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Ministry of Industry
Commerce and Transportation of The Republic of Mali

TECHNICAL ASSISTANCE ON THE PROPOSED AIRPORT CONCESSION PROJECT REPUBLIC OF MALI

FINAL REPORT

APRIL 2004

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AAROTEC
INFRASTRUCTURE
GROUP, Inc.
Worldwide Consulting Since 1944

MAL 1999-10032C

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According to the terms of the Final Report, following is the contact data for AAROTEC Infrastructure Group Inc. During Phase II of the project AAROTEC was the only contractor to execute and perform work on the referenced project. There were no subcontractors on the project to list or identify.

Should you require further information concerning becoming a potential US Concessionaires or potential US Suppliers for the Mali Airport Concessions Airport Project you may contact our office with this data:

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Table of Contents

APPENDIX

1. INTRODUCTION

1.1 General Context

In 2000, the Government of the Republic of Mali selected AAROTEC Infrastructure Group Inc. to undertake a Feasibility Study of the expansion and modernization of Bamako-Sénou International Airport. This effort, referred to as the Phase I Study, determined the improvements to the airside/landside infrastructure required in order to accommodate future demand and ensure compliance with international standards and established a timetable for their implementation.

The Phase I Study also included an evaluation of the financial feasibility of implementing this capital expenditure program at Bamako-Sénou as part of a concession arrangement between the Government and an eventual private sector operator/investor. The results of this evaluation indicated that a private concession to develop and operate Bamako-Sénou International Airport and implement the proposed capital investment program could be financially feasible.

Having accepted the Phase I Study as a basis for the program of capital improvements at Bamako-Sénou, the Government decided to seek the participation of a concessionaire as partner in order to ensure its timely implementation as well as other aspects of its objectives for the civil aviation sector. Recognizing the importance of a healthy civil aviation sector as a motor for socio-economic development throughout the extensive territory of the country, the Government also decided to evaluate the feasibility of including the up-grading, development and management of the remaining sites of the national airports system in the mandate of the proposed concession.

Since the Terms of Reference for the Phase I Study did not address the question of the other airports open to public air traffic in Mali, the Government authorized AAROTEC to proceed with a second phase in order to evaluate the feasibility of an airport development and management concession at a national level which would include all airports open to public air traffic.

The present **Final Report** represents the completion and final documentation of the contract for this second phase, referred to as **Technical Assistance on the Proposed Airport Concession Project in Mali** and executed by AAROTEC Infrastructure Group Inc. of Virginia.

Phase II of the project was funded by US Trade and Development Agency by virtue of a Grant Agreement signed on January 8, 2001. The relevant references are:

Appropriation No. 110/11001
Activity No. 199910032C
Reservation No. 1132153
Grant No. GH1132153

This technical assistance was requested by the Government of the Republic of Mali by virtue of **Amendment No. 1** to the contract for the **Feasibility Study of the Extension and Modernization of Bamako/Sénou International Airport** (referred to as the Phase I Study). This amendment was signed upon completion of the above-mentioned Phase I Study, which was executed by AAROTEC Infrastructure Group Inc. of Virginia, with funding from TDA. The objective of the amendment was to implement the study of the concession of the management and development of the Malian Airports System, leading to the choice of a new concessionaire.

1.2 Objectives of the Technical Assistance Project

The objective of the present mandate, referred to as **Technical Assistance on the Proposed Airport Concession Project in Mali**, is to aid the Government of Mali to introduce private sector participation in the management, operation and development of the airports system of the country. By doing so, the Government's objectives include the improvement of the quality of service to airport users and the mobilization of non-government financing for the implementation of the necessary investments in airport infrastructure.

The government has chosen the "airport concession" model in order to achieve this aim. Therefore, the present technical assistance project is intended to (a) evaluate the financial feasibility of the airports concession project, (b) collaborate with the Government to develop and implement the process of consultation and selection of interested concessionaire partners and (c) provide the Government with the necessary documentation to support this process.

1.3 Scope of the Technical Assistance Project

The scope of the mandate assigned to the Consultants included:

- Review of the domestic airport system, including field visits to key domestic airports to assess the current air and landside infrastructure, operating constraints and problems;

- Determination of domestic airport requirements and costs, including air traffic forecasts, analysis of infrastructure needs and estimation of improvement costs;

- Recommendation of an institutional model, including the regulation of the concessionaire and the responsibilities for airport air traffic control, infrastructure operation and maintenance, as well as the sharing of aeronautical revenues and/or the development of new revenues;

- Revision of the financial model, including preparation of an investment program for Bamako-Senou and key domestic airports, as well as revised revenue and operating/maintenance cost projections, and development of a revised financial model spreadsheet;

- Assistance in pre-qualification of potential concessionaires, including coordination with the designated Malian authorities and preparation of the requirements and conditions that would have to be met by potential concessionaires;

- Preparation of concession specifications, including a description of the initial and 15-year investment plan, the time period of the concession, the expected payments for concession rights and the minimum investment commitment in order to comply with international standards;

- Preparation of an Information Memorandum on the project in order to promote the concession to investors/operators experienced in the operation and construction of airports;

- Assistance and participation in marketing the project and organizing an Investors Seminar;

- Preparation of a Concession Contract and other transaction documents to serve as a basis for bidding by interested parties;

- Assistance in the bidding process, including preparation of invitation notices specifying the necessary qualifications of bidders, advice on the distribution of the announcements to be published in the local and international press and specialized media, provision of information to possible investor/operators in their research and analysis of the legal, financial and technical information related to the process and advice to the Government on how to set up a briefing room with documents for interested investor/operators;

- Preparation of a system for the technical evaluation and selection of the offers which are received;

- Provision of advisory assistance to the Government in the negotiations with the selected concessionaire;

- Submission of a Final Report.

2. SUMMARY OF PROJECT ACTIVITIES AND ACCOMPLISHMENTS

2.1 Project Activities

The AAROTEC team worked closely with the various Malian stakeholders to complete the required feasibility study and prepare the necessary documentation, assisted the Government in a program of contacts with prospective concessionaires and organized and participated in an information seminar held under the auspices of the Minister responsible for Transport. The AAROTEC team continued to provide advice to the Government throughout the bidding process.

At the outset of the project, in February-March 2001, the AAROTEC team visited the airports of Bamako, Gao, Timbuktu and Mopti in order to inspect the facilities and operations, as stipulated in the terms of reference and to establish the basis for the determination of the airport investment requirements. During this mission, meetings were also held with the Study Coordinating Committee and other relevant Malian authorities, in order to establish the basis for the financial analysis and the recommendations concerning the institutional framework associated with the proposed airports concession project.

Further missions to Mali took place in April 2001 and January 2002 in order to present, discuss and obtain approval for the documentation, which AAROTEC had prepared in accordance with the terms of reference, and to review the list of potential concessionaires established by AAROTEC.

AAROTEC established a list of 32 enterprises on a worldwide basis likely to meet the requirements of the terms of reference for the concession of the Malian airports. During the period from May to September 2002, AAROTEC contacted these organizations by telephone, fax and e-mail in order to gauge their level of interest and capacity to participate in the Call for Tenders for the concession.

Following this process of consultation, AAROTEC proposed a short list of eight (8) enterprises deemed most apt to meet the requirements of the Government. A Request for Expressions of Interest was issued by AAROTEC on the basis of the list of potential concessionaires and follow-up contacts were made by telephone, fax and e-mail. A Call for Proposals was issued in October 2002, with the deadline for submissions specified as 28 January 2003. The documentation prepared by AAROTEC included the following:

Letter of invitation
Memorandum of information
Instructions to bidders
Draft Concession Contract

The Call for Proposals process included the organization of a Marketing and Information Seminar, including a Briefing Room, which took place in Bamako from 16 to 18 December 2002.

Another mission took place in December 2002 and included the participation of a representative of AAROTEC in a Marketing and Information Seminar, which was organized jointly by AAROTEC and the Government of Mali. The objective of this seminar was to present the airports concession project to organizations which had expressed interest in the project as a result of contacts made by AAROTEC and the Government, to make available to them all pertinent documentation, to clarify any points in response to questions and to elicit suggestions from the interested parties. The seminar

was attended by representatives of four (4) interested potential concessionaires, as well as the Minister responsible for Transportation and other Malian authorities.

Following the seminar, AAROTEC contacted directly an additional three (3) groups which had expressed interest in the Malian airports concession but which had not participated in the briefing. At the request of the Government, AAROTEC supplied these parties with copies of the Call for Proposals, including (in addition to the above-mentioned documents) a copy of the Proceedings of the Marketing and Information Seminar of 16-18 December 2002

At the 28 January deadline, the Government did not receive any submissions which conformed to the requirements as set forth in the tender documentation which had been prepared and distributed to interested bidders by AAROTEC. This being said, additional indications of interest were received from a number of other interested parties and the Minister confirmed the intention of the Government to continue to pursue the objective of concluding an agreement with an operator for the airports concession.

A final mission took place in Mali from 8 to 19 February 2003. The purpose of this mission to Mali was to hand over additional copies of previously prepared reports as requested by the client and to agree on a strategy to enable the Government to achieve its objectives. While in Mali, discussions were held with the Study Co-ordinating Committee and the Minister responsible for Transportation regarding the results of the initial Call for Proposals and the actions to be undertaken.

At the request of the Government, AAROTEC undertook a further survey of organizations, which had previously indicated their interest in the project, in order to determine the reasons behind the results of the initial Call for Proposals. The potential concessionaires mentioned the following points:

- Revenue generating activities (passengers, aircraft movements, air cargo volume) relatively limited in comparison to other investment opportunities elsewhere;

- Perception of risk relatively high due to factors specific to the sub-region, such as the collapse of the dominant multi-national airline Air Afrique, the politico-economic crisis in Côte d'Ivoire, etc.;

- The general weakness of the worldwide air transport market (precariousness and poor financial situation of the major airlines), especially following the events of September 11, 2001;

- Need for additional time on the part of bidders in order to organize consortia, especially including Malian partners.

As a result of the above considerations, the Government decided to proceed with a formal second round of consultations with the interested parties, leaving a greater degree of flexibility to the eventual bidders. AAROTEC was therefore requested by the Minister

responsible for Transportation to consult with the Study Co-ordinating Committee and to assist the Government by preparing revised documentation to be distributed to those parties. Additional documentation was therefore prepared in Mali and submitted to the Minister responsible for Transportation and the Malian Co-ordinator for the project.

2.2 Accomplishments

AAROTEC has completed all tasks and produced all deliverables to the Government as specified in the Terms of Reference of the TDA technical assistance project, thus enabling the Government to proceed with the implementation of the concession program. The firm continues to advise and assist the Government on an *ad hoc* basis in order to ensure the best results.

As a result of the TDA technical assistance, the airport concession project is well advanced. Proposals by interested parties were submitted in mid-September 2003, in response to the second Call for Proposals. The Government received six (6) proposals, which were opened in public at a ceremony, presided over by the Minister responsible for Transportation. As of the end of October 2003, the work of the Evaluation Commission was completed and the two (2) highest-ranking submissions were forwarded to the Inter-Ministerial Committee of the Government for a decision.

The process of awarding the concession for the management of the Malian airports is in its final phase at the time of this writing. Following approval of the report of the evaluation commission by the Government authorities and a decision by the Inter-Ministerial Committee, negotiations are set to commence in November 2003. A commission charged with negotiating the "Protocole d'entente" has been set up for this purpose by decision of the Minister responsible for Transportation. The Government intends to have completed negotiations by the end of the calendar year 2003.

3. PROJECT DOCUMENTATION

During the course of the technical assistance mandate, AAROTEC prepared and submitted to the Client the documents, which were used by the Government to support and implement the airport concession project:

> Documents are extensive and comprehensive for the financial feasibility of implementing the investment program associated with bringing the ten airports presently managed by the state-owned corporation Aéroports du Mali (ADM) under a BOT concession arrangement. Copies of these studies were made available to interested parties in the Briefing Room which was associated with the Marketing and Information Seminar which took place in Bamako from 16 to 18 December 2002.
>
> The information constitutes an essential element of the documentation, which was distributed to potential concessionaires as part of the initial Call for Proposals. It is intended to provide interested parties with a summary of all critical information

necessary for bidders to prepare their submissions, including basic data on the economic, social and political situation of the country, the key characteristics of the airports, the Malian air transportation market, the planned airports investment program and the proposed concession arrangements. At the request of the Malian Government following the results of the initial Call for Proposals, AAROTEC revised the report in April 2003 in order to reflect the change in orientation for the second Call for Proposals.

The report constitutes a complete draft contract for a concession to manage, operate and develop the Malian airports system and was distributed to potential bidders during the Call for Proposals as an indication of the intentions of the Government and as a basis for eventual negotiations with the winning bidder.

A list of potential concessionaires was set up initially by AAROTEC in May 2002 and maintained and revised on numerous occasions in order to keep it current on the basis of feedback received from contacts with potential concessionaires and our tracking of changes in the industry. It is included as an Appendix in this final report.

The notice of request for proposal were developed by AAROTEC and distributed directly to potential concessionaires as part of the initial Call for Proposals process. At the request of the Malian Government following the results of the initial Call for Proposals, AAROTEC revised this document in April 2003 in order to reflect the change in orientation for the second Call for Proposals and the notice was distributed to both invited bidders as well as to the international media. It is included as an Appendix in this final report.

The instruction to bidders was prepared by AAROTEC as part of the initial Call for Proposals documentation. Following the Marketing and Information Seminar which took place in Bamako from 16 to 18 December 2002, AAROTEC revised the document at the request of the Government to take into account the comments received during the Seminar and distributed it to the interested parties. It is included as an Appendix in this final report.

Terms of reference questionnaire was prepared by AAROTEC at the request of the Government as part of the second round of consultations with interested parties, following the results of the initial Call for Proposals. It's aim was to explain the revised strategy of the Government, including the introduction of a greater degree of flexibility in the submissions to be made by bidders, and to present the revised parameters for the concession. The document included, in addition to the revised terms of reference, a questionnaire to be completed and returned to the Government by the interested parties, in order to facilitate feedback of pertinent information. It is included in the Appendix in this final report

II. GENERAL CONTEXT

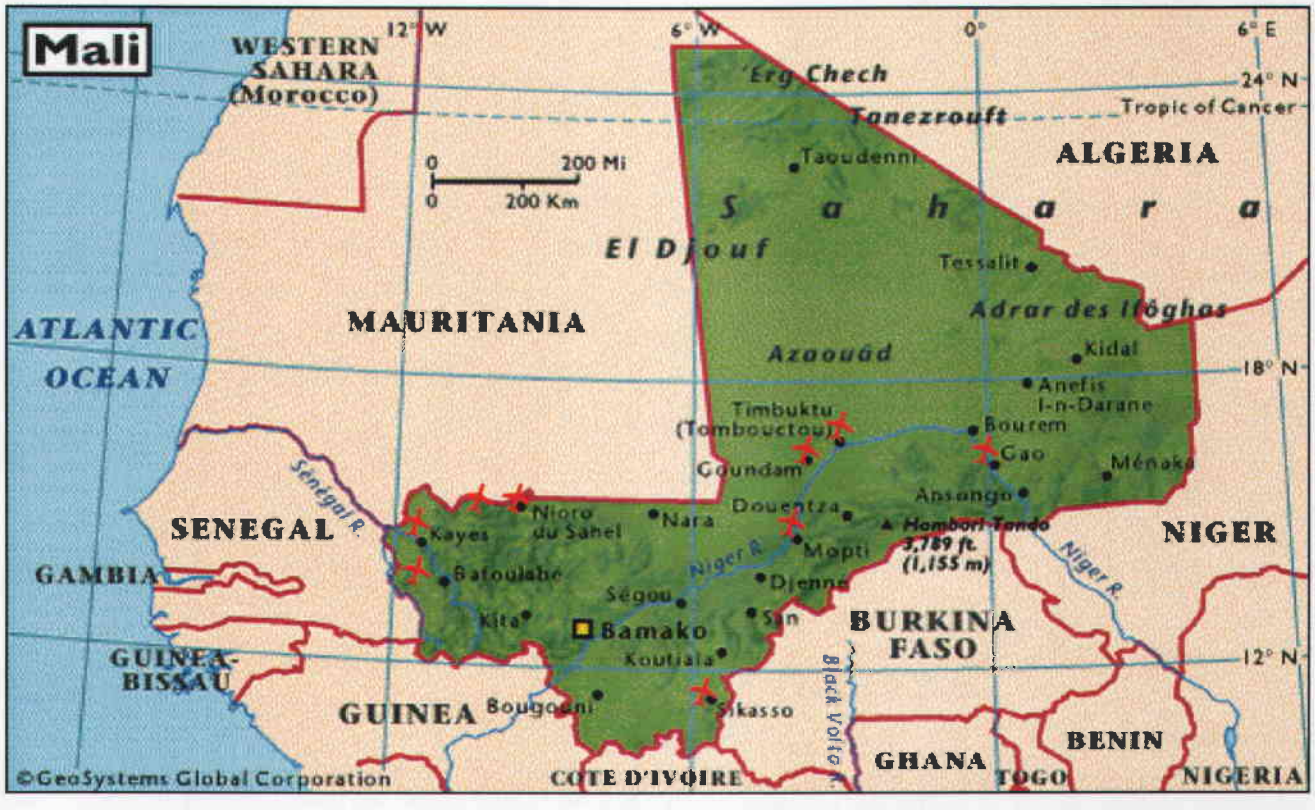
2.1 Geographic Background

Mali is the largest country in Western Africa, a total land area of 1,240,192 km^2. The great Niger River traverses the south-eastern section of the country. It has a diverse topography and boasts such natural resources as gold, untapped copper deposits, phosphates, uranium, bauxite and iron ore. Despite the large land area and the subtropical climate, only 2% of the land is arable, since the entire northern part of the country lies in the Sahara Desert.

Mali sits at the crossroads of western Africa, linking the Maghreb countries with the subsaharan countries and sharing borders with Algeria, Niger, Burkina Faso, Côte d'Ivoire, Guinea, Senegal and Mauritania.

Bamako is the capital of Mali and the country's chief administrative, commercial, financial and transportation center. It is situated in the south-western part of the country, on the banks of the Niger River. The current population of Bamako is around 1,100,000.

The other regions of the country include the following which are served by airports open to public air traffic:

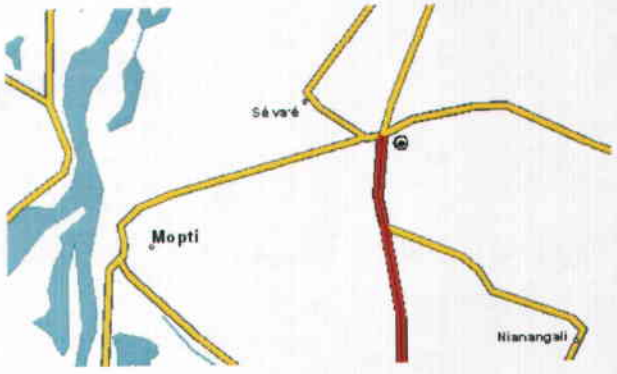


2.1.1 *Tombouctou*

Tombouctou city, the regional capital, is located on the southern edge of the Sahara, about 8 miles (13 km) north of the Niger River. Salt is mined in the north of the region at Taoudenni and is transported by camel caravan south to the town of Tombouctou. The principal irrigated crops grown in the Niger Valley are corn (maize) and rice. The population encompassed 70,725 peoples at the last census in 1998.

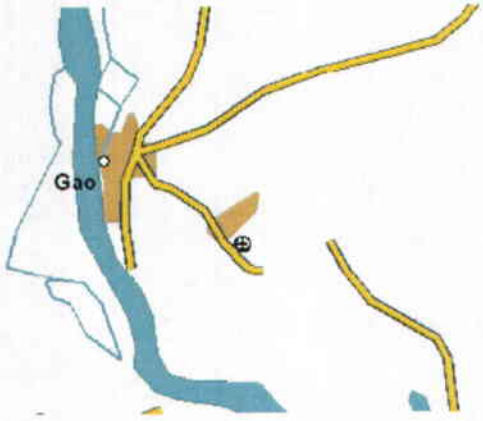
2.1.2 *Mopti*

Mopti town is located at the confluence of the Niger and Bani rivers. Mopti has become an important commercial town and the center of Mali's fishing and livestock industries. Major crops grown in the surrounding area are rice, millet, onions, cassava, and peanuts. Livestock raising and fishing are also significant. Mopti is one of the most densely populated areas in Mali. Population in 1998 was some 258,700 inhabitants.



2.1.3 *Gao*

Gao town is situated on the Niger River at the southern edge of the Sahara Desert in eastern Mali. Gao serves as a terminus for large steamers emanating from Mopti and Koulikoro. A road crossing the Sahara links the town with Algeria, and other roads connect with Tombouctou and Mopti. Most of the Gao region population lives near the banks of the Niger River, where irrigation permits the growing of wheat, rice, and sorghum. Phosphate is mined in the Tilemsi area north of Gao town. Population, according to the census of 1998, is 170,572 people, of which 83,496 are men, and 87,076 are women.



2.1.4 *Kayes*

Kayes is located near the border with Senegal and Mauritania, along the Senegal River. Kayes is both the terminus of Senegal River traffic and an important stop on the Mali Railway (Regie des Chemins de Fer du Mali). Town population in 1998 was 327,000. Kayes is the capital of Region I and the sixth most important city of the country. The economy in Kayes is dominated by commerce and trades with Mauritania and Senegal. The railroad, which handles the commerce, constitutes the main link of the city with the rest of the country and Senegal.

2.1.5 *Nioro*

Nioro is an isolated city near the Mauritanian border, nearly 500 kilometers from Bamako. Detailed economic data for Nioro was not found; however, it is mainly an agricultural and pastoral region like Kayes. Nioro is not an economically important area and has never been equipped with electricity by the Malian government. The population of the city of Nioro was approximately 25,400 according to a census in 2000.

2.1.6 *Goundam*

Goundam is located only 97 km west of Tombouctou. It has access to the Niger River through the Diré port, located 34 km away. The main tourist attractions of the Goundam area are the Gold and Faguibine Lakes that surround the city. The tourism development of these lakes is included in the Strategic Plan of the Ministry of Tourism, but its implementation is not forecast for the medium term.

2.1.7 Sikasso

Sikasso is the capital of Region III and the richest in the country after Bamako. The Sikasso region is considered to be a dynamic area and, and with about 125,000 inhabitants, is the third largest city in the country. Commerce with neighboring countries, especially Côte d'Ivoire, is important.

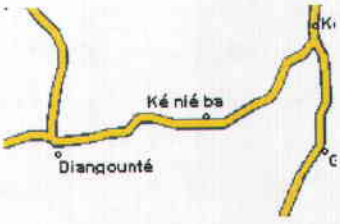
Sikasso is experiencing constant economic growth mainly based on agriculture and commerce with Côte d'Ivoire and Burkina-Faso.

Since the devaluation of the local currency (the FCFA) in 1994, Mali has become a source of supply for products such as potatoes and onions to other countries in western Africa, such as Côte d'Ivoire and Ghana and the Sikasso region plays a significant role in this export trade.

2.1.8 Yélimané

Yélimané is located in Region I of Mali and its economic and social activity is similar to Kayes and Nioro. One of the characteristics of this region is the strong emigration it has experienced. Yélimané is located between Kayes, 136 km away, and Nioro, 60 km away.

2.1.9 Kéniéba



Kéniéba is located in western Mali, some 30 km from the Senegal border. Road access to Kéniéba is somewhat complicated. Kéniéba is located within the Bafing National Park. It is a critical city in Mali due to the gold mining potential of its surrounding region.

2.2 Socioeconomic Background

Mali's national GDP has experienced a significant increase from 1992 to the year 2000. From 1992 until 1996 the growth rate averaged 2.5%, in 1998 it was 4.9%, in 1999 5.6% and in 2000 4.7%.

Some internal factors, such as the devaluation of the currency, the FCFA, in 1994 contributed to GDP improvement. Other structural reforms in Mali, such as market liberalization, investment policies, participation of the private sector in the management of public companies, reduction of the public deficit, etc., have also been contributing factors to the improvement of Mali's economy in general.

The GDP distribution is 13% industry (two thirds of Mali's private companies are located in Bamako), 32% agriculture, 27% textiles, leather and furs and 20% energy.

Outside Bamako, Mali's main economic activity is situated in the regions of Sikasso and Ségou, where the industrial sector represents 80% and agriculture represents 70% of total country production, except for Bamako. Sikasso is the most important producer of cattle stock, vegetables and cotton, while Ségou exports cereals and sheep stock.

Gao has shown an important urban development in the past years, resulting from being a key link with neighboring countries, like Sikasso.

Roads are the most utilized means of transportation, before air, river and rail transport. However, the only roads with the capacity for normal ground transportation use are the ones connecting Bamako-Segou-Mopti-Gao and Bamako-Sikasso. The ground transportation data with regard to kilometers per inhabitant shows some interesting characteristics regarding the distribution of the national economy.

Gold and cotton are Mali's main exports. Mali has become West Africa's largest producer of cotton, West Africa's 'white gold', by trebling the land available for growing cotton. Mali has invested a great deal of money in developing capacity for the production of cotton. Production has doubled since 1993. In 1997, cotton accounted for 39% of all export earnings. However, 98% of the cotton is exported in its raw state, without processing into thread or cloth, reducing the amount of profit that can be made from it and the number of people employed. Moreover, the producers become susceptible to fluctuations in the world price of cotton and the economy is dangerously dependent on the price of cotton. This was a problem in the late 80s and early 90s when the price of cotton fell. Producers are paid little for their crop.

The country's economic growth is thus highly dependent on agricultural production; therefore, it is subject to sensitive variations year after year. Meanwhile, gold mining is expanding rapidly. It looks set to overtake cotton as the major export earner for Mali in 1999-2000. Commercial production of gold has increased fourfold between 1991 and 1998.

By region, the West Region Mali where Kayes is located is not very developed. Most Malian emigrants come from this region (in 1987 they represented 44% of the total population of Mali), which with their economic contribution are the only investment source for basic infrastructure development. The Ségou and Mopti regions play an important role in the country's production of cereal, but their economy is slow due to lack of investment. The Southern Region, Sikasso, is the most dynamic, showing a major economic development, a rapid increase in investments and a door to neighboring countries. The Northeastern Region, Tombouctou, Gao and Kidal, has a small population but is the best urbanized and most interesting from a tourism point of view. However, its economy has so far been relatively undeveloped due to lack of investment in ground infrastructure in Tombouctou, thus creating total dependency on air and river travel for communications, exacerbated by the deteriorating performance of Air Mali and the limited commercial attraction of Gao.

Appendix D presents a statistical and data profile of Mali. Other more detailed annual economic data (since 1994) is derived from the "Situation Economique et Sociale du Mali en 1999 et Perspectives pour 2000" report from the Ministry of Economy and Finance, edited in June 2000.

Table II-1. Annual Economic Data

	1994	1995	1996	1997	1998	1999	2000
A – Economic Growth							
GDP constant prices (millions of 1987 FCFA)	697.5	746.1	778.4	830.9	871.9	921.1	964.3
GDP in current prices (millions of FCFA)	977.9	1,186.30	1,318.90	1,422.50	1,592.50	1,658.10	1,769.50
GDP Growth Rate (%)	2.6	7	4.3	6.7	4.9	5.6	4.7
Population (thousands)	8832	9017	9198	9373	9579	9790	10005
GDP per capita (FCFA)	110,722	131,556	143,397	151,767	166,249	169,377	176,866
Net national income available (millions of FCFA)	1,085.40	1,279.80	1,409.90	1,478.10	1,573.10	1,691.90	1,831.00
Average annual demographic growth rate (%)	2.2	2.1	2	1.9	2.2	2.2	2.2
GDP per capita growth rate (%)	0.4	4.8	2.3	4.7	2.6	3.3	2.4
GDP per capital growth index (base = 1)	0.99	1.04	1.01	1.03	1.01	1.02	1.01
B – Investment – Savings							
Investments	238.4	285.5	275.2	324.6	403.9	409	409.7
Investment rate (investments are % of GDP)	24.4	24.1	20.9	22.8	25.4	24.7	23.2
Net national savings (millions of FCFA)	148.4	147.1	144	257	321.4	294.5	284.7
Savings rate (savings are % of RND)	13.7	11.5	10.2	17.4	20.4	17.4	15.5
C – Production							
I – Agriculture							
Rice	384,848	422,214	416,432	552,569	511,538	634,086	722,483
Millet	637,256	807,833	635,999	664,970	576,980	732,254	857,819
Sorghum	666,191	671,596	639,248	486,246	502,922	539,077	641,579
Corn	260,703	296,693	243,300	266,580	310,696	354,247	397,436
Cotton	276,285	293,757	405,907	470,129	538,312	518,000	459,500
Groundnut	147,070	213,008	155,541	132,788	142,887	150,620	158,362
II - Livestock Farming							
Cows	5,542	5,708	5,882	6,058	6,240	6,427	6,620
Sheep	12,552	13,179	13,809	14,500	15,224	15,986	16,785

	1994	1995	1996	1997	1998	1999	2000
III – Mining							
Gold in Kg	5,677	6,157	6,744	18,478	22,826	25,349	25,650
D – Different Sector Participation in GDP							
Sectors							
Primary	46.3	46.6	43.9	40.7	41.4	43.1	44.2
Secondary	15.5	15.9	16.1	18.7	19.8	18.6	18
Tertiary	38.2	37.5	40.1	40.6	38.9	38.3	37.7
E – Foreign Exchange and Debt Balance							
Imports	453	494.8	478.2	522.8	537.7	553	590.5
Exports	229.3	220.5	221.4	327.7	328.1	330.2	368.4
Market Balance	-223.7	-274.3	-256.8	-195.1	-209.6	-222.8	-222.1
F – Monetary Situation							
Net Foreign Debt	84.3	125.1	190.5	183.4	150.1	116.7	
Domestic Credit	117	138.2	149.5	178	229	264.2	
Monetary Volume	234.7	281.9	317.3	345.3	360.2	372.4	
G – Prices and Inflation							
Annual Inflation Rate (%)	23.9	12.7	6.5	-0.7	4	-1.2	
GDP Deflator (%)	33.4	13.3	6.6	1	6.7	-1.4	1.9

The Introduction Chapter contains a chapter for conclusions and recommendations. Keeping in mind the historical data analysis and year 2000 perspectives, some of the main objectives identified in the report are as follows:

- Maintain investment rates over the GDP level
- Maintain public finance restructuring
- Ensure price stability in order to preserve the population's buying power and export competition
- Structural reforms
    - Completion of the CMDT financial audit
    - 60% privatization of EDM
    - Reforms in the telecommunications sector
- Completion of the Strategic Plan for the Fight Against Poverty
- Stimulate growth and improvements in human capital, education, health, nutrition and other factors
- Compensate for monetary inequalities
- Compensate for inequalities in living conditions
- Guarantee equal opportunities
- Prevent ravenous hunger and other such disasters

Other data related to employment and unemployment are identified in said report. In 1997, OEF carried out a study, which specifies that unemployment is mainly an urban phenomenon, whose unemployment rate is 12.5% with respect to 1.1% for rural population. Since 1989 until 1997, the relation between urban and rural unemployment rate has been a minimum of 7 times higher.

The unemployment rate between regions in 1997 is distributed as follows:

Koulikoro	20%	Tombouctou	1%
Ségou	14.3%	Mopti	11.2%

Bamako	13.2%	Gao	11.2%
Kidal	1.2%		

At least 70% of unemployment is young adults looking for their first job.

2.3 Tourism Background

Mali is a country with an incredible tourism potential, but the tourism infrastructure is poorly developed and unorganized. In 1988, a strategic plan for tourism development called "Plan Directeur de Développement du Tourisme" was prepared. The arguments of the plan have become obsolete due to the lack of resolution and coordination.

The focus of this chapter, as an essential factor for the air traffic demand, has two main sources of information: the report entitled "La Problematique et les Priorités du Développement Touristique au Mali", 1999, submitted to the DNAC, and personal conversations with technical personnel from the Ministry of Tourism on government strategies.

In the Feasibility Study for the Bamako International Airport prepared by AAROTEC Infrastructure Group, Inc. in the year 2000, the tourism factor was not taken into account because it is not considered sufficiently a priori to influence the international or domestic air traffic volume at the airport. However, for the elaboration of the air traffic forecast in the domestic airports it is a determinating factor for some of them, such as Tombouctou, Mopti or Gao. On the other hand, it should be noted that the traffic flow of tourist passing through the Bamako Airport could provide it with an additional stimulus for global domestic air traffic as the consequence of possible development plans of the tourism offer by the airports concessionaire. This in turn favors air transport and allows for more tour-operator and airline agreements in order to attract a greater amount of tourists, through either the airports of this study or through Bamako. This hypothesis could be a possible development scenario.

The forecast of tourism agencies for the year 2000 of 100,000 tourists seem to have been right, even though this data is not conclusive or reliable. The number of tourists registered until October 2000 was of approximately 89,000 and the forecast for year-end seems to reach to about 106,800 tourists. The Table II-2 shows the annual evolution of the number of tourists in Mali, in addition to other interesting indicators regarding the tourism level of the country.

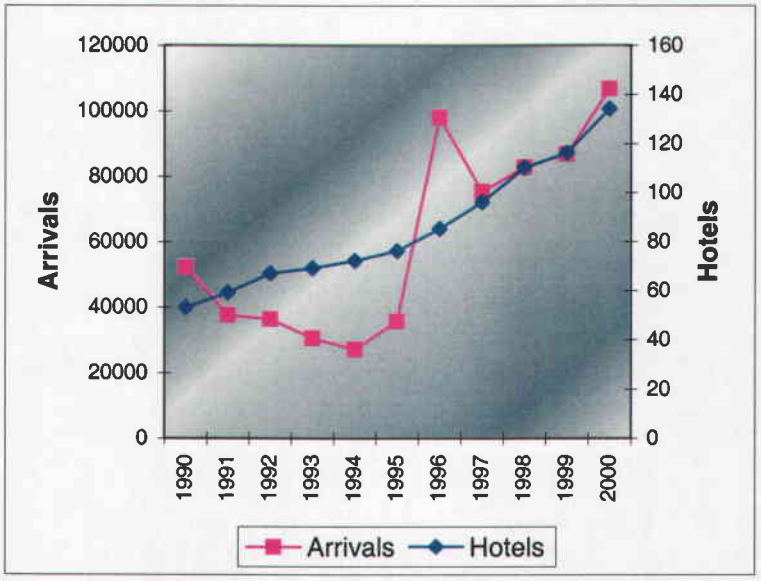
Table II-2. Tourism in Mali

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Arrivals	52 101	37 596	36 307	30 522	27 083	35 683	98 023	75 280	82 780	86 780	106 800
Nights	115 160	80 659	78 724	48 011	71 252	88 149	194 034	148 031	162 831	170 831	201 600
Hotels	53	59	67	69	72	76	85	96	110	116	134
Int'l tourists	30 713	29 811	17 342	16 200	17 240	23 856	39 640	46 745	48 624	50 624	0
CEDEAO[1] tourists	6 715	6 773	7 180	7 883	9 943	11 827	14 803	18 535	20 116	20 616	0
Beds	1 454	1 466	1 474	1 478	1 489	1 683	1 744	1 912	1 988	2 100	3 076
Occupancy rate (%)	35.8	25.6	24.6	20.7	18.2	21.2	56.2	39.4	41.6	41.3	34.7
Average stay (days)	2.2	2.1	2.2	1.6	2.6	2.5	2.0	2.0	2.0	2.0	1.9

However, this data does not seem to reflect reality of the tourism system in Mali. Coordination problems between the Ministry of Tourism and other agencies involved in the exploitation of tourism make them hide the real data for reasons beyond the scope of this study.

Anyways, even though the data is not reliable, they are useful for analyzing tourism evolution of the country for the past ten years. Graph II-1 shows the number of arrival passengers and the hotel availability from 1990 to 2000.

Graph II-1. Arrivals and Hotel Availability

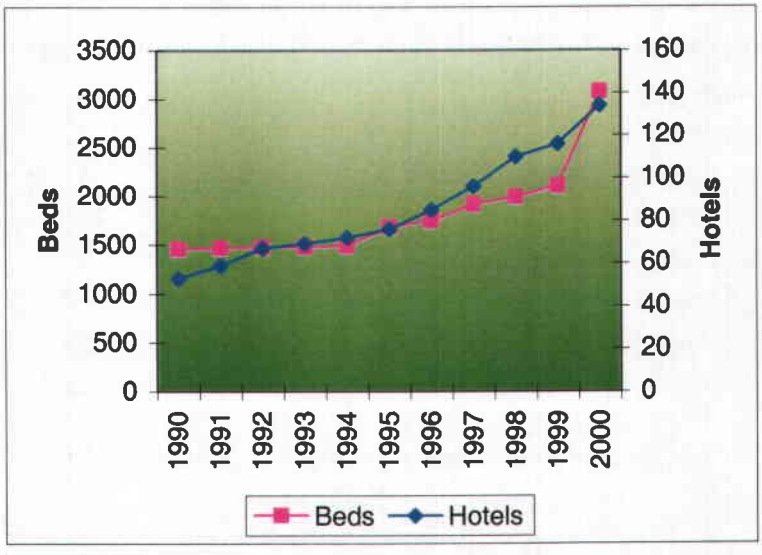


The number of tourists has been growing in the last three years at a 13% rate; however, these are below the true tourism potential of Mali. The above graph shows the rapid descent of tourism

[1] Communauté Economique des Etats de l'Afrique de l'Ouest

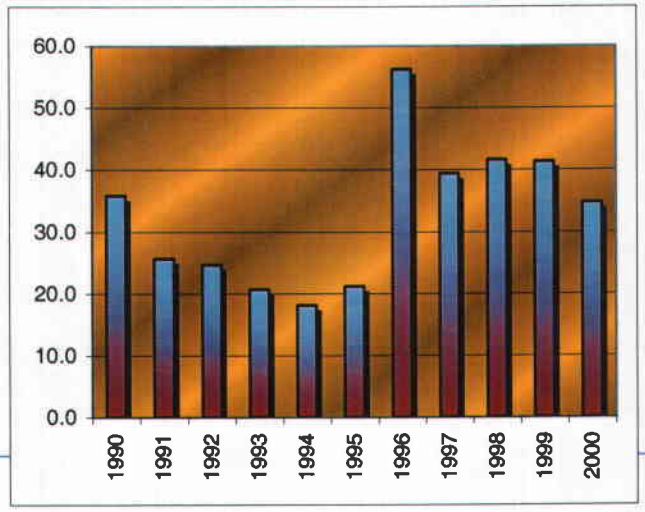
flow in the first couple of years of 1990 as a consequence of various events that took place during those years: upheavals in 1991, north rebellion in 1992, and unstable government. These factors cause an image of instability and insecurity that is necessary to resolve. On the other hand, there is an annual increase of 9% for hotel availability, and, as shown in Graph II-2, the number of beds available has followed the same growth. This graph also shows the disorganization between the statistical data and possible reality when in the year 2000 46% more beds were registered while the number of hotels increased only 13% with regard to the year before.

Graph II-2. Hotel and Bed Availability



Graph II-3 shows the evolution of occupancy rate of hotels in Mali. Seasonal demand is evident due to the decrease in registered occupancy rate in the last ten years.

Graph II-3. Occupancy Rate



Another interesting data is the flow of tourism by country of origin, which is shown in Table II-3. The main areas that contribute to visitors in Mali are neighboring African countries, especially countries of North Africa, Europe and United States. It should be pointed out that some African visitors have other motives of travel to Mali of cultural and religious character. Tombouctou, Djenné and Mopti were fundamental places of the Islamic world in the XIV and XV century, where important mesquites were constructed, which are still in place today as places of worship and admiration, besides being university centers of the Islamic culture. The other visitors are of French and Swiss origin.

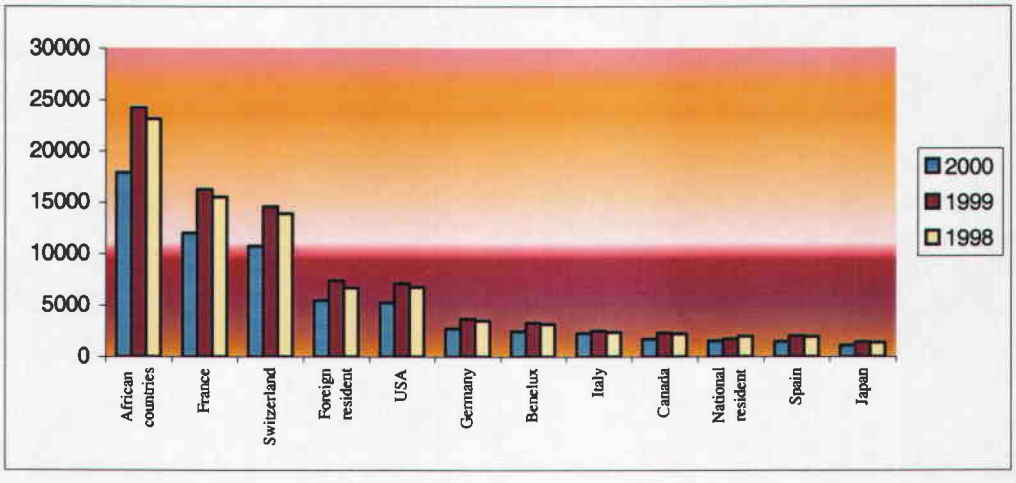
Table II-3. Main Tourist Origins

	1997		1998		1999		2000	
African countries	21 048	28%	23 145	28%	24 263	28%	17 900	20%
France	14 115	19%	15 521	19%	16 271	19%	12 005	13%
Switzerland	12 624	17%	13 882	17%	14 553	17%	10 740	12%
Foreign resident	6 446	9%	6 732	8%	7 430	9%	5 486	6%
USA	6 188	8%	6 804	8%	7 133	8%	5 274	6%
Germany	3 206	4%	3 526	4%	3 696	4%	2 736	3%
Benelux[2]	2 905	4%	3 195	4%	3 349	4%	2 473	3%
Italy	2 183	3%	2 400	3%	2 516	3%	2 298	3%
Canada	2 009	3%	2 210	3%	2 317	3%	1 711	2%
National resident	1 493	2%	1 997	2%	1 721	2%	1 563	2%
Spain	1 791	2%	1 970	2%	2 065	2%	1 501	2%
Japan	1 272	2%	1 398	2%	1 466	2%	1 088	1%

[2] Former Belgium, Netherlands and Luxemburg

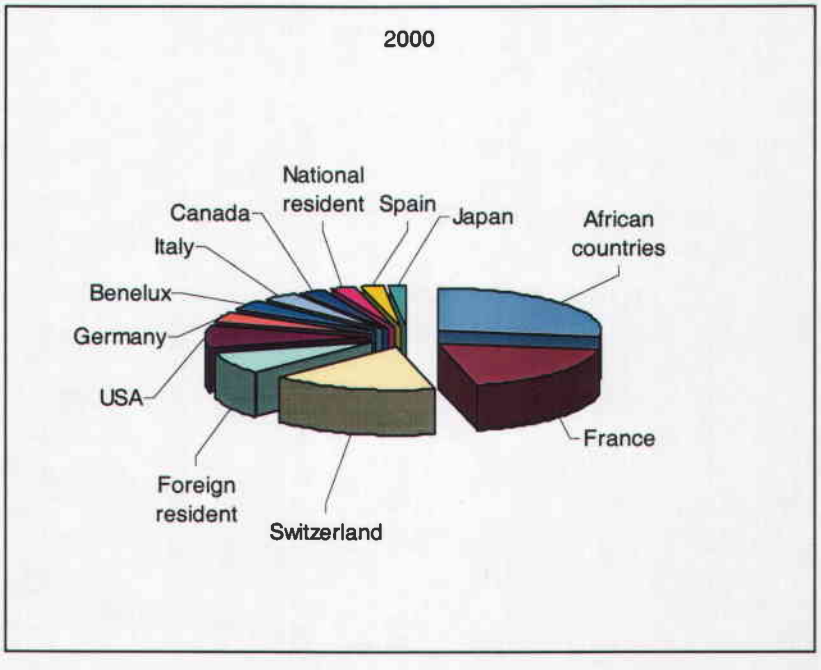
Table II-3 is graphically shown in Graph II-4, where the evolution of the last three years is shown.

Graph II-4. Main Tourist Origins



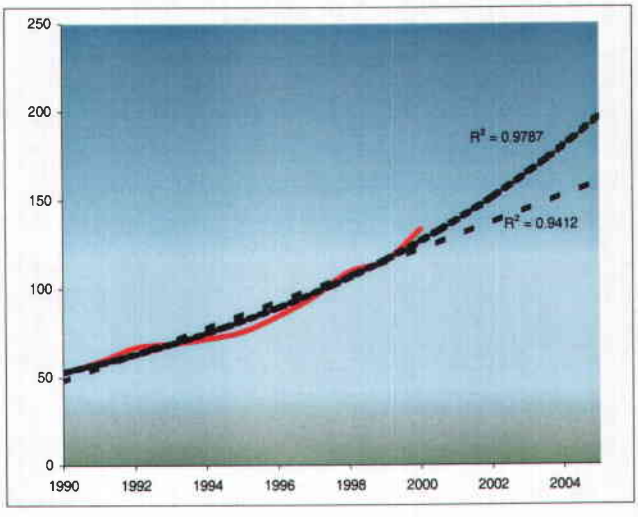
Graph II-5 illustrates the ratio of visitors by country of origin registered during 2000.

Graph II-5. Visitors in 2000



The trend of hotels available in Mali's territory is adjusted to two types of curves, one lineal with a correlation coefficient of R^2 of 0.94, and the other exponential with a correlation coefficient of 0.98, as shown in Graph II-6.

Graph II-6. Hotel Availability

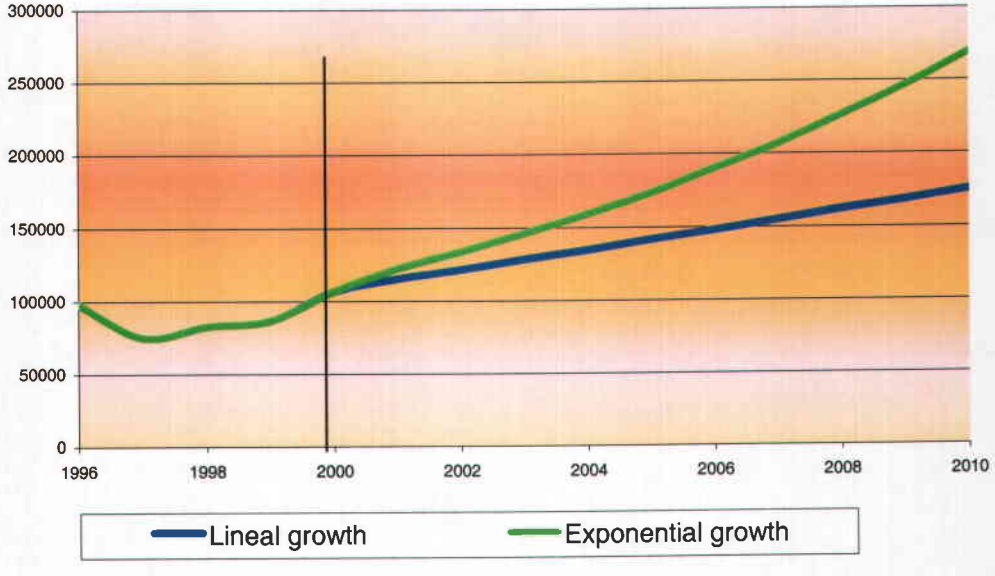


This trend of the number of hotels allows for the calculation of an estimated number of visitors in the next few years through the application of a series of assumptions, such as

Average number of beds per hotel	22
Occupancy rate	40%
Average overnights	2

The calculation results are shown in Graph II-7 for both scenarios.

Graph II-7. Number of Tourists



While the annual values of forecast are shown in Table II-4.

Table II-4. Annual Values

	1999	2000	Trend	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Arrivals	86,780	106,800	Lineal	115,280	121,440	128,480	134,640	141,680	147,840	154,880	161,920	168,080	175,120
			Exponential	122,320	133,760	146,080	159,280	173,360	190,080	206,800	226,160	246,400	269,280
Hotels	116	134	Lineal	131	138	146	153	161	168	176	184	191	199
			Exponential	139	152	166	181	197	216	235	257	280	306
Beds	2,100	3,076	Lineal	2,882	3,036	3,212	3,366	3,542	3,696	3,872	4,048	4,202	4,378
			Exponential	3,058	3,344	3,652	3,982	4,334	4,752	5,170	5,654	6,160	6,732
Occupancy	41.3	34.7		40	40	40	40	40	40	40	40	40	40
Overnight	2.0	1.9		2	2	2	2	2	2	2	2	2	2
Beds/Hotel	18	23		22	22	22	22	22	22	22	22	22	22

The number of visitors in Mali does not correspond exactly to the number of tourists. The data presented corresponds to statistics of the Ministry of Tourism regarding hotel occupancy, which does not mean that all of them were tourists. However, it is assumed that the majority of hotels in other cities of the country are mostly tourists, while Bamako might have a mix of tourists, visitors or business people. Unfortunately, it was not possible to have a quantitative relation of the location of hotels in order to make a pertinent analysis on this last assumption.

The relation between the volume of passengers of domestic airports and the number of visitors shown in this section is extremely low. For example, one of the airports with more tourism, Tombouctou, disembarked 5,517 people in 1999, which is only 6% of the number of visitors registered that year. In 2000, the relation was only 4%. The remainder of the airports does not go above the percentage of Tombouctou and jointly it is not assumed to be more than 15% of visitors. As a matter of fact, the correlation of historical data between the number of visitors registered each year and the number of passengers in each of the airports is low, being Tombouctou R^2=0.20, Mopti 0.7 and Gao 0.4.

The Government of Mali proposes a triennial development plan for the development of tourism in Mali. However, the tourism policies experience a weak development due to lack of coherent and constant policies. For the past couple of years, there have been attempts to get the Government's attention from different points of view regarding the incredible tourism potential of Mali.

Today Mali possesses an important tourism potential, a cultural, historical and natural patrimony throughout the entire territory, which is unique in the world such as the Pays Dogon, Tombouctou, Djenné, Tata de Sikasso, Medina and Koniakry Forts, the tombs of Askia, etc.

Mali shows 5 main tourism focus points:

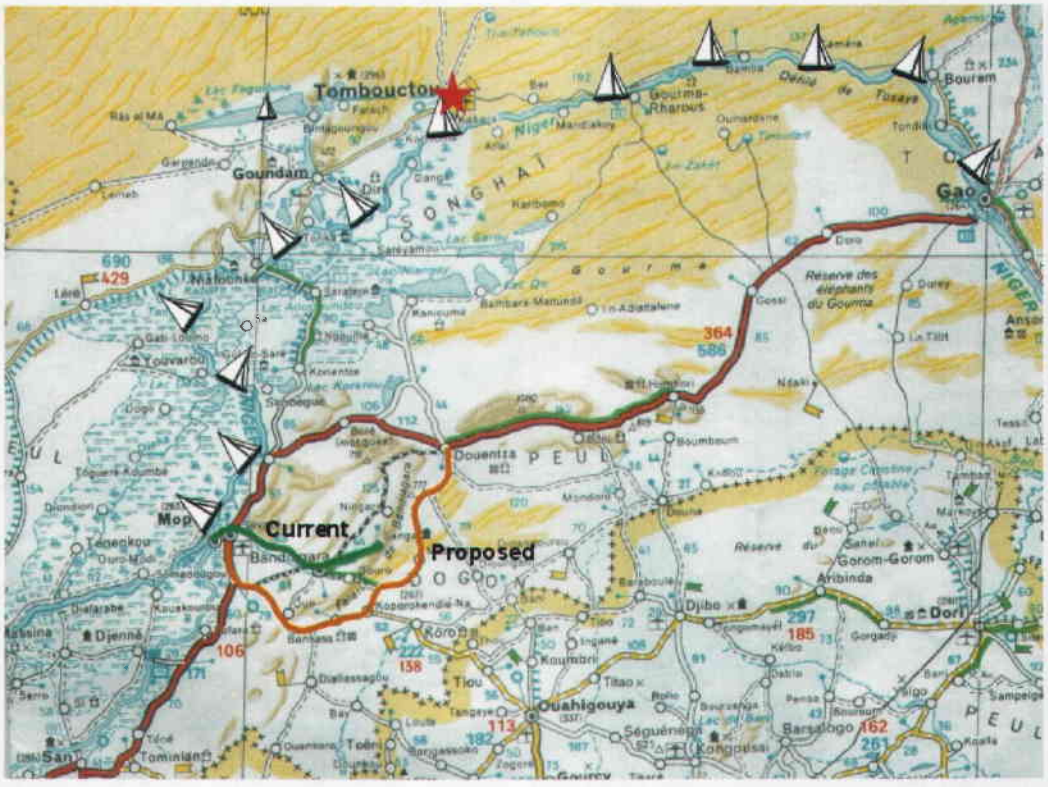
- The Niger Delta and the Dogon Plateau, whose focal point is the triangle formed by Mopti-Djenné-Pays Dogon.
- The center of Mali focusing on Bamako
- Tombouctou
- West of Mali focusing on the Baoulé and Befing National Parks
- The Niger River

The strategy of the Ministry of Tourism is to first develop the Mopti-Djenné-Pays Dogon triangle to include Tombouctou, which will later be capable of extending to the other northwest sectors of the country (Baoulé and Befing National Parks), once a reliable tourist clientele has been drawn and secured. This objective can only be carried out with the endowment of a comfortable and reliable transport infrastructure.

Currently, one of the most important tourism circuits is the one passing through *Falaises* of Pays Dogon from Mopti through Sevaré up to Bandiagara and Sanga. Another circuit is projected to be developed from Mopti passing through Somadougou and Bankas until the foot of the *Falaises* (Endé) and continue along the *Falaises* until Doventza.

Another tourism exploitation project is based on the course of the Niger River crossing by boat from Mopti until Lac Debo and to Tonka. At this point, Lac Faguibine shows extraordinary qualities with its 50 km of white sand beaches and transparent waters.

Figure II-1. Tourism Attractions



Among the main problems involved in the development of the tourism activities in Mali, the following can be pointed out:

- Faulty relation between quality-price of the tourism products.
- Lack of quality and quantity of hotel parks
- The hotels show a constant state of degradation worsened by the lack of clients and financial resources.
- The travel agencies are confronted by a perpetual crisis due to the low tourism activity and seasonal demand.
- Insufficiency of transportation infrastructures and transport means, which are characterized by the domestic air transport weakness.
- Lack of financial and investment resources in tourism activities by the Government, due mainly to the priority of satisfying the basic needs of the population.

- Lack of production of quality tourism material, which does not allow the tourism industry to evolve and adapt to the demands of the international market.

On the other hand, some solutions have been identified and proposed as priority actions:

- Implementation of institutional guidelines for updating the tourism office (OMATHO).
- Promote national and foreign private investment in the tourism sector.
- Facilitate tourist circulation and entry to the country.
- Increase tourist entry capacity through the development of charter flights.
- Quality adaptation of the existing hotel offers for international clientele.
- Preparation of a promotion and marketing plan of tourism products.
- Development and extension of tourism availability.

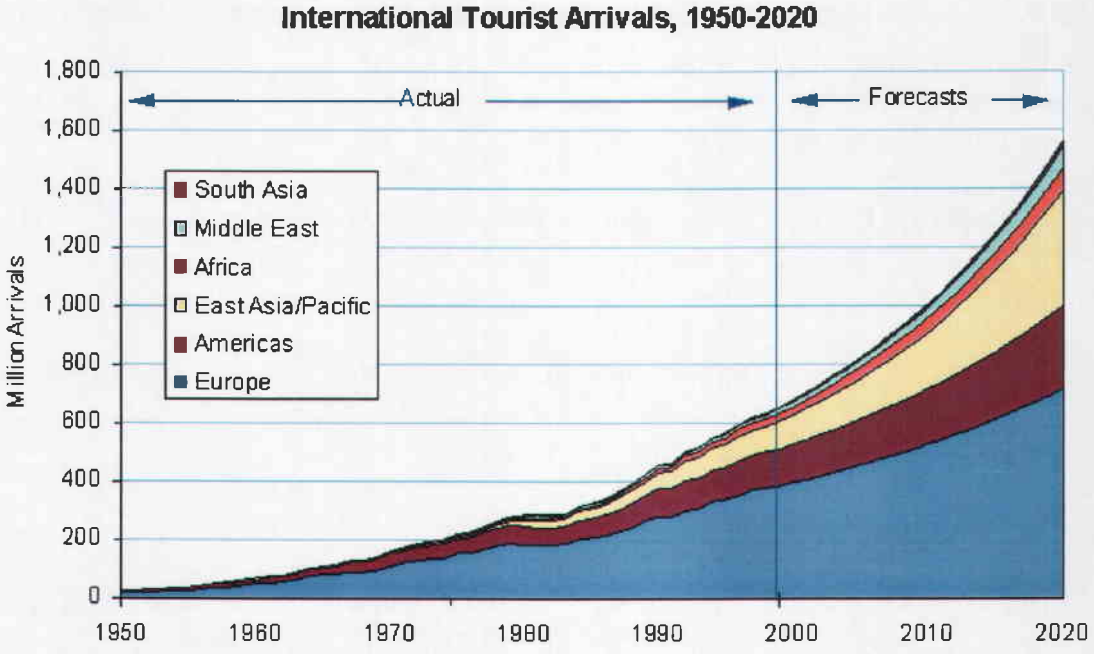
Various organizations and international agencies, such as World Tourism Office (WTO), carry out their own global analysis and forecasts on tourist movement.

The consensus on Africa is that tourism is on the rise, with the shooting up of infrastructure in key international cities, the boosting of flights and air access into the continent, and more international investment continuing to flow into this sector. According to the Africa Travel Association, no longer will the 52 countries that make up Africa be considered distant and difficult. On the contrary, they will become increasingly accessible and affordable. Within the past five years there has been a proliferation of airline flights and destinations stretching from western Africa to the eastern and southern regions of the continent.

For the first time, long-distance African carriers, such as Ethiopian Airlines, Air Afrique and South African Airlines, are code sharing their routes to allow for better access between African nations.

Graph II-8 shows the global tourism growth trend by region.

Graph II-8. International Tourist Arrivals



The forecasted growth rate in the next 20 years for the African continent is 5.5%, while at a global level; the average intraregional growth of tourism is 3.8%.

WTO Tourism 2020 Vision: Forecast of Inbound Tourism, World by Regions
International Tourist Arrivals by Tourist Receiving Region (million)

	Base Year	Forecasts		Average Annual Growth Rate (%)	Market share (%)	
	1995	2010	2020	1995-2020	1995	2020
Total	**565.4**	**1,006.4**	**1,561.1**	**4.1**	**100**	**100**
Africa	20.2	47.0	77.3	5.5	3.6	5.0
Americas	108.9	190.4	282.3	3.9	19.3	18.1
East Asia/Pacific	81.4	195.2	397.2	6.5	14.4	25.4
Europe	338.4	527.3	717.0	3.0	59.8	45.9
Middle East	12.4	35.9	68.5	7.1	2.2	4.4
South Asia	4.2	10.6	18.8	6.2	0.7	1.2
Intraregional (a)	464.1	790.9	1,183.3	3.8	82.1	75.8
Long-Haul (b)	101.3	215.5	377.9	5.4	17.9	24.2

Source: World Tourism Organization (WTO) (Actual data as in WTO database July 2000)

Notes: (a) Intraregional includes arrivals where country of origin is not specified
(b) Long-Haul is defined as everything except intraregional travel

2.4 *Transportation Background*

Transportation data in Mali was obtained from the "Annuaire Statistique des Transports, Résultats 1999" edited in September 2000 by the National Directorate of Transport of the Ministry of Industry, Commerce and Transport.

2.4.1 Roadway Transportation

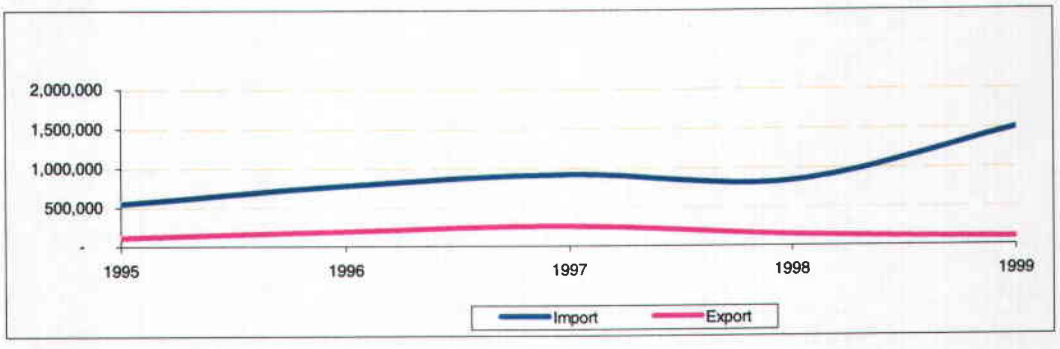
The distribution of the road network according to the administrative classification is as follows:

National Roads	R.N.	33%	5,696 km
Regional Roads	R.R.	33%	5,595 km
Local Roads	R.L.	10%	1,713 km
Unclassified Roads	R.N.C.	24%	4,130 km

From these roads only 16% are paved (2,760 km), 10% are lined with gravel (1,652 km), 41% are rehabilitated roads (6,980 km), and 33% correspond to seasonal roads (5,725 km). Total road network is 17,107 km.

Cargo traffic through roads has evolved considerably reaching an amount of 1,501,342 tons of imports and 102,967 tons of exports. Import cargo traffic has grown since 1996 at a 32% annual rate while the exported products have grown at a 7% rate. However, this last value does not show a precipitated slump in cargo ground transport since 1998. Graph II-9 shows the evolution of international cargo transport.

Graph II-9. International Goods Traffic by Route in Metric Tons



The main international cities with cargo originating are the cities close to shore:

Graph II-10. Cargo

Abidjan	1,445,506 tons
Dakar	42,654 tons
Lome	7,461 tons
Others[3]	3,722 tons

Note: 1999 values are in metric tons

As far as the destination cities for export cargo, it is only mainly through the Abidjan Port.

The ground communication between Mali and the different maritime ports is mainly through roads, whose distances vary from 700 km to 2000 km, as shown in Table II-5.

Table II-5. Land Access from Mali to the Ocean

Coastal Country	Port	Origin	Destination	Transport mode	Distance (km)
Senegal	Dakar	Bamako	Dakar	Train	1 228
Senegal	Dakar	Kayes	Dakar	Route	745
Ivory Coast	Abidjan	Bamako	Abidjan	Route	1 225
Ivory Coast	Abidjan	Bamako	Abidjan	Route+Train	569+608=1 225
Ivory Coast	San Pedro	Bamako	San Pedro	Route	1 091
Togo	Lomé	Bamako	Lomé	Route	1 967
Guinea	Conakry	Bamako	Conakry	Route	980
Mauritania	Nouakchott	Bamako	Nouakchott	Route	1 430
Benin	Cotonou	Gao	Cotonou	Route	1 476
Ghana	Tema	Mopti	Tema	Route	1 392

[3] San Pedro (Ivory Coast), Conakry (Guinea), Nouakchott (Mauritania), Cotonou (Benin), Tema (Ghana)

The main exported products are: cotton, cereals, foodstuffs, sodas, gum arabic, leather and fiber of dah. While the main imported products by ground are: cereals, foodstuffs, chemical products, equipment, vehicles/spare parts, construction supplies and books/paper.

The amount of metric tons transported by type of cargo and destination are shown in the following table:

Table II-6. Export and Import of Major Products in 1999 (metric tons)

Export				
	Abidjan	Dakar	Lome & others	Total
Cotton	100 449	77 092		177 541
Cereals			107	107
Foodstuffs	623	7 031	149	7 803
Sodas		3 655		3 655
Gum arabic		20		20
Skin & leather	88	367		455
Fiber of dah	244			244
Miscellaneous	856	2842	452	4 150
Total export	102 260	91 007	708	193 975
Import				
	Abidjan	Dakar	Lome & others	Total
Cereals	79 494	55 014		134 508
Foodstuffs	54 596	73 631	1 183	129 410
Chemical products	228 319	19 489		247 808
Equipment	24 358	3 613	274	28 245
Vehicles & spare parts	24 546	44 447	1 159	70 152
Construction supplies	638 897	40 523	388	679 808
Books & paper	2 202	1 253		3 455
Miscellaneous	108 714	48 909	3 737	161 360
Total import	1 161 126	286 879	6 741	1 454 746

The influence of the main economic sectors of Mali, which were already mentioned in the socioeconomic context: Bamako, Segou, Mopti and Sikasso, are evident on the regional ground

cargo traffic for Mali. The following table shows the cargo traffic distribution in kilogram by origin and destination.

Table II-7. Cargo Traffic Distribution (Kilograms)

Destination	Kayes	Bamako	Sikasso	Ségou	Mopti	Tombouctou	Gao	Kidal	TOTAL
Origin									
Kayes	23,240								**23,240**
Bamako	67	64,459	45,883	51,076	24,140	2,367	10,659		**198,651**
Sikasso		51,919	24,148	26,152	11,064		2,753		**116,036**
Ségou		93,280	14,320	38,827	22,822	1,020	18,320	39	**188,628**
Mopti		12,310	4,595	1,318		214	5,439		**23,876**
Tombouctou		27		5	12				**44**
Gao		5,245	545	887	1,427			48	**8,152**
Kidal							397		**397**
TOTAL	**23,307**	**227,240**	**89,491**	**118,265**	**59,465**	**3,601**	**37,568**	**87**	**559,024**

The road transport prices for goods vary according to three factors: type of road (paved, soil or trail), international or domestic, goods or fuel.

Table II-8. Road Transport Prices

International Route Abidjan - Mali's Regions

Goods			Fuel		
Asphalted route	29.45	FCFA/T-km	Asphalted route	31.84	FCFA/T-km
Laterite route	48.75	FCFA/T-km	Laterite route	47.76	FCFA/T-km
Trail	65	FCFA/T-km	Trail	63.68	FCFA/T-km

Domestic Route Bamako – Mali's Regions

Goods			Fuel				
				Truck < 15,000 liters		Truck > 15,000 liters	
Asphalted route	32.5	FCFA/T-km	Asphalted route	35.56	FCFA/M^3-km	31.84	FCFA/M^3-km
Laterite route	48.75	FCFA/T-km	Laterite route	53.34	FCFA/M^3-km	47.76	FCFA/M^3-km
Trail	65	FCFA/T-km	Trail	71.12	FCFA/M^3-km	63.68	FCFA/M^3-km

The price of passenger road transport vary according to destination. As reference, the average passenger transport price between Bamako and other regional cities is 12.08 FCFA/Passenger-km, which is the average price paid by a passenger for 6,127 FCFA and an average distance of 512 km. For the cities of this study, the passenger transport price from Bamako are the following:

Table II-9. Passenger Transport Price

Destination	Total distance (km)	Tariff by	
		Passenger (FCFA)	Passenger-km (FCFA/Pax-km)
Bandiagara	697	7 500	10.76
Djenne	574	6 000	10.45
Gao	1 208	12 500	10.35
Mopti	646	6 500	10.06
Nioro	433	12 500	28.87
Sikasso	372	3 500	9.41
Tombouctou	944	19 000	20.13

2.4.2 *Railway Transport*

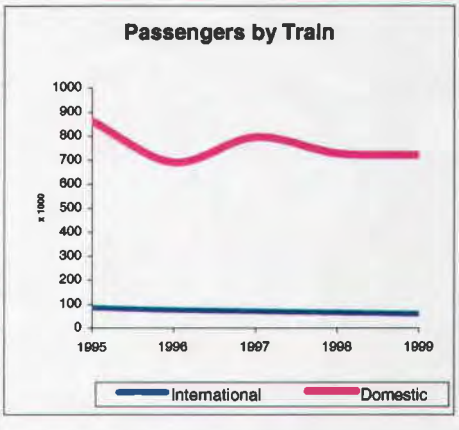
The evolution of railway traffic of the national company Régie des Chemin de Fer du Mali (RCFM) has experienced a slump in the number of passengers and tons of goods transported.

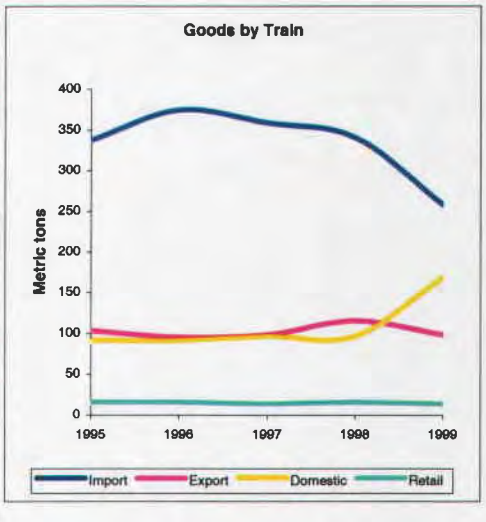
The total passenger traffic has decreased in the last five years at an average rate of 4%, while the volume of tons of goods transported has decreased at a slower rate of 2% annually. Although, the traffic of goods in the Malian territory has increased at the same rate as the import traffic has decreased, as can be seen in the following graphs.

Table II-10 shows data related to railway traffic of passengers and goods for the last five years.

Table II-10. Railway Traffic of Passengers

Passengers					
International	***1995***	***1996***	***1997***	***1998***	***1999***
Passengers (thousands)	83	74	68	63	58
Passenger-km (millions)	40	27	33	32	30
Average transport distance (km)	485	371	490	508	517
Domestic					
Passengers (thousands)	860	690	794	726	720
Passenger-km (millions)	214	154	190	186	181
Average transport distance (km)	248	223	239	256	251
Total					
Passengers (thousands)	943	764	862	789	778
Passenger-km (millions)	254	181	223	218	211
Average transport distance (km)	733	594	729	764	768
Goods					
Import	***1995***	***1996***	***1997***	***1998***	***1999***
Tonnage (tons)	337	374	358	340	257
Ton-km (millions)	161	171	161	152	120
Average transport distance (km)	477	458	450	447	465
Export					
Tonnage (tons)	103	95	98	115	98
Ton-km (millions)	60	54	59	64	55
Average transport distance (km)	578	565	597	556	558
International					
Tonnage (tons)	440	469	457	455	355
Ton-km (millions)	220	225	220	216	175
Average transport distance (km)	500	480	482	475	491
Domestic					
Tonnage (tons)	90	90	95	95	167
Ton-km (millions)	29	31	34	35	62





Average transport distance (km)	320	344	353	367	371	
Retail						
Tonnage (tons)	15	15	13	15	13	
Ton-km (millions)	5	5	5	5	5	
Average transport distance (km)	348	350	360	338	365	
Total						
Tonnage (tons)	985	1043	1021	1020	890	
Ton-km (millions)	475	486	479	472	417	
Average transport distance (km)	2223	2197	2242	2183	2250	
Average price (FCFA/T-km)	27	33	N/A	N/A	N/A	

As complementary data, the following table shows statistics of goods transported in 1999.

Table II-11. Statistics of Goods Transported

RCFM Production Statistics 1999

Goods transported	Tonnage thousands	Average Distance km	Ton-km millions	Total Revenues M FCFA	Average revenue FCFA/T-km
Import					
Total Import Products	*256*	*3764*	*119*	*3363*	*340*
Cereals	35	426	16	402	27
Foodstuffs	1	108		7	41
Chemical products	2	553	1	45	34
Equipment	6	386	2	72	30
Vehicles & spare parts	1	425	1	54	86
Construction supplies	5	512	2	70	30
Goods in containers	73	524	38	1045	27
Fuel	50	287	14	586	41
Other products	83	543	45	1082	24
Export					
Total Export Products	*100*	*3684*	*55*	*966*	*155*
Cereals		525			20
Cotton	20	470	10	240	25

RCFM Production Statistics 1999

Goods transported	Tonnage thousands	Average Distance km	Ton-km millions	Total Revenues M FCFA	Average revenue FCFA/T-km
Fruit and vegetables	11	588	6	153	24
Sodas	7	584	4	122	32
Skin & leather	0	600	0	0	17
Goods in containers	56	585	33	400	12
Other products	6	332	2	51	25
Domestic					
Total Domestic Products	*119*	*5108*	*35*	*1121*	*555*
Cereals	12	376	6	108	24
Foodstuffs	25	390	9	242	25
Salt	9	484	3	101	22
Groundnut	12	369	4	83	19
Almonds & shea butter					
Sodas	2	493	0	29	34
Crabs	6	230	1	40	30
Wood	1	80	0	3	55
Fuel	3	355	1	32	34
Cement	8	262	2	52	26
Fertilizer	7	206	1	33	24
Marble	0	475	0		39
Manufactured products	1	462	1	20	65
Grouped goods		152		3	65
Automobiles	2	441	1	55	62
Other products	31	333	6	320	31

2.4.3 *Fluvial Transportation*

Transportation along the Niger River is important, being Kabara, Mopti and Segou the main river ports as far as volume of tons of goods transported.

There was a decrease in the figures related to passenger and good transport in 1999. The number of passenger during 1999 was 12,350, while the amount of goods was 9,361 metric tons. The average distances traveled were 544 km and 475 km.

Table II-12 shows the evolution since 1995 of the traffic through river in Mali.

Table II-12. Passenger and Goods Transportation

Indicator	Unit	1995/96	1996/97	1997/98	1998/99	1999/2000
Passenger Transportation						
Passengers	unit	24 572	18 975	20 043	14 644	12 350
Passenger-km	thousands	11 757	8 651	9 617	77 84	6 721
Average pax course	Km	478	456	480	532	544
Boat course	boat-km	45 770	42 552	5 1012	42 780	44360
Passenger receipts	thousands FCFA	338 593	228 774	266420	300 775	400 517
Receipts by pax-km	FCFA/Pax-km	29	26	28	39	60
Goods Transportation						
Tonnage	metric ton	11 147	9 379	16 089	12 966	9 361
metric ton-km	thousands T-km	5 056	3 935	8 580	6 763	4 451
Average transport distance	km	454	420	533	522	475
Goods receipts	thousands FCFA	41	44	31	41	80

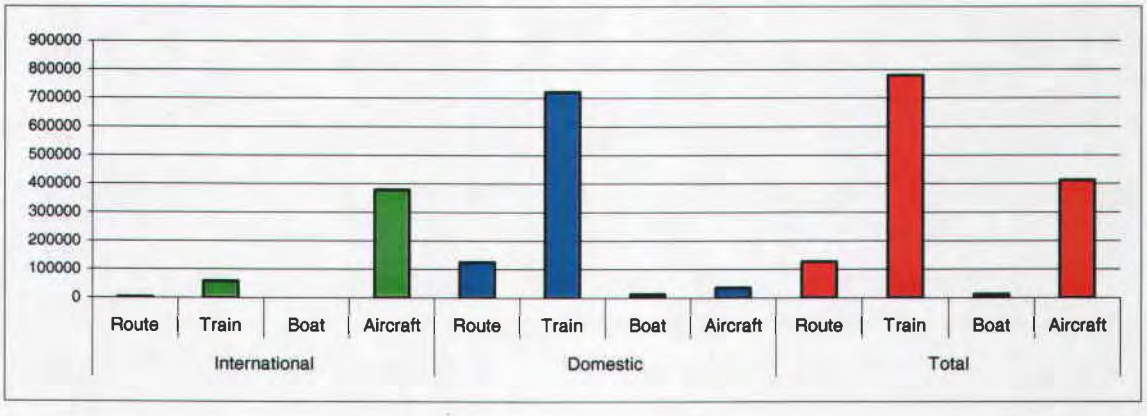
2.4.4 *Conclusion*

Some interesting data related to the transport system in Mali have been obtained from the document already mentioned, which are shown in the following Table II-13 in passenger and goods transported in 1999 by transport type.

Table II-13. Passenger and Good Transportation

	International				Domestic				**Total**			
	Route	Train	Boat	Aircraft	Route	Train	Boat	Aircraft	**Route**	**Train**	**Boat**	**Aircraft**
Passengers	1 738 [4]	58 000	0	377 734	124 189	720 000	12 350	34 432	125 927	778 000	12 350	412 166
Goods (metric ton)	1 604 309	355	0	4 423	559 024	167	9 361	25.5	2 163 333	522	9 361	4 448.5

Graph II-11. Passenger Transportation



The comparison of travel tariffs and times of travel between the cities considered in the airport system of this project are very interesting. Table II-14 shows that the price of one-way air ticket is much higher than bus, although the difference is compensated by the time of travel. This does not result advantageous since air tariffs and flow of income per passenger in Air Mali are the result of the incapacity to balance the exploitation costs of the airlines and the three aircraft it possesses. Even though, at this time, Air Mali only has two aircraft because the L410 of 19 seats is now out of service.

[4] Need to be verified

Table II-14. Travel Schedule

Origin	Destination	Total distance (km)	Bus			Aircraft			Train		
			Time Trip hhmm	Passenger (FCFA)	Km-km (FCFA/V-km)	Time Trip hhmm	Passenger (FCFA)	Km-km (FCFA/Pax-km)	Time Trip hhmm	Passenger (FCFA)	Km-km (FCFA/Pax-km)
Bamako	Gao	1208	24h	12500	10.35	2h15	82700	68.46	-	N/A	0.00
Bamako	Mopti	646	10h	6500	10.06	1h30	36500	56.50	-	N/A	0.00
Bamako	Nioro	433	48h	12500	28.87	1h30	43000	99.31	-	N/A	0.00
Bamako	Sikasso	372	5h	3500	9.41	-	-	-	-	N/A	0.00
Bamako	Tombouctou	944	60h	19000	20.13	1h50	63600	67.37	-	N/A	0.00
Bamako	Kayes	450	N/A	N/A	N/A	1h30	41100	91.33	12h	N/A	14.00

Some of the problems of the transport infrastructure in Mali are:

- Only 16% of the road network is paved, even though its condition is good, while 10% are of soil and their condition varies. This makes, obviously, the communication difficult between the different points of the country, allowing for the dependence on air transport.
- The roads are less reliable and a lot of them (33%) depend on the season to be operational.
- The railway infrastructure allows to somehow resolve the road deficiency, although it only has 650 km of railroad between Dakar and Koulikoro plus the section between Bamako and Kayes.
- The elevated air tariff restricts the access of the local population to the use of aircraft, which is then worsened by the economic situation of Air Mali and its lack of secure and reliable schedules.
- Maritime transport is seasonal in great part and only joins certain cities of Mali. Although in the case of Tombouctou it is a great alternative.

2.5 *Analysis of Current Institutional Framework*

2.5.1 Legal and Legislative Basis

The institutional framework governing the relationships and split of responsibilities and jurisdictions among the various organizations participating in the civil aviation sector is defined by the following legal instruments, among others:

- *Ordonnance* No. 29/CMLN (06 July 1970), creating the state corporation *Aéroports du Mali* (ADM)
- Decree No. 90/PG-RM (13 July 1970), establishing the Statutes of ADM
- Decree No. 104/PG-RM (07 June 1974), fixing the categories and modalities of recovery of airport charges in Mali
- *Arrêté* no. 786/CAB-MTTT (27 October 1974), stipulating the activities of ADM and the functioning of its Board of Directors, *et al.*
- *Convention de Dakar* (1974), international treaty signed by 16 sovereign States, establishing the multi-national *Agence pour la Sécurité de la Navigation Aérienne en Afrique et Madagascar* (ASECNA),
- Decision no. 005/MTTP-CAB, establishing the split of the revenues generated by aircraft landing fees
- *Contrat particulier* (Special Contract) dated 01 January 1990 between the Republic of Mali and ASECNA, by virtue of Article 10 of the *Convention de Dakar*, regulating the "National Activities" confided to the Agency in Mali
- Law no. 90-109/AN-RM (31 October 1990), creating the *Direction Nationale de l'Aviation Civile* (DNAC)
- Presidential Decree no. 90-436/P-RM (31 October 1990), defining the organization of DNAC and its modalities of functioning
- *Loi no. 93-079 du 29 décembre 1993 portant Code de l'aviation civile (Civil Aviation Code)*
- Decree No. 94-470/PG-RM (30 December 1994), fixing the categories and modalities for recovery of aeronautical and meteorological fees applicable in Mali

- *Arrêté* no. 94-9500/MET (05 October 1994), regarding the organization of emergency services at Bamako-Sénou International Airport
- *Arrêté* no. 95-1726/MTPT-SG (17 August 1995), establishing the modalities of functioning of the National Committee for the Security of Civil Aviation and the Airport Security Committees
- Decree No. 96-086/PM-RM (21 March 1996), creating the National Committee Against Bird Strikes
- *Arrêté* no. 98-0431/MTPT-MF (27 March 1998), fixing the rates of the aeronautical and meteorological charges, modified by *Arrêté* no. 99-0001/MTPT-MF (05 January 1999)
- *Arrêté* no. 143/MTPT-SG (22 March 1999), establishing the conditions for the creation, the putting into service and the utilization of aerodromes

2.5.2 *Organizations, Roles and Responsibilities*

At present, a number of organizations have jurisdiction over and responsibilities for the various aspects of the civil aviation sector in Mali. The present analysis deals with those concerned with the management, operation and development of airports.

2.5.2.1 DNAC (Direction Nationale de l'Aéronautique Civile)

DNAC is the central government administration charged with the exercise of the sovereign state attributes of the Republic of Mali with respect to civil aviation, including the oversight and regulation of the entire sector as well as the conception, elaboration, coordination of implementation and control of the national aeronautical policy. It is also responsible, on behalf of the government, for the development of the required civil aviation infrastructure and the implementation and management of capital investment programs associated with such development.

DNAC is a government department created by Law no. 90-109/AN-RM (31 October 1990) and reporting to the Minister responsible for civil aviation, i.e. the Minister of Industry, Commerce and Transport. According to Presidential Decree no. 90-436/P-RM (31 October 1990), which defines its organization and modalities of functioning, DNAC is responsible *inter alia* for the following aspects of civil aviation relating to the administration of airports:

- publication and monitoring of the application of ICAO Standards and Recommended Practices;

- design and realization of aeronautical infrastructure and equipment;
- planning of measures for airport environmental protection, for mitigation of aircraft noise impact and other types of pollution, as well as bird strikes;
- search and rescue, in relation with other authorized services;
- identification of non-respect of regulatory measures;
- quality control of the provision of technical and commercial aeronautical services.

As a government agency, DNAC has no independent source of funds; it relies on the state budget for its financial requirements. DNAC employees are civil servants; however, the funds for their salaries come from the portion of the ASECNA Article 10 (National Activities) revenues assigned to the government (see the section dealing with ASECNA below).

2.5.2.2 ADM (Aéroports du Mali)

ADM is the organization charged with the responsibility for the management and operation of the "commercial" aspects of the airports open to public air traffic in Mali. According to its statutes, ADM is responsible for the "operation and the development of the facilities and equipment at these airports intended to facilitate the arrival and departure of aircraft and the enplaning, deplaning and ground flow of air passengers, freight and mail".

In practical terms, this means that ADM operates and manages the passenger terminals and the other non-aeronautical areas of the airports. ADM also performs certain public service missions on behalf of the State, including the coordination of airport safety and security, management and maintenance of VIP and Head of State facilities, etc.

At present, the responsibilities of ADM include the non-aeronautical facilities and services at the following airports (in alphabetical order):

- Bamako
- Gao
- Goundam
- Kayes
- Kéniéba

- Mopti
- Nioro
- Sikasso
- Tombouctou
- Yélimané

ADM is classed as an *Établissement Public à Caractère Industriel et Commercial* (EPIC) having the status of a financially autonomous state corporation under the authority of the Minister responsible for Transport. It was created by virtue of *Ordonnance* No. 29/CMLN (06 July 1970), the statutes fixing its organization and functioning being defined under Decree No. 90/PG-RM (13 July 1970).

According to the above-mentioned Statutes, the Director of ADM is named by an Order of the Minister responsible for Transport and the Chief Financial Officer (*Agent Comptable*) by a joint Order of the Ministers responsible for Transport and Finance.

The Director of ADM reports to a Board of Directors (*Conseil d'Administration*) whose members are named by the Minister responsible for Transport and consist of the following:

- 1 representative of the Ministry responsible for Transport (Chairperson)
- 1 representative of the Ministry responsible for Finance
- 1 representative of the Ministry responsible for Public Works
- The Director of Civil Aviation
- 1 delegate of the ASECNA Représentation nationale
- 1 representative of the Chamber of Commerce
- 1 representative of the organization's workers

It should be noted that the above-mentioned legal texts only deal with the internal structure of ADM and its relationship to the government administration. They do not include a specification of the precise scope of responsibilities of, or a description of the real property conveyed to, the organization. This last point is significant, since the activities of ADM intersect with the airport-

related activities of DNAC, as described previously, and ASECNA, as described in the following section.

As a financially autonomous state corporation, ADM is expected to depend on the funds generated by its activities in order to meet its financial obligations. ADM's revenues are generated by both aeronautical and non-aeronautical activities. Decree No. 94-470/PG-RM (30 December 1994) fixes the categories and modalities for recovery of aeronautical and meteorological fees applicable in Mali; the aeronautical charges assigned to ADM are limited to the following:

- Air passenger fees
- Air freight fees
- Aircraft fuel fees

ADM's non-aeronautical revenues are generated mainly by the following, among others:

- Land rentals
- Duty free shop
- Rental of space in the passenger terminal building
- Fees for water and electricity
- Check-in counter charges

At present, ADM does not receive any specific funds for the public service missions that it performs on behalf of the State, i.e. the coordination of airport safety and security, management and maintenance of VIP and Head of State facilities, etc.

2.5.2.3 ASECNA (Agence pour la Sécurité de la Navigation Aérienne en Afrique et Madagascar)

ASECNA is the agency charged with the responsibility for air navigation and aeronautical meteorological services in Mali, including both en-route and airport facilities. These services are provided at Bamako, as well as at the interior airports.

ASECNA is a multinational agency involving 14 countries in Africa, in addition to Madagascar and France, which operates under the terms of the *Convention de Dakar* (1974). Its primary mission is to provide those services intended to ensure the regularity and safety of air traffic

within the territories of its member States and others (by mutual agreement) in Africa and Madagascar and to manage their airspace; its headquarters are in Dakar (Sénégal).

The services which ASECNA provides in Mali fall into two categories: those defined under Article 2 of the Dakar Convention (Community Activities) and those defined under Article 10 (National Activities).

According to Article 2, ASECNA is responsible for the conception, implementation and management of air-navigation-related installations (runways, taxiways, aircraft parking areas, navaids, telecommunications and meteorological equipment, etc.) and services at the airports of Bamako and Gao. Under this article, Mali is required to make available to ASECNA the installations and the means necessary for their operation, while the agency provides the specified services from the community activities budget.

As called for in Article 10, the "National Activities" of ASECNA are regulated by a *Contrat particulier* (Special Contract) dated 01 January 1990, which specifies the activities confided to the Agency. In general, these comprise the management and maintenance of the secondary airports and include air navigation, aeronautical telecommunications and meteorology, as well as fire and crash rescue services at these airports.

Annex II of this Contract confides "all movable and immovable goods and building facilities (with the exception of "commercial" buildings) located on the airports listed under Annex III ....." to ASECNA, thus rendering the Agency responsible for the management of the airside facilities (runways, taxiways and aprons) at these sites.

The airports specified in Annex III are categorized as follows:

- 1st Category: Controlled aerodromes
    - Mopti
    - Tombouctou
    - Kayes
    - Nioro
- 2nd Category: Non-controlled aerodromes (but provided with an air navigation protection service requiring the presence of full-time specialized personnel)
    - Goundam

- 3rd Category: Non-controlled aerodromes (but provided with an air navigation protection service not requiring the presence of full-time specialized personnel)
    - Nara
    - Tessalit
    - Kéniéba
    - Manantali
    - Yélimané

This list does not include Bamako and Gao, since the Special Contract concerns only the National Activities of ASECNA in Mali; the latter two airports are already covered under the Community Activities (Article 2) of ASECNA as specified in the Dakar Convention.

All of the activities performed in Mali by ASECNA (both Article 2 and Article 10) are administered by the *Représentation Nationale*, which reports directly to the Director General of ASECNA in Dakar. There is no distinct corporate entity for the management of the airport-specific or Article 10 aspects of ASECNA's mandate in Mali.

According to Decree No. 94-470/PG-RM (30 December 1994), which fixes the categories and modalities for recovery of aeronautical and meteorological fees applicable in Mali, the aeronautical charges assigned to ASECNA include the following:

- Aircraft landing fees
- Airfield lighting fees
- Aircraft parking fees

In addition, a recent decision of the Government assigned the collection of the Airport Security Tax to ASECNA.

It should be noted that ASECNA does not provide the investment capital for improvements to airport infrastructure; this is the responsibility of the signatory state in question. The essential role of ASECNA is to manage, operate and maintain the air navigation and airports infrastructure of the State. As such, its arrangement with the State is essentially that of management contract.

2.5.2.4 Others

Responsibility for **meteorological facilities and services** is divided between the *Direction Nationale de la Météorologie* (DNM) and ASECNA. As with the air navigation activities assigned to ASECNA by virtue of the Dakar Convention, the meteorological facilities at the country's airports are provided by the State and confided to ASECNA for management, operation and maintenance.

Direct responsibility for **Inspection, security and safety services** at airports in Mali lies with the specific Government agencies concerned, i.e. Customs, Immigration, Police, Health, etc. ADM, however, has the responsibility for coordination of these activities. This being said, the Security Tax that is levied on air passengers is collected by ASECNA rather than ADM or any other Government agency.

Airport ground handling services at Bamako-Sénou International Airport are provided by Air Afrique and Air Mali for international and domestic/regional air carriers respectively. Despite the fact that no other companies currently compete with the above operators for the provision of these services to airlines, no *de jure* monopoly exists in this field in Mali according to the Government. No royalties are charged to either of these companies by ADM, ASECNA, DNAC or any other agency for the right to provide these services at the airports.

2.5.3 Observations

The current institutional framework of civil aviation and, more particularly of airport-related activities, in Mali presents a number of shortcomings. These will have to be addressed in order to ensure an appropriate environment for the establishment of a successful concession arrangement for the airports of Mali. They can be summarized as follows:

1. With respect to the airport aeronautical charges collected by ASECNA, the formula for their establishment and the procedure and calculations for their assignment between the Government and ASECNA are not clearly documented in the material which was supplied to the Consultants by the authorities. Accordingly, it is not possible to determine to what extent they reflect the principles of cost recovery in this area as recommended by ICAO.

2. The Government's civil aviation regulatory agency (DNAC) has no autonomous funding; in fact, it receives the bulk of its financial resources (salaries of personnel) from aeronautical charges collected on behalf of the Government by one of the agencies it is supposed to regulate (ASECNA). This situation is not conducive to the attributes of transparency and independence which are required of an effective regulator and which are set out in ICAO's

guidelines for an appropriate legal and institutional framework to ensure civil aviation safety and security.

3. The administration of the airport-related activities of ASECNA is bundled together with the provision of other services on the part of the organization: meteorology, air traffic (approach and terminal services) and support to DNAC (see above). Despite the professionalism displayed by ASECNA in the execution of specific tasks, this situation leads to a blurring of the lines between public service, air navigation and airport missions (e.g. aeronautical meteorology services, air traffic control and airfield maintenance).

4. At present, there appears to be no clear and duly registered physical demarcation between the airport real estate property administered by ADM and ASECNA respectively. In order to avoid potential conflicts and to ensure a transparent split of responsibilities, this demarcation will have to be established and registered as a pre-condition to a successful concession of the airport commercial areas.

5. It appears that the demarcation of the overall airport property at some of the interior airports has not yet been accomplished. This will have to be established as a pre-condition to the airports concession.

6. The restrictions on access to the airport aeronautical revenues on the part of the agency currently responsible for airport commercial operations (ADM) make it impossible for this organization to justify any investment in airside facilities from a financial point of view.

III. APPROACH AND METHODOLOGY

3.1 Aviation Background

This project is aimed at creating a first level airport system without being a weight on the country's economy. In order to achieve this objective, the Government of Mali wishes to increase private sector participation in the development, maintenance and operation of the air transport sector. Some of the objectives sought when concessioning the airport management to a private operator are:

- Increasing capital investment
- Achieving operational cost savings
- Reducing capital costs
- Improving passenger service
- Putting existing airports on a commercial status

The data of the main airports that form part of the concession project have been obtained from a 1999 report "Politique Aeronautique du Mali" by the MTPT[1]. In this report, the strong and weak points are shown, both for the country's aeronautical system and airports as well as the conditions of aeronautical facilities and infrastructures. Some basic but decisive conclusions can be extracted from said study.

- Given Mali's vast territory and the lack of adequate ground infrastructure its airport system is of extreme importance.
- There's a lack of investment for the update and modernization of the airports.
- There are no capacity problems in any of the airports.

Mali's airport system is composed of 9 airports that have regular flights, 22 aerodromes that only have non-regular flights, and 4 private aerodromes, whose characteristics are the following:

[1] Ministère des Travaux Public et des Transports

Table III-1. Commercial Flight Airports

Airport	Class DNAC	Runway Length m x m	Pavement	Accessibility	Navaids or Use Conditions
Bamako-Senou	1	2,700 x 45	Asphalt	B-747	ILS VOR AFL
Gao	1	2,500 x 40	Asphalt	B727/IL18/DC6	Lighting Obstructions
Goundam	2	1,500 x 30	Latéritique	DC4	
Kayes	2	1,165 x 40	Maccadam	AN24/DC3	Lighting Obstructions
Kéniéba	2	900 x 28	Latéritique	Less than 5.6 tons	
Mopti	2	2,500 x 40	Asphalt	B727/IL18	AFL
Nioro	2	1,500 x 30	Asphalt	DC4	AFL
Tombouctou	2	1,500 x 30	Asphalt	DC4/IL14	AFL
Yélimané	2	1,600 x 45	Latéritique	AN24/AN26	

The analysis of the air traffic data is the most important issue in assessing the potential revenues of the airports.

Table III-2. Air Traffic Data

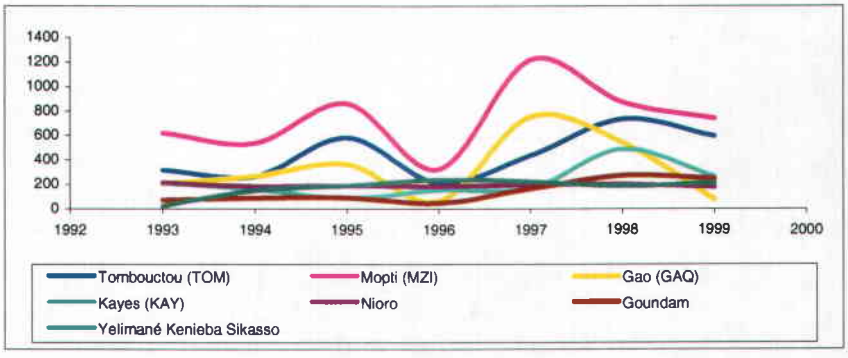
		1993	1994	1995	1996	1997	1998	1999	2000
Tombouctou (TOM)	Aircraft Operations	320	268	584	212	438	735	596	526
	Passengers	3670	3530	11612	1829	6359	12654	11035	9020
	Freight (Kg)	12244	907	91943	768	5436	72527	7013	6 979
	Mail (Kg)	334	395	672	668	35	605	82	400
Mopti (MZI)	Aircraft Operations	622	538	862	324	1219	872	739	809
	Passengers	3853	4507	5807	6146	6323	7096	11577	9452
	Freight (Kg)	1389	7654	1418	3679	465	329	3082	3000
	Mail (Kg)	1910	1073	645	659	37	0	228	442

		1993	1994	1995	1996	1997	1998	1999	2000
Gao (GAQ)	Aircraft Operations	208	270	368	68	757	547	81	467
	Passengers	1164	868	2228	390	2484	2293	1526	4637
	Freight (Kg)	155	0	15867	71	0	0	878	913
	Mail (Kg)	1816	2530	668	675	0	84	58	60
Kayes (KAY)	Aircraft Operations	212	160	88	156	170	490	266	527
	Passengers	2071	1258	585	1492	2225	2805	2732	1904
	Freight (Kg)	5142	0	15	132	0	30881	3247	3377
	Mail (Kg)	846	1010	0	0	0	0	0	0
Nioro	Aircraft Operations	214	182	190	184	198	203	178	137
	Passengers	3342	2361	2799	3120	2167	2138	1220	1862
	Freight (Kg)	0	5	0	1289	2	0	157	0
	Mail (Kg)	129	248	96	110	37	0	0	0
Goundam	Aircraft Operations	74	90	92	48	166	272	248	N/A
	Passengers	374	323	414	118	1296	977	1220	N/A
	Freight (Kg)	100	0	139	24	0	329	9052	N/A
	Mail (Kg)	0	0	0	0	248	169	96	N/A
Yélimané, Kéniéba, Sikasso	Aircraft Operations	24	150	190	240	222	188	216	N/A
	Passengers	167	1232	1917	2604	3745	3034	4115	N/A
	Freight (Kg)	0	0	755	655	100	0	2168	N/A
	Mail (Kg)	0	0	0	0	357	858	488	N/A

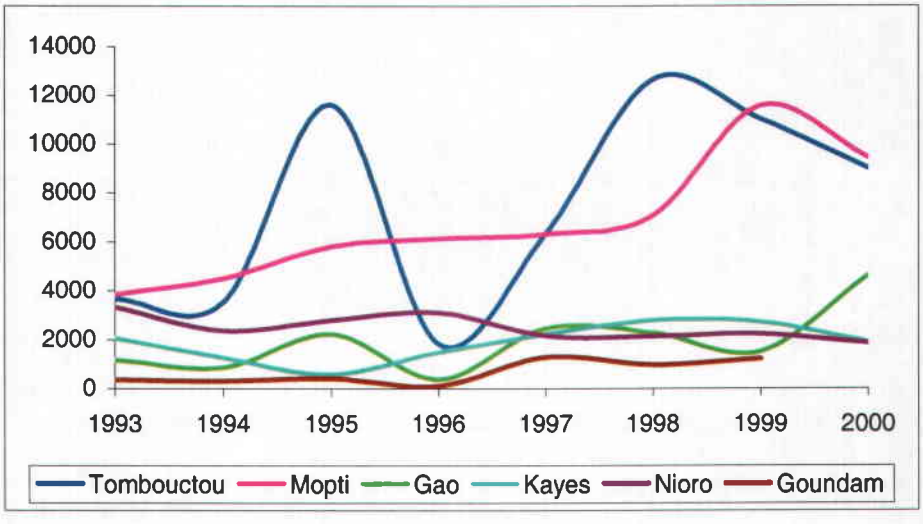
Graph III-1 graphically shows the evolution of aircraft movements in the various domestic airports. The rapid changes in the number of operations from one year to the other for the three main domestic airports (Tombouctou, Mopti and Gao) can be observed. These changes are mainly due to Air Mali's fluctuations, since it's the only domestic flight operator. In 1999 it has experienced a decrease in all airports which has remained until 2000, even though reliable information could not be collected and therefore has been omitted. This decrease in the number of aircraft movements is due to the irregularity of Air Mali flights. In 1999 it had

three aircraft type Fokker 28 (85 seats), serving mostly international destinations, Antonov 24 (5 seats) and Let 410 (19 seats).

Graph III-1. Aircraft Movements



Graph III-2. Cargo Volume



The air cargo traffic is not exact for the volume carried, even though it is an important development factor and should have special attention.

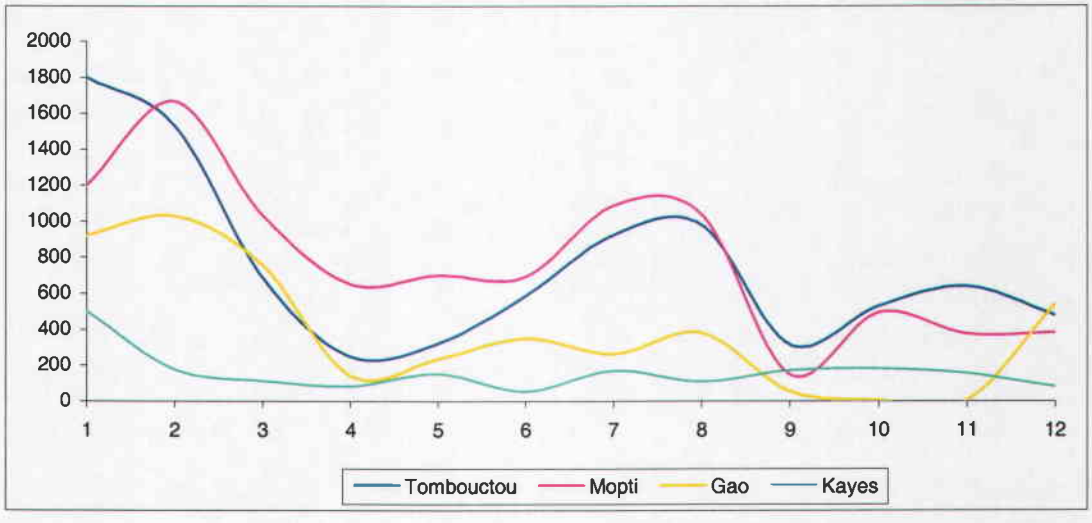
Seasonal demand is evident in the domestic airports, more over on those whose main activity is tourism in the region. Graph III-3 graphically shows the values presented in Table III-3 with regard to the monthly passenger volume in the four main domestic airports.

Table III-3. Monthly Passenger Volume

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	TOTAL
GAO	Commercial	0	22	44	61	20	0	0	0	0	0	0	279	426
	Non-commercial	918	1002	710	79	231	346	259	375	50	1	0	261	4232

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	TOTAL
	Total	918	1024	754	139	231	346	259	375	50	1	0	540	4637
KAYES	Commercial	449	149	5	0	0	0	0	39	76	91	104	71	984
	Non-commercial	50	24	104	80	149	50	165	66	92	88	48	4	920
MOPTI	Commercial	953	1494	958	570	584	629	936	888	50	375	246	161	7844
	Non-commercial	243	173	74	81	115	62	149	148	97	119	128	219	1608
	Total	1196	1667	1032	651	699	691	1085	1036	147	494	374	380	9452
NIORO	Commercial	86	145	219	199	295	288	355	211	0	6	0	0	1804
	Non-commercial	0	0	0	9	0	41	0	8	0	0	0	0	58
	Total	86	145	219	208	295	329	355	219	0	6	0	0	1862
TOMBOUCTOU	Commercial	1225	1276	571	140	230	458	787	811	65	449	426	173	6611
	Non-commercial	573	254	115	107	90	126	135	166	248	80	211	304	2409
	Total	1798	1530	686	247	320	584	922	977	313	529	637	477	9020

Graph III-3. Monthly Passenger Volume



The highest period of air traffic demand is on the dry season months between December and March. These are the months with the most tourist flow to Tombouctou, Mopti and Gao. There is also a slight increment during the months of July and August which correspond to vacation months for Europe, which are used by tourists as well as the Malian population living abroad for visiting the main tourist centers and visiting family.

Gao, on the other hand, is the only domestic airport which currently receives one international charter flight a week during the December-March period. This flight is chartered by Air Corsair together with an European tour operator, which uses a B737 with a capacity of 140 passengers from France.

The domestic airports have been mainly served by private aircraft during 2000. Tables III-4 shows the aircraft movements at the domestic airports while Table III-5 shows the average number of passengers per aircraft for both commercial and non-commercial air traffic.

Table III-4. Aircraft Movements at Domestic Airports

		Total	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
GAO	Commercial	37	1	8	8	8	4	2	0	0	0	0	0	6
	Non-commercial	430	39	26	64	36	37	51	60	58	10	1	0	48
	Total	467	40	34	72	44	41	53	60	58	10	1	0	54
KAYES	Commercial	258	49	14	2	24	34	32	0	16	27	24	20	16
	Non-commercial	269	7	24	37	24	34	32	44	16	14	10	24	3
	Total	527	56	38	39	48	68	64	44	32	41	34	44	19
MOPTI	Commercial	439	52	70	52	32	38	34	34	49	2	28	32	16
	Non-commercial	370	50	43	24	26	19	28	22	22	19	53	30	34
	Total	809	102	113	76	58	57	62	56	71	21	81	62	50
NIORO	Commercial	133	24	12	20	14	20	14	16	9	0	2	0	2
	Non-commercial	4	0	0	0	0	0	0	0	2	0	0	2	0
	Total	137	24	12	20	14	20	14	16	11	0	2	2	2
TOMBOUCTOU	Commercial	265	48	46	23	7	12	18	20	26	2	17	34	12
	Non-commercial	261	44	27	24	12	15	17	8	20	19	21	18	36
	Total	526	92	73	47	19	27	35	28	46	21	38	52	48

The average number of passengers per aircraft in Mali is as follows:

Commercial Flights 14 passengers/aircraft

Noncommercial Flights 8 passengers/aircraft

Keeping in mind that the commercial flights are mainly operated by Air Mali with an AN24 with a capacity of 51 passengers, the occupancy rate comes out to be very low. Although these ratios vary from one airport to the other, for example, Tombouctou is 24 passengers per

aircraft for commercial flights, Kayes 4 passengers/aircraft or Mopti 17 passengers/aircraft. The data corresponding to noncommercial flights are more congruent as shown in Table III-5.

Table III-5. Passenger/Aircraft Ratio

		Passengers/Aircraft
GAO	Commercial	11.5
	Non-commercial	9.8
	Total	9.9
KAYES	Commercial	3.8
	Non-commercial	3.4
	Total	3.6
MOPTI	Commercial	17.9
	Non-commercial	4.3
	Total	11.7
NIORO	Commercial	13.6
	Non-commercial	14.5
	Total	13.6
TOMBOUCTOU	Commercial	24.9
	Non-commercial	9.2
	Total	17.1

3.1.1 Air Mali

In January of 2001, a report was submitted ("Creation d'une Compagnie Aérienne au Mali") regarding the situation of the national company, Air Mali S.A., to Mali's Government. In this study Air Mali's current situation is analyzed as well as the presentation of recommendations for correct exploitation.

Air Mali S.A. is experiencing a series of economic and operational difficulties worsened by taking out of service of the Let 410. The company's image is completely deteriorated due to the numerous delays and frequent flight cancellations. This situation only achieves a great mistrust on the flight schedule of the company and, therefore, terrible support to the domestic airports during 2000, as shown in Graph III-1. Therefore, the Federal Aviation

Administration of United States has recommended to not use Air Mali due to a lack of ways for ensuring operational security.

With regard to air traffic data, it should be noted that there exist contradicting data between the passenger volume statistics presented by said report and data provided by Air Mali. Our data is the one shown in Table III-6, which does not coincide with the data provided in the report. Unfortunately, the data could not be corroborated, so we assume that the statistics we have are accurate.

Table III-6. Air Traffic Data

	1998	1999	2000(1)
International	25 023	23 682	12 710
Boucle du Niger	15 475	14 238	5 890
Sahel	10 609	10 558	3 459
Total	51 107	48 478	22 059

(1) The data corresponding to 1998 and 1999 were provided by Air Mali, while the 2000 data were extracted from ADM statistics.

Due to Air Mali's condition as a public company, it must provide service to airports of national interest, which makes the company invest in the exploitation of routes with no financial return. This factor is not the determinant on the appalling situation that it is going through, it is more of deficient management, lack of tourism infrastructure that would provide air traffic incentives, participation of Air Afrique in the capitalization of the company, lack of aeronautical means, etc.

The recommendations shown in the report are, briefly, as follows:

- Regular flight schedules
- Flight punctuality
- Assessment of the fleet in a rational way
- Propose air tariffs adapted to each clientele segment
- Develop cargo transport

- Negotiate associations with other air companies and other market agents

3.1.2 Liberalization of Airspace

In 1992, the Government of Mali formed part of the Yamoussoukro Declaration in order to allow the liberalization of airspace among all the African states and the intervention of various air national companies. The results of this treaty have still not been productive. Recently, a Second Yamoussoukro Declaration has been signed in order to ultimately put into practice the open-skies concept in the African territory. Therefore, any company will be able to operate in any African airport and exploit the routes it considers most profitable, without any national impediments.

In the case of Mali, the commercial airspace is divided among Air Afrique for international flights and Air Mali for domestic flights.

The structure for international flight exploitation is managed in its entirety by Air Afrique. Even though the 1992 agreement allows any company to operate in Mali, this liberalization is fictitious since the only handling operator in Bamako is Air Afrique, which imposes exaggerated tariffs for those airlines with which it does not have any bilateral agreements. On the other hand, until recently Air Mali exercised total monopoly of domestic commercial routes. Currently, the ministerial order 1672 MTPT SG dated October 15, 1998 allows for the creation of any air company registered in Mali aimed at commercial exploitation of domestic flights.

In 2000, the airline Ligne Aérienne Felou appeared serving the Kayes and Nioro Airports with an Antonov 24, transporting a total of 63 passengers, but it has stopped flying due to a lack of income in order to maintain the aircraft. Currently, there are 4 companies registered and authorized for regular commercial flights: L.A. Felou (AN24), Multi Air Services (Northon 262 – 29 seats), SociétéAvion Express (Cessna 402), and STA Mali (2 Let 410 plus other small capacity planes). These companies are authorized to exploit aircraft of any capacity.

Another lower level is the air taxi category which corresponds to aircraft of less than 10 seats. In this category there are three companies registered and authorized to operate: SAS, CTK and Malitas Air Taxi.

The authorization of an airline follows a predetermined inspection and official approval process. The first step is registration of the companies statutes in the Chamber of Commerce, then the statute is deposited in the DNAC (Direction National de l'Aéronautique Civil) together with a feasibility study and a certain amount of money depending on the category of exploitation: 4,000,000 FCFA for first level companies and 400,000 FCFA for air taxi companies. With the authorization from the Ministry, the DNAC proceeds to inspect the

organic structure of the company, air fleet, maintenance facilities, operations, material, equipment, licenses, etc.

If everything is in order, the DNAC authorizes the company the permit for exploitation. Later and in a periodic manner, the DNAC inspects the air company according to Annexes 1.6 and 8 of the International Civil Aviation Organization (ICAO).

3.1.3 Factors Affecting Demand

Today, the air transport scenario in Mali has multiple incentives:

- There is a real air traffic demand motivated by the tourism attractions of the country and for its strategic situation in the African continent.
- The domestic airport infrastructures are modernizing in order to accommodate long-range aircraft that up to now could not operate as is the case of Tombouctou, which has a new airport complex designed for B727; Mopti must be renovated before the 2002 National African Cup (NAC) and will have a runway of 2,500 meters for landing B737; Kayes, Nioro and Sikasso are venues for the 2002 NAC and are being renovated and modernized,
- The liberalization of the air transport has allowed for the appearance of new national companies,
- The extension of the country and bad condition of infrastructures of other modes of transportation lead to the dependence of air travel for communicating with other regions in the country.

However, there are other inconveniences that have deadlocked air traffic in the domestic airports, among them are:

- Lack of coordination between the different agents that are directly or indirectly involved in the air transport market,
- Lack of government to implement the development strategies of activities that promote air traffic,
- Lack of financing for the development of transport, tourism and other infrastructures
- Lack of promotion and securing of investors and other agents that participate in the development of activities related to airports,
- Lack of a business attitude for medium term by the agents involved in air transport
- The monopolistic exercise of the ground assistance service by Air Afrique in Bamako,

- Although Tombouctou has more modern airport facilities it does not have the fundamental element to provide services to long-range aircraft: aircraft fuel supply, therefore, discouraging tour operators to charter aircraft from Europe destined to Tombouctou. Conversations with the people from Mobil responsible for fuel supply of the Mali airports concluded in that assistance to Tombouctou depends in great part in the air traffic volume from the airport. The supply is possible through Cisterna 4x4 vehicles with the capacity to circulate through sand with a capacity of 15,000 liters of JetA-1.
- Air transport access by the local passengers is difficult due to the high cost of air tariffs.
- Lack of development of air cargo transport activities, which could be, mainly, fresh products such as fruits and vegetables from Sikasso or other products such as gold from Kayes.

Table III-7. Boeing Company Global Market Forecast

	Africa	Asia-Pacific	Europe
	2000-2019	2000-2019	2000-2019
Traffic Growth			
to/from:	%/year	%/year	%/year
Africa	6.5	5.1	5.2
Asia-Pacific	5.1	6.7	5.7
Europe	5.2	5.7	5.0
Middle East	4.0	4.3	4.4
Latin America	6.8	3.8	5.1
North America	4.4	5.0	3.6
Airplane deliveries			
Number of airplanes			
Single-aisle and regional jets	358	2,626	5,496
Twin-aisle	103	1,975	1,128
747 and larger	18	613	173
Total	479	5,214	6,797

Delivery dollars, billions (1999)			
Single-aisle and regional jets	14.9	116.1	222.6
Twin-aisle	13.6	267.1	144.2
747 and larger	3.3	123.0	34.5
Total	31.8	506.2	401

20-Year Outlook—Airplanes

Economic and traffic growth, 2000–2019

Major projections for the 20-year period 2000 to 2019 are as follows:

- Worldwide economic growth will average 3.0% per year.
- Passenger traffic growth will average 4.8% per year.
- Cargo traffic growth will average 6.4% per year.

Worldwide demand for commercial airplanes, 2000–2019

The world fleet will be 31,755 passenger and cargo jets in 2019. The composition of the world fleet in 2019 will be:

- 15% smaller regional jets.
- 22% intermediate-size airplanes.
- 57% single-aisle airplanes.
- 6% 747-size or larger airplanes.

The total market potential for new commercial airplanes is 22,315 airplanes, or an equivalent $1.50 trillion in 1999 US dollars. Airlines will take delivery of:

- 4,195 smaller regional jets.
- 4,730 intermediate-size airplanes.
- 12,380 single-aisle airplanes.
- 1,010 747-size or larger airplanes

Table III-8. Airbus Industrie Global Market Forecast (Gmf) 2000-2019

AIR PASSENGERS				
Markets	% world RPK	Average annual growth rate (%)		
		1999-2009	2009-2019	1999-2019
Africa – Europe	2.72	4.4	4.0	4.2
Africa – Middle East	.30	4.5	4.7	4.6
Domestic Africa	.29	4.1	4.0	4.1
Intra-Africa	.26	4.1	4.0	4.1

AIR PASSENGERS				
Markets	**% world RPK**	**Average annual growth rate (%)**		
		1999-2009	**2009-2019**	**1999-2019**
Africa – USA	.23	5.0	4.3	4.7
Africa – Asia	.14	4.7	3.4	4.0
Africa – Pacific	.10	6.7	5.1	5.9
Africa – India	.05	4.3	4.7	4.5
Africa – China	.05	6.7	5.1	5.9
Africa – Canada	.02	5.0	4.3	4.7
Africa – South America	.02	5.4	4.4	4.9
Africa – CIS	<.01	4.6	5.0	4.8
Africa – Central America	<.01	5.4	4.4	4.9
Total World		5.7	4.6	4.9

AIR FREIGHT				
Markets	**% world FTK**	**Average annual growth rate (%)**		
		1999-2009	**2009-2019**	**1999-2019**
Africa to Asia	.09	5.5	6.2	5.9
Africa to Central America	.01	5.5	5.5	5.5
Africa to China	.03	7.8	5.7	6.7
Africa to CIS	.01	5.5	5.5	5.5
Africa to Europe	.89	7.8	5.5	6.6
Africa to India	.01	5.5	5.5	5.5
Africa to Middle East	.03	5.5	5.5	5.5
Africa to North America	.20	5.5	5.5	5.5
Africa to Pacific	.02	5.5	5.5	5.5
Asia to Africa	.27	4.2	2.6	3.4
Africa to South America	.01	7.0	4.2	5.6
Central America to Africa	.01	5.5	5.5	5.5

China to Africa	.21	10.1	6.3	8.2
CIS to Africa	.01	5.5	5.5	5.5
Europe to Africa	1.02	6.1	5.7	5.9
India to Africa	.04	5.5	5.5	5.5
Intra-Africa	.11	8.2	4.7	6.5
Middle East to Africa	.03	5.5	5.5	5.5
North America to Africa	.34	5.5	5.5	5.5
Pacific to Africa	.05	5.5	5.5	5.5
South America to Africa	.04	4.3	3.0	3.6
Total World		6.1	5.3	5.7

Source: African Aviation Magazine, December 2000

3.2 Planning Criteria and Design Standards

3.2.1 Introduction

Airport planning standards and criteria to ensure safe aircraft operations have been established by the International Civil Aviation Organization (ICAO) under Annex 14 to the Convention on International Civil Aviation. These criteria and standards cover such aspects as the vertical space surrounding the airport, the horizontal configuration of the airport's airside infrastructure, the visual and navigational aids systems of the airfield and safety and security aspects such as fire and rescue services and perimeter fencing.

In regard to vertical space, the standards recommend that clear approach and departure paths to and from runways are free of obstacles for aircraft landing and taking off, and that imaginary horizontal surfaces above the airport be clear of penetration.

Airside infrastructure (runways, taxiways and aprons) dimensions are based on an ICAO Aerodrome Reference Code for airports derived from the airport runway length and the dimensions of the largest aircraft regularly using the airport. Following this code designation, certain airport dimensional standards are recommended which cover runway and taxiway width as well as separations between runways and taxiways and fixed or movable objects on the ground (for example aircraft parked on the apron) in order to provide adequate space for landing, taxiing or departing aircraft. Dimensions are recommended for graded areas off the end of runways and on the sides of runways to take care of aircraft overrunning or under running or veering off the runway. Annex 14 also covers gradients for runways, taxiways and aircraft parking aprons.

Annex 14 contains standards for airfield lighting for night aircraft operations or daytime operations in poor visibility, for approach lighting systems and for the visual and radio navigational aids required for safe aircraft operations. The type of navigational aids (navaids) and lighting equipment at an airport along with its related emergency power system are directly related to permissible minimum ceiling and visibility requirements for aircraft landing at the airport. ICAO has, for example, established different approach categories for aircraft operations based on the prevailing visibility conditions and radio navigational aid systems in operation during instrument flying conditions.

In addition, ICAO has adopted recommended standards for the location of fire and rescue installations on the airport, and the type and quantity of fire fighting and rescue equipment, which should be on hand, and operational based on the size of aircraft using the airport. ICAO has also developed recommended standards for airport perimeter security fencing specifications.

Specific planning standards and criteria against which the current status and condition of the existing airports be measured, and for determining future airport development requirements related to air traffic growth, have been grouped into various categories and are further described below.

3.2.2 ICAO Criteria

The basis for establishing the reference code for the airports is illustrated in the table shown below. This table is directly taken from ICAO's Annex 14.

Table III-9. ICAO Aerodrome Reference Code

Code Element 1		Code Element 2		
Code Number	**Aircraft Reference Field Length**	**Code Letter**	**Wing Span**	**Outer Main Gear Wheel Span[a]**
(1)	(2)	(3)	(4)	(5)
1	Less than 800 m	A	Up to but not including 15 m	Up to but not including 4.5 m
2	800 m up to but not including 1200 m	B	15 m up to but not including 24 m	4.5 m up to but not including 6 m
3	1200 m up to but not including 1800 m	C	24 m up to but not including 36 m	6 m up to but not including 9 m
4	1800 m and over	D	36 m up to but including 52 m	9 m up to but not including 14 m
		E	52 m up to but not including 65 m	9 m up to but not including 14 m

	F	65 m up to but not including 80 m	14 m up to but not including 16 m

[a] Distance between the outside edges of the main gear wheels.

Source: Aerodromes, Annex 14 to the Convention on International Civil Aviation, Volume I, 3rd Ed., International Civil Aviation Organization, July 1999, Table 1-1.

The recommended ICAO standards for the dimensions of runway strips, cleared and graded areas, runway and taxiway widths and minimum separations are shown in the following four tables, which are also taken from Annex 14.

3.2.2.1 Length and Width of Runway Strip and Runway Width

A strip shall extend before the threshold and beyond the end of the runway or stopway for a distance of at least:

- 60 m where the code number is 2, 3 or 4;
- 60 m where the code number is 1 and the runway is an instrument one; and
- 30 m where the code number is 1 and the runway is a non-instrument one.

Table III-10. ICAO Minimum Dimensional Recommended Standards

	ICAO Code Number			
	1	2	3	4
Width of runway strips				
Precision approach runway (m)	75	75	150	150
Nonprecision approach runway (m)	75	75	150	150
Noninstrument runway (m)	30	40	75	75
Width of cleared and graded area				
Instrument runway (m)	40	40	75	75
Noninstrument runway (m)	30	40	75	75

Note: Distances shown extend laterally on each side of the centerline of the runway and its extended centerline throughout the length of the strip.

Source: Aerodromes, Annex 14 to the Convention on International Civil Aviation, Volume I, 3rd Ed., International Civil Aviation Organization, July 1999, Chapter 3.

Table III-11. ICAO Recommended Standards – Minimum Width of Runways

Code Number	Code Letter					
	A	B	C	D	E	F
1[a]	18 m	18 m	23 m	-----	-----	-----
2[a]	23 m	23 m	30 m	-----	-----	-----
3	30 m	30 m	30 m	45 m	-----	-----
4	-----	-----	45 m	45 m	45 m	60 m

[a] The width of a precision approach runway should be not less than 30 m where the code number is 1 or 2.

Source: Aerodromes, Annex 14 to the Convention on International Civil Aviation, Volume I, 3rd Ed., International Civil Aviation Organization, July 1999, Chapter 3.

In addition, there are specific recommendations concerning the width of shoulders for Code D or E runways and taxiways. The recommended width for each shoulder of a Code E runway is 7.5 meters and for a Code E taxiway is 10.5 meters.

A runway shoulder should be prepared or constructed so as to be capable, in the event of an aircraft running off the runway, of supporting the aircraft without inducing structural damage to the aircraft and of supporting ground vehicles, which may operate on the shoulder. Guidance on strength of runway shoulders is given in the *Aerodrome Design Manual, Part 1.*

Table III-12 shows the ICAO recommended standards for the width of taxiway and Table III-13 shows the recommended minimum taxiway separation distances.

Table III-12. ICAO Recommended Standards – Width of Taxiways

Code Letter	Taxiway Width
A	7.5 m
B	10.5 m
C	15 m if the taxiway is intended to be used by airplanes with a wheel base less than 18 m 18 m if the taxiway is intended to be used by airplanes with a wheel base equal to or greater than 18 m

Code Letter	Taxiway Width
D	18 m if the taxiway is intended to be used by airplanes with an outer main gear wheel span of less than 9 m
E	23 m

Source: Aerodromes, Annex 14 to the Convention on International Civil Aviation, Volume I, 3rd Ed., International Civil Aviation Organization, July 1999, Chapter 3.

Table III-13. ICAO Recommended Standards – Taxiway Minimum Separation Distances

	Distance Between Taxiway Center Line and Runway Center Line										
	Instrument Runways				Non-Instrument Runways						
	Code Number				Code Number						
Code Letter	1	2	3	4	1	2	3	4	Taxiway Center Line To Taxiway Center Line (m)	Taxiway, Other Than Aircraft Stand Taxilane, Center Line to Object (m)	Aircraft Stand Taxilane Center Line to Object (m)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
A	82.5	82.5			37.5	47.5	-----	-----	23.75	16.25	12
B	87	87			42	52	-----	-----	33.5	21.5	16.5
C	-----	-----	168		-----	-----	93	-----	44	26	24.5
D	-----	-----	176	176	-----	-----	101	101	66.5	40.5	36
E	-----	-----	-----	182.5	-----	-----	-----	107.5	80	47.5	42.5
F	-----	-----	-----	190				115	97.5	57.5	50.5

Note1: The separation distances shown in columns 2 to 9 represent ordinary combinations of runways and taxiways. The basis for development of these distances is given in the *Aerodrome Design Manual, Part 2.*

Note 2: The distances in columns (2) to (9) do not guarantee sufficient clearance behind a holding aircraft to permit the passing of another aircraft on a parallel taxiway. See the *Aerodrome Design Manual, Part 2.*

Source: Aerodromes, Annex 14 to the Convention on International Civil Aviation, Volume I, 3rd Ed. July 1999, Table 3-1.

3.2.3 Other Applicable Criteria

In determining whether airports meet generally acceptable criteria for an appropriate level of service as well for estimating facility requirements from forecast traffic demand, a set of recommended criteria and planning factors have been developed which are considered to be the norm which address other aspects beyond the ICAO standards previously discussed. Much of the research and development of these criteria and factors has been conducted by the U.S. FAA, IATA, ICAO and the aircraft manufacturers (in regard to the effects of aircraft take-off, load and maneuvering characteristics). The Consultants have successfully used these criteria and factors in their airport planning activities. These criteria and factors, which are further described below, will be used as guidelines in calculating facility requirements for the Malian airports, and will be supplemented by a more detailed analysis as required.

The criteria and factors which the Consultants will use in developing airport requirements for the Malian airports break down generally into the following categories: a) the airfield, which includes separations between runways and future taxiways and criteria for separation between runway/taxiway and fixed objects and runway take-off length; b) the terminal area to include passenger terminal and cargo terminal space requirements and aircraft parking requirements; c) the land or ground side consisting of public and airport employee parking space requirements and access roadway lane requirements; and, d) and utility support requirements to include water, sewage treatment and electric power.

3.2.4 Airfield

3.2.4.1 Number of Runways

A single runway with a parallel taxiway may accommodate a peak hour capacity of up to 56 IFR operations hourly, or an annual service volume of 205,000 IFR operations, with an average aircraft mix index of 67, according to the standard runway capacity analysis by the U.S. FAA.[2] However, this is based on standards of controller efficiency, equipment and aircraft separations prevalent in the U.S. and should be reduced for use in most other countries. Based on international experience outside the United States, the Consultants believe that a limit of approximately 35 to 40 peak hour IFR operations for a single runway in a radar environment is a more appropriate standard to use, or 30 operations an hour in a non-radar environment. Thirty operations an hour would convert to an annual service volume of about 110,000 operations. This would indicate, in order to avoid excessive delay without radar, that the development of a second runway could become necessary as annual operations approach the 90,000 to 100,000 level.

[2] See FAA Advisory Circular AC150/5060-5, Airport Capacity and Delay, Change 2, January 12, 1995.

3.2.4.2 Runway Length

Another aspect of runway requirement analysis is that of runway length. Runway length is principally a function of ambient temperature, runway elevation, take-off flap setting, engine type and thrust and the longest flight stage length of the most critical aircraft using the runway. The critical aircraft is the aircraft currently in service or which is likely to be in service during the planning period, which requires the longest runway for take-off in comparison with all other aircraft in general, using at the airport. Without adequate runway length, airlines face a penalty in terms of the passenger and cargo load, which can be carried to selected destinations. In the past, the critical aircraft was also defined as the aircraft using the airport, which required the greatest strength of pavement because of a combination of its total weight and landing gear configuration. However, with the advent of new and more sophisticated techniques for analyzing the optimum design of airfield pavement, this is no longer the case.

3.2.4.3 Runway End Safety Area

Runway End Safety Area is an area at the end of each runway consisting of an area 300 meters long as recommended by ICAO and 150 meters wide along the extension of the runway centerline. This safety area provides a cleared and graded area with stabilized soil in the event that an aircraft undershoots or overruns the runway. It also facilities the movement of rescue and fire fighting vehicles.

3.2.4.4 Aircraft Parking Aprons

The size of apron required for air carrier operations is determined by the size and number of the various aircraft using the apron, the apron and terminal building configuration and the taxilane location and configuration. Apron space requirements should be tailored to the layout of the passenger terminal area and will be discussed in more detail in a subsequent section of the report. In general, parked aircraft should be separated from each other, wing tip to wing tip, by 7.5 meters and should be parked no closer than 4.5 meters from the terminal building. In addition, as prescribed in the previously shown ICAO Table listing minimum taxiway separation distances, there should be a 42.5-meter separation between the centerline of a taxilane on the apron and any object such as an aircraft or a building.

The aprons were sized for the peak hour air traffic forecast with the minimum amount of apron space determined using the parking arrangements for a minimum of two design aircrafts for the possibilities during the peak hour, one aircraft parking position will be utilized for arriving aircraft and the other position occupied for a departure flight, maintenance or a transient aircraft. All aprons were size for power in- power out with perimeter access for service vehicles.

3.2.5 Terminals

3.2.5.1 Passenger Terminals

General standards have been developed for determining the adequacy of passenger terminal space requirements based on the estimated number of passengers to be accommodated during the peak hour. For terminal planning throughout the world, criteria and formulas developed for various terminal functions by the International Air Transport Association (IATA) are generally used. Based on the IATA criteria and formulas, plus assumptions derived from experience in incorporating the additional space required for non-passenger and non-baggage processing functions such as concessions, bathrooms, circulation, etc., a comparison will be made between existing terminal capacity and demand. In planning a terminal expansion for the Malian airports, the Consultants will conduct a more detailed space requirement analysis.

3.2.5.2 Cargo Terminals

For purposes of arriving at a general estimate of the air cargo handling space required at some of the Malian airports included in this study, the use of factors based on annual volumes of air cargo is considered acceptable. In the developing world, the average is about 5 to 6 tons of cargo per square meters.

3.2.6 Other Airport Installations and Equipment

Other required airport installations and equipment include such items as perimeter fencing; fire and rescue installations and equipment; airfield lighting and emergency power; control towers and tower cabs of adequate height and visibility with sufficient controller positions; major utilities such as water supply, sewage treatment and electric power; as well as vehicle parking and access roads.

3.2.7 Safety and Security

3.2.7.1 Fire and Rescue

The ICAO recommended standards for fire and rescue installations and equipment are considered particularly important for safety. ICAO standards govern the location of fire stations. Fire and rescue vehicles must have unobstructed access to the airfield, with a minimum number of turns, at all times. Vehicles should be able to achieve a response time of two minutes, not exceeding three minutes, to reach the ends of all runways and begin dispensing fire-fighting foam.

Airports are assigned categories[3] by ICAO for purposes of specifying the minimum available amounts of extinguishing agents to be carried on the fire fighting vehicles. These categories are shown in the following table, which is taken from Table 9-1 of ICAO Annex 14.

Table III-14. Aerodrome Category for Rescue and Fire Fighting

Aerodrome Category (1)	Aircraft Over-All Length (2)	Maximum Fuselage Width (3)
1	0 up to but not including 9 m	2 m
2	9 m up to but not including 12 m	2 m
3	12 m up to but not including 18 m	3 m
4	18 m up to but not including 24 m	4 m
5	24 m up to but not including 28 m	4 m
6	28 m up to but not including 39 m	5 m
7	39 m up to but not including 49 m	5 m
8	49 m up to but not including 61 m	7 m
9	61 m up to but not including 76 m	7 m
10	76 m up to but not including 90 m	8 m

Some improvement in water and foam discharge capacity is anticipated at all airports to meet performance level A standards.

The amount of water for foam production and the complimentary agents to be provided on the rescue and fire fighting vehicles shall be in accordance with the following table.

[3] Until recently the largest aircraft with 700 or more annual operations determined the category. However, the current requirement is that by the Year 2005, the largest aircraft will determine the category regardless of the number of annual operations.

Table III-15. Minimum Usable amounts of extinguishing Agents

Foam Meeting Performance Level A			Foam Meeting Performance Level B		Complementary Agents		
Aerodrome Category	Water (L)	Discharge Rate Foam Solution/ Minute (L)	Water (L)	Discharge Rate Foam Solution/Minute (L)	Dry Chemical Powders (kg)	Halons or (kg)	CO_2 (kg)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	350	350	230	230	45	45	90
2	1000	800	670	550	90	90	180
3	1800	1300	1200	900	135	135	270
4	3600	2600	2400	1800	135	135	270
5	8100	4500	5400	3000	180	180	360
6	11800	6000	7900	4000	225	225	450
7	18200	7900	12100	5300	225	225	450
8	27300	10800	18200	7200	450	450	900
9	36400	13500	24300	9000	450	450	900
10	48200	16600	32300	11200	450	450	900

Source: Chapter 9, Aerodrome Annex 14, Volume 1, Aerodrome Design and Operations, Third Edition.

The table below, Table III-16, shows the minimum number of fire/rescue vehicles required under each aerodrome category.

Table III-16. Minimum Number of Vehicles

Airport Category	Rescue and Fire Fighting Vehicles
1	1
2	1
3	1
4	1
5	1
6	2
7	2
8	3
9	3
10	3

Source: Chapter 9, Aerodrome Annex 14, Volume 1, Aerodrome Design and Operations, Third Edition.

3.2.7.2 Perimeter Fencing

ICAO recommendations for perimeter fencing are found in ICAO Annex 14, Chapter 8; ICAO Airport Services Manual, Part 8, Airport Operational Services; and Part 1, Chapter 4 of the ICAO Security Manual for Safeguarding Civil Aviation against Acts of Unlawful Interference. The specific recommendations concerning airport perimeter fencing, contained on page I-4-42 of Chapter 4 of the latter manual, state that the fencing should have a minimum height of 2.13 meters with a total height of 2.44 meters including several strands of barbed wire. The fencing should be metal chain link supported by reinforced concrete posts, steel stanchions or the fence should be steel-rodded. The fencing wire should be not less than US 10 gauge with apertures no larger than 5 centimeters square.

3.2.8 Navigational Aids

For a precision instrument approach, an ILS radio navigational aid is required and normally a terminal VOR/DME is also used.

3.2.9 Utilities

3.2.9.1 Water

All airports require an adequate supply of potable water[4]. Typical water consumption rates for the analysis of water supply requirements at the Malian airports included in this study are as follows:

Daily terminal area employees	250 liters per day
Passengers during peak day	20 liters per day
Daily maintenance area employees	450 liters per day

3.2.9.2 Sewage Treatment

Sewage treatment capacity requirements, provided the sewage system is protected against storm water, are normally calculated by applying a factor of 100 % of the potable water supply requirement, which is the planning criteria which will be used this study. The type of treatment proposed for the airports is a septic tank system that discharges into a cylindrical leaching pit. This treatment is the most feasible based upon the level of treatment required, Malian building code requirements and is the predominant system currently in place at the airports.

3.2.9.3 Electrical Power

The standard electric power coming off the power grid should provide sufficient power to the airports to meet all their operational needs with the capability of expansion to meet airport growth. If possible, the power coming into the airport should come from two separate power sources to increase its reliability.

3.2.9.3.1 Emergency Power

As specified in Table 8-1 of ICAO Annex 14, emergency power supply for airfield and approach lighting for a precision (ILS) CAT I instrument approach must have a 15 second switch-over

[4] The health standard that will be used for the desired quantity level of potable water is that prescribed by the World Health Organization (WHO).

time. The radio navigational aids, as well as the control tower, should have uninterrupted emergency power (UIP).

3.2.10 Vehicle Parking

Parking for vehicles at airports must be adequate to accommodate employee and passenger related parking. The adequacy of present and future parking at the passenger terminal(s) will be determined based on an evaluation of current vehicular traffic and its relationship to peak hour passenger. For forecasting, future levels of arriving and departing passengers excluding transfer passengers and including visitors. A criteria of 25 square meters per parked vehicle was assumed as an average parking position requirement.

TOC

IV. AIRPORTS ANALYSIS

4.1 Gao Airport

4.1.1 Socioeconomic Profile

4.1.1.1 Transportation Factors

Gao town is situated on the Niger River at the southern edge of the Sahara (desert) in eastern Mali. Gao serves as a terminus for large steamers emanating from Mopti and Koulikoro. A road crossing the Sahara links the town with Algeria, and other roads connect with Tombouctou and Mopti.

Gao is approximately 1,210 km northeast of Bamako and is connected to Bamako via a paved road in good conditions, as follows:

Bamako/Mopti-Sévaré	RN-6	631 km
Mopti-Sévaré/Gao	RN-16	579 km

With the exception of the road connecting it with Bamako, Gao's ground communication is not reliable or comfortable. Gao is also connected to the neighboring countries with the following roads:

Table IV-1. Road Transportation Infrastructures for Gao

		Road Code	Distance (km)	Type of Road	Condition
Gao	Nigeria Border	RN17	212	Improved	Bad
Gao	Algeria Border	RN18	100	Improved	Fair
			532	Improved	Fair

RN17 penetrates Nigeria at the Labbezanga border post and provides a link to Niamey, some 248 km to the Southeast via paved road. This route also provides Gao with access to the Atlantic Ocean through Cotonou (Benin) some 1,476 km away.

RN18 enters Algeria through Bordj-Mokhtar and proceeds some 640 km north to Reganne where it connects to a paved road that leads to the north of the country.

4.1.1.2 Tourism Factors

Although Gao is not a tourist attraction on the level of Tombouctou or Mopti, the region contains the archeological remains of Gao Sanèye, the Askia Mohammed tombs, the elephant reserve of Gouma and the Sahel museum.

One of the key factors for tourist attraction in Gao is the cultural tourism of the city, where a traveler can visit some of the already mentioned centers.

4.1.1.3 Socioeconomic Factors

Most of Gao region's population lives near the banks of the Niger River, where irrigation permits the growing of wheat, rice, and sorghum. Phosphate is mined in the Tilemsi area north of Gao. The population, as reported in the census of 1998, was 170,572.

4.1.2 Current Airport Activities

Gao Airport, like Tombouctou and Mopti, currently receives regular commercial flights from Air Mali on a weekly basis. The arrival is scheduled for Wednesday at 12:35 p.m., departing Thursday at 7:00 a.m. The Air Mali AN-24 aircraft servicing Gao overnights in Gao Airport. Due to its frequent financial and technical problems, Air Mali has so far provided irregular services to Gao.

Gao is the only interior airport that currently receives international flights. At present, these are weekly charter flights operated by Air Corsair during the months of December to August, originating in France. Air Corsair uses a B-737 aircraft with a capacity of 140 tourists, who disembark in Gao and take a bus to Mopti. As shown in Table IV-2, the 200% increment in the number of passengers between 1999 and 2000 is due to charter flights.

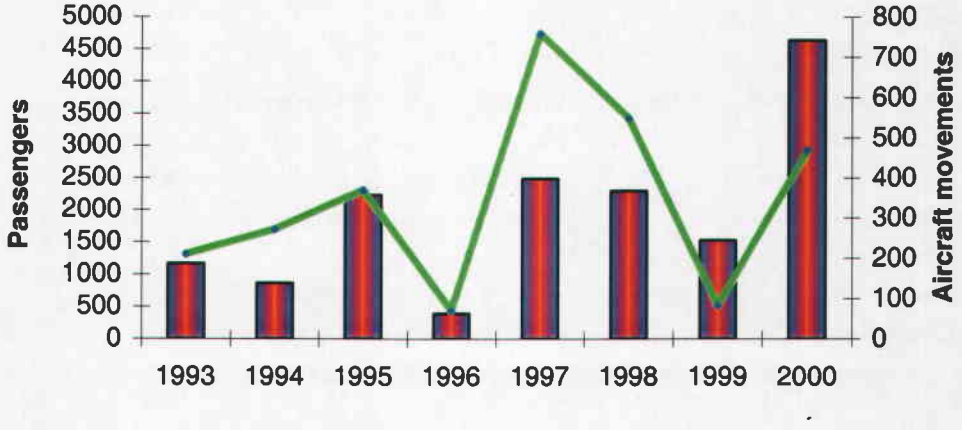
During 2000, Gao Airport registered an average of two operations per day, which means only one aircraft parked per day.

Table IV-2. Airport Activity in Gao

		1993	1994	1995	1996	1997	1998	1999	2000
Gao (GAQ)	Aircraft Operations	208	270	368	68	757	547	81	467
	Passengers	1164	868	2228	390	2484	2293	1526	4637
	Freight (kg)	155	-	15867	71	-	-	878	913
	Mail (kg)	1816	2530	668	675	-	84	58	60

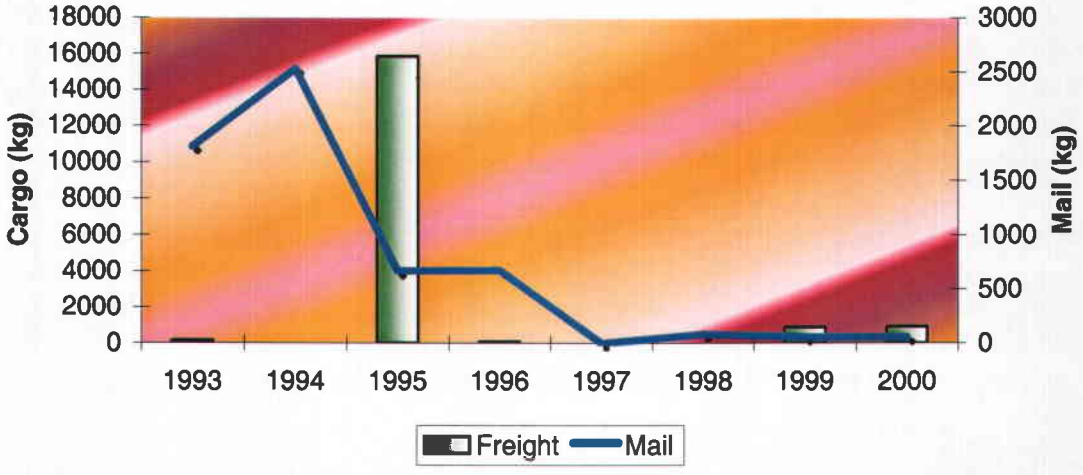
There is a slight R^2 correlation equal to 0.65 between passenger traffic and aircraft traffic in Gao Airport during the past seven years.

Graph IV-1. Gao Airport Activity



The cargo traffic at the airport has very irregular statistics, as shown in Graph IV-2. Some years are not given due to zero cargo movement or cargo was not registered at the airport, as happened in 1997. For 2000, no reliable data was available from the information provided, therefore, for 2000 the same growth trend equal to the forecast trend and a break down between cargo and mail as the one registered for 1999 was used.

Graph IV-2. Cargo and Mail Operations at Gao Airport

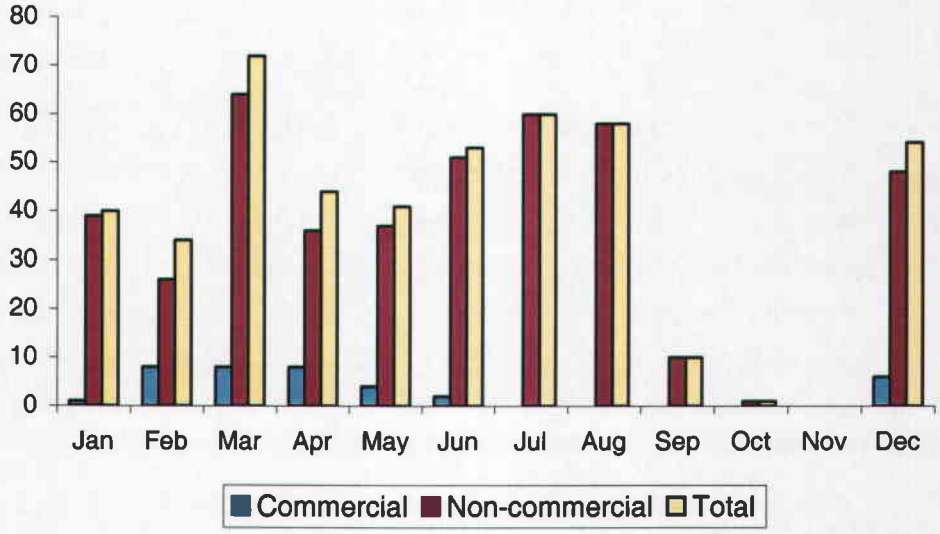


Seasonal traffic at Gao shows a different profile than the Tombouctou and Mopti airports. Due to the operations of a tourist nature from Air Corsair, the tour-operator operates until the month of August coinciding with European and African summer vacations. In addition, during the months from December until March most of the air movements correspond to charter flights. Through the month of February the number of operations decreased 33% while the volume of passenger increased 9%. Graphs IV-3 and IV-4 show the values on Table IV-3 related to the monthly aircraft operations and monthly passenger volume.

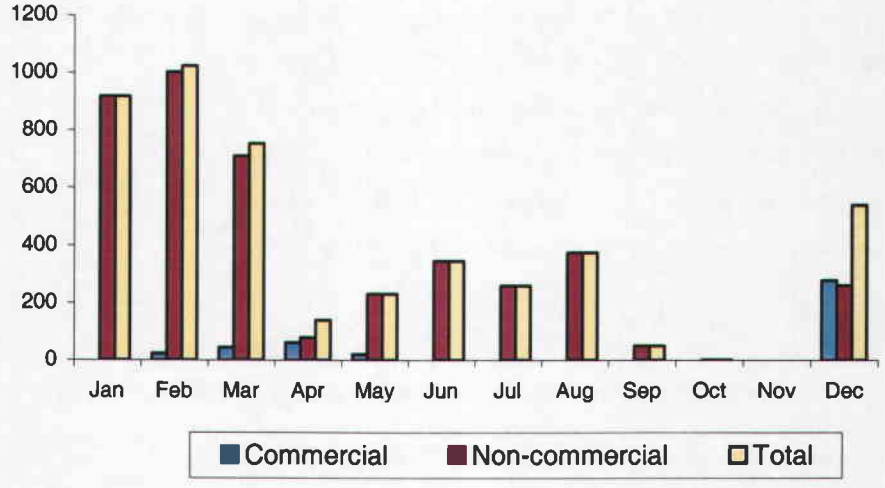
Table IV-3. Monthly Aircraft and Passenger Movements

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	TOTAL
Passengers	Commercial	0	22	44	61	20	0	0	0	0	0	0	279	**426**
	Non-commercial	918	1 002	710	79	231	346	259	375	50	1	0	261	**4 232**
	Total	918	1 024	754	139	231	346	259	375	50	1	0	540	**4 637**
Aircraft Operations	Commercial	1	8	8	8	4	2	0	0	0	0	0	6	**37**
	Non-commercial	39	26	64	36	37	51	60	58	10	1	0	48	**430**
	Total	40	34	72	44	41	53	60	58	10	1	0	54	**467**

Graph IV-3. Aicraft Movement at Gao Airport



Graph IV-4. Passenger Traffic at Gao Airport



4.1.3 Aviation Activity Forecast

4.1.3.1 Base Scenario

4.1.3.1.1 Passengers

The base scenario for the annual passenger traffic forecast at Gao is based on the growth index carried out by the aircraft manufacturer Airbus in the western region of Africa. As observed on Table III-8, the growth shows a trend of 4.1% between 1999 until 2009 and 4% thereafter, until 2020. In addition, the rehabilitation of the Mopti and Tombouctou airports is expected to permit the operation of long-range aircraft of similar B-737 type as currently operating in Gao. Therefore, those flights currently going to Gao may be attracted to the other airports, while Gao will continue, due to its road connection center for the western region of Africa, as a link between neighboring countries.

4.1.3.1.2 Aircraft Movements

The calculation of number of aircraft operations for the next 20 years has followed the same procedure as the ones for Mopti and Tombouctou. However, due to the fact that the Gao Airport together with the rest of the domestic airports is not very important or influential, it was decided to calculate the forecast of aircraft movements for all of those airports according to the same criteria, assuming a national average of passengers per aircraft in order to obtain the results. In the same manner as the process used for the Tombouctou and Mopti airports, the average occupancy coefficient per aircraft, but at a national level, of 27% has been used. The trend will be that in the future an occupancy coefficient of 70% will be achieved. The result of the calculation was an average annual percentage growth of 2.4%.

It is assumed that only regular domestic flights will operated with aircraft type ATR-42 for 50 passengers as maximum until 2020.

4.1.3.1.3 Cargo

Air cargo traffic follows the same process as in the other airports, which assumes a growth equal to the Bamako-Senou Airport increase of 4% annually with regard to cargo and mail.

Air cargo traffic in Gao is not important and its forecast depends mainly on external airport factors, which would require a market study in order to establish the potential of Gao as a distribution point. Without a doubt, Gao is strategically located with regard to neighboring countries for forecasting a development of cargo activity assuming that numerous improvements

in the airport are carried out as well as the promotion of commercial activities; however, this market study is outside the scope of this project.

4.1.3.2 High Scenario

4.1.3.2.1 Passengers

The growth index for this scenario takes the growth forecasts from the Boeing Company for the western region of Africa. The growth percentage between 2000 and 2020 is 6.1%, as can be observed in Table III-7.

This scenario assumes economic development of the region and greater weight as a commercial activity point. Gao is experiencing an important urban and population growth, which will be reflected in the increase of consumption.

4.1.3.2.2 Aircraft Movements

This scenario, in the same way as the previous scenario, assumes an occupancy factor for aircraft of 70% for 2020. The growth is correlated to the number of domestic passengers. In this scenario, no long-range flights similar to the one currently operating for Air Corsair are forecasted. It is assumed that charter flights will find themselves attracted and deflected to Tombouctou or Mopti when their airport facilities are rehabilitated.

It is assumed that only regular domestic flights will operated with aircraft type ATR-42 for 50 passengers as maximum until 2020.

4.1.3.2.3 Cargo

A second scenario was not developed for air cargo because it is not considered to be significant or influential in the general context. Gao has potential for growth as a distribution center for air cargo; however, the analysis should be more detailed and specific, which is not contained under this study.

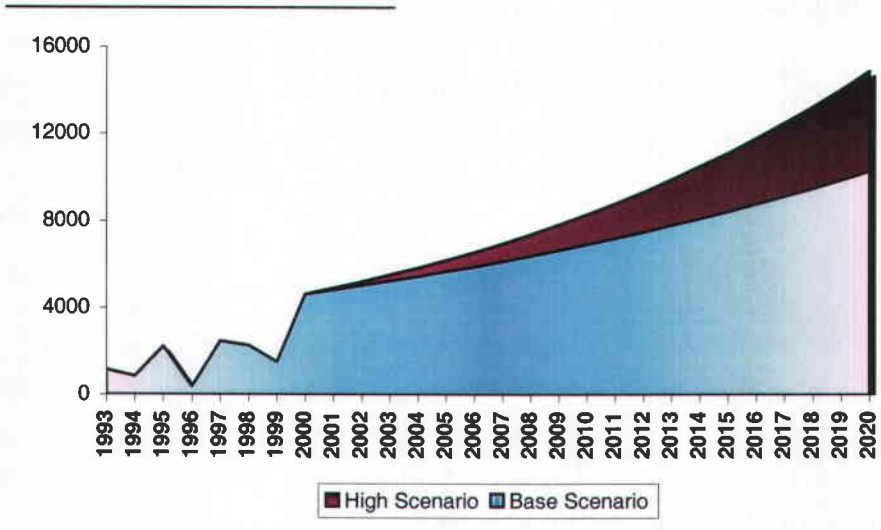
4.1.3.3 Passenger Forecast

Table IV-4. Passenger Forecast – Gao Airport

	Scenario	2000	2001	2002	2003	2004	2005	2006
Passengers	Base	4637	4828	5026	5233	5448	5672	5905
	High		4916	5211	5524	5856	6208	7395

	Scenario	2007	2008	2009	2010	2011	2012	2013
Passengers	Base	6148	6401	6664	6931	7209	7498	7798
	High	6976	7395	7839	8310	8809	9338	9899
	Scenario	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
Passengers	Base	8110	8435	8773	9124	9489	9869	10264
	High	10493	11123	11791	12499	13249	14044	14887

Graph IV-5. Passenger Forecast – Gao Airport



The forecast of the number of passengers during peak hour is based on theoretical calculations, where the number of passengers during peak hour in a typical day represents 2% of total traffic.

	2005	2010	2015	2020
Base	113	139	169	205
High	124	166	222	298

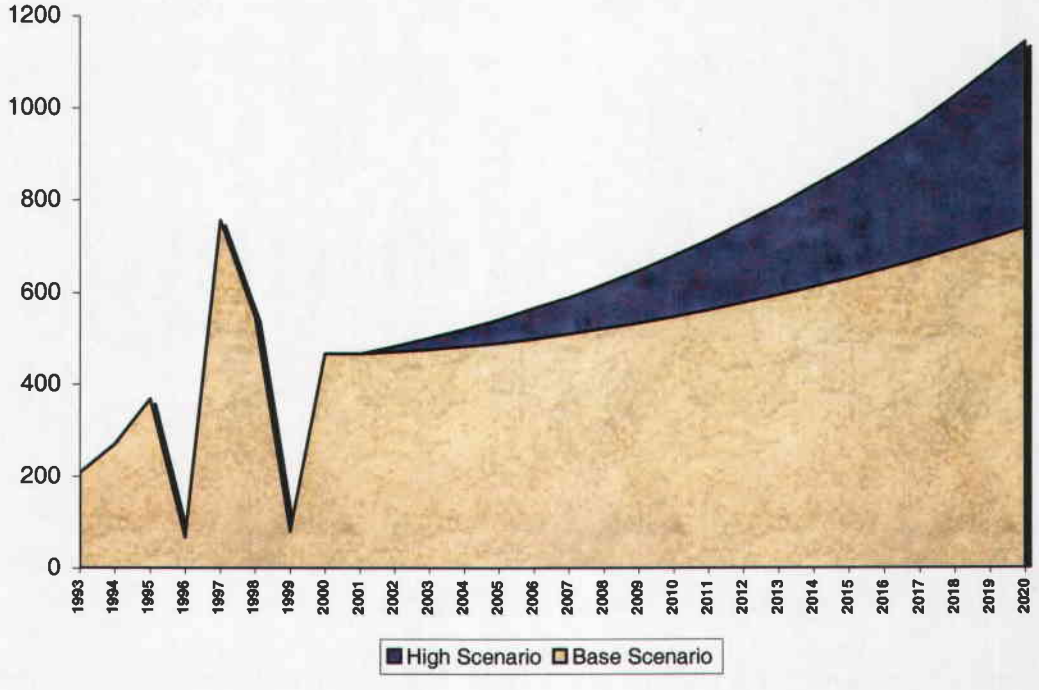
4.1.3.4 Aircraft Movements Forecast

Table IV-5. Aircraft Movement Forecast – Gao Airport

	Scenario	2000	2001	2002	2003	2004	2005	2006
Aircraft Movements	Base	467	467	471	476	483	490	499
	High	467	467	483	501	521	541	566

	Scenario	2007	2008	2009	2010	2011	2012	2013
Aircraft Movements	Base	510	522	534	547	562	578	595
	High	590	618	647	679	713	750	788
	Scenario	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
Aircraft Movements	Base	612	630	650	671	693	716	739
	High	830	872	920	969	1024	1082	1142

Graph IV-6. Aircraft Movement Forecast – Gao Airport

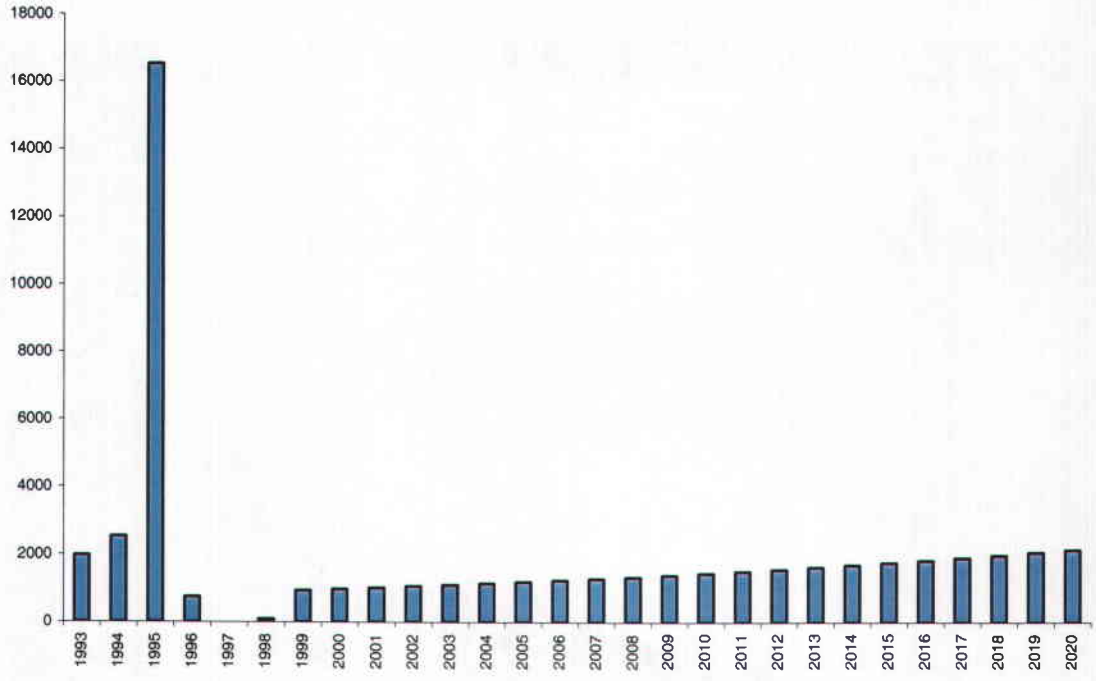


4.1.3.5 Cargo Forecast

Table IV-6. Cargo and Mail Forecast – Gao Airport

	Scenario	2000	2001	2002	2003	2004	2005	2006
Cargo & Mail (kg)	Base	973	1013	1054	1097	1141	1187	1235
	High		-	-	-	-	-	-
	Scenario	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**
Cargo & Mail (kg)	Base	1285	1337	1391	1447	1505	1566	1629
	High	-	-	-	-	-	-	-
	Scenario	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
Cargo & Mail (kg)	Base	1695	1763	1834	1908	1985	2065	2148
	High	-	-	-	-	-	-	-

Graph IV-7. Cargo and Mail Forecast – Gao Airport (kg)



4.1.4 Existing Facilities and Equipment

Figure IV-2, at the end of this section, shows the current airport layout plan.

4.1.4.1 Runway

The existing runway dimensions are 2500 m in length and 30 m wide with 7.5 m stabilized shoulders on both sides and 60 m paved runway overruns. The pavement is bituminous concrete with a well-defined pattern of block cracking throughout the entire pavement section, which is age related deterioration and not load-related.

4.1.4.2 Connector

There is a 90-degree connector located approximately 1280 m from the threshold providing access from the runway to the apron. The geometrics of the connector are 18 m wide x 250 m.

4.1.4.3 Apron

The existing apron is of bituminous concrete pavement and 120 m x 60 m. The pavement condition is similar to the runway with a predominant pattern of block cracking.

4.1.4.4 Navaids

Gao Airport is the only domestic airport with international traffic and is well equipped for such operations. It is part of the Niamey FIR and the control tower provides approach control services inside the Gao TMA and support to Niamey's control center.

The airport equipment inventory and devices are as follows:

- Control tower equipment
- HI/BI threshold and runway edge lighting
- HI threshold lighting
- Taxiway lighting
- PAPI
- Obstacle lighting
- CCR
- Transformer
- Power generators
- Transmission Antennas
- Reception Antennas
- HF Transmitter
- HF Receiver
- HF Transmitter-Receiver
- VHF Transmitter
- VHF Receiver
- VHF Transmitter-Receiver

- VOR
- NDB
- Communication register
- PABX
- Meteo equipment
    - Hydrogen generator
    - Observation station
    - Optic theodolite
    - Wind
    - Barometer
    - Barograph
    - Thermograph
    - Power generator

4.1.4.5 Perimeter Fence

There is no perimeter fencing currently at the airport.

4.1.4.6 Airfield Drainage System

The existing drainage system is a series of constructed vegetative lined drainage channels, culverts and ditches parallel to the airport improvements which outfall into natural drainage courses.

4.1.4.7 Terminal Building

Currently, a 750 m^2 hangar acts as the international passenger terminal. The terminal has restrooms, a small bar, rudimentary passport control and customs desk and some 140 seats.

During peak hour, the airport has a capacity for 140 arriving and departing passengers on the Air Corsair B-737. This peak hour occurs once a week during four months a year.

4.1.4.8 Maintenance/Storage Building

Currently, there is no warehouse for equipment or runway material.

4.1.4.9 Airport Rescue and Fire Fighting (ARFF)

A new ARFF facility exists at the airport, which was constructed of reinforced concrete consisting of bays for the parking of the fire fighting vehicles, an attached office building and storage for equipment and chemicals. The airport has pumper vehicle in well maintained condition. A new above ground water storage tank has been constructed to be used exclusively for ARFF operations.

4.1.4.10 Utilities

4.1.4.10.1 Water

A service line from the town's water supply connects to the terminal building. This line currently is inadequate to meet the current water supply requirements and also has a low flow and pressure.

A new above ground water storage tank exists for the ARFF vehicle requirements.

4.1.4.10.2 Sanitary Sewer

No information was available for the amount, size and location of the existing wastewater treatment system. From plans and observations at other airports, the common treatment system is septic tanks, which discharge into a cylindrical leachent pit, which is the type of treatment system that was used for budgetary estimates for this airport. For the costs, it was assumed that one tank exists with adequate storage volumes and in good condition.

4.1.4.10.3 Electrical Power Supply

The electrical service provider for the airport is EDM (Electricité du Mali). There are 3 back-up generator each with a capacity of 60 KVA's located inside the electrical building. The generators are old but are in good operating condition.

4.1.4.10.4 Telephone System

Information was not available on the amount of telephone lines that currently exist; although, it was assumed that 5 lines are available and functional.

4.1.4.11 Access Roads

No information was available on the location, size and condition of the existing airport access road. It was assumed that the access road is a 2 lane paved road with a shoulder and a ditch section.

4.1.4.12 Vehicle Parking

The size of the parking lot is assumed to be 15 spaces ($375m^2$) and currently in poor condition.

4.1.5 Evaluation of Existing Facilities

4.1.5.1 Runway

The new runway geometric is adequate for the ICAO minimum requirements for an AN-24 design aircraft (airport reference code 3C). The length and width of runway required is 1500 m x 30 m. The Consultants recommend that only 1500 m of the runway be rehabilitated and a permanent displaced threshold of 1000 m be installed to avoid any additional construction and maintenance costs. A pavement analysis performed in 1996[1] recommends that crack and joint repair be carried out immediately followed by a bituminous concrete overlay for the entire runway to prevent possible irreversible damage. Table IV-7 shows the runway length and improvement requirements.

Table IV-7. Runway Requirements

Design Aircraft	Required Length	Required Width	Exist Length	Exist Width	Improvement Required	Year
AN24	1500 m	30 m	2500 m	45 m	1500m x 45m overlay and 1000m displaced threshold	2000-2005

4.1.5.2 Connector

The width of the connector satisfies the requirements for the Category 3C – AN-24 with no current improvements in geometry required, or in the future.

[1] Aéroport Gao – Mesures des Deflexions, ASECNA, 1996.

As with the runway improvements, the connector will require immediate rehabilitation by a bituminous concrete overlay. Table IV-8 shows the design requirements for the connectors.

Table IV-8. Connector Requirements

Design Aircraft	Existing Width	Existing Area	Required Width	Improvements Required	Phase Required
AN24	18m	8000 m^2	15 m	Overlay (8000 m^2)	2000/2005

4.1.5.3 Apron

In order to meet the parking requirements for peak hour air traffic forecasts, the apron will need to be expanded to 105 m x 76 m in phase 2000-2005. Also, due to the age and present condition of the existing apron pavement, it requires a bituminous concrete overlay. Table IV-9 shows the apron sizing requirements and Figure IV-1 aircraft parking and movement requirements.

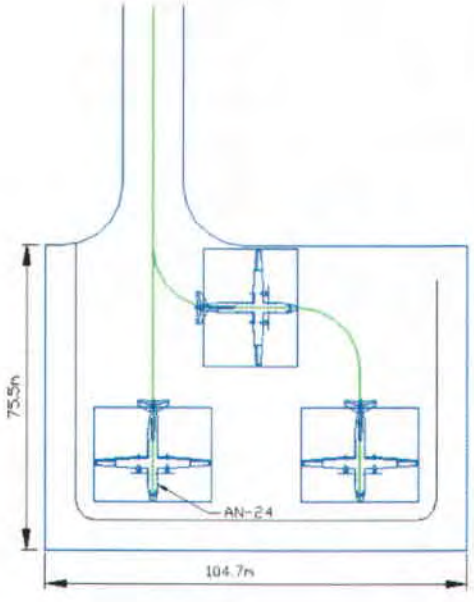
Table IV-9. Apron Sizing Requirements

Phase	Design Aircraft	Apron Size		Improvements
		Existing	Required	
2000-2005	2 AN-24 2 AN-24	120 m x 60 m	105 m x 76 m	120 m x 16 m expansion (1920 m^2) & 120 m x 60 m overlay
2005-2010	2 AN-24 2 AN-24	120 m x 76 m	105 m x 76 m	120 m x 76 crack and joint repair
2010-2015	2 AN-24 2 AN-24	120 m x 76 m	105 m x 76 m	120 m x 76 crack and joint repair
2015-2020	2 AN-24 2 AN-24	120 m x 76 m	105 m x 76 m	120 m x 76 crack and joint repair

Comments

1. Estimated improvements based upon the existing apron pavement being in good condition.
2. Power in - power out
3. Surry seal required on new pavement in aircraft fueling areas.
4. Pavement Marking required for all phases.

Figure IV-1. Apron Parking



4.1.5.4 Navaids

The following table shows the equipment investment needs for the airport's air navigation system in order to conform to ICAO security standards. An approximate useful life of the equipment, between 12 and 15 years, has been taken into account.

Table IV-10. Navaids Equipment Requirements

2000-2005	2005-2010	2010-2015	2015-2020
New airfield lighting system	VHF/HF Tx/Rx equipment	Airfield lighting system	VHF/HF Tx/Rx equipment
New PAPI	New PABX		New PABX
New Meteo equipment	Control tower equipment		
New VHF/HF antennas			

4.1.5.5 Perimeter Fence

Table IV-11 summarizes the fence requirements. For phase 2000-2005, an estimated total length of 8600m of new fencing is required to meet the minimum ICAO's requirements for minimum height, material and spacing. Two 4-m vehicular and 3 personnel gates are also estimated.

Table IV-11. Perimeter Fence Requirements

Fencing Required	Comments
8600 m	Phase 2000-2005, 2-4 m gates, 3 personnel gates (assumes no existing fencing meeting ICAO requirements)

4.1.5.6 Airfield Drainage System

Because of the rapid infiltration of the runoff due to the soil's high permeability properties and the low amounts of annual rainfall, minimal maintenance and improvements are required for the drainage system. It is recommended that routine cleaning and clearing of the drainage ditches and channels by removing the vegetation that has accumulated inside and around the drainage improvements. Also, it is estimated that every 5 years the major drainage ditches and channels will require removal of the accumulated sediment and that the design flow lines be reestablished. In Phase I (2000-2005), the apron expansion will require 120 m of new drainage channel construction.

Table IV-12 below shows information on scheduled maintenance and improvements to the drainage system.

Table IV-12. Drainage Improvements

Phase	Improvements		Comment
	Airside	Landside	
2005	120 m 5850 m	 500 m	Apron Expansion – new channel Reestablish channel flow lines Reestablish channel flow lines
2010	—	—	—
2015	5850 m	 500 m	Reestablish channel flow lines Reestablish channel flow lines
2020	—	—	—

4.1.5.7 Terminal Building

With regard to the number of passenger during peak hour forecasted for the period of the study, the IATA method described in the Airport Development Reference Manual has been used in order to calculate the theoretical terminal dimensions and breakdown of all the different components. The following table shows these results.

Table IV-13. Terminal Building Requirements

Terminal Building		**2005**	**2010**	**2015**	**2020**
Base	Design Passenger Peak Hour	21	25	30	37
	Area (m^2)	**294**	**350**	**420**	**518**
High	Design Passenger Peak Hour	23	30	41	54
	Area (m^2)	**322**	**420**	**574**	**756**

The existing hangar serving as passenger terminal will be enough in terms of space requirements to accommodate the peak hour traffic until 2020. It will be necessary to rehabilitate it on 2010.

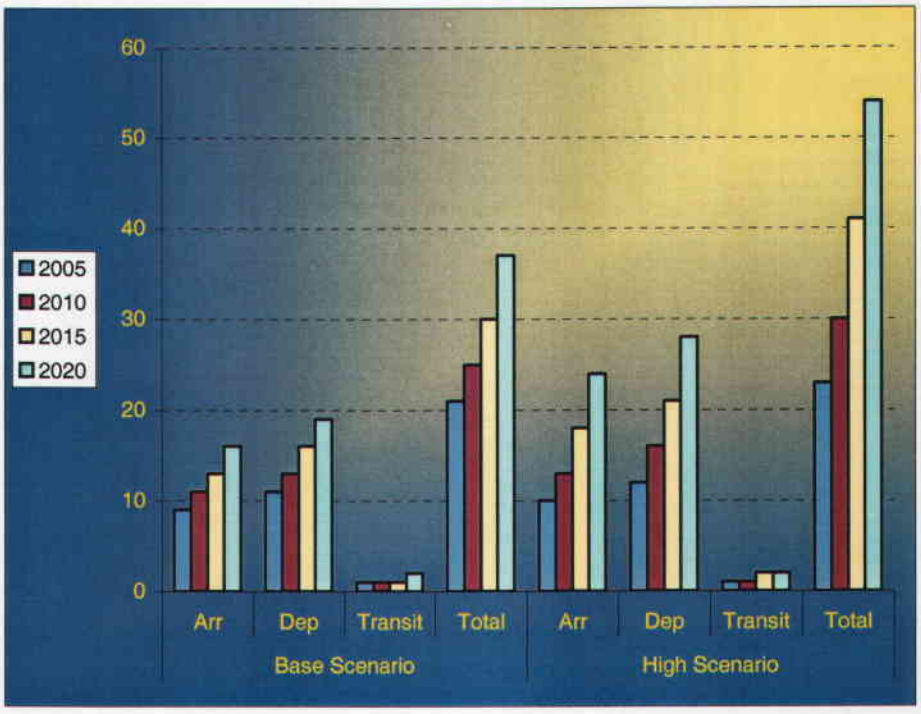
The existing terminal area of 720 m^2 exceeds the requirements shown in the Table IV-13 above.

The number of passengers during peak hour for the study period are distributed according to the passenger flow, as follows:

Table IV-14. Peak Hour Passenger Forecast – Gao Airport

	Base Scenario				High Scenario			
	Arrival	Departure	Transit	**Total**	Arrival	Departure	Transit	**Total**
2005	9	11	1	**21**	10	12	1	**23**
2010	11	13	1	**25**	13	16	1	**30**
2015	13	16	1	**30**	18	21	2	**41**
2020	16	19	2	**37**	24	28	2	**54**

Graph IV-8. Peak Hour Passenger Forecast – Gao Airport



4.1.5.8 Terminal Equipment

The breakdown of all terminal facilities areas and calculation of the number of units for public service elements were obtained in the same manner and are presented in four development phases in the following table.

Table IV-15. Terminal Equipment Requirements

	BASE SCENARIO				HIGH SCENARIO			
	2005	2010	2015	2020	2005	2010	2015	2020
Check-in Desks	1	1	1	2	1	1	2	3
Security Check-Centralized	0	0	0	0	0	0	0	0
Number of Baggage Claim Devices	1	1	1	1	1	1	1	1

4.1.5.9 Maintenance/Storage Building

Table IV-16. Maintenance/Storage Building Requirements

Maintenance/Storage	**2005**	**2010**	**2015**	**2020**
Area (m^2)	5	5	5	5

4.1.5.10 Airport Rescue and Fire Fighting (ARFF)

Table IV-17 classifies the Aerodrome ICAO Category by the size of the design aircraft and also determines the amount of fire and rescue vehicles required according to ICAO's standards. For Gao, the aerodrome category is 4, which requires 1 vehicle for all phases. It is estimated in phase 2005-2010 the existing vehicle will need to be replaced. The new fire and rescue building is adequate for the present and future phases.

Table IV-17. ARFF Requirements

Design Aircraft	Aerodrome Category	Aircraft Overall Length	Maximum Fuselage Width	Existing	Required	New Vehicles Replacements	Year
Antonov AN-24	4	23.5m	-----	1	1	1 - Replacement	2010

4.1.5.11 Utilities

4.1.5.11.1 Water

Currently (phase 2000-2005) the water supply to the terminal building needs to be upgraded with a new 6 m^3 storage tank and booster pump. The current improvements to the demand for the phase 2015-2020 passenger and employee forecasts was increased, as there will be minimal additional investment required. Table IV-18 shows the water supply requirements.

Table IV-18. Water Requirements

		A	B	C	D	F	G
Year	Passengers Peak Hour	Arrivals 50%	Departures 50%	Transit 0%	Visitors (1 x arrivals)	@ Terminal Area	@ Maintenance Area
2005	21	10.5	10.5	0	10.5	10	5
2010	25	12.5	12.5	0	12.5	10	5
2015	30	15	15	0	15	10	5
2020	37	18.5	18.5	0	18.5	10	5

	J						I	W	
Year	(A+B+C+D)	J*20	F*250	G*450	Sum	Sum/ 1000	Existing Storage Tank	Total Req. (m^3/day)	Additional Storage Req.
2005	31.5	630	2500	2250	5380	5	0	5	5
2010	37.5	750	2500	2250	5500	6	5	6	1
2015	45	900	2500	2250	5650	6	6	6	0
2020	55.5	1110	2500	2250	5860	6	6	6	0

4.1.5.11.2 Sanitary Sewer

For the passenger and employee forecasts and our estimate on the conditions of the present systems, an additional septic tank/leachent system is anticipated in phase II (2005-2010). Table IV-19 shows the sanitary sewer requirements.

Table IV-19. Sanitary Sewer Requirements

Year	Total Req. (m^3/day)	Persons Equivalent	Septic Tanks Required	Functional Existing Tanks	New Tanks Required
2005	5	13.2	1	1	0
2010	6	15.84	1	0	1
2015	6	15.84	1	1	0
2020	6	15.84	1	1	0

Note 1: Daily design flow for one person is 0.379m^3/day

Note 2: New tanks sized for 20-person capacity, capacity of existing tanks assumed at 15 persons.

4.1.5.11.3 Electrical Power Supply

It is anticipated that in Phase I (2000-2005) and III (2015-2020) investments for upgrades for the electrical supply and additional electrical equipment will be required for the improvements to the terminal building and navaids. In Phase II (2005-2010), it is anticipated that two of the three back-up generators will need to be replaced. Table IV-20 for electrical power supply requirements.

Table IV-20. Electrical Power Supply Requirements

Existing Facilities	2005	2010	2015	2020	Comments
Technical Bldg. Adequate, upgrades replacements needed terminal bldg.	Major Upgrades	None	None	Minor Upgrades	New transformers, regulators, stand-by generators

4.1.5.11.4 Telephone System

The amount of telephone lines required for the airport administration, faxes, computers, police, airlines, passengers, visitors and employees are calculated and summarized in Table IV-21, which shows the additional lines are required for Gao.

Table IV-21. Telephone System Requirements

Phase	Total Line Requirements	Existing Lines	Additional Lines
2000-2005	8	5	3
2005-2010	8	8	0
2010-2015	8	8	0
2015-2020	14	8	6

4.1.5.12 Access Roads

It is assumed that any type of improvements to be done on the access road will be carried out and funded by the government.

4.1.5.13 Vehicle Parking

The size of the parking required for the 4 phases of development was determined using the forecast passenger volumes and the estimated number of employees. The adequacy of the passenger and employee parking for present and future phases is determined based upon an evaluation of current vehicular traffic and its relationship to peak hour passengers as shown in Table IV-22.

The following is a summary of the additional parking required for the 4 phases of development.

Table IV-22. Vehicle Parking Requirement

Phase	Total Required Parking (m^2)	Existing Parking (m^2)	Additional Parking (m^2)
2000 – 2005	637.5	375	262.5
2005 – 2010	687.5	637.5	50
2010 – 2015	937.5	687.5	250
2015 – 2020	1068.75	937.5	131.25

4.1.6 Cost Estimates

Capital Cost Estimates of airport improvements have been prepared for four phases of development. These phases are:

Phase I - Years 2002-2005

Phase II - Years 2005-2010

Phase III - Years 2010-2015

Phase IV - Years 2015-2020

All costs are in current US Dollars, without inflation. A summary sheet of the capital cost estimates is shown in Table IV-23. In preparing these estimates, unit cost information collected in Mali was utilized, as was the Consultant's own data base on international construction costs. Fifteen percent was added to all construction and equipment cost estimates to cover contingencies and the cost of engineering services.

The cost estimate shown here refers to the base case scenario as described on the precedent sections and includes only the minimum (base case) requirements as detailed on the corresponding section.

Table IV-23. Cost Estimate for Gao Airport Improvements

ITEM	DESCRIPTION	PHASE I (2002-2005) (US $)	PHASE II (2005-2010) (US $)	PHASE III (2010-2015) (US $)	PHASE IV (2015-2020) (US $)	TOTAL (US $)
1	RUNWAY	2,041,200	0	0	0	2,041,200
2	TAXIWAY LOOP & CONNECTOR	364,512	0	0	0	364,512
3	APRON(s) (New Pavements /Rehabilitation)	468,553	12,768	12,768	12,768	506,857
4	DRAINAGE	136,600	0	127,000	0	263,600
5	TERMINAL BUILDING/EQUIPMENT	0	135,000	0	135,000	270,000
6	VEHICULAR PARKING (Terminal Building)	15,750	3,000	15,000	7,875	41,625
7	POTABLE WATER	25,000	0	0	0	25,000
8	SEWAGE TREATMENT	0	30,000	0	0	30,000
9	NAVAIDS	250,000	175,000	100,000	0	525,000
10	TELEPHONE SYSTEM	75,000	0	0	75,000	150,000
11	ELECTRICAL POWER	175,000	0	0	0	175,000
12	ARFF FACILITY	0	120,000	0	0	120,000
13	PERIMETER FENCE	184,250	0	0	0	184,250
14	CONTINGENCY & ENGINEERING 15%	560,380	71,365	38,215	34,596	704,557
	TOTAL	**$4,296,245**	**$547,133**	**$292,983**	**$265,239**	**$5,401,601**

TOC

4.2 Goundam Airport

4.2.1 Socioeconomic Profile

4.2.1.1 Transportation Factors

Goundam is located only 97 km west of Tombouctou and is connected to Tombouctou via an earth road. It has access to the Niger River through the Diré port, located 34 km away. The Diré port registered a movement of 478 tons of goods during 1999.

The travel time between Goundam and Bamako by road is approximately two days.

4.2.1.2 Tourism Factors

The main tourist attractions of the Goundam area are the Gold and Faguibine Lakes that surround the city. The tourism development of these lakes is included in the Strategic Plan of the Ministry of Tourism, and its implementation is forecasted for the long term.

4.2.1.3 Socioeconomic Factors

Due to the proximity between Goundam and Tombouctou most socioeconomic data described in the Tombouctou section are also valid for Goundam with regard to types of activities, although the economic, social and urban development are not included in the planning and development studies for the regions of the country.

4.2.2 Current Airport Activities

The air traffic activity of the Goundam Airport is very low, as shown in Table IV-24, reaching a maximum number of passenger of 1,296 in 1997, while the maximum number of aircraft operations was registered in 1998.

Goundam is serviced by Air Mali twice a week: on Wednesday coming from Mopti and on Thursday with a final destination to Bamako.

The air activity increased considerably in 1997, which grew 1000% and it stabilized in 1999 with a 2% average growth. It was not possible to obtain 2000 data from either the General Directorate of Civil Aeronautics, ADM or ASECNA.

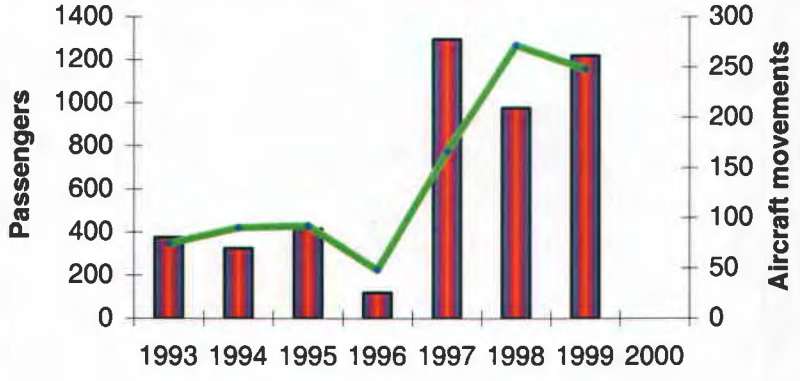
The aircraft activity as shown in Graph IV-9 follows the same profile as the passenger traffic with an average increase since 1993 of 40%.

Table IV-24. Goundam Airport Activity

Goundam

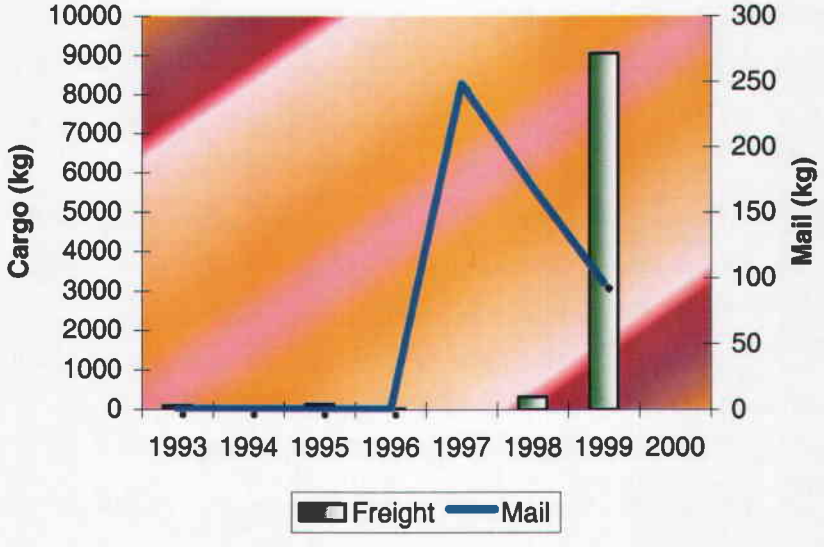
	1993	1994	1995	1996	1997	1998	1999	2000
Aircraft Operations	74	90	92	48	166	272	248	N/A
Passengers	374	323	414	118	1296	977	1220	N/A
Freight (Kg)	100	0	139	24	0	329	9052	N/A
Mail (Kg)	0	0	0	0	248	169	96	N/A

Graph IV-9. Goundam Airport Activity



Air cargo and mail traffic is practically nonexistent at Goundam Airport with the exception of the year 1999 when a total of 9,052 kg of goods and 96 kg of mail were registered.

Graph IV-10. Cargo and Mail Operations at Goundam Airport



4.2.3 Aviation Activity Forecast

4.2.3.1 Base Scenario

4.2.3.1.1 Passenger

The base scenario for annual passenger traffic forecast at Goundam is based on the growth index proposed by the manufacturer of Airbus aircraft for the western region of Africa. As shown in Table III-8 of the section of Aviation Factors, the growth shows a trend of 4.1% between 1999 until 2009 and 4% thereafter, until 2020.

It is assumed that the socioeconomic conditions of the region will continue at the same rate of growth as today and there are no projected development that could affect air traffic.

4.2.3.1.2 Aircraft Movements

The calculation of the aircraft operations figures for the next 20 years has followed the same procedure as the Gao and Kayes Airports. However, due to the fact that the Goundam Airport together with the rest of the domestic airports is not important or influential, it was decided to calculate the forecast of aircraft movements for all of those airports according to the same criteria, assuming a national average of passengers per aircraft in order to obtain the results. In the same manner as the process used for the Tombouctou and Mopti airports, the average occupancy coefficient per aircraft (at a national level), of 27% has been used. The trend will be

that in the future an occupancy coefficient of 70% will be achieved. The result of the calculation was an average annual percentage of growth 2.4%.

The available length of the runway is 1,500 meters, it is designed for AN24 and no improvement to the infrastructure is projected for the flight zone; therefore, it is assumed that aircraft bigger than the ATR42 will not be able to operate in Goundam and there will be no demand for them.

4.2.3.1.3 Cargo

Air cargo traffic follows the same increase process as in the other airports, which assumes a growth equal to the Bamako-Senou Airport of 4% annually with regard to cargo and mail. In any case, the cargo traffic operated in Goundam or anyone of the other airports and the traffic that could operate in case the activity is well developed, does not justify a cargo terminal or special facilities for it in the medium term.

4.2.3.2 High Scenario

4.2.3.2.1 Passengers

The growth index for this scenario takes the growth forecasts by the Boeing company of the western region of Africa. The growth percentage between 2000 and 2020 is 6.1%, as can be observed in Table III-7.

This scenario assumes that tourism will grow, therefore, tourism infrastructure will be improved. In addition, this scenario assumes an economic growth for Goundam to follow the country's rate.

4.2.3.2.2 Aircraft Movements

This scenario, in the same way as the previous scenario, assumes an occupancy factor for aircraft of 70% for 2020. The growth is correlated to the number of domestic passengers. It is forecasted that only regular domestic flights will operate with aircraft type ATR-42 for 50 passengers. Since Region I has the greatest number of Malian population residing abroad, it is expected that in the future special flights will be chartered from close points with medium-range aircraft flying directly to Goundam.

4.2.3.2.3 Cargo

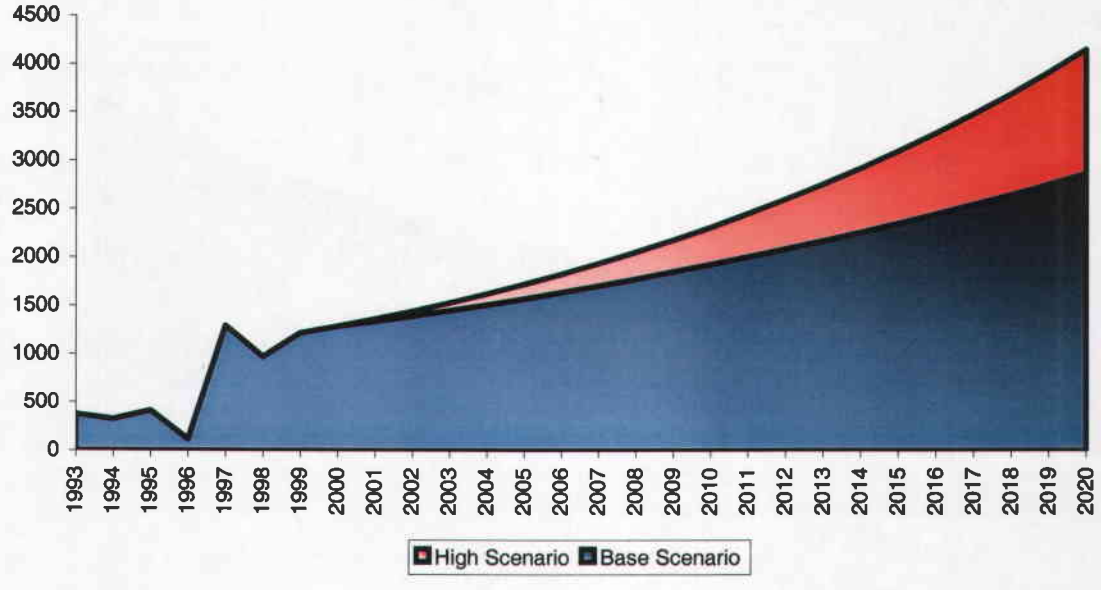
A second scenario was not developed for air cargo because it is not considered to be significant or influential in the general context.

4.2.3.3 Passenger Forecast

Table IV-25. Passenger Forecast – Goundam Airport

	Scenario	2000	2001	2002	2003	2004	2005	2006
Passengers	Base	1288	1341	1396	1454	1514	1577	1642
	High		1366	1448	1535	1628	1726	1830
	Scenario	2007	2008	2009	2010	2011	2012	2013
Passengers	Base	1710	1781	1855	1930	2008	2089	2173
	High	1940	2057	2181	2312	2451	2599	2755
	Scenario	2014	2015	2016	2017	2018	2019	2020
Passengers	Base	2260	2351	2446	2544	2646	2752	2863
	High	2921	3097	3283	3480	3689	3911	4146

Graph IV-11. Passenger Forecast – Goundam Airport



The forecast of the number of passengers during peak hour is based on theoretical calculations, where the number of passengers during peak hour in a typical day represents 2% of total traffic.

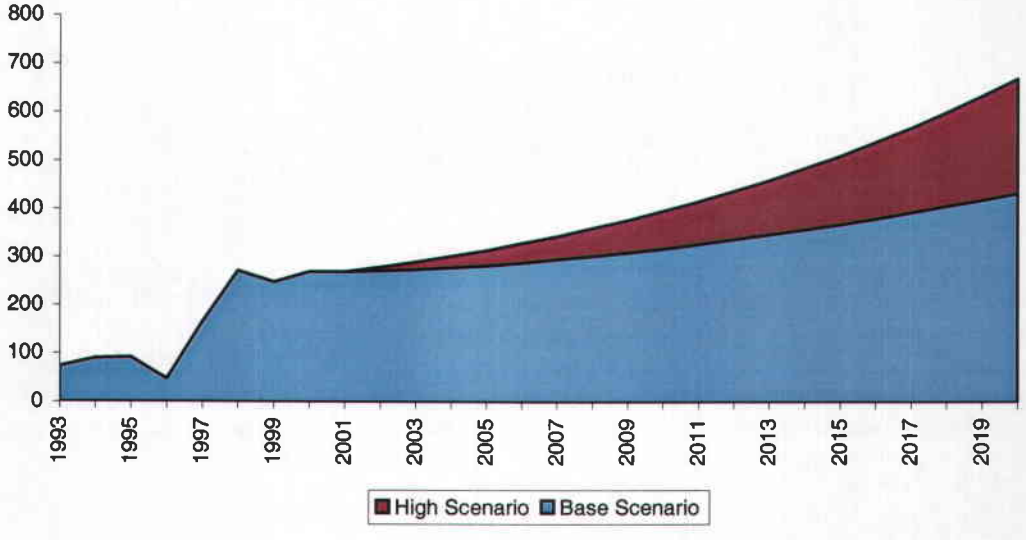
	2005	2010	2015	2020
Base	32	39	47	57
High	35	44	62	83

4.2.3.4 Aircraft Movement Forecast

Table IV-26. Aircraft Movement Forecast – Goundam Airport

	Scenario	2000	2001	2002	2003	2004	2005	2006
Aircraft Movements	Base	270	270	272	275	279	283	289
	High	270	270	280	291	303	315	330
	Scenario	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**
Aircraft Movements	Base	296	303	310	318	327	337	347
	High	344	361	378	397	417	439	461
	Scenario	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
Aircraft Movements	Base	357	368	380	393	406	419	433
	High	486	511	540	569	601	635	670

Graph IV-12. Aircraft Movement Forecast – Goundam Airport



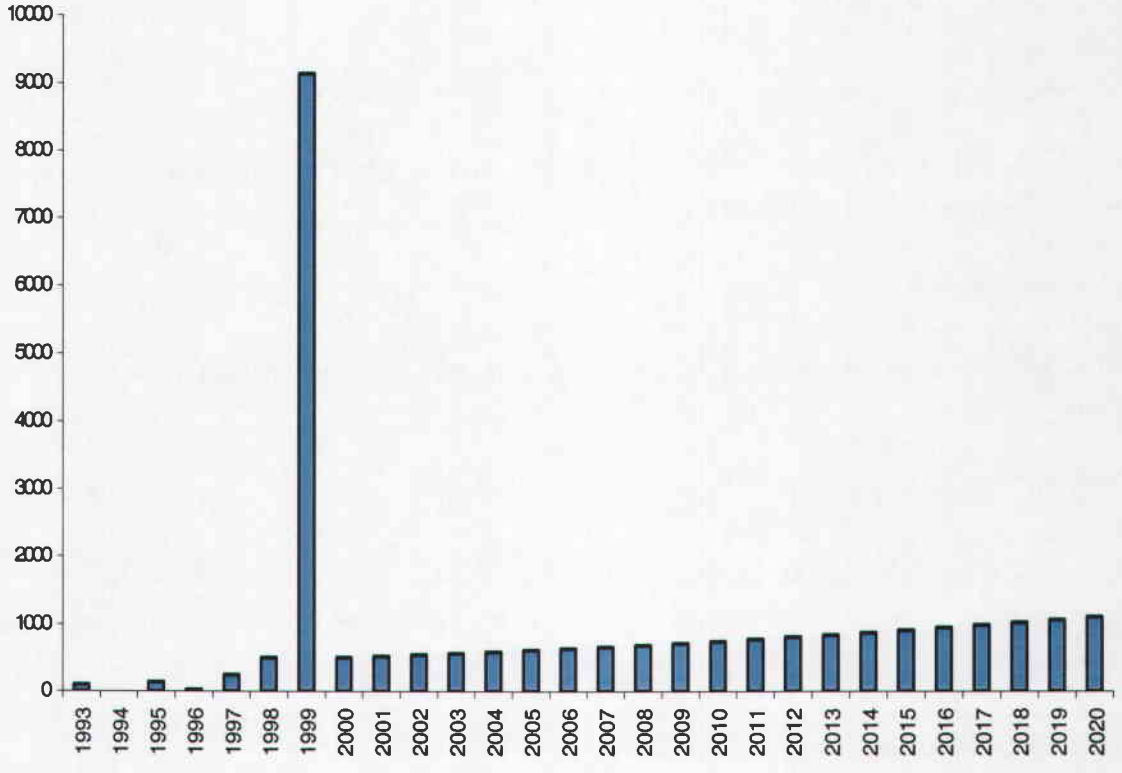
4.2.3.5 Cargo Forecast

Table IV-27. Cargo and Mail Forecast – Goundam Airport

	Scenario	2000	2001	2002	2003	2004	2005	2006
Cargo & Mail (kg)	Base	500	520	541	563	586	610	635
	High		-	-	-	-	-	-
	Scenario	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**
Cargo & Mail (kg)	Base	661	688	716	745	775	806	839
	High	-	-	-	-	-	-	-

	Scenario	2014	2015	2016	2017	2018	2019	2020
Cargo & Mail (kg)	Base	873	908	945	983	1023	1064	1107
	High	-	-	-	-	-	-	-

Graph IV-13. Cargo and Mail Forecast – Goundam Airport



4.2.4 Existing Facilities and Equipment

Figure IV-4, at the end of this section, shows the current airport layout plan.

4.2.4.1 Runway

The existing runway's dimensions are 1545 m in length and 30 m wide. No other information was shown on the plans for shoulders or overruns and no information was received on the pavement condition.

4.2.4.2 Connector

A 90-degree connector with its centerline located 158 m from the threshold provides access from the runway to the apron. The geometrics of the connector as mentioned from the plans are approximately 15 m wide by 120 m long.

4.2.4.3 Apron

The existing apron is 100 m x 100 m. No information was available on the existing pavement condition.

4.2.4.4 Navaids

Goundam Airport is not controlled and with regard to navaids equipment it only has an NDB in bad conditions and an old HF emission/receptor.

4.2.4.5 Perimeter Fence

No information was available on the size, condition and amount of perimeter fencing and access gates, if any.

4.2.4.6 Airfield Drainage System

No information was available on the existing drainage system. It is estimated that the drainage system is the same type as the other airports, which consists of manmade vegetative lined drainage channels, ditches and culverts which outfall into natural drainage courses.

4.2.4.7 Terminal Building

There is no passenger terminal in the Goundam Airport.

4.2.4.8 Airport Rescue and Fire Fighting (ARFF)

An ARFF facility in good conditions and of adequate capacity is assumed to exist at the airport although no information was available. We estimate this structure is a building with bays for the parking of the fire fighting vehicles and an attached office and storage building. It was estimated that the fire-fighting vehicles are old but in good operating condition. Also, it was estimated that an above ground water storage tank exists and is in good condition.

4.2.4.9 Utilities

4.2.4.9.1 Water

Although no information was available on the water supply, it was assumed that the current water supply is not adequate for the peak hour demand for the forecasted passengers and employees. On the other hand, it was assumed that an adequate storage tank exists for the ARFF vehicles.

4.2.4.9.2 Sanitary System

No information was available on the amount, size and location of the existing wastewater treatment system. From plans and observations at other airports, the common treatment system is septic tanks discharging into a cylindrical leachent pit, which is the type of treatment system being used for cost estimates for this airport. For the costs, it was assumed that one tank exists with adequate storage volumes and in good condition.

4.2.4.9.3 Electrical Power Supply

No information was available on the size and type of electrical power supply for the airport. It was estimated that current improvements are required including new equipment and upgrades and that the stand-by generators, if existing are old and need to be replaced.

4.2.4.9.4 Telephone System

Information was not available on the amount of telephone lines or the condition of the telephone equipment. For cost estimates, it was assumed that 5 lines are available.

4.2.4.10 Access Roads

No information was available on the location, size and condition of the existing airport access road. It was estimated that the access road is a 2 lane paved road with a shoulder and a ditch section.

4.2.4.11 Vehicle Parking

No information was available on the size of the existing parking lot. Based upon information on similar size airports in this study, it was assumed that 15 spaces are provided (375 m^2) and that this parking lot is paved but in poor condition.

4.2.5 Evaluation of Existing Facilities

4.2.5.1 Runway

The existing runway geometric is adequate for the ICAO minimum requirements for the AN-24 design aircraft (airport reference code 3C). In 2005-2010, it is assumed that the runway will require rehabilitation by a bituminous concrete overlay. It was estimated that this overlay will be sufficient beyond the year 2020. Table IV-28 shows the runway length and improvement requirements.

Table IV-28. Runway Requirements

Design Aircraft	Required Length	Required Width	Exist Length	Exist Width	Improvement Required	Year
AN24	1500 m	30 m	1545 m	30 m	1545 x 30m overlay	2005-2010

4.2.5.2 Connector

The width of the connector satisfies the minimum 15 m requirements for the Category 3C – AN24 design aircraft with no current or future improvements in dimensions required.

As with the runway improvements, it is anticipated that the connector will have to be rehabilitated in phase 2005-2010 with a bituminous concrete overlay.

Table IV-29 shows the design requirements for the connectors.

Table IV-29. Connector Requirements

Design Aircraft	Existing Width	Existing Area	Required Width	Improvements Required	Phase Required
AN24	15 m	2712 m^2	15 m	Overlay (2712 m^2)	2005-2010

4.2.5.3 Apron

The apron will require a 5 m x 100 m expansion in phase 2000-2005 and the existing 100 m x 100 m pavement will require a surface overlay to meet the parking requirements for the peak

hour air traffic forecasts. Table IV-30 shows the apron sizing requirements and Figure IV-3 shows the aircraft parking and movement requirements.

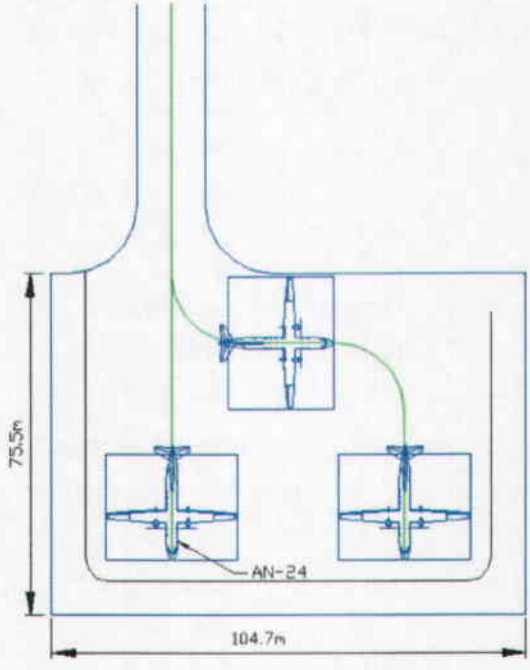
Table IV-30. Apron Sizing Requirements

Phase	Design Aircraft	Apron Size		Improvements
		Existing	Required	
2000-2005	2 AN-24 2 AN-24	100 m x 100 m	157 m x 76 m	5 m x 100 m expansion (500 m^2) & 100 m x 100 m overlay (10,000 m^2)
2005-2010	2 AN-24 2 AN-24	105 m x 100 m	157 m x 76 m	105 m x 100 m crack and joint repair
2010-2015	2 AN-24 2 AN-24	105 m x 100 m	157 m x 76 m	105 m x 100 m crack and joint repair
2015-2020	2 AN-24 2 AN-24	105 m x 100 m	157 m x 76 m	105 m x 100 m crack and joint repair

Comments

1. Estimated improvements base upon the existing apron pavement being in good condition.
2. Power in - power out
3. Surry seal required on new pavement in aircraft fueling areas.
4. Pavement Marking required all phases.

Figure IV-3. Apron Parking



4.2.5.4 Navaids

The recommendations for navaids equipment are basically to provide the airport with the minimum necessary equipment to ensure air operations. The following table summarizes these recommendations.

Table IV-31. Navaids Equipment Requirements

2000-2005	2005-2010	2010-2015	2015-2020
NDB HF Transmitter/Receiver VHF Tx / Rx Meteo equipment		VHF Tx / Rx	Meteo equipment

4.2.5.5 Perimeter Fence

Table IV-32 summarizes the fencing requirements. For Goundam, in Phase I (2000-2005) an estimated length of 5190 m of new fencing is required including new access gates. The fencing will have to meet ICAO's minimum height, size and material requirements.

Table IV-32. Perimeter Fence Requirements

Fencing Required	Comments
5190 m	Phase I (2000-2005), 2-4m gates, 3 personnel gates (assumes no existing fencing meeting ICAO requirements)

4.2.5.6 Airfield Drainage System

Because of the rapid infiltration of the runoff due to the soil's high permeability properties and the low amounts of annual rainfall, minimal maintenance and improvements are required for the drainage system. Routine cleaning and clearing of the drainage ditches and channels by removing the vegetation that has accumulated inside and around the drainage improvements is recommended. Also, it is estimated that every five years the major drainage ditches and channels will require removal of the accumulated sediment and overgrowth to reestablish design flow lines. Table IV-33 below shows information on scheduled maintenance and improvements to the drainage system.

Table IV-33. Drainage Improvements

Phase	Improvements		Comment
	Airside	Landside	
2005	100 m 4750 m	 500 m	Apron expansion – new channel Reestablish channel flow lines Reestablish channel flow lines
2010	—	—	—
2015	4750 m	 500 m	Reestablish channel flow lines Reestablish channel flow lines
2020	—	—	—

4.2.5.7 Terminal Building

With regard to the number of passenger during peak hour forecasted for the period of the study, the IATA method described in the Airport Development Reference Manual has been used in order to calculate the theoretical terminal dimensions and breakdown of all the different components. The following table shows these results.

Table IV-34. Terminal Building Requirements

Terminal Building		2005	2010	2015	2020
Base	Design Passenger Peak Hour	11	14	16	20
	Area (m^2)	**154**	**196**	**224**	**280**
High	Design Passenger Peak Hour	12	16	21	30
	Area (m^2)	**168**	**224**	**294**	**420**

However, as displayed in Table IV-34 the number of passengers on peak hour does not justify any major investment in terms of terminal requirements.

The number of passengers during peak hour for the study period are distributed according to the passenger flow, as follows:

Table IV-35. Peak Hour Passenger Forecast – Goundam Airport

	Base Scenario				High Scenario			
	Arrival	Departure	Transit	**Total**	Arrival	Departure	Transit	**Total**
2005	3	2	6	**11**	3	2	7	**12**
2010	3	3	8	**14**	4	3	9	**16**
2015	4	3	9	**16**	5	4	12	**21**
2020	5	4	11	**20**	7	6	17	**30**

4.2.5.8 Airport Rescue and Fire Fighting (ARFF)

Table IV-36 classifies the airport by an Aerodrome ICAO category determined from the size of the design aircraft and also determines the amount of fire and rescue vehicles required according to ICAO's standards. For Goundam, the aerodrome category is 4 requiring one vehicle for the present and up to the year 2020. It is estimated in Phase II (2005-2010) that the existing vehicle will need to be replaced.

Table IV-36. ARFF Requirements

Design Aircraft	Aerodrome Category	Aircraft Overall Length	Maximum Fuselage Width	Existing	Required	New Vehicles Replacements	Year
Antonov AN-24	4	23.5 m	-----	1	1	1 - Replacement	2010

4.2.5.9 Utilities

4.2.5.9.1 Water

For cost estimates, it was estimated that in Phase I (2000-2005) a storage tank with a capacity of 5 m^3 will be required to meet the forecasted domestic water supply requirements for the passengers and employees to the year 2020. Table IV-37 shows the water supply requirements.

Table IV-37. Water Requirements

		A	B	C	D	F	G
Year	Passengers Peak Hour	Arrivals 50%	Departures 50%	Transit 0%	Visitors (1 x arrivals)	@ Terminal Area	@ Maintenance Area
2005	11	5.5	5.5	0	5.5	10	5
2010	14	7	7	0	7	10	5
2015	16	8	8	0	8	10	5
2020	20	10	10	0	10	10	5

	J						I	W	
Year	(A+B+C+D)	J*20	F*250	G*450	Sum	Sum/ 1000	Existing Storage Tank	Total Req. (m^3/day)	Additional Storage Req.
2005	16.5	330	2500	2250	5080	5	0	5	5
2010	21	420	2500	2250	5170	5	5	5	0
2015	24	480	2500	2250	5230	5	5	5	0
2020	30	600	2500	2250	5350	5	5	5	0

4.2.5.9.2 Sanitary Sewer

According to the passenger and employee forecasts and assumptions on the conditions of the present systems, an additional septic tank/leachent system will be required in Phase II (2005-2010). Table IV-38 shows the sanitary sewer requirements.

Table IV-38. Sanitary Sewer

Year	Total Req. (m^3/day)	Persons Equivalent	Septic Tanks Required	Functional Existing Tanks	New Tanks Required
2005	5	13.2	1	1	0

Year	Total Req. (m^3/day)	Persons Equivalent	Septic Tanks Required	Functional Existing Tanks	New Tanks Required
2010	5	13.2	1	0	1
2015	5	13.2	1	1	0
2020	5	13.2	1	1	0

Note 1: Daily design flow for one person is 0.379m^3/day

Note 2: New tanks sized for 20 person capacity, capacity of existing tanks assumed at 15 persons.

4.2.5.9.3 Electrical Power Supply

It is forecasted that in Phase I (2000-2005) major upgrades will be required in the electrical supply system and equipment as well as two stand-by generators. In Phase III (2015-2020) minor upgrades will be required due to the increase in electrical power demand and also the age of the existing facilities. Table IV-39 shows the electrical power and supply requirements.

Table IV-39. Electrical Power Supply Requirements

Existing Facilities	2005	2010	2015	2020	Comments
Conditions unknown assumes improvement required	Major Upgrades	None	None	Minor Upgrades	2005 - New Transformers, regulators, stand-by generators, distribution

4.2.5.9.4 Telephone System

The number of telephone lines required for the airport administration, faxes, computers, police, airlines, passengers, visitors and employees are calculated and summarized in Table IV-40.

Table IV-40. Telephone System Requirements

Phase	Total Line Requirements	Existing Lines	Additional Lines
2000-2005	8	5	3
2005-2010	8	8	0
2010-2015	8	8	0
2015-2020	8	14	6

4.2.5.10 Access Roads

It is assumed that any type of improvements to be done on the access road will be carried out and funded by the government.

4.2.5.11 Vehicle Parking

The size of the parking required for the four phases of development was determined by using the forecasted passenger volume and the estimated number of employees. The adequacy of the passenger and employee parking for present and future phases is determined based upon an evaluation of current vehicular traffic and its relationship to peak hour passengers as shown in Table IV-41. It is assumed that the current parking lot (estimated size of 375 m^2) will require a bituminous concrete overlay in Phase I (2000-2005).

The following is a summary of the additional parking required for the four phases of development.

Table IV-41. Vehicle Parking Requirements

Phase	Total Required Parking (m^2)	Existing Parking (m^2)	Additional Parking (m^2)
2000-2005	512.5	375	137.5
2005-2010	550	512.5	37.5
2010-2015	675	550	125
2015-2020	750	675	75

4.2.6 Cost Estimates

Capital Cost Estimates of airport improvements have been prepared for four phases of development. These phases are:

Phase I - Years 2002-2005

Phase II - Years 2005-2010

Phase III - Years 2010-2015

Phase IV - Years 2015-2020

All costs are in current US Dollars, without inflation. A summary sheet of the capital cost estimates is shown in Table IV-42. In preparing these estimates, unit cost information collected in Mali was utilized, as was the Consultant's own data base on international construction costs. Fifteen percent was added to all construction and equipment cost estimates to cover contingencies and the cost of engineering services.

The cost estimate shown here refers to the base case scenario as described on the precedent sections and includes only the minimum (base case) requirements as detailed on the corresponding section.

Table IV-42. Cost Estimate for Goundam Airport Improvements

ITEM	DESCRIPTION	PHASE I (2002-2005) (US $)	PHASE II (2005-2010) (US $)	PHASE III (2010-2015) (US $)	PHASE IV (2015-2020) (US $)	TOTAL (US $)
1	RUNWAY	0	1,401,624	0	0	1,401,624
2	TAXIWAY LOOP & CONNECTOR	0	113,633	0	0	113,633
3	APRON(s) (New Pavements /Rehabilitation)	529,663	14,700	14,700	14,700	573,763
4	DRAINAGE	113,000	0	105,000	0	218,000
5	TERMINAL BUILDING/EQUIPMENT	0	0	0	0	0
6	VEHICULAR PARKING (Terminal Building)	8,250	2,250	7,500	4,500	22,500
7	POTABLE WATER	25,000	0	0	0	25,000
8	SEWAGE TREATMENT	0	30,000	0	0	30,000
9	NAVAIDS	225,000	0	50,000	50,000	325,000
10	TELEPHONE SYSTEM	75,000	0	0	75,000	150,000
11	ELECTRICAL POWER	175,000	0	0	25,000	200,000
12	ARFF FACILITY	0	120,000	0	0	120,000
13	PERIMETER FENCE	116,050	0	0	0	116,050
14	CONTINGENCY & ENGINEERING 15%	190,044	252,331	26,580	25,380	494,335
	TOTAL	**$1,457,007**	**$1,934,538**	**$203,780**	**$194,580**	**$3,789,905**

TOC

4.3 Kayes Airport

4.3.1 Socioeconomic Profile

4.3.1.1 Transportation Factors

Ground communications in Kayes is mainly based on railroads, which connects Bamako to Kayes with approximately 560 km of railroad. The line continues to Dakar, entering Senegal through Diboli. The passenger transport by train is an important factor since it is assumed to be an important communication method between Bamako and Kayes. In 1999, 720,000 passengers used the train to travel inside Mali with an average distance of 251 km and by comparing to the 37,794 passengers transported by Air Mali for the same year in domestic flights, it is a very high number. It should be mentioned that the 57 km separating Bamako from Koulikoro are greatest with regard to traffic of train passengers. However, the travel time between Bamako and Kayes by train is 12 hours.

With regard to cargo transportation by train, in 1999 the cargo volume transported by railroad was only 0.02% of the total cargo transported in Mali.

The accessibility of Kayes by road has some of the weakest points, and that could be the reason for the economic slowdown of the region. Kayes connects to Bamako with a marked road of 330 km from Kayes to Kita, which is not in very good condition, plus a 180 km unpaved road from Kita to Bamako. A road with gravel of 251 km connects Kayes with Nioro.

Kayes is connected to Dakar through a 980 km road, which 168 km between Kayes and Bakel is gravel, 553 km up to St. Louis is paved road and 260 km up to Dakar is also paved. Additionally, the Bamako-Kayes-Dakar corridor is one of the main links for international cargo traffic in Mali. In 1999, this corridor had a movement of 42,654 tons of imports from Dakar to Kayes. In 1999, by train, 355 tons between Bamako and Dakar were transported. Kayes does not have commercial connections with any other economic points of the country. In 1999, 23,240 tons of merchandise was registered only for the area surrounding Kayes.

The Senegal River is navigational between the months of August and November for 100 km from the border with Senegal up to Kayes, although there are no references indicating if it is used as an alternative mode of transport.

4.3.1.2 Tourism Factors

Kayes is not a tourist attraction point. The only source of tourism is the National Parks of Baoulé and Bafing, which present a vast fauna and flora and some remains of the Neolithic period.

These parks are included in the Strategic Plan for development of tourist activities by the Ministry of Tourism, but there are other areas with more priority in the Government's view. In addition, the tourism that these parks could generate is more of an ecotourism.

Access to the Bafing Park takes 7 hours by car from Bamako. Another alternative could be provided by flying weekly with an ATR72 type aircraft for 68 passengers from Bamako to Kayes and later access the park by road. The major problem observed is the seasonal conditions of the roads from Kayes, which is only operational during the dry season and is closed the rest of the year.

4.3.1.3 Socioeconomic Factors

Kayes' town lies along the Senegal River. Kayes is both the terminus of Senegal River traffic and an important stop on the Mali Railway (Regie des Chemins de Fer du Mali). The area in which Kayes is situated has an economy based on subsistence agriculture. The most important crop is peanuts (groundnuts) and, also, some livestock is raised. Town population in 1998 was 327,000.

Kayes is the capital of Region I and the sixth most important city of the country. It has one of the weakest rates of economic development. The economy in Kayes is dominated by commerce and trades with Mauritania and Senegal. The railroad, which handles the commerce, constitutes the main link of the city with the rest of the country and Senegal. The secondary sector is almost nonexistent in Kayes.

The gold mines in Sadiola (25,650 kg extracted in 2000) are located 70 km south of Kayes.

4.3.2 Current Airport Activities

Kayes is serviced three times a week by regular commercial flight from Air Mali, it belongs to the Sahel circuit.

Passenger traffic shows a wave-like effect since 1993 with an average growth of 15%, which generated a maximum volume of passenger in 1998 of 2,805. Since then, traffic has decreased 30% up to 1,904 passengers in 2000. With regard to aircraft, the average growth was 36% in the past 7 years and 100% between 1999 and 2000.

The sharp variations shown in Table IV-43 and Graph IV-14 are due to the uncertainty of the economic and social situation in Mali. Region 1 generates the highest amount of emigrating population, which usually comes back during July and August to visit their family. Usually, this Malian population residing outside travels with limited time so aircraft use is most common, also they travel with a lot of luggage and are the main generators of air cargo for Kayes.

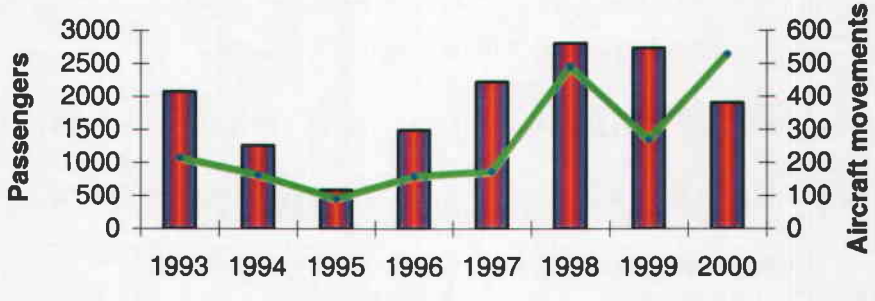
There is another type of passenger that travels to Kayes for business reasons due to the gold mines in Sadiola and usually fly with private companies.

Table IV-43. Kayes Airport Activity

		1993	1994	1995	1996	1997	1998	1999	2000
Kayes (KAY)	Aircraft Operations	212	160	88	156	170	490	266	527
	Passengers	2071	1258	585	1492	2225	2805	2732	1904
	Freight (kg)	5142	0	15	132	0	30881	3247	3377
	Mail (kg)	846	1010	0	0	0	0	0	0

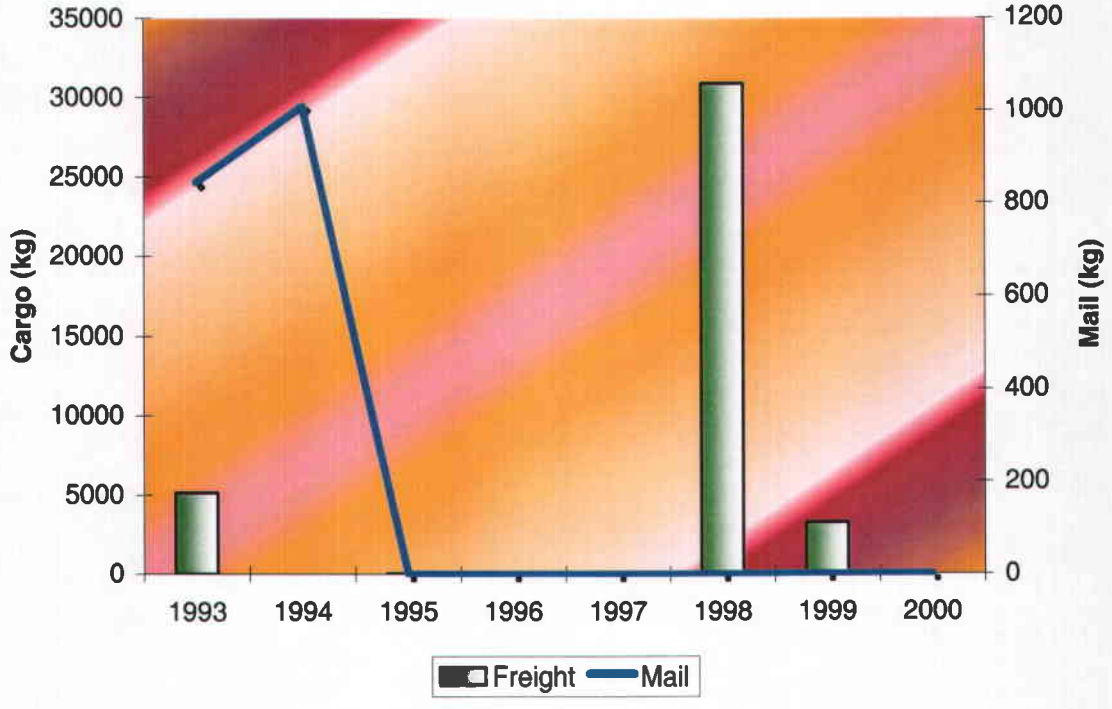
The correlation between passenger traffic and the number of aircraft operations in Kayes is R^2=0.6.

Graph IV-14. Kayes Airport Activity



Graph IV-15 shows the lack of air cargo activity generated by the Kayes Airport.

Graph IV-15. Cargo and Mail Operations at Kayes Airport



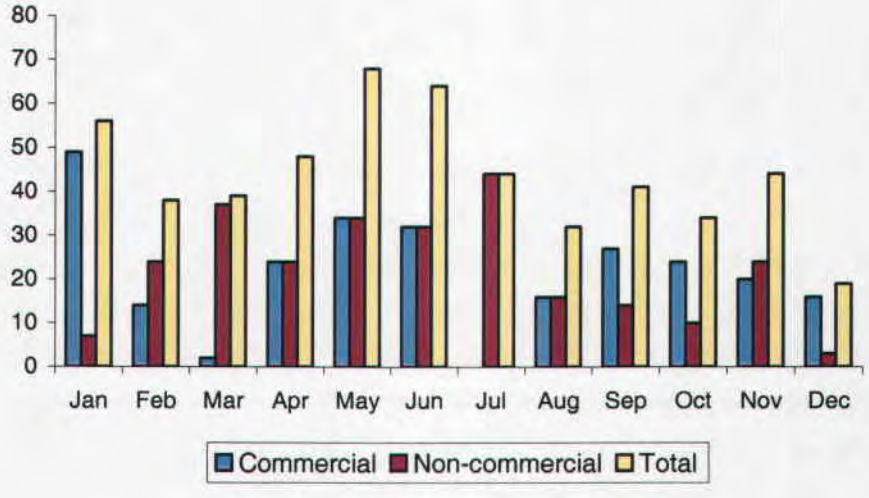
Seasonal traffic does not show the same profiles as the tourist oriented airports of Mopti, Tombouctou or Gao. The highest volume of passenger traffic is during the month of December as well as the number of commercial operations. On the other hand, the noncommercial flights represent half of the flights in Kayes as well as half of the passengers, which produces a very low occupancy rate of aircraft: 4 passenger per commercial aircraft. Keeping in mind that Air Mali uses L-410 aircraft for 19 passengers, the occupancy factor is around 21%.

Table IV-44. Aircraft Movements and Passenger Traffic at Kayes Airport

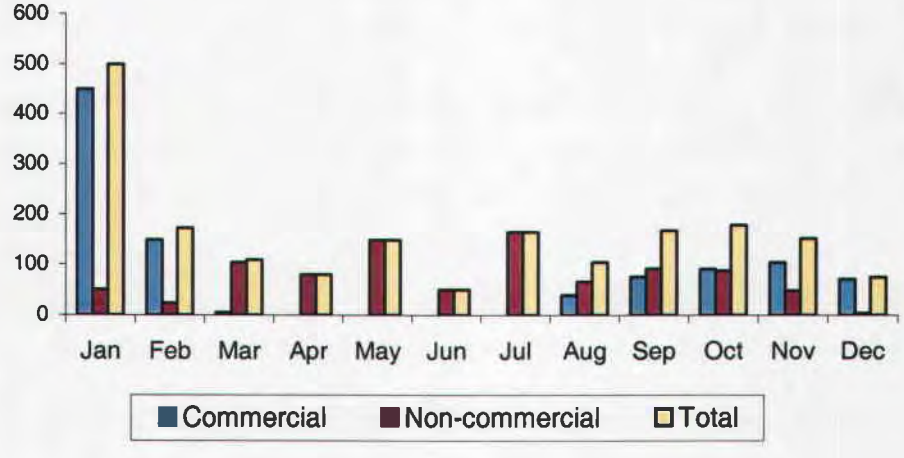
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
	Aircraft Movements												
Commercial	49	14	2	24	34	32	0	16	27	24	20	16	**258**
Non-commercial	7	24	37	24	34	32	44	16	14	10	24	3	**269**
Total	56	38	39	48	68	64	44	32	41	34	44	19	**527**

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
	Passenger Traffic												
Commercial	449	149	5	0	0	0	0	39	76	91	104	71	**984**
Non-commercial	50	24	104	80	149	50	165	66	92	88	48	4	**920**
Total	499	173	109	80	149	50	165	105	168	179	152	75	**1 904**

Graph IV-16. Aircraft Movement at Kayes Airport



Graph IV-17. Passenger Movement at Kayes Airport



4.3.3 Aviation Activity Forecast

4.3.3.1 Base Scenario

4.3.3.1.1 Passengers

The base scenario for passenger traffic forecast at Kayes is based on the growth index proposed by the manufacturer of Airbus aircraft for the western region of Africa. As shown in Table III-8 of the section of Aviation Factors, the growth shows a trend of 4.1% between 1999 up to 2009 and 4% thereafter, until 2020.

It is assumed that the socioeconomic conditions of the region continue at the same rate of growth as today. The Kayes Airport operates as a distribution and interchange point with other sectors of the country.

4.3.3.1.2 Aircraft Movements

The calculation of the aircraft operations figures for the next 20 years has followed the same procedure as the Gao Airport. However, due to the fact that the Kayes Airport together with the rest of the domestic airports is not important or influential, it was determined to calculate all of those airports in the same criteria, assuming a national average of passengers per aircraft in order to obtain the results. In the same manner as the process used for the Tombouctou and Mopti airports, the average occupancy coefficient per aircraft, but at a national level, of 27% has been used. The trend will be that in the future the occupancy coefficient of 70% will be achieved. The result of the calculation was an average annual percentage of 2.4%.

4.3.3.1.3 Cargo

Air cargo traffic follows the same process as the previous airports, which assumes a growth equal to the Bamako-Senou Airport of 4% increase annually with regard to cargo and mail.

Air cargo traffic in Kayes is not important and its forecast depends mainly on external airport factors which would need a market study in order to establish the potential of Kayes as a distribution point. Kayes could become a key commercial activity point and air cargo hub due to its strategic location for northern Africa.

4.3.3.2 High Scenario

4.3.3.2.1 Passengers

The growth index for this scenario takes the growth forecasts from the Boeing Company for the western region of Africa. The growth percentage between 2000 and 2020 is 6.1%, as can be observed in Table III-7.

This scenario assumes an economic development of the region and greater weight as a commercial activity point due to its mining activity of gold extraction and the improvement of road infrastructures. It is further assumed that in the future a plan will be implemented for the development of tourism activities at the Bafing Park through Kayes.

4.3.3.2.2 Aircraft Movements

This scenario, in the same way as the previous scenario, assumes an occupancy factor for aircraft of 70% for 2020. The growth is correlated to the number of domestic passengers. In this scenario no long-range flights are forecasted, nevertheless, medium-range flights coming mainly from Morocco or other neighboring countries from North Africa are not ruled out.

It is forecasted that only regular domestic flights will operate with aircraft type ATR-42 for 50 passengers as maximum until 2020. Aircraft type B-737 for 130 passengers coming from Casablanca or Dakar could start operating, specifically during the school vacation periods, when Malian emigrants come see their families.

4.3.3.2.3 Cargo

A second scenario was not developed for air cargo transportation because it is not considered to be significant or influential in the general context.

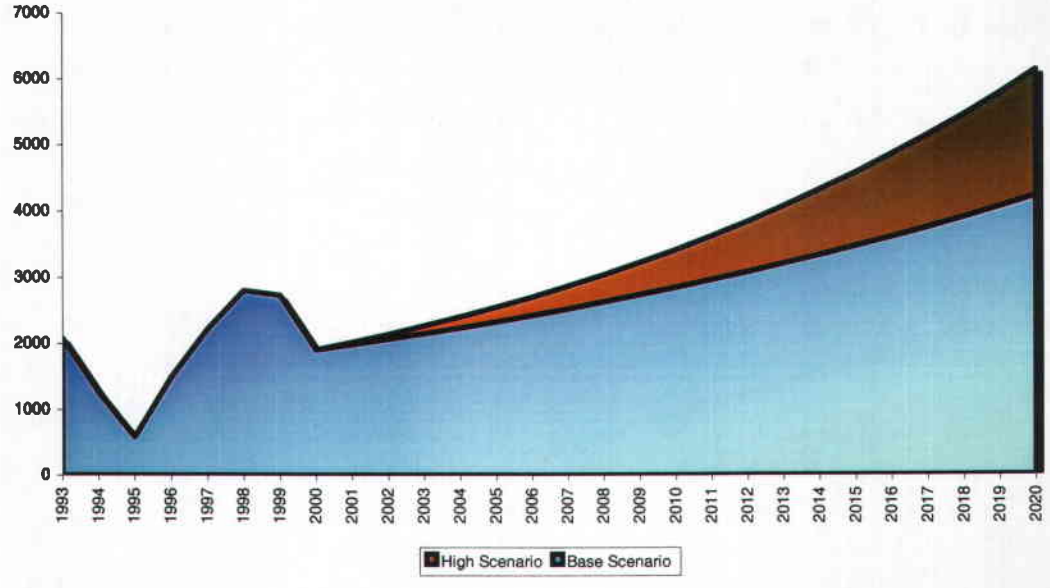
4.3.3.3 Passenger Forecast

Table IV-45. Passenger Forecast – Kayes Airport

	Scenario	2000	2001	2002	2003	2004	2005	2006
Passengers	Base	1904	1983	2065	2150	2239	2331	2427
	High		2019	2141	2270	2407	2552	2706
	Scenario	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**
Passengers	Base	2527	2631	2739	2849	2963	3082	3206
	High	2869	3042	3225	3419	3625	3843	4074

	Scenario	2014	2015	2016	2017	2018	2019	2020
Passengers	Base	3335	3469	3608	3763	3904	4061	4224
	High	4319	4579	4854	5146	5455	5783	6130

Graph IV-18. Passenger Forecast – Kayes Airport



The forecast of number of passengers during peak hour is based on theoretical calculations, where the number of passengers during peak hour in a typical day represents 2% of total traffic.

	2005	2010	2015	2020
Base	47	57	69	84
High	51	68	92	123

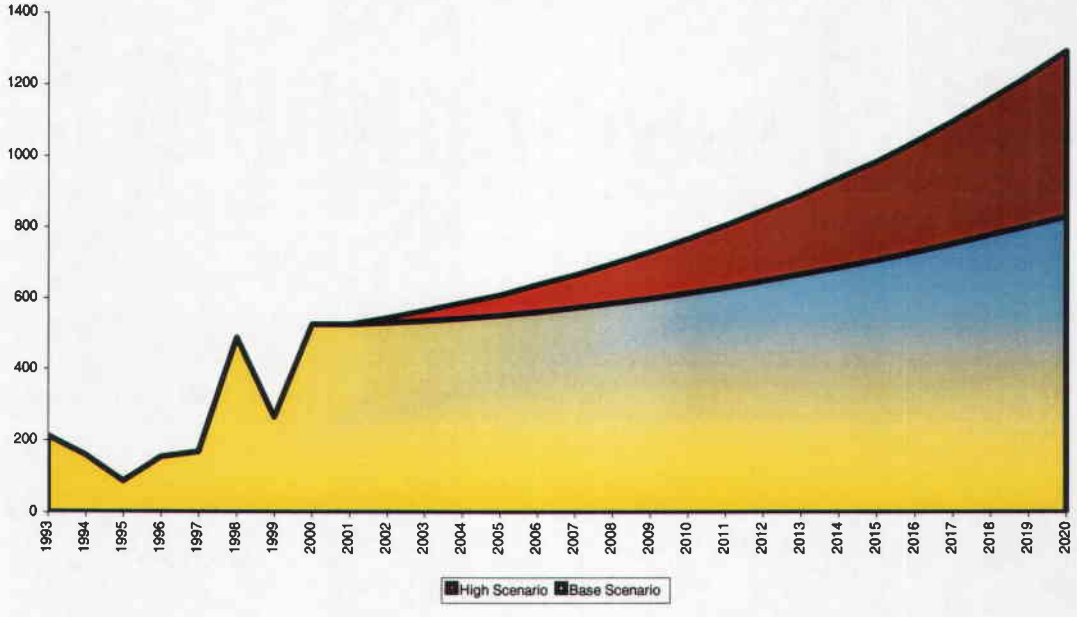
4.3.3.4 Aircraft Movement Forecast

Table IV-46. Aircraft Movement Forecast – Kayes Airport

	Scenario	2000	2001	2002	2003	2004	2005	2006
Aircraft Movements	Base	527	527	531	537	544	552	562
	High	527	527	545	566	588	610	639

	Scenario	2007	2008	2009	2010	2011	2012	2013
Aircraft Movements	Base	574	587	600	615	631	649	668
	High	666	698	731	767	805	847	890
	Scenario	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
Aircraft Movements	Base	687	707	729	753	778	803	1223
	High	938	985	1040	4096	1158	1223	1291

Graph IV-19. Aircraft Movement Forecast – Kayes Airport

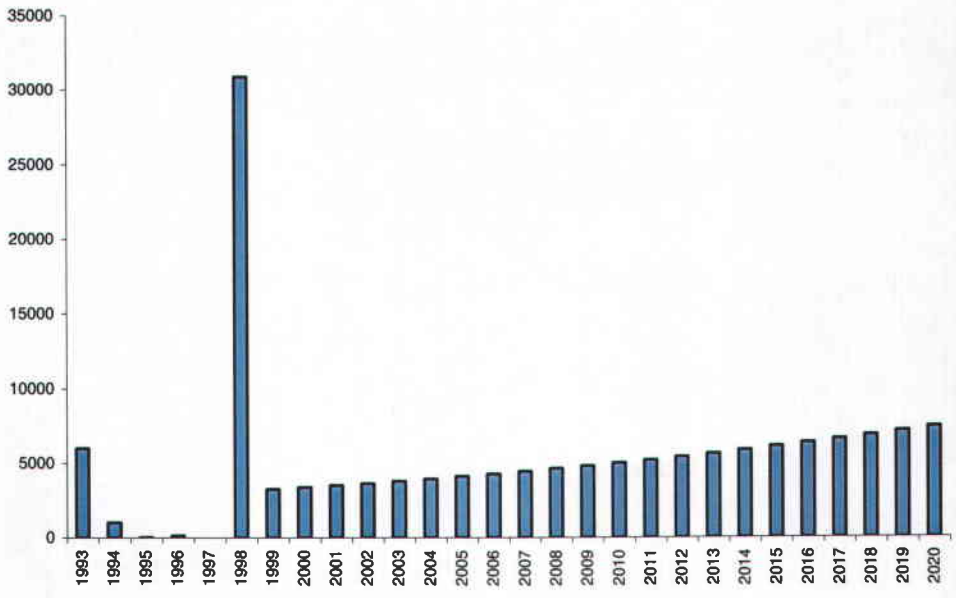


4.3.3.5 Cargo Forecast

Table IV-47. Cargo and Mail Forecast – Kayes Airport

	Scenario	2000	2001	2002	2003	2004	2005	2006
Cargo & Mail (kg)	Base	3377	3512	3653	3800	3952	4111	4276
	High		-	-	-	-	-	-
	Scenario	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**
Cargo & Mail (kg)	Base	4448	4626	4812	5005	5206	5415	5632
	High	-	-	-	-	-	-	-
	Scenario	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
Cargo & Mail (kg)	Base	5858	6093	6337	6591	6855	7130	7416
	High	-	-	-	-	-	-	-

Graph IV-20. Cargo and Mail Forecast – Kayes Airport (kg)



4.3.4 Existing Facilities and Equipment

Figure IV-6, at the end of this section, shows the current airport layout plan.

4.3.4.1 Runway

Under contract for construction is a new bituminous concrete runway that is 1600 m in length and 30 m wide with 7.5m shoulders on both sides and 60 m paved runway overruns.

Although not specified on the information received, it was assumed that runway edge lights and new threshold lighting are included with the construction of the new airport.

4.3.4.2 Connector

A 90-degree connector is to be constructed located approximately 1280 m from threshold 08, which provides access from the runway to the apron. The geometric of the connector is 23 m wide x 150 m long.

4.3.4.3 Apron

A new apron is to be constructed, which will be 100 m x 70 m.

4.3.4.4 Navaids

Kayes Airport is being modernized due to the championship for African Soccer, which will be in February 2002 and Kayes is on the venue. Due to the expansion and security problems with the old airport, which was located in the middle of the city, a new site was designated and construction of new airport facilities have been carried out. As consequence of the new facilities the navaids equipments have also been reinstalled.

The existing equipment identified through layout plans and requirements presented by STUDI are as follows:

- NDB
- VHF Transmitter-Receiver
- HF Transmitter-Receiver
- Power generator
- VOR
- Meteo equipment
    - Hydrogen generator
    - Observation station
    - Optic theodolite
    - Barometer
    - Barograph
    - Thermograph
    - Power generator

4.3.4.5 Perimeter Fence

It was estimated that new perimeter fencing would be included with the construction of the new airport to meet ICAO's minimum height, size and material standards.

4.3.4.6 Airfield Drainage System

With the construction of the new airport, it was assumed that the drainage system will be the same type common to the other airports and consists of manmade vegetative lined drainage channels and ditches outfalling into the natural drainage courses.

4.3.4.7 Terminal Building

The passenger facilities dimensions and areas were taken from construction plans of the airport from previous studies. A terminal of approximately 875 m^2 will service 62 passengers during peak hour, who are expected to use the airport during the short period of the sport event.

Without taking into account this unusual increase in traffic, the theoretical number of passengers during peak hour obtained through calculations as was also carried out for Mopti gave the following results for the year 2001:

Table IV-48. Peak Hour Passengers

	Domestic		Transit	Total
	Arrival	Departure		
2001	5	7	5	17

Furthermore, the construction of a VIP room is also forecasted and will be located away from the main terminal.

4.3.4.8 Cargo Terminal

A 2450 m^2 cargo terminal is projected, assuming a low technology cargo terminal with the capacity to process some 3 tons per m^2, which calculates to a cargo volume of 7,350 tons. This value would assume some 320 annual flights of an A-300 type aircraft with a capacity of 23,000 kg of useful cargo.

The previous study does not specify when this estimated value would be reached, but for the characteristics of Region I and gold export potential by air, the forecasts are no more than an

average of 5,000 kg in 2020. Also, the Bamako-Senou Airport forecasts for 2020 are approximately 10,300 tons. If Kayes' expectations of 7,350 tons were reached, it would mean an annual increase of over 100%.

4.3.4.9 Maintenance/Storage Building

Aimed at providing storage for airport maintenance materials and equipment parts, a 400 m^2 building is projected.

4.3.4.10 Airport Rescue and Fire Fighting (ARFF)

A new ARFF facility is assumed to be included with the new airport construction although no specific information was available. It was assumed that this structure would be constructed of reinforced concrete consisting of bays for parking the fire fighting vehicles, an attached office building and storage for equipment and chemicals. In addition, it was assumed that 2 new fire-fighting vehicles will be purchased and that an above ground water storage tank will be provided.

4.3.4.11 Utilities

4.3.4.11.1 Water

Although not identified in the data provided, it was assumed that adequate water service will be provided with the new construction and water supply facilities would be sized to meet the additional future flow requirements. Also, it was assumed that the new construction would include a water storage tank to be used exclusively for the ARFF vehicles.

4.3.4.11.2 Sanitary Sewer

No information was available on the amount, size and location of the new wastewater treatment system. From plans and observations at other airports, the common treatment system is septic tanks that discharge into cylindrical leaching pit, which is the type of treatment system assumed to be installed at the new airport and sized for the increase flows of future passenger and employee forecasts.

4.3.4.11.3 Electrical Power Supply

No information was available on the size and type of electrical power supply that will be provided to the new airport. It was assumed that adequate electrical facilities would be provided including back-up generators with additional capacities for future expansion.

4.3.4.11.4 Telephone System

Information was not available on the number of telephone lines to be provided for the new airport; although, it was forecasted that 10 lines will be provided.

4.3.4.12 Access Roads

From information received, it was estimated that a new airport access road would be constructed from the terminal building to the intersection with Road RR3 (Kayes-Segue) for a scaled length of 1800 m from the plans. The width of this new access road was shown to be 6 m. It was estimated that this road will have two lanes with a shoulder and a ditch cross-section, and, also, the pavement will be bituminous concrete.

4.3.4.13 Vehicle Parking

No information was available on the size of the new parking lot to be constructed. Based upon information on similar size airports in our study, it was assumed that 30 spaces will be provided ($750m^2$) and that this parking lot will be constructed of bituminous concrete.

4.3.5 Evaluation of Existing Facilities

4.3.5.1 Runway

The new runway geometric is adequate for the ICAO minimum requirements for an AN-24 design aircraft (airport reference code 3C). Based upon the pavement conditional observations and studies at the other Malian domestic airports, the new pavement should not require any major rehabilitation in the 20-year study period. Table IV-49 shows the runway length and improvement requirements.

Table IV-49. Runway Requirements

Design Aircraft	Required Length	Required Width	Exist Length	Exist Width	Improvement Required	Year
AN24	1500 m	30 m	1600 m	30 m	1600m x 30m overlay	2005-2010

4.3.5.2 Connector

The width of the connector satisfies the requirements for the Category 3C – AN-24 with no improvements in dimensions required in the future.

As with the runway improvements, it is anticipated that no major improvements or pavement rehabilitations will be required in the 20-year study period. Table IV-50 shows the design requirements for the connectors.

Table IV-50. Connector Requirements

Design Aircraft	Existing Width	Existing Area	Required Width	Improvements Required	Phase Required
AN24	23m	4620 m^2	15 m	none	N/A

4.3.5.3 Apron

In order to meet the parking requirements for the peak hour air traffic forecasts, the apron will need to be expanded to 105 m x 76 m (980m^2) in phase 2000-2005. Table IV-51 shows the apron sizing requirements and Figure IV-3 shows the aircraft parking and movement requirements.

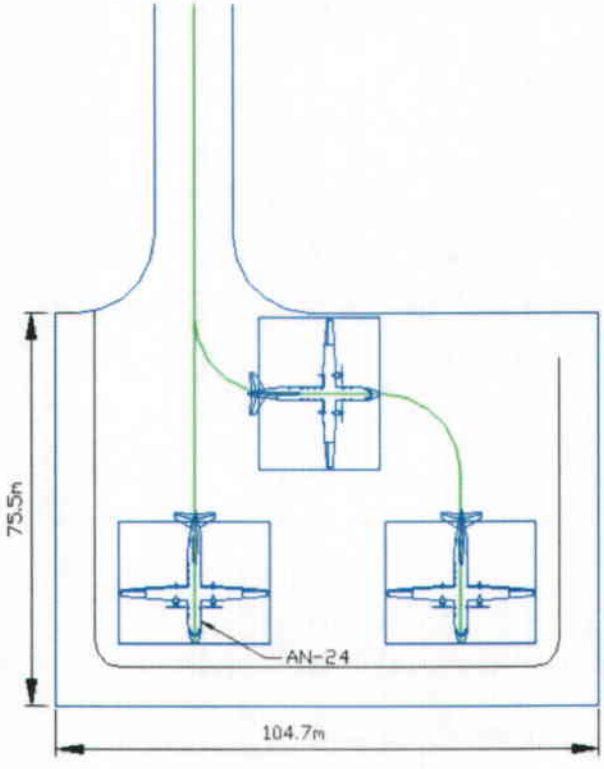
Table IV-51. Apron Requirements

Phase	Design Aircraft	Apron Size		Improvements
		Existing	Required	
2000-2005	2 AN-24 2 AN-24	100 m x 70 m	105 m x 76 m	100 m x 6 m & 5 m x 76 m expansion (980 m^2)
2005-2010	2 AN-24 2 AN-24	105 m x 76 m	105 m x 76 m	105 m x 76 m crack and joint repair
2010-2015	2 AN-24 2 AN-24	105 m x 76 m	105 m x 76 m	105 m x 76 m crack and joint repair
2015-2020	2 AN-24 2 AN-24	105 m x 76 m	105 m x 76 m	105 m x 76 m crack and joint repair

Comments

1. Estimated improvements based upon the existing apron pavement being in good condition.
2. Power in - power out
3. Surry seal required on new pavement in aircraft fueling areas.
4. Pavement Marking required for all phases

Figure IV-5. Apron Parking



4.3.5.4 Navaids

The following table shows the equipment investment needs for the four development phases. An approximate useful life of the equipment, between 12 and 15 years, has been taken into account.

Table IV-52. Navaids Equipment Forecast

2000-2005	2005-2010	2010-2015	2015-2020
		VHF data link equipment Airfield lighting system New PAPI	New Meteo equipment

4.3.5.5 Perimeter Fence

No additional fencing is required for the future phases included in this study for the Kayes Airport.

4.3.5.6 Airfield Drainage System

Due to the rapid infiltration of the runoff due to the soil's high permeability properties and the low amounts if annual rainfall, minimal maintenance and improvements are required for the drainage system. It is recommended that routine cleaning and clearing of the drainage ditches and channels by removing the vegetation that has accumulated inside and around the drainage improvements. Also, it is estimated that every 5 years the major drainage ditches and channels would require removal of the accumulated sediment and that the design flow lines be reestablished.

Table IV-53 below shows information on scheduled maintenance and improvements to the drainage system.

Table IV-53. Airfield Drainage System

Phase	Improvements		Comment
	Airside	Landside	
2005	181 m		Apron Expansion – new channel
	4750 m		Reestablish channel flow lines
		500 m	Reestablish channel flow lines
2010	—	—	—
2015	4750 m		Reestablish channel flow lines
		500 m	Reestablish channel flow lines
2020	—	—	—

4.3.5.7 Terminal Building

With regard to the number of passenger during peak hour forecasted for the period of the study, the IATA method described in the Airport Development Reference Manual has been used in order to calculate the theoretical terminal dimensions and breakdown of all the different components. The following table shows these results.

Table IV-54. Terminal Building Requirements

Terminal Building		2005	2010	2015	2020
Base	Design Passenger Peak Hour	20	24	29	36
	Area (m^2)	**280**	**336**	**406**	**504**
High	Design Passenger Peak Hour	22	29	39	52
	Area (m^2)	**308**	**406**	**546**	**728**

As foreseen, the construction of a new passenger terminal building of 875 m^2 for 2001 will be carried out. Then the terminal area of 875 m^2 exceeds the requirements shown in the Table IV-54 above.

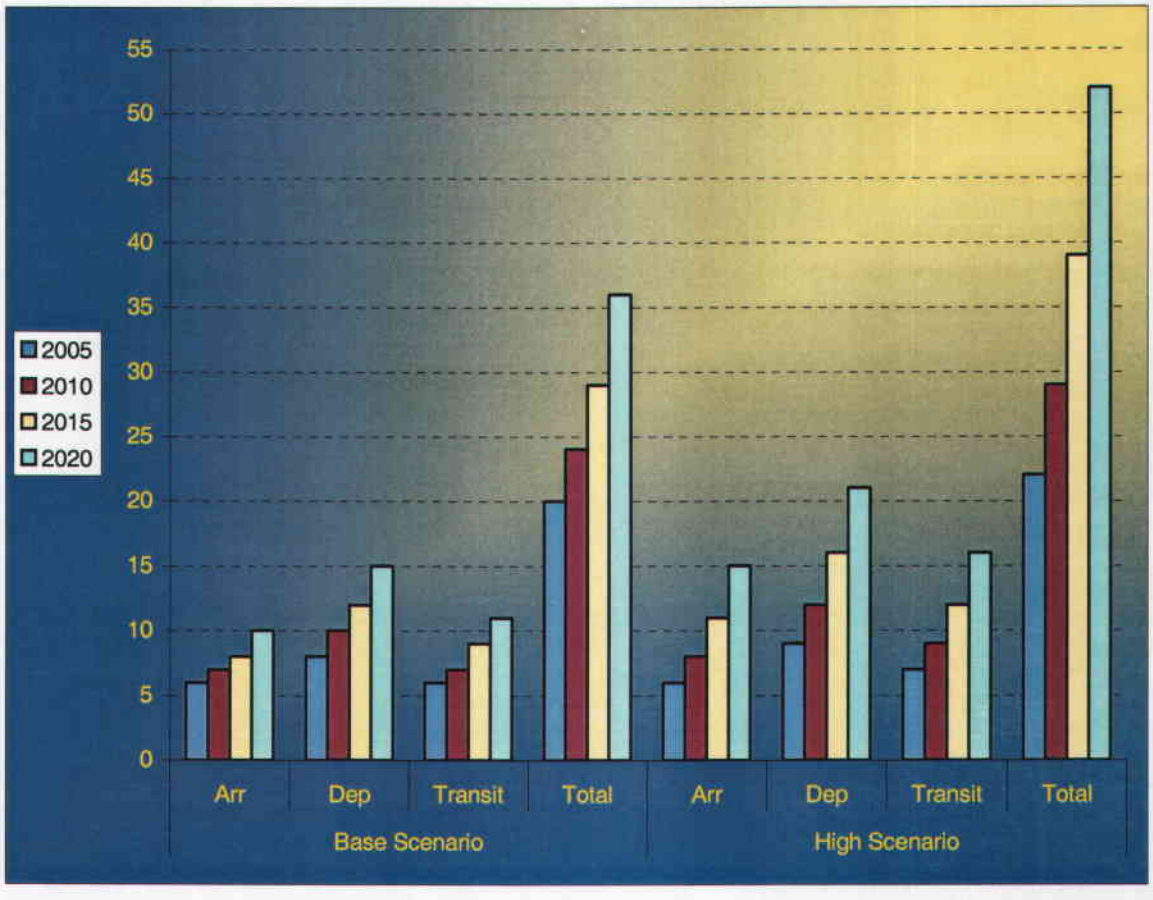
No terminal improvements are required.

The number of passengers during peak hour for the study period are distributed according to the passenger flow, as follows:

Table IV-55. Peak Hour Passenger Forecast at Kayes Airport

	Base Scenario				High Scenario			
	Arrival	Departure	Transit	**Total**	Arrival	Departure	Transit	**Total**
2005	6	8	6	**20**	6	9	7	**22**
2010	7	10	7	**24**	8	12	9	**29**
2015	8	12	9	**29**	11	16	12	**39**
2020	10	15	11	**36**	15	21	16	**52**

Graph IV-21. Peak Hour Passenger Forecast at Kayes Airport



4.3.5.8 Terminal Equipment

The breakdown of all terminal facilities area and measurement of the number of units for public service elements were obtained in the same manner and are presented in four development phases in the following table.

Table IV-56. Terminal Equipment Requirements

	BASE SCENARIO				HIGH SCENARIO			
	2005	2010	2015	2020	2005	2010	2015	2020
Check-in Desks	1	1	2	2	1	2	2	2
Security Check-Centralized	1	1	1	1	1	1	1	1
Arrival Health Check	3	3	3	3	3	3	3	3
Number of Baggage Claim Devices	1	1	1	1	1	1	1	1

4.3.5.9 Maintenance/Storage Building

Table IV-57. Maintenance/Storage Building Requirements

Maintenance/Storage	2005	2010	2015	2020
Area (m^2)	6	6	6	6

4.3.5.10 Airport Rescue and Fire Fighting (ARFF)

Table IV-58 classifies the Aerodrome ICAO Category by the size of the design aircraft and also determines the amount of fire and rescue vehicles required according to ICAO's standards. For Kayes the aerodrome category is 4, which requires 1 vehicle for all phases. It is estimated in phase 2015-2020 the existing vehicle will need a major overhaul.

Table IV-58. ARFF Requirements

Design Aircraft	Aerodrome Category	Aircraft Overall Length	Maximum Fuselage Width	Existing	Required	New Vehicles Replacements	Year
Antonov AN-24	4	23.5 m	-----	1	1	1 - Replacement	2010

4.3.5.11 Utilities

4.3.5.11.1 Water

For the cost estimates, we have estimated that in phase 2010-2015 an additional storage tank with a capacity of 6 m^3 will be required with an additional booster pump. Table IV-59 shows the water supply requirements.

Table IV-59. Water Requirements

		A	B	C	D	F	G
Year	Passengers Peak Hour	Arrivals 50%	Departures 50%	Transit 0%	Visitors (1 x arrivals)	@ Terminal Area	@ Maintenance Area
2005	20	10	10	0	10	10	5

		A	B	C	D	F	G
Year	Passengers Peak Hour	Arrivals 50%	Departures 50%	Transit 0%	Visitors (1 x arrivals)	@ Terminal Area	@ Maintenance Area
2010	24	12	12	0	12	10	5
2015	29	14.5	14.5	0	14.5	10	5
2020	36	18	18	0	18	10	5

	J						I	W	
Year	(A+B+C+D)	J*20	F*250	G*450	Sum	Sum/ 1000	Existing Storage Tank	Total Req. (m^3/day)	Additional Storage Req.
2005	30	600	2500	2250	5350	5	0	5	5
2010	36	720	2500	2250	5470	5	5	5	0
2015	43.5	870	2500	2250	5620	6	5	6	1
2020	54	1080	2500	2250	5830	6	5	6	1

4.3.5.11.2 Sanitary Sewer

Based upon a new treatment system for the new airport and the passenger/employee forecast up to the year 2020, it was estimated that in phase 2015-2020 a new septic tank and leaching pits would be needed. Table IV-60 shows the sanitary sewer sizing requirements.

Table IV-60. Sanitary Sewer Requirements

Year	Total Req. (m^3/day)	Persons Equivalent	Septic Tanks Required	Functional Existing Tanks	New Tanks Required
2005	5	13.2	1	1	0
2010	5	13.2	1	1	0
2015	6	15.84	1	1	0
2020	6	15.84	1	0	1

Note 1: Daily design flow for one person is 0.379m3/day

Note 2: New tanks sized for 20-person capacity, capacity of existing tanks assumed at 15 persons.

4.3.5.11.3 Electrical Power Supply

It is not anticipated that any major upgrades or replacements will be required for the electrical power supply if the electrical equipment and facilities are properly maintained. In phase 2010-2015, it was estimated that minor upgrades and improvements to the electrical facilities due to the age of the existing equipment would be required. Table IV-61 shows the electrical power and supply requirements.

Table IV-61. Electrical Power Supply Requirements

Existing Facilities	2005	2010	2015	2020	Comments
Assumes adequate facilities provided with new airport	None	None	Minor Upgrades	None	

4.3.5.11.4 Telephone System

The number of telephone lines required for the airport administration, faxes, computers, police, airlines, passengers, visitors and employees are calculated and summarized in Table IV-62 below.

Table IV-62. Telephone System Requirements

Phase	Total Lines	Existing Lines	Additional Lines
2000-2005	8	10	0
2005-2010	8	10	0
2010-2015	8	10	0
2015-2020	14	10	4

4.3.5.12 Access Roads

It was assumed that any type of improvements to be done on the access road will be carried out and funded for by the government.

4.3.5.13 Vehicle Parking

The size of the parking required for the 4 phases of development was determined by using the forecasted passenger counts and the estimated number of employees. The adequacy of the passenger and employee parking for present and future phases is determined based upon an evaluation of current vehicular traffic and its relationship to peak hour passengers as shown in Table IV-63.

The following is a summary of the additional parking required for the 4 phases of development.

Table IV-63. Vehicle Parking Requirements

Phase	Total Parking (m^2)	Existing Parking (m^2)	Additional Parking (m^2)
2000-2005	625	750	0
2005-2010	675	750	0
2010-2015	918.5	750	168.75
2015-2020	1050	918.75	131.25

4.3.6 Cost Estimates

Capital Cost Estimates of airport improvements have been prepared for four phases of development. These phases are:

Phase I - Years 2002-2005

Phase II - Years 2005-2010

Phase III - Years 2010-2015

Phase IV - Years 2015-2020

All costs are in current US Dollars, without inflation. A summary sheet of the capital cost estimates is shown in Table IV-64. In preparing these estimates, unit cost information collected in Mali was utilized, as was the Consultant's own data base on international construction costs. Fifteen percent was added to all construction and equipment cost estimates to cover contingencies and the cost of engineering services.

The cost estimate shown here refers to the base case scenario as described on the precedent sections and includes only the minimum (base case) requirements as detailed on the corresponding section.

Table IV-64. Cost Estimate for Kayes Airport Improvement

ITEM	DESCRIPTION	PHASE I (2002-2005) (US $)	PHASE II (2005-2010) (US $)	PHASE III (2010-2015) (US $)	PHASE IV (2015-2020) (US $)	TOTAL (US $)
1	RUNWAY	0	0	0	0	**0**
2	TAXIWAY LOOP & CONNECTOR	0	0	0	0	**0**
3	APRON(s) (New Pavements /Rehabilitation)	92,502	11,172	11,172	11,172	**126,018**
4	DRAINAGE	119,480	0	105,000	0	**224,480**
5	TERMINAL BUILDING/EQUIPMENT	0	135,000	0	135,000	**270,000**
6	VEHICULAR PARKING (Terminal Building)	0	0	10,125	7,875	**18,000**
7	POTABLE WATER	0	0	25,000	0	**25,000**
8	SEWAGE TREATMENT	0	0	0	30,000	**30,000**
9	NAVAIDS	0	0	200,000	50,000	**250,000**
10	TELEPHONE SYSTEM	0	0	0	75,000	**75,000**
11	ELECTRICAL POWER	0	0	50,000	0	**50,000**
12	ARFF FACILITY	0	0	0	120,000	**120,000**
13	PERIMETER FENCE	0	0	0	0	**0**
14	CONTINGENCY & ENGINEERING 15%	31,797	21,926	60,195	64,357	**178,275**
	TOTAL	**$243,779**	**$168,098**	**$461,492**	**$493,404**	**$1,366,772**

TOC

4.4 Kéniéba Airport

4.4.1 Socioeconomic Profile

4.4.1.1 Transportation Factors

Kéniéba is located on the western side of Mali, approximately 30 km from the Senegal border. Road access to Kéniéba is complicated.

4.4.1.2 Tourism Factors

Kéniéba is located within the Bafing National Park. The Ministry of Tourism has planned for the ecotourism development of the zone.

4.4.2 Current Airport Activities

The statistics for the three airports as a group are shown in Table IV-65. This data was taken from ADM statistics and was registered as "Other Airports", which for this analysis it must be assumed that it corresponds to Sikasso, Yélimané and Kéniéba, as far as the financial analysis is concerned.

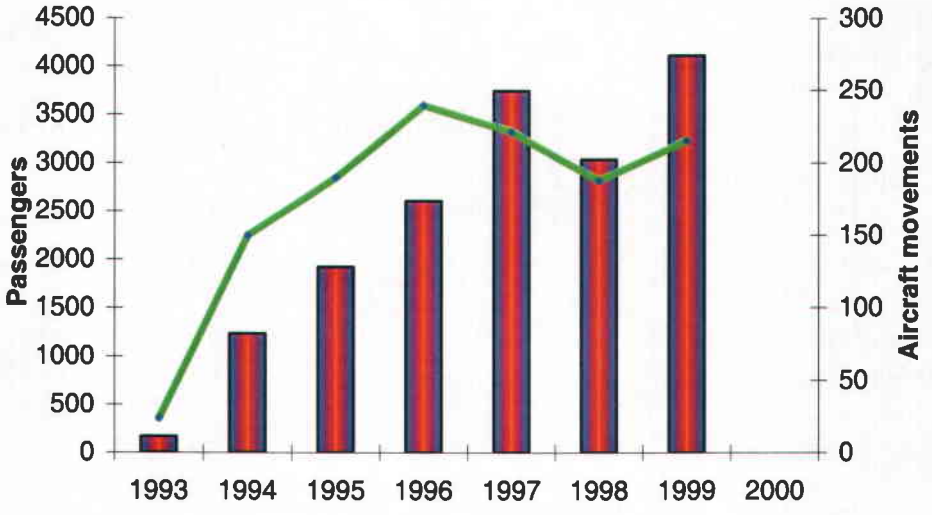
Table IV-65. Airport Activity for Yélimané, Kéniéba and Sikasso

Yélimané, Kéniéba, Sikasso

	1993	1994	1995	1996	1997	1998	1999	2000
Aircraft Operations	24	150	190	240	222	188	216	N/A
Passengers	167	1232	1917	2604	3745	3034	4115	N/A
Freight (kg)	0	0	755	655	100	0	2168	N/A
Mail (kg)	0	0	0	0	357	858	488	N/A

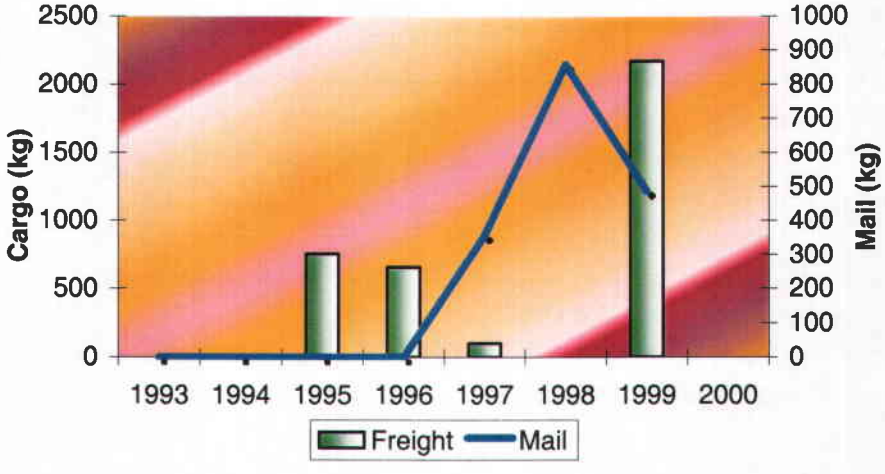
Graph IV-22 shows the constant growth experienced by the group of airports.

Graph IV-22. Sikasso, Yélimané and Kéniéba Airport Activity



The air cargo activity is not assumed to be great, as shown in Graph IV-23.

Graph IV-23. Cargo and Mail Operations – Sikasso, Yélimané and Kéniéba Airports



4.4.3 Aviation Activity Forecast

4.4.3.1 Base Scenario

4.4.3.1.1 Passengers

The base scenario for the annual passenger traffic forecast in Sikasso, Yélimané and Kéniéba is based on the growth index carried out by the aircraft manufacturer Airbus in the western region of Africa. As observed on Table III-8, the growth shows a trend of 4.1% between 1999 until 2009 and 4% thereafter, until the year 2020.

4.4.3.1.2 Aircraft Movements

The calculation of the aircraft operations figures for the next 20 years has followed the same procedure as the Gao and Kayes Airports. However, due to the fact that the Sikasso, Yélimané and Kéniéba Airports together with the rest of the domestic airports is not important or influential, it was decided to calculate the forecast of aircraft movements for all of those airports in the same criteria, assuming a national average of passengers per aircraft in order to obtain the results. In the same manner as the process used for the Tombouctou and Mopti airports, the average occupancy coefficient per aircraft, but at a national level, of 27% has been used. The trend will be that in the future an occupancy coefficient of 70% will be achieved. The result of the calculation was an average annual percentage of growth 2.4%.

4.4.3.1.3 Cargo

Air cargo traffic follows the same process as in the other airports, which assumes a growth equal to the Bamako-Senou Airport increase of 4% annually with regard to cargo and mail.

4.4.3.2 High Scenario

4.4.3.2.1 Passengers

The growth index for this scenario has been assumed the same growth as the one forecasted by Boeing company for the western region of Africa. The growth percentage between the years 2000 and 2020 is 6.1%, as can be observed in Table III-7.

4.4.3.2.2 Aircraft Movements

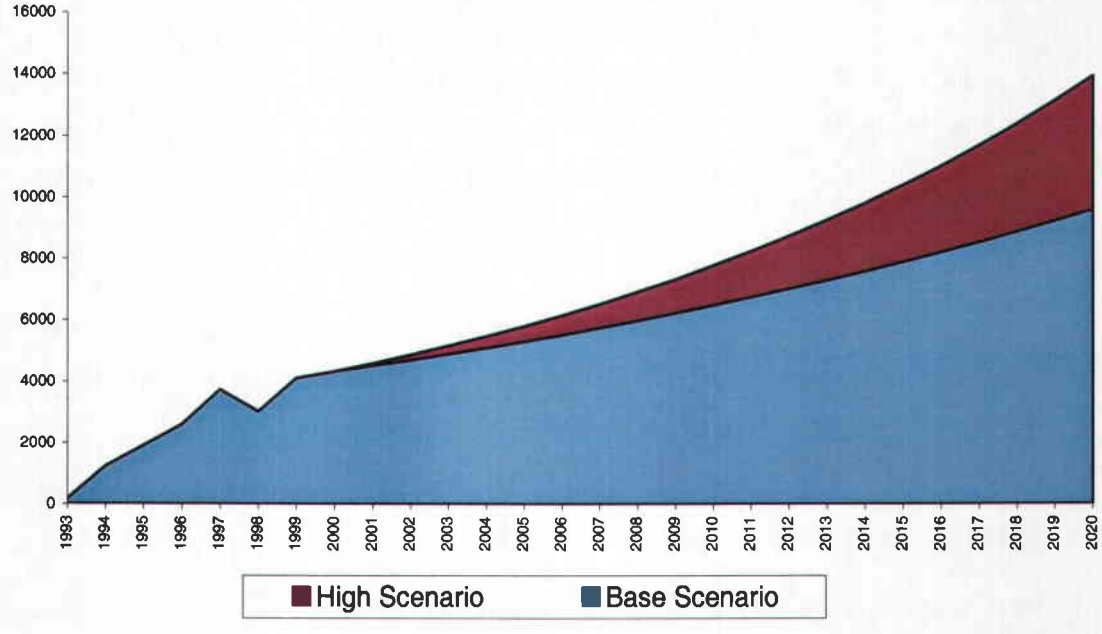
This scenario, in the same way as the previous scenario, assumes an occupancy factor for aircraft of 70% for 2020. The growth is correlated to the number of domestic passengers. It is forecasted that only regular domestic flights will operate with aircraft type ATR-42 for 50 passengers.

4.4.3.3 Passenger Forecast

Table IV-66. Passenger Forecast – Sikasso, Yélimané and Kéniéba Airports

	Scenario	2000	2001	2002	2003	2004	2005	2006
Passengers	Base	4342	4521	4707	4900	5101	5311	5529
	High		4603	4880	5173	5484	5814	6163
	Scenario	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**
Passengers	Base	5756	5992	6238	6488	6748	7018	7299
	High	6533	6925	7341	7782	8249	8744	9269
	Scenario	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
Passengers	Base	7591	7895	8211	8540	8882	9238	9608
	High	9826	10416	11041	11704	12407	13152	13942

Graph IV-24. Passenger Forecast – Sikasso, Yélimané and Kéniéba Airports



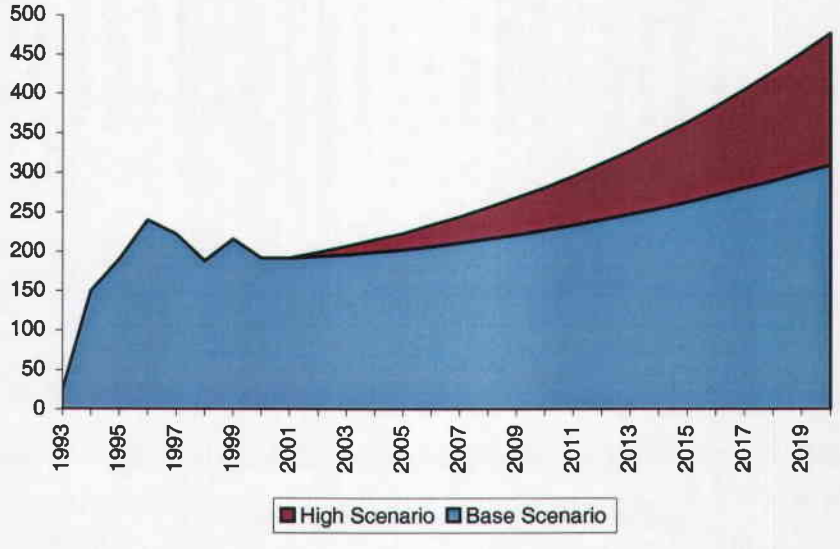
4.4.3.4 Aircraft Movement Forecast

Table IV-67. Aircraft Movement Forecast – Sikasso, Yélimané and Kéniéba Airports

	Scenario	2000	2001	2002	2003	2004	2005	2006
Aircraft Movements	Base	192	192	194	196	199	202	206
	High	192	192	199	207	215	223	234

	Scenario	2007	2008	2009	2010	2011	2012	2013
Aircraft Movements	Base	211	216	221	227	233	240	247
	High	244	256	268	281	295	311	327
	Scenario	2014	2015	2016	2017	2018	2019	2020
Aircraft Movements	Base	254	262	271	280	289	299	309
	High	345	363	383	404	427	451	476

Graph IV-25. Aircraft Movement Forecast – Sikasso, Yélimané and Kéniéba Airports

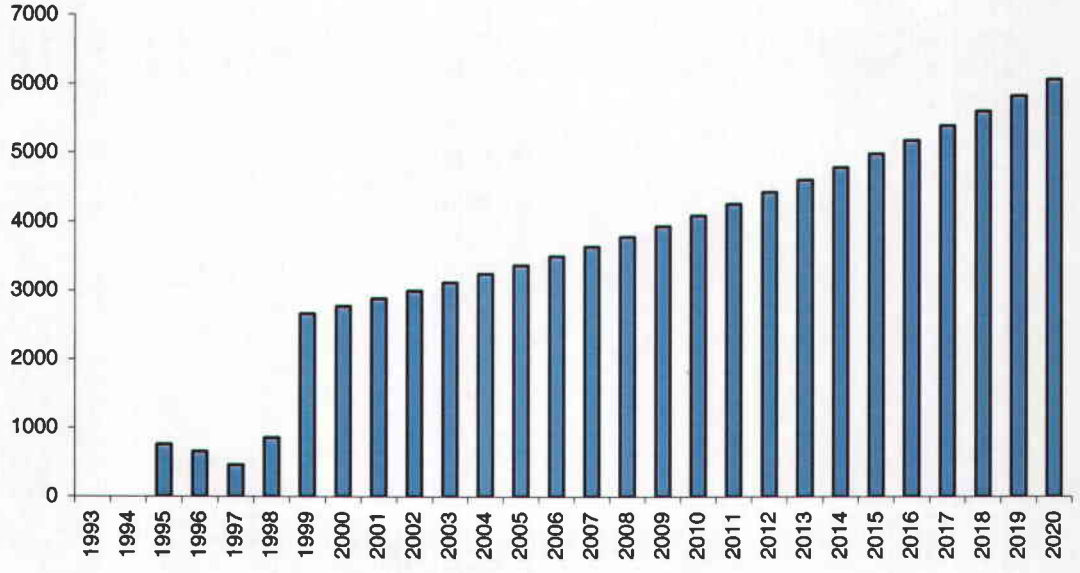


4.4.3.5 Cargo Forecast

Table IV-68. Cargo and Mail Forecast – Sikasso, Yélimané and Kéniéba Airports (kg)

	Scenario	2000	2001	2002	2003	2004	2005	2006
Cargo & Mail (kg)	Base	2762	2873	2988	3108	3233	3363	3498
	High		-	-	-	-	-	-
	Scenario	2007	2008	2009	2010	2011	2012	2013
Cargo & Mail (kg)	Base	3638	3784	3936	4094	4258	4429	4607
	High	-	-	-	-	-	-	-
	Scenario	2014	2015	2016	2017	2018	2019	2020
Cargo & Mail (kg)	Base	4792	4984	5184	5392	5608	5833	6067
	High	-	-	-	-	-	-	-

Graph IV-26. Cargo and Mail Forecast – Sikasso, Yélimané and Kéniéba Airports (kg)



4.4.4 Existing Facilities and Equipment

4.4.4.1 Runway

The existing runway at the Kéniéba Airport is 900 m in length and 28 m wide. No other information was available on runway shoulders, overrun and pavement condition. It was assumed that the pavement is in poor condition and there is no airfield lighting.

4.4.4.2 Connector

No information was available on the connector. It was assumed that a 90-degree connector exists from the runway to the apron with dimensions assumed at 15 m wide x 83 m in length.

4.4.4.3 Apron

There was no available information on the apron. It was assumed that the pavement is bituminous concrete with the same dimensions as Yélimané, 75 m x 45 m and also assuming that the pavement is in poor condition.

4.4.4.4 Navaids

Kéniéba Airport has an NDB and meteorological instruments which are obsolete.

4.4.4.5 Perimeter Fence

No information was available on the size, condition and amount of perimeter fencing and access gates. It was assumed that there currently is no airport perimeter fencing.

4.4.4.6 Airfield Drainage System

No information was available on either of the airports. It was assumed that the drainage system is the same type common to the other airports and consists of manmade vegetative lined drainage channels and ditches outfalling into the natural drainage courses.

4.4.4.7 Terminal Building

There is no passenger terminal at Kéniéba Airport.

4.4.4.8 Airport Rescue and Fire Fighting (ARFF)

An ARFF facility in good condition and of adequate capacity is assumed to exist at the airport although no information was available. It was assumed that this structure is a building with bays for the parking of the fire fighting vehicles and an attached office and storage building. Also, it was estimated that the fire-fighting vehicles are in old but good operating condition and that an above ground water storage tank exists and is in good condition.

4.4.4.9 Utilities

4.4.4.9.1 Water

Although no information was available on either airport on the water supply, it was assumed that the current water supply is not adequate for the peak hour demand for the forecasted passengers and employees. Also, it was assumed that an adequate storage tank exists for the ARFF vehicles.

4.4.4.9.2 Sanitary Sewer

No information was available on the amount, size and location of the wastewater treatment system. It was assumed that one septic tank/septic pit exist and is adequate to meet the current treatment requirements.

4.4.4.9.3 Electrical Power Supply

No information was available on the size and type of electrical power supply for the airport. It was estimated that current improvements are required, including new equipment and upgrades and that the stand-by generators, if existing, are old and need to be replaced.

4.4.4.9.4 Telephone System

Information was not available on the number of telephone lines or the condition of the telephone equipment. For cost estimates, it was estimated that 5 working lines exist at each airport.

4.4.4.10 Access Roads

No information was available on either airport on the location, size and condition of the existing airport access road. It was estimated that the access road is a two-lane paved road with a shoulder and a ditch section.

4.4.4.11 Vehicle Parking

No information was available on the size of the existing parking lot. Based upon information on similar size airports in the study, it was estimated that 15 spaces are provided (375 m^2) for each airport and that this parking lot is paved and in poor condition.

4.4.5 Evaluation of Existing Facilities

4.4.5.1 Runway

The existing runway will have to be extended an additional 600 m and the width increased an additional two meters to meet ICAO's minimum standards for the AN-24 design aircraft (airport reference code 3C). For the 2000-2005 phase, it was estimated that the existing 900 m x 28 m pavement would require rehabilitation by a bituminous concrete overlay. With these improvements and proper maintenance, the pavement will be sufficient until the year 2020.

Table IV-69. Runway Requirements

Design Aircraft	Required Length	Required Width	Exist Length	Exist Width	Improvement Required	Year
AN24	1500 m	30 m	900 m	28 m	600 m x 30m extension, 2m x 900m width increase and 900m x 28m overlay	2000 - 2005

4.4.5.2 Connector

The estimated width of the connector satisfies the minimum 15 m requirements for the Category 3C – AN24 design aircraft with no improvements in dimensions required now or in the future.

As with the runway improvements, it is anticipated the pavement condition of the connector is poor and to be rehabilitated in Phase I (2000-2005) with a bituminous concrete overlay.

Table IV-70. Connector Requirements

Design Aircraft	Existing Width	Existing Area	Required Width	Improvements Required	Phase Required
AN24	15m	1800 m^2	15 m	Overlay (1800 m^2)	2000-2010

4.4.5.3 Apron

The assumed apron dimensions and pavement condition will require expansion to 105 m x 76 m in the 2000-2005 phase. This expansion will require 4,605 m^2 of new pavement and the existing pavement (3,375 m) will require a bituminous concrete overlay. Figure IV-4 shows the apron parking requirements.

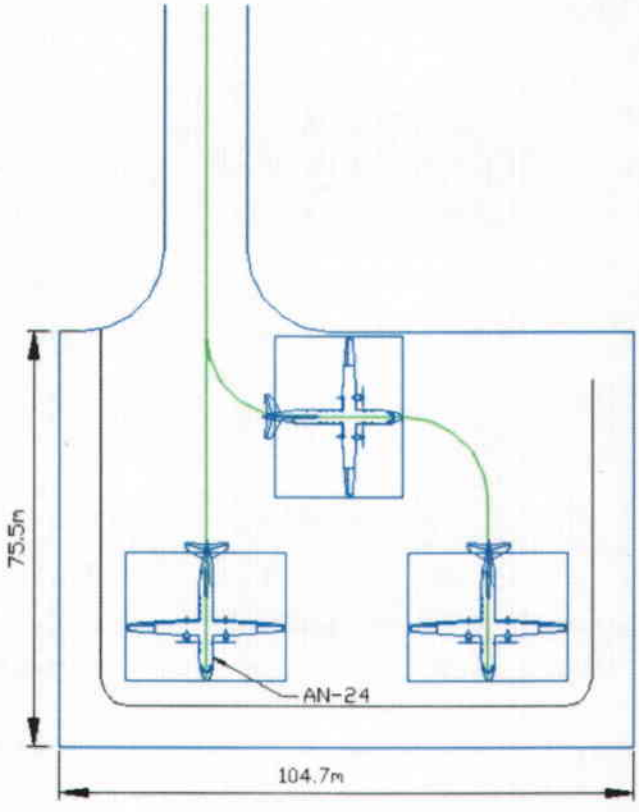
Table IV-71. Apron Requirements

Phase	Design Aircraft	Apron Size		Improvements
		Existing	Required	
2000-2005	2 AN-24 2 AN-24	75 m x 45 m	105 m x 76 m	30 m x 45 m & 31 m x 105 m expansion (4,605 m^2) & 75 m x 45 m overlay (3,375 m^2)
2005-2010	2 AN-24 2 AN-24	105 m x 76 m	105 m x 76 m	105 m x 76 m crack and joint repair
2010-2015	2 AN-24 2 AN-24	105 m x 76 m	105 m x 76 m	105 m x 76 m crack and joint repair
2015-2020	2 AN-24 2 AN-24	105 m x 76 m	105 m x 76 m	105 m x 76 m crack and joint repair

Comments

1. Estimated improvements based upon the existing apron pavement being in good condition.
2. Power in - power out
3. Surry seal required on new pavement in aircraft fueling areas.
4. Pavement Marking required for all phases.

Figure IV-7. Apron Parking



4.4.5.4 Navaids

No recommendations can be made due to lack of information.

4.4.5.5 Perimeter Fence

The following table summarizes the fence requirements for the three airports.

For the Kéniéba Airport, in Phase I (2000-2005) an estimated length of 5480 m of new fence is required including new access gates. The fence will have to meet ICAO's minimum height, size and material standards.

Table IV-72. Perimeter Fence Requirements

Fencing Required	Comments
5480 m	Phase 2000-2005, 2-4m gates, 3 personnel gates (assumes no existing fencing meeting ICAO requirements)

4.4.5.6 Airfield Drainage System

Due to the rapid infiltration of the runoff due to the soil's high permeability properties and the low amounts if annual rainfall, minimal maintenance and improvements are required for the drainage system. It is recommended that routine cleaning and clearing of the drainage ditches and channels by removing the vegetation that has accumulated inside and around the drainage improvements. Also, it is estimated that every 5 years, the major drainage ditches and channels will require removal of the accumulated sediment and overgrowth to reestablish design flow lines.

In phase 2000-2005, the apron expansion will require 135 m of new drainage ditch construction.

Table IV-73. Airfield Drainage System Requirements

Phase	Improvements		Comment
	Airside	Landside	
2005	135 m 4645 m	 500 m	Apron Expansion Reestablish channel flow lines Reestablish channel flow lines
2010	—	—	—
2015	4645 m	 500 m	Reestablish channel flow lines Reestablish channel flow lines
2020	—	—	—

4.4.5.7 Terminal Building

No terminal requirements are forecasted for Kéniéba airport either.

The number of passengers during peak hour for the study period are distributed according to the passenger flow, as follows:

Table IV-74. Peak Hour Passenger Forecast – Kéniéba Airport

	Base Scenario				High Scenario			
	Arrival	Departure	Transit	**Total**	Arrival	Departure	Transit	**Total**
2005	3	3	9	**15**	4	3	9	**16**
2010	4	4	10	**18**	5	4	13	**22**
2015	5	4	13	**22**	7	6	17	**30**
2020	6	5	15	**26**	9	8	22	**39**

4.4.5.8 Airport Rescue and Fire Fighting (ARFF)

The following table classifies the airport by an Aerodrome ICAO category determined from the size of the design aircraft and also determines the amount of fire and rescue vehicles required according to ICAO's standards.

For Kéniéba, the aerodrome category is 4, which requires one vehicle. It is estimated that in Phase IV (2015-2020), the existing vehicle will need to be replaced.

Table IV-75. ARFF Requirements

Design Aircraft	Aerodrome Category	Aircraft Overall Length	Maximum Fuselage Width	Existing	Required	New Vehicles Replacements	Year
Antonov AN-24	4	23.5 m	-----	1	1	1 - Replacement	2010

4.4.5.9 Utilities

4.4.5.9.1 Water

For cost estimates for both airports, it was estimated that in Phase I (2000-2005), a storage tank with a capacity of 6 m^3 would be required to meet the forecasted domestic water supply requirements for the passengers and employees to the year 2020.

Table IV-76. Water Requirements

		A	B	C	D	F	G
Year	**Passengers Peak Hour**	**Arrivals 50%**	**Departures 50%**	**Transit 0%**	**Visitors (1 x arrivals)**	**@ Terminal Area**	**@ Maintenance Area**
2005	15	7.5	7.5	0	7.5	10	5
2010	18	9	9	0	9	10	5
2015	22	11	11	0	11	10	5
2020	26	13	13	0	13	10	5

	J						I	W	
Year	**(A+B+C+D)**	**J*20**	**F*250**	**G*450**	**Sum**	**Sum/ 1000**	**Existing Storage Tank**	**Total Req. (m^3/day)**	**Additional Storage Req.**
2005	22.5	450	2500	2250	5200	5	0	5	5
2010	27	540	2500	2250	5290	5	5	5	0
2015	33	660	2500	2250	5410	5	5	5	0
2020	39	780	2500	2250	5530	6	5	6	1

4.4.5.9.2 Sanitary Sewer

It is estimated that in Phase II (2005-2010), a septic tank and septic pit will be required to replace the existing system for all three airports.

Table IV-77. Sanitary Sewer Requirements

Year	Total Req. (m^3/day)	Persons Equivalent	Septic Tanks Required	Functional Existing Tanks	New Tanks Required
2005	5	13.2	1	1	0
2010	5	13.2	1	0	1
2015	5	13.2	1	1	0
2020	6	15.84	1	1	0

Note 1: Daily design flow for one person is 0.379m3/day

Note 2: New tanks sized for 20-person capacity, capacity of existing tanks assumed at 15 persons.

4.4.5.9.3 Electrical Power Supply

It is forecasted that in Phase I (2000-2005), major upgrades will be required in the electrical supply system and equipment and that two stand-by generator will be needed. In Phase IV (2015-2020) minor upgrades will be required due to the increase in electrical power demand and also due to the age of the existing facilities.

Table IV-78. Electrical Power Supply

Existing Facilities	2005	2010	2015	2020	Comments
Conditions unknown assumes improvement required	Major Upgrades	None	None	Minor Upgrades	2005 - New Transformers, regulators, stand-by generators, distribution

4.4.5.9.4 Telephone System

The number of telephone lines required for the airport administration, faxes, computers, police, airlines, passengers, visitors and employees are calculated and summarized in Table IV-79.

Table IV-79. Telephone System Requirements

Phase	Total Line Requirements	Existing Lines	Additional Lines
2005	8	5	3
2010	8	8	0
2015	8	8	0
2020	14	8	6

4.4.5.10 Access Roads

It is assumed that any type of maintenance and improvements to be done on the access road on Kéniéba Airport will be carried out and funded by the government.

4.4.5.11 Vehicle Parking

The size of the parking required for the four phases of development was determined using the forecasted passenger volumes and the estimated number of employees. The adequacy of the passenger and employee parking for present and future phases is determined based upon an

evaluation of current vehicular traffic and its relationship to peak hour passengers as shown in the following table.

For Kéniéba, it was assumed that the current parking lot (size estimated 375 m^2) would require a bituminous concrete overlay in phase 2000-2005.

Table IV-80. Vehicle Parking Requirements

Phase	Total Required Parking (m^2)	Existing Parking (m^2)	Additional Parking (m^2)
2005	562.5	375	187.5
2010	600	562.5	37.5
2015	787.5	600	187.5
2020	862.5	787.5	75

4.4.6 Cost Estimates

Capital Cost Estimates of airport improvements have been prepared for four phases of development. These phases are:

Phase I - Years 2002-2005

Phase II - Years 2005-2010

Phase III - Years 2010-2015

Phase IV - Years 2015-2020

All costs are in current US Dollars, without inflation. A summary sheet of the capital cost estimates is shown in Table IV-81. In preparing these estimates, unit cost information collected in Mali was utilized, as was the Consultant's own data base on international construction costs. Fifteen percent was added to all construction and equipment cost estimates to cover contingencies and the cost of engineering services.

The cost estimate shown here refers to the base case scenario as described on the precedent sections and includes only the minimum (base case) requirements as detailed on the corresponding section.

Table IV-81. Cost Estimate for Kenieba Airport Improvements

ITEM	DESCRIPTION	PHASE I (2000-2005) (US $)	PHASE II (2005-2010) (US $)	PHASE III (2010-2015) (US $)	PHASE IV (2015-2020) (US $)	TOTAL
1	RUNWAY	1,974,521	0	0	0	1,974,521
2	TAXIWAY LOOP & CONNECTOR	82,015	0	0	0	82,015
3	APRON(s) (New Pavements /Rehabilitation)	505,620	11,172	11,172	11,172	539,136
4	DRAINAGE	113,700	0	102,900	0	216,600
5	TERMINAL BUILDING/EQUIPMENT	0	0	0	0	0
6	VEHICULAR PARKING (Terminal Building)	11,250	2,250	11,250	4,500	29,250
7	POTABLE WATER	25,000	0	0	0	25,000
8	SEWAGE TREATMENT	0	30,000	0	0	30,000
9	VISUAL / NAVIGATIONAL AIDS	0	0	0	0	0
10	TELEPHONE SYSTEM	75,000	0	0	75,000	150,000
11	ELECTRICAL POWER	175,000	0	0	25,000	200,000
12	ARFF FACILITY	0	120,000	0	0	120,000
13	PERIMETER FENCE	121,850	0	0	0	121,850
14	CONTINGENCY & ENGINEERING 15%	462,593	24,513	18,798	17,351	523,256
	TOTAL	**$3,546,550**	**$187,935**	**$144,120**	**$133,023**	**$4,011,628**

TOC

4.5 *Mopti Airport*

4.5.1 Socioeconomic Profile

4.5.1.1 Transportation Factors

Mopti town, capital of Region V, is located at the confluence of the Niger and Bani rivers. Mopti has very good communication routes with important economic activity centers. Bamako is located 646 km from Mopti via a paved road, RN6, and in good condition. Ségou is located 411 km on the way to Bamako.

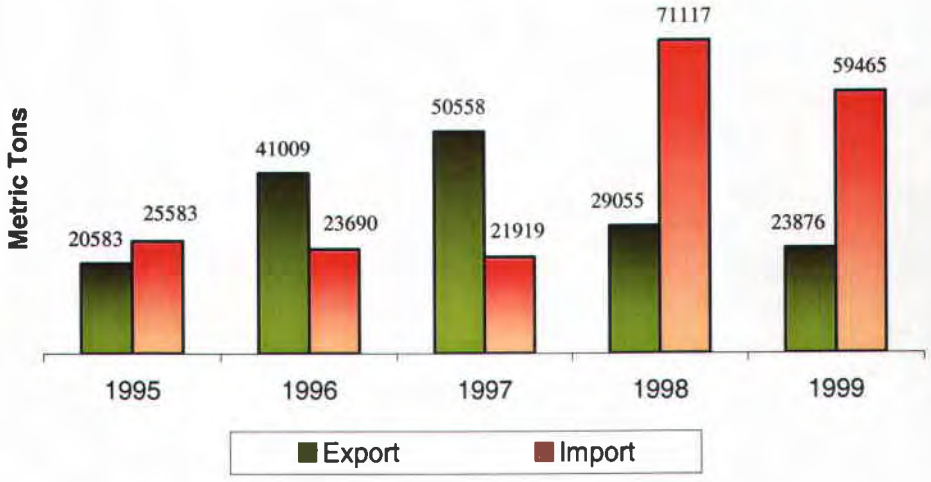
The main access route to Mopti is through roads, with a travel time of approximately 10 hours by bus. The travel time by plane is one and half hours. The ratio between a bus and plane ticket cost per kilometer is:

$$\frac{\text{Bus}}{\text{Plane}} = \frac{10.06 \text{ FCFA/Passenger-km}}{13.45 \text{ FCFA/Passenger-km}} = 0.7$$

This result theoretically gives advantage to bus travel if travel time and trip comfort is not taken into account. However, the price of a one-way ticket from Bamako to Mopti is six times more expensive by plane, which is beyond the buying power of the Malian population. On the other hand, tourists who arrive in Bamako and want to travel to Mopti are mostly independent travelers who organize their trip around Mali with a local travel agency and are aware of the travel conditions of the country. In addition, the average daily budget of a traveler in Mali is around US$50 (30,000 FCFA), which means that between hotel and meals there is not much left for travel making air travel a last resort. Also, another factor to add is the uncertainty of Air Mali's flights.

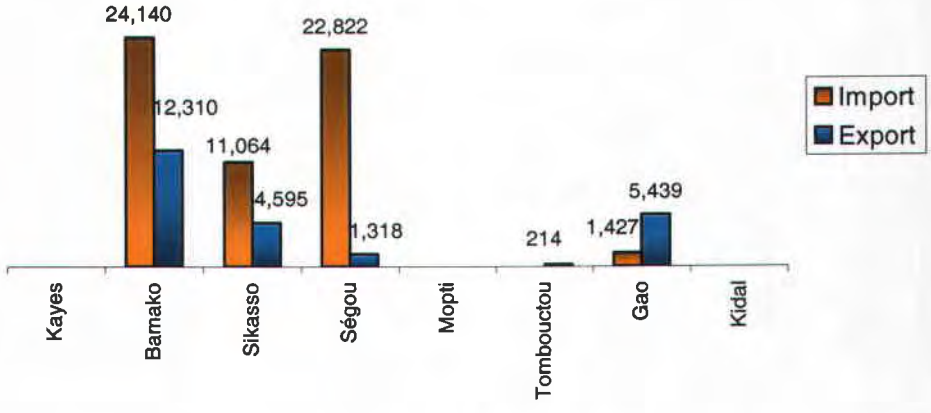
As far as transportation of goods, most is done through roads. Graph IV-27 shows the consumption of the last years for the Mopti region against production capacity. This graph indicated the metric tons of exported and imported goods during the last five years.

Graph IV-27. Domestic Cargo Road Traffic (metric tons)



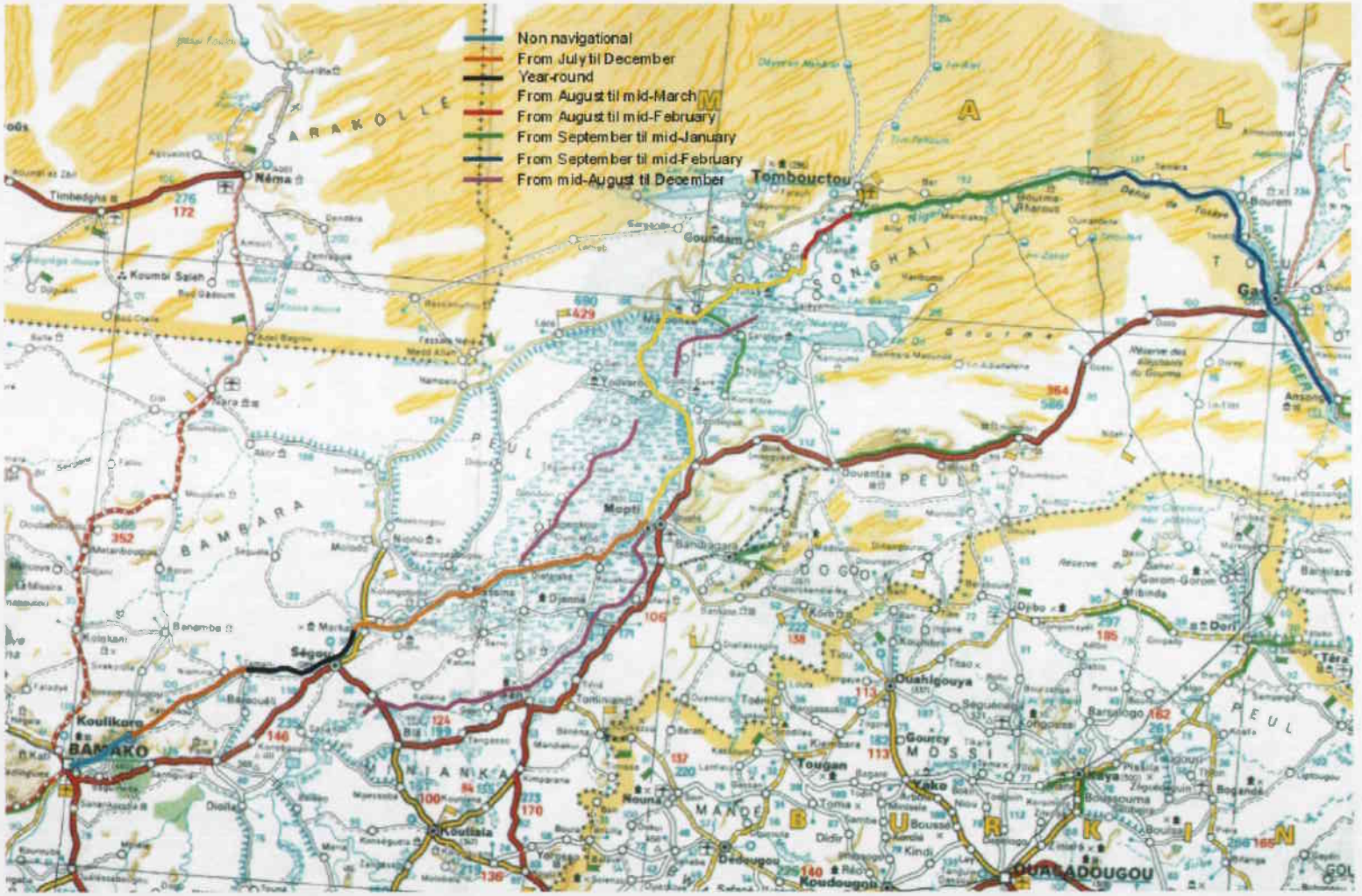
This traffic of goods through roads can be break down by region of origin and destination during 1999 as shown in Graph IV-28. Bamako and its surroundings is the main consumer of products from Mopti, while the main suppliers are divided between Bamako and Ségou.

Graph IV-28. 1999 Domestic Cargo Road Traffic (metric tons)



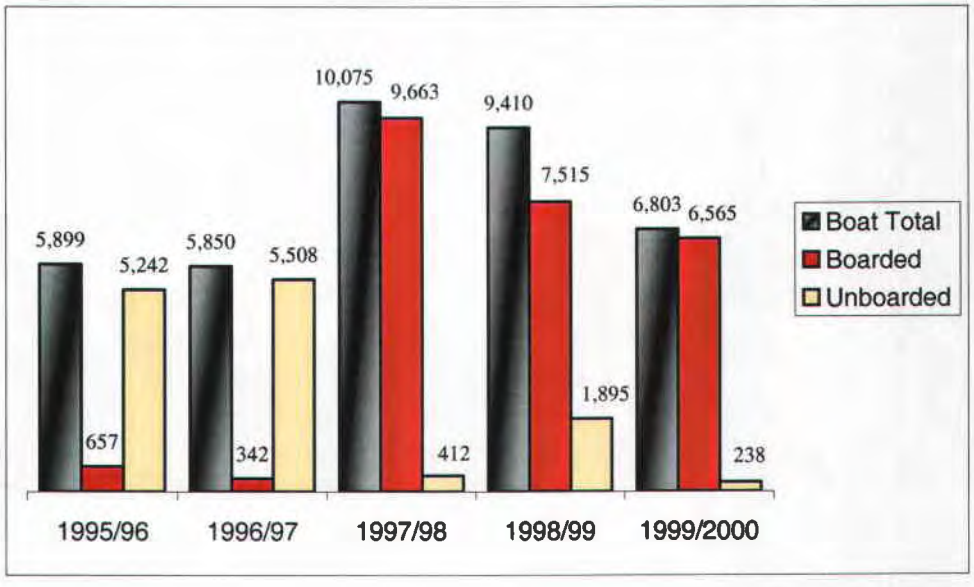
One very interesting transportation alternative is the Niger River, even though most of the ports are only accessible in certain periods of the year, as shown in the following graphic.

Figure IV-8. Accessibility of the Niger River



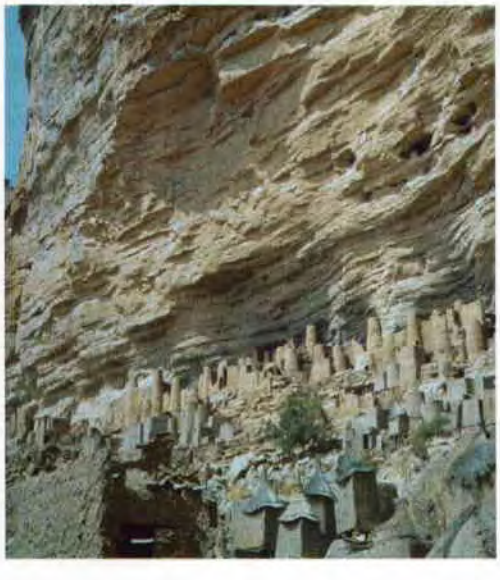
Despite the river's seasonal navigation capabilities, the cargo volume transported by boat is more important than air cargo, as shown in Graph IV-29, and it is approximately 11% of the cargo transported by road.

Graph IV-29. Total Freight Transport by Boat (metric tons)



As can be observed from Graphs IV-27 and IV-29, there is an inverse relationship between exports and imports transported by road and river.

4.5.1.2 Tourism Factors



The Mopti region and, specifically, the triangle formed by Mopti-Djenné-Pays Dogon, is the main focal point of tourists in Mali, together with Tombouctou. Furthermore, the destination of most tourists is to visit the Pays Dogon (Dogon Country) and its constructions at the foot of the Falaises of Bandiagara. Unfortunately, the tourism potential of the zone is under exploited. Figure I-1 on the Chapter I, describes the existing and projected circuits for visiting the Falaises of Bandiagara.

The Dogon are best known for their extensive carving of masks and wooden figurative art. The primary colors used by the Dogon are usually red, black, and white, and popular patterns include spirals and

checkerboard motifs, both of which can be traced to their origin stories. Early history is informed by oral traditions, which claim that the Dogon originated from the west bank of the Niger River (10th to 13th centuries). They emigrated west to northern Burkina Faso, where local histories describe them as kibsi. Then around 1490, they fled to a region now known as the northern Mossi kingdom of Yatenga, when it was invaded by Mossi cavalry. They ended up in the Bandiagara cliffs region, safe from the approaching horsemen.

Among the main points of interest of tourists in the Pays Dogon are the Gruteas of Déguimberé (place of pilgrimage of the Tidjani), Songo cave paintings, and the Sangha population (as shown in the picture, which corresponds to Banani).

Six hundred years ago, Djenne was a mighty city. Its position astride the grand trans-Saharan trade routes brought them inestimable wealth, as their merchants profited from the transport of gold, ivory, and salt from West Africa to the Mediterranean. By the sixteenth century, this city had become legendary in European's imagination, representing all of the exotic wealth of Africa.

Today Djenné is a mecca for curious travelers, as far off the beaten track as can be imagined. Djenne seems to have been frozen in time, a grand mud-brick monument to an empire that disintegrated five centuries ago.

The most interesting and most frequently visited places are the mesquite (originally constructed in 1830, due to many rehabilitations the current one is from 1908), the tomb of Tapama DJENEPO, the archeological remains of the old city of Djenné, and the Nana Wangara Wells.

4.5.1.3 Socioeconomic Factors

Mopti has become an important commercial town and the center of Mali's fishing and livestock industries. Major crops grown in the surrounding area are rice, millet, onions, cassava, and peanuts. Livestock raising and fishing are also significant. Mopti is one of the most densely populated areas in Mali. Mopti's population in 1998 was 258,695 people, of which 127,902 are men, and 130,793 are women.

Mopti is considered the economic center of the Niger Delta. It represents one of the main passenger and merchandise ports of the Niger River and capital commerce of the Delta.

Fishing constitutes the most important activity for Mopti, besides being characterized as a main exporter of livestock and tourist center. However, the industry derived from fishing has decreased enormously in the past years, and the tourist activity is below its potential.

With regard to the ecosystem surrounding Mopti, there exists a special condition in the Niger River a delta covering an extension of 20,000 km^2 during rainy season. Soil fertility in the flooded plains of the delta is at a high level.

The Mopti region is characterized for being an area of great consumption but low production. Mopti provides rice, mainly, to localities in the northern region of the country: Tombouctou, Diré, Tonka, Atara, Douentza, etc.

4.5.2 Current Airport Activities

Regular commercial flights to the Mopti Airport are mainly provided through Air Mali four times a week. The AN24 aircraft departs from Bamako on Wednesday and Saturday and arrives in Mopti at 9 a.m. and immediately departs to Goundam or Tombouctou. The AN24 returns to Bamako through Mopti on Thursday and Sunday, closing the circuit.

Table IV-82 shows annual aircraft operations, passenger and cargo since 1993.

Table IV-82. Annual Operations – Mopti Airport

	1993	1994	1995	1996	1997	1998	1999	2000
Aircraft Operations	622	538	862	324	1219	872	739	809
Passengers	3853	4507	5807	6146	6323	7096	11577	9452
Freight (kg)	1389	7654	1418	3679	465	329	3082	3000
Mail (kg)	1910	1073	645	659	37	0	228	442

On the other hand, Graph IV-30 graphically illustrates annual trends of passenger volume and aircraft movement. There is no correlation between the number of operations and passengers at the Mopti Airport, opposite to Tombouctou. Passenger traffic has been experiencing a constant growth of 21% annually up until 1999. During the year 2000, the number of passengers in Mopti decreased to 18% with regard to the previous year due to difficulties in Air Mali.

Aircraft traffic shows an irregular evolution with an annual average increase of 32% since 1993.

Graph IV-30. Mopti Airport Activity

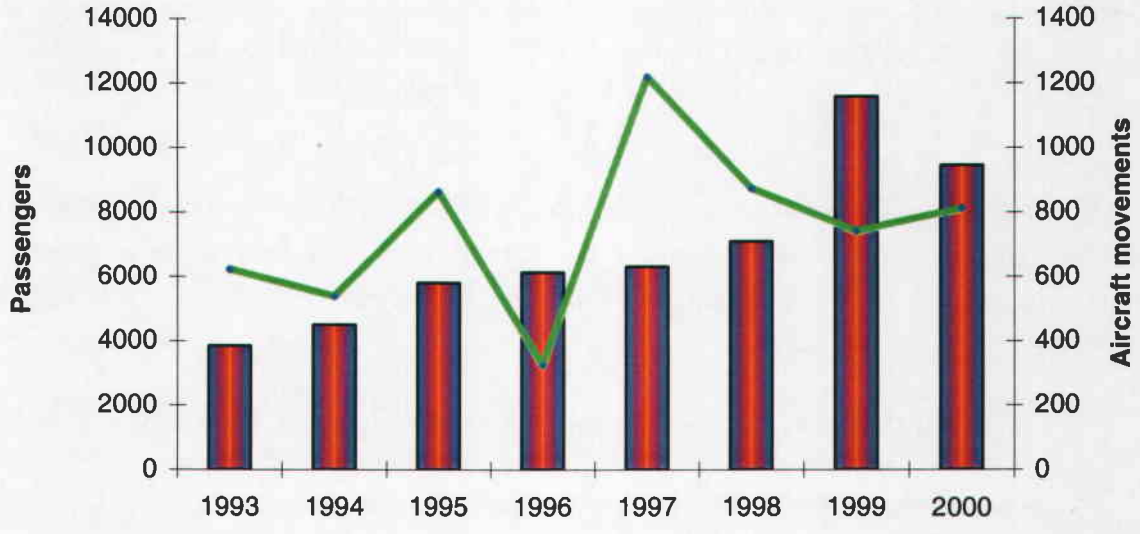


Table IV-83 shows the monthly evolution of aircraft and passenger traffic at Mopti Airport divided into commercial and noncommercial flights. Due to the closeness of Mopti to Bamako and the good condition of the roads, commercial traffic volume is higher than noncommercial traffic. Services from a private company are high and there are other ways of getting to Mopti. During the year 2000, the ratio between commercial passengers was exactly 83% of total passengers and commercial aircraft was exactly 54% of total aircraft movements.

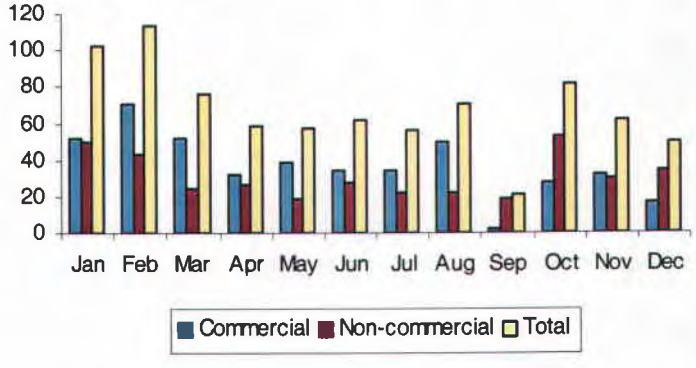
Table IV-83. Aircraft and Passenger Movement at Mopti Airport – Year 2000

	Aircraft Movements												
	Total	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Commercial	**439**	52	70	52	32	38	34	34	49	2	28	32	16
Non-commercial	**370**	50	43	24	26	19	28	22	22	19	53	30	34
Total	**809**	102	113	76	58	57	62	56	71	21	81	62	50

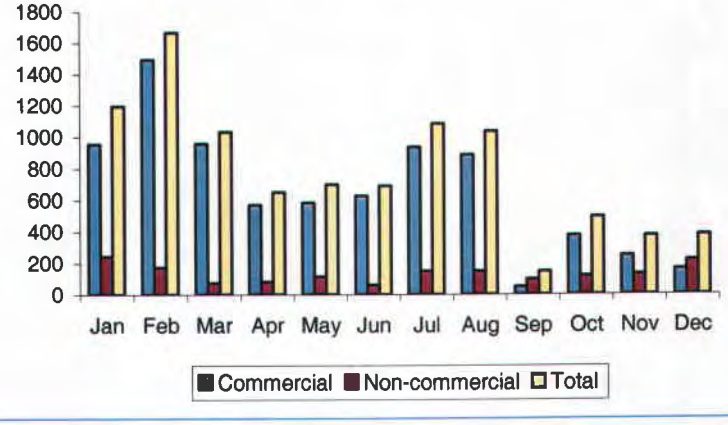
	Passengers												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	TOTAL
Commercial	953	1494	958	570	584	629	936	888	50	375	246	161	**7844**
Non-commercial	243	173	74	81	115	62	149	148	97	119	128	219	**1608**
Total	1196	1667	1032	651	699	691	1085	1036	147	494	374	380	**9452**

The above data is graphically shown in Graphs IV-31 and IV-32. The seasonal demand is shown during the months of January to March and the summer months in Europe (July and August). During the year 2000, air traffic in Mopti represented a low occupancy rate of commercial flights of only 33%.

Graph IV-31. Aircraft Movements at Mopti Airport – Year 2000

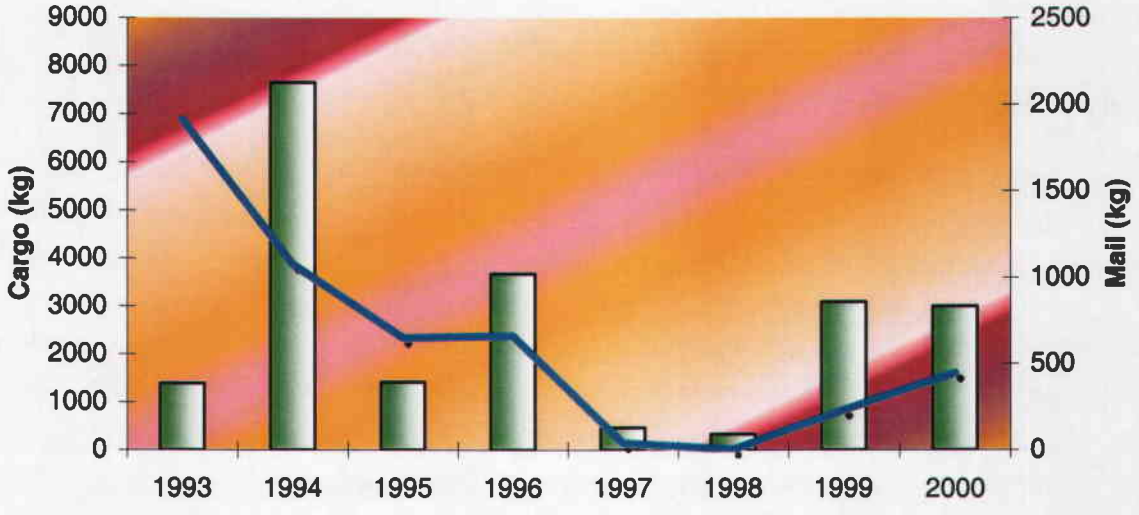


Graph IV-32. Passenger Movements at Mopti Airport – Year 2000



The traffic of goods at Mopti Airport is not an important factor among the airport operations despite its important production capacity, and more as a consumer, in the region. On the data of cargo transportation, mail cargo represents approximately 17% of total cargo in Mopti, while the remainder 83% is goods.

Graph IV-33. Cargo and Main Operations at Mopti Airport



4.5.3 Aviation Activity Forecast

4.5.3.1 Base Scenario

4.5.3.1.1 Passengers

The passenger traffic at Mopti Airport is mainly for tourism. A basic growth scenario of the volume of domestic passenger similar to the base scenario for Tombouctou Airport has been implemented. Both regions have a tourist characteristic and both fall into the tourism growth forecast of Western Africa according to the World Tourism Office (WTO). According to WTO, the tourism growth for the region will be 5.5% for the next 20 years. This forecast was accounted for in the forecast made for the Mopti Airport.

There is a real air traffic demand in Mopti but it is influenced, almost exclusively, by the current airport infrastructure. Mopti currently has a 2,500 x 40 meters runway in very bad condition (600 meters of threshold 23 are not being used); however, there is a project for the rehabilitation of the runway before February 2002 for servicing the 2002 African Nations Soccer Cup demand.

This scenario includes the projected improvements at the airport as a consequence of the 2002 African Nations Soccer Cup, which are necessary for the airport to accommodate the expected demand: pavement reinforcement, navaids equipment and ARFF.

From a socioeconomic point of view, it is foreseen that the tourist demand will cause the development of the region and the necessary investments to serve the clientele.

4.5.3.1.2 Aircraft Movements

The same reasoning as the one implemented in the aircraft movement forecast for the base scenario for Tombouctou has been followed.

It is forecasted to accommodate two domestic flights during the peak hour for the year 2005, although this peak hour will be reached during short periods of time, once a week. The commercial aircraft type is based on the ATR-72 aircraft.

The current occupancy factor of commercial aircraft is 54% and it is expected to reach 70% occupancy in the year 2020. The average growth of aircraft movement is expected to be 2.9%.

4.5.3.1.3 Cargo

Only one scenario has been carried out for the cargo traffic development because it is not considered to be relevant. Mopti does not show any potential for transportation of goods by air that will be more profitable than road or boat transportation.

Similar to the Tombouctou base scenario, the goods and mail traffic is projected to increase at the same rate as the Bamako Airport forecasts. This growth rate is 4%.

4.5.3.2 High Scenario

4.5.3.2.1 Passengers

This scenario is based on the same guidelines as Tombouctou. This scenario for passenger traffic represents a great challenge in commercial activities for the airport operator and for technical personnel of the tourism sector in the Government. A large investment is projected for tourism and transport infrastructure and the development of activities with the coordination of all agents involved in the industry. The WTO forecasts developed in the base scenario represent a natural growth of tourism for the specified regions. However, this scenario shows an alternative in which tourism activities must follow their development potential in Tombouctou. The most important development is hotel availability for the city. As explained in the section regarding tourism

factors, Graph II-1, in Section II, shows a historical evolution of the hotel availability in Mali and its correlation with an exponential curve.

This scenario forecasts a development that has a correlation between passenger traffic and number of hotels available with growth adjusting to the following equation curve:

$$\text{Passengers} = 0.2 \times e^{0.087 \times \text{Year}}$$

4.5.3.2.2 Aircraft Movements

The same reasoning as the one implemented in the aircraft movement forecast for the base scenario for Tombouctou has been followed.

The current occupancy factor of commercial aircraft is 33% and it is expected to reach 70% occupancy in the year 2020, with a rate of 95% of charter flights, which will begin operating in Mopti once the airport has adequate facilities. The average growth of aircraft movement is expected to be 5.2%.

4.5.3.2.3 Cargo

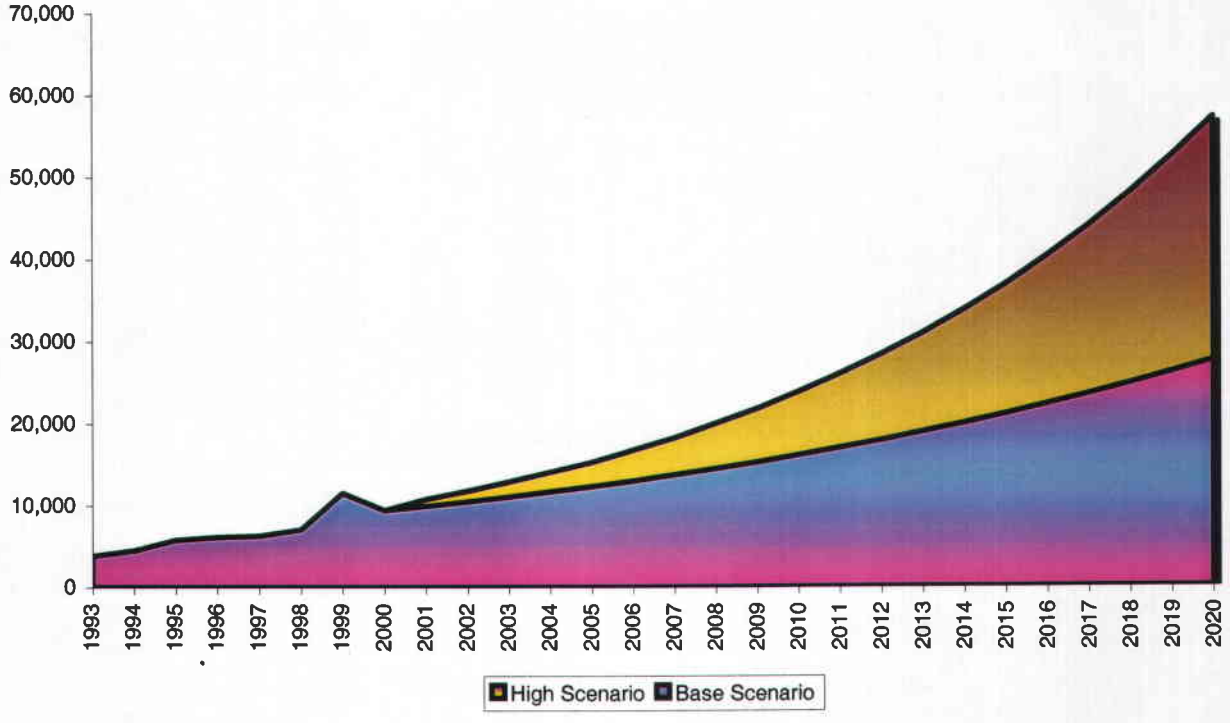
Mopti's geographic location and excellent ground and water communication routes, together with the low price of alternative transport modes with regard to air transport, does not allow for a great optimism with regard to air cargo traffic for the purpose of establishing a second scenario. Unfortunately, for a more profound analysis of the good transportation conditions in Mopti, a detailed and precise study should be carried out, which is beyond the scope of this project.

4.5.3.3 Passenger Forecast

Table IV-84. Passenger Forecast – Mopti Airport

	Scenario	2000	2001	2002	2003	2004	2005	2006
Passengers	Base	9452	9972	10521	11100	11711	12356	13036
	High		10826	11839	12930	14099	15346	16827
	Scenario	2007	2008	2009	2010	2011	2012	2013
Passengers	Base	13753	14510	15309	16151	17040	17978	18967
	High	18308	20022	21814	23840	26022	28438	31010
	Scenario	2014	2015	2016	2017	2018	2019	2020
Passengers	Base	20011	21112	22274	23500	24793	26157	27596
	High	33893	36932	40361	44024	48076	52518	57272

Graph IV-34. Passenger Forecast – Mopti Airport



The forecast for the number of passengers during the peak hour was based on theoretical calculations, where the number of passengers during peak hour in a typical day represents 2% of total traffic.

	2005	2010	2015	2020
Base	247	323	422	552
High	307	455	705	1 145

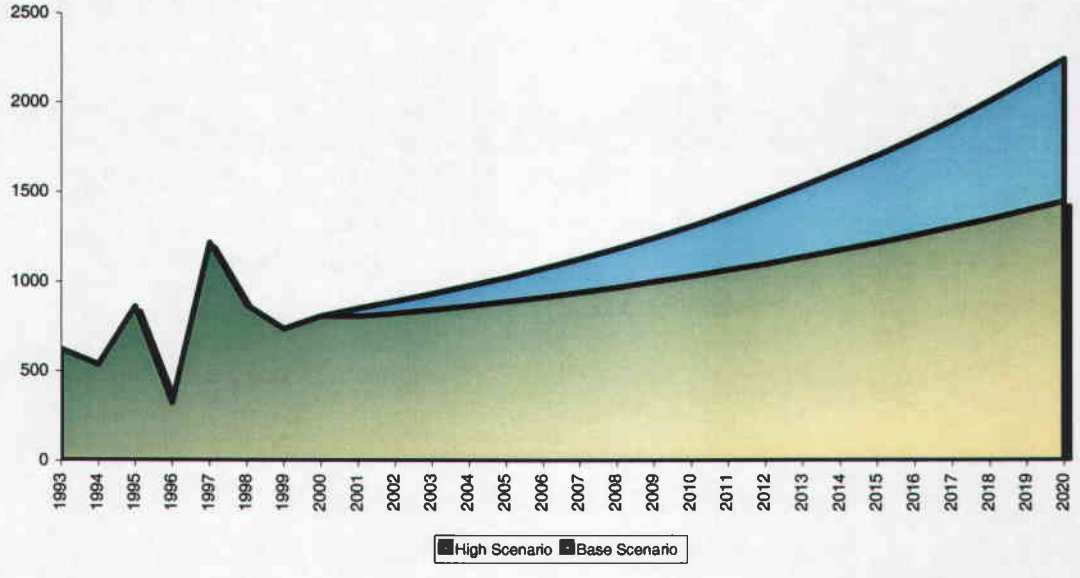
4.5.3.4 Aircraft Movements Forecast

Table IV-85. Aircraft Movement Forecast – Mopti Airport

	Scenario	2000	2001	2002	2003	2004	2005	2006
Aircraft Movements	Base	809	809	826	846	868	892	917
	High	809	853	893	935	979	1024	1077

	Scenario	2007	2008	2009	2010	2011	2012	2013
Aircraft Movements	Base	943	971	1002	1033	1067	1101	1138
	High	1129	1187	1247	1312	1381	1455	1533
	Scenario	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
Aircraft Movements	Base	1177	1216	1259	1304	1350	1398	1447
	High	1618	1703	1799	1900	2007	2122	2241

Graph IV-35. Aircraft Movement Forecast – Mopti Airport



The breakdown between commercial and noncommercial aircraft movement of Table IV-86 shows the forecast of general aviation aircraft with a capacity of less than 15 passengers and aircraft with a capacity of more than 15 passengers. The main reason is due to the fact that in this category, the B-737 charter flights from Europe have been included.

Table IV-86. Commercial and Noncommercial Aircraft

	General aviation aircraft movements		Commercial and Charter Flights movements	
	Base	**High**	**Base**	**High**
2005	450	450	439	570
2010	548	548	476	755
2015	666	666	538	1 021
2020	811	811	619	1 405

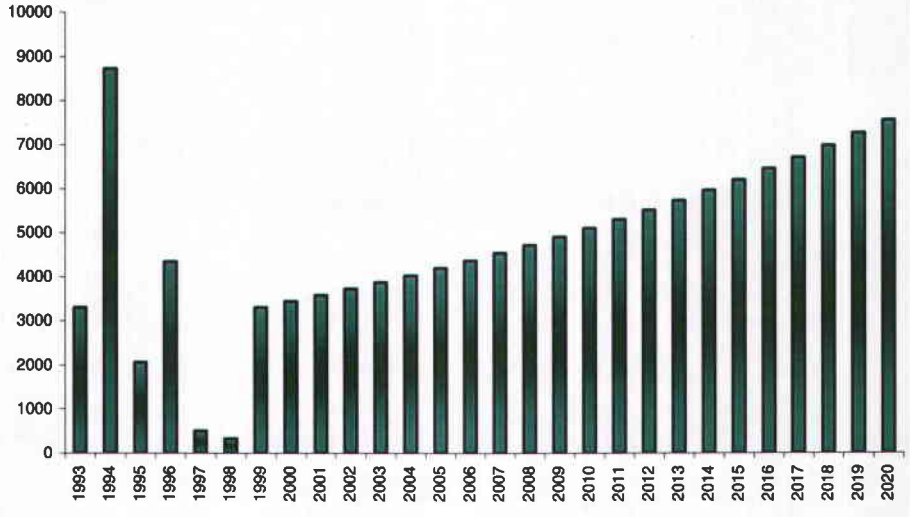
4.5.3.5 Cargo Forecast

As mentioned previously, only one scenario has been considered for cargo forecast at Mopti Airport, which is shown on the following table and graph.

Table IV-87. Cargo Forecast at Mopti Airport

	Scenario		2000	2001	2002	2003	2004	2005	2006
Cargo & Mail (kg)	Base	Arrivals	1475	1475	1518	1562	1609	1657	1708
		Departures	1968	2107	2208	2312	2420	2534	2651
		Total	**3442**	**3581**	**3725**	**3874**	**4029**	**4191**	**4359**
	Scenario		**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**
Cargo & Mail (kg)	Base	Arrivals	1760	1815	1872	1931	1992	2056	2122
		Departures	2774	2901	3034	3171	3315	3464	3619
		Total	**4534**	**4716**	**4905**	**5102**	**5307**	**5520**	**5741**
	Scenario		**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
Cargo & Mail (kg)	Base	Arrivals	2191	2263	2338	2415	2496	2580	2667
		Departures	3780	3947	4121	4303	4491	4687	4891
		Total	**5971**	**6210**	**6459**	**6718**	**6987**	**7267**	**7558**

Graph IV-36. Cargo and Mail Forecast at Mopti Airport (Kg)



4.5.4 Existing Facilities and Equipment

Figure IV-10, at the end of this section, shows the current airport layout plan.

4.5.4.1 Runway

The rehabilitation of the runway is under contract for construction, which consists of a bituminous concrete overlay over the existing pavement of 30 m x 2500 m with 6.5 m shoulders on both sides and slope transitioning grading beyond the shoulders.

It is assumed that runway edge lights and new threshold lighting are included in the current airport improvements. Figure IV-11, at the end of this section, shows a cross section of the runway overlay.

4.5.4.2 Runway-Apron Connector

A 90-degree connector with the runway centerline located 585 m, scaled from the plan[2], from the threshold provides access from the runway to the apron. The geometric of the connector are 20 m wide x 130 m long. It is assumed that the connector will be rehabilitated by a bituminous concrete overlay along with the current construction improvements for the runway.

4.5.4.3 Apron

An apron with dimensions, scaled from the plan[2], of 115 m x 70 m currently exists and is anticipated to be rehabilitated with a new bituminous concrete overlay with the current construction improvements to the runway.

4.5.4.4 Navaids

Mopti has recently installed equipment and other existing equipment, although obsolete, are still in good functioning conditions.

The control tower is located in a room of approximately 20 m^2 attached to the passenger terminal. The tower has the minimum equipment necessary to provide services to the airport: VHF/HF radio equipment, meteorological indications, which do not work, and a closet for remote control of runway lighting.

- PAPI
- Airfield lighting system based on portable lights
- VOR

[2] Aérodrome de Mopti Barbé, Plan de Masse, Plan d'Implantation

- NDB
- VHF Transmitter-Receiver
- HF Transmitter-Receiver
- VHF Radio Direction Finder
- 80Kva Power generator
- Meteo equipment
    - Hydrogen generator
    - Observation station
    - Optic theodolite
    - Barometer
    - Thermograph
    - Power generator

4.5.4.5 Perimeter Fence

It is assumed that new perimeter fencing will be included with the current construction of airport improvements to meet ICAO's minimum height, size and material standards.

4.5.4.6 Airfield Drainage System

The drainage is predominantly grass lined drainage ditches, channels and culverts that collect the surface runoff from the runway, connector, aprons and buildings and discharge the runoff down stream into natural drainage courses.

4.5.4.7 Terminal Building

Mopti Airport currently has a passenger terminal of about 300 m^2. The terminal has a counter operated by Air Mali for check-in and their offices, a bar, restrooms, and a hall with about 20 sofas. It is ventilated by three ceiling fans.

Due to the fact that there was no available data on the number of passengers during peak hour in the terminal, a theoretical calculation was used based on the average number of passenger per aircraft (see Table III-5 in Chapter III). The value obtained for commercial aircraft was 18 passengers per aircraft in year 2000.

With this value, it is evident that the terminal space seems enough for the actual requirements. Assuming a minimum of 14 m^2 per passenger during peak hour for the calculation of the terminal's total gross area the result would be 252 m^2. However, in terms of terminal requirements for 2005 it will be necessary to extend the existing terminal building.

4.5.4.8 Terminal Equipment

There is only one check-in counter operated by Air Mali, with a table that also functions as baggage check-in and claim counter.

4.5.4.9 Maintenance/Storage Building

There is no warehouse for storage of materials or equipment.

4.5.4.10 Airport Rescue and Fire Fighting (ARFF)

A new ARFF facility was recently constructed on the airport. The facility is made of reinforced concrete and consists of two high roof structure bays for the parking of the fire fighting equipment and an attached office building. One ARFF pumper vehicle is currently being used. A recently constructed water tower is used exclusively for the ARFF requirements.

4.5.4.11 Utilities

4.5.4.11.1 Water

A service line from the town's water supply connects to the terminal building. This line currently is inadequate to meet the water supply requirements with low flow and pressures.

A new above ground water storage tank exists for the ARFF vehicle requirements.

4.5.4.11.2 Sanitary Sewer

No information was available on the amount, size and location of the existing waste water treatment system. Construction of a new septic tank next to the terminal building was in progress during the airport visits. From plans obtained at other airports, the common treatment system is septic tanks which discharge into one circular leachent pit, which is the type of treatment system

being used for costs estimates for this airport. For costs estimates, it was assumed that there are 2 tanks with adequate storage volumes and in good condition.

4.5.4.11.3 Electrical Power Supply

The electrical service provider for the airport is EDM (Electricité de Mali). It is assumed, for cost estimate purposes, that 2 new power generating units of 60KVA will be provided with the current airport improvements and that these new units will supplement the existing 2 power generating units of 60KVA.

4.5.4.11.4 Telephone System

From the information provided[3], an automatic exchange with a capacity of 12 to 16 lines will be provided with the current airport improvements for direct communications on the airport only. The telephone improvements will also provide ATN with the air traffic control centers of Bamako and Niamey. It is estimated that there will be 10 public telephone lines in service.

4.5.4.12 Access Roads

It is assumed that the access road will be improved with the new construction. The road section after improvements is estimated to be 6 m wide with stabilized shoulders, drainage ditch and culverts improvements.

4.5.4.13 Vehicle Parking

The size of the existing parking lot was estimated to be 20 spaces and the pavement is in poor condition.

4.5.5 Evaluation of Existing Facilities

4.5.5.1 Runway

The new improvements meet the geometric requirements for the AN-24 design aircraft (airport category 3C) for the traffic forecasts for all phases. Based upon the pavement conditional observations and studies at the other Malian domestic airports, the new pavement should not require any major rehabilitations until after the year 2020. Table IV-88 shows the runway length and improvement requirements. Figure IV-12, at the end of this section, shows the new pavement for the runway.

[3] Etude Preliminaire de l'Aerodrome de Mopti

Table IV-88. Runway Requirements

Design Aircraft	Required Length	Required Width	Exist Length	Exist Width	Improvement Required	Year
B737	1500m/2600m	30m/45m	2500 m	30 m	100m extension, 15 m width increase (*)	2005 - 2010

Note *: Runway length determined by using reduced operating range to 1400 nautical miles to Paris. This is an optional expenditure and to be constructed if profits from International Flights can be generated

Alternative I

For the international flights alternative, the runway does not meet the geometric requirements for the Boeing 737 design aircraft (airport reference code 4C). The runway will need to be extended 100 m for a total length of 2600 m and widened to 45 m with recommended 7.5 m paved shoulders on both sides. For the upgrading of the runway to the required category 4C standards, the runway edge lights and threshold lights will need to be relocated.

4.5.5.2 Connector

The width of the connector satisfies the requirements for both the AN-24 category 3C and the Alternate I category 4C -B737 requirements with no improvements in dimensions required.

Table IV-89. Connector Requirements

Design Aircraft	Existing Width	Existing Area	Required Width	Improvements Required	Phase Required
B737	20m	3000 m^2	15 m	none	N/A

4.5.5.3 Apron

To meet the peak hour air traffic forecasts for domestic flights, the apron will need to be expanded in phases 2000-2005 an additional 690 m^2. Figure IV-9 shows the apron parking requirements and Figure IV-13, at the end of this section, shows the apron pavement requirements.

Alternative I

For the international flights alternative with the Boeing 737 design aircraft, the apron will need to be expanded an additional 8,286 m^2 beyond what is required for domestic flights.

Table IV-90. Apron Requirements

Phase	Design Aircraft	Apron Size		Improvements
		Existing	Required	
2000-2005	2 AN-24 2 AN-24	115 m x 70 m	105 m x 76 m	115 m x 6 m expansion (690 m^2) & 115 m x 70 m overlay (8,050 m^2)
2005-2010	2 AN-24 2 AN-24	115 m x 76 m	105 m x 76 m	115 m x 76 m crack and joint repair
2010-2015	2 AN-24 2 AN-24	115 m x 76 m	105 m x 76 m	115 m x 76 m crack and joint repair
2015-2020	2 AN-24 2 AN-24	115 m x 76 m	105 m x 76 m	115 m x 76 m crack and joint repair

Comments

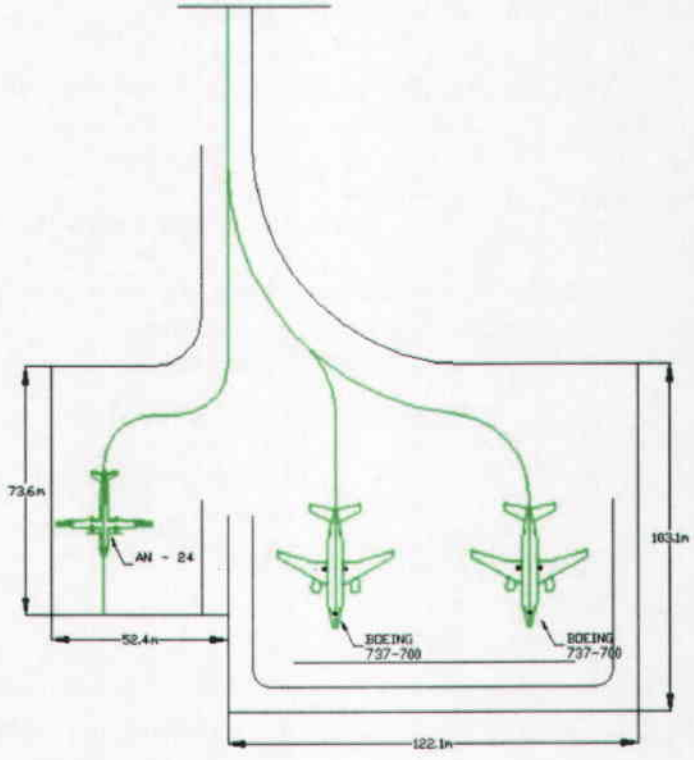
1. Estimated improvements based upon the existing apron pavement being in good condition.
2. Power in - power out
3. Surry seal required on new pavement in aircraft fueling areas.
4. Pavement Marking required for all phases

Table IV-91. Apron Requirements – Alternative 1

Design Aircraft	Apron Size		Improvements
	Existing	Required	
2 737's 1 AN-24	115 m x 76 m	123 m x 104 m 53 m x 74 m	8 m x 115 m, 123 m x 28 m & 53 m x 74 m expansion (8,286 m^2) (assumes apron improved to recommendations for domestic flights)

Note: There are additional costs for apron lights for inclement weather.

Figure IV-9. Apron Parking



4.5.5.4 Navaids

Considering the calculated forecast and the needs identified in order to provide aeronautical services in accordance with the ICAO recommendations and standards with ASECNA, the following table summarizes the devices to be installed during the four study periods.

Table IV-92. Navaids Equipment Requirements

2000-2005	2005-2010	2010-2015	2015-2020
New NDB		New airfield lighting system	Meteo equipment
Control tower equipment		New Control tower equipment	
New Meteo equipment		New PABX	
PABX		New VHF Tx/Rx equipment	
New VHF/HF equipment			

4.5.5.5 Perimeter Fence

Table IV-93 summarizes the perimeter fence requirements.

Table IV-93. Perimeter Fence Requirements

Fencing Required	Comments
875m (*)	Phase 2005-2010, required for runway extension

Note *: This is an alternate expenditure not included with base costs and recommended to be constructed when revenues from international flights can support the construction improvements.

Alternative I

For international flights, the runway will have to be extended which will require an estimated additional 875 m of fencing.

4.5.5.6 Airfield Drainage System

Because of the rapid infiltration of the runoff due to the soil's high permeability properties and the low amounts of annual rainfall, minimal maintenance and improvements are required for the drainage system. It is recommended that routine cleaning and clearing of the drainage ditches and channels by removing the vegetation that has accumulated inside and around the drainage improvements. Also, it is estimated that every five years the major drainage ditches and channels will require removal of the accumulated sediment and that the design flow lines be reestablished.

For the present phase, (2000-2005) it is estimated that 180 m of a new drainage channel will be required to accommodate the apron expansion.

Alternative 1

For international flights, the runway and apron expansion will require an estimated 5,440 m of new infield drainage channels for the runway and 180 m of a new drainage channel to accommodate the apron expansion.

Table IV-94. Airfield Drainage System Requirements

Phase	Improvements		Comment
	Airside	Landside	
2005	5440 m (*) 115 m 180 m		Runway: 500 m extension, 60 m overrun and 2100 m additional width - new channel Apron expansion new channel (base costs airside) Apron expansion new channel (alternative 1 airside) (*)

Phase	Improvements		Comment
	Airside	Landside	
2010	—	—	—
2015	6300 m		Reestablish channel flow lines
		2400 m	Reestablish channel flow lines
2020	—	—	—

Note *: This is an alternative expenditure not included with base costs and recommended to be constructed when revenues from air cargo expansions can support the construction improvements.

4.5.5.7 Terminal Building

With regard to the number of passenger during peak hour forecasted for the period of the study, the IATA[4] method described in the Airport Development Reference Manual has been used in order to calculate the theoretical terminal equipment of all the different components. The following table shows these results, taking into account only one way (departure + transit) shown in the Table IV-95:

Table IV-95. Terminal Building Requirements

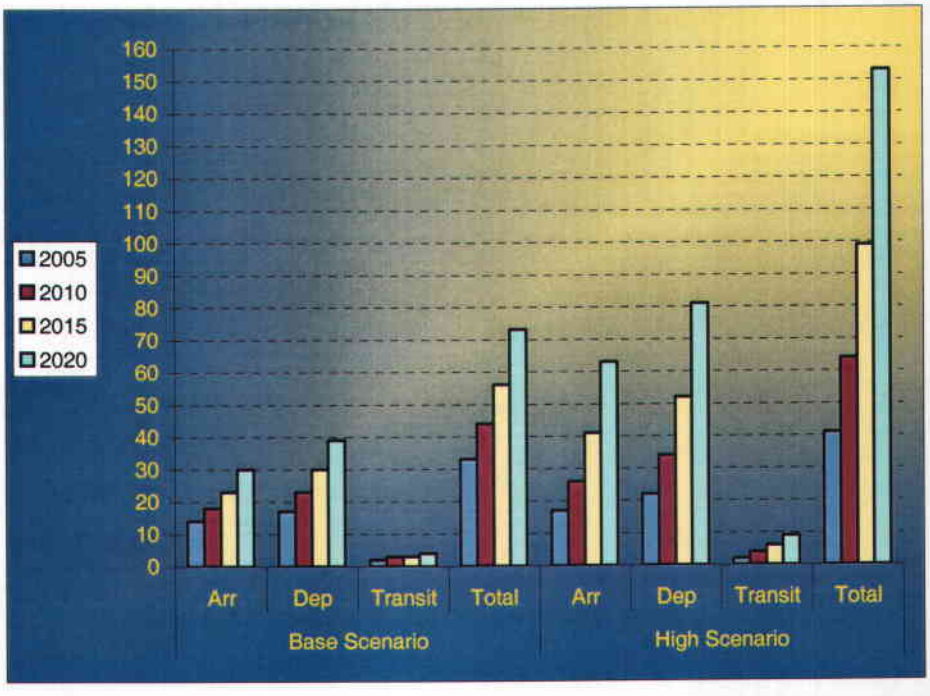
Terminal Building		2005	2010	2015	2020
Base	Design Passenger Peak Hour	33	44	56	73
	Area (m^2)	**462**	**616**	**784**	**1022**
High	Design Passenger Peak Hour	41	64	99	153
	Area (m^2)	**574**	**896**	**1386**	**2142**

The number of passengers during peak hour for the study period are distributed according to the passenger flow, as follows:

Table IV-96. Peak Hour Passenger

	Base Scenario				High Scenario			
	Arrival	Departure	Transit	Total	Arrival	Departure	Transit	Total
2005	14	17	2	**33**	17	22	2	**41**
2010	18	23	3	**44**	26	34	4	**64**
2015	23	30	3	**56**	41	52	6	**99**
2020	30	39	4	**73**	63	81	9	**153**

Graph IV-37. Forecast of Peak Hour Passenger at Mopti Airport



4.5.5.8 Terminal Equipment

The breakdown of all terminal facilities area and measurement of the number of units for public service elements were obtained in the same manner and are presented in four development phases in the following table.

Table IV-97. Terminal Building Equipment Requirements

	BASE SCENARIO				HIGH SCENARIO			
	2005	2010	2015	2020	2005	2010	2015	2020
Check-in Desks	2	2	3	4	2	3	5	7
Security Check-Centralized	1	1	1	1	1	1	1	1
Arrival Health Check	3	3	3	3	3	3	3	3
Number of Baggage Claim Devices	1	1	1	1	1	1	1	1

[4] International Air Transportation Association

4.5.5.9 Airport Rescue and Fire Fighting (ARFF)

Table IV-98 classifies the airport by an Aerodrome ICAO category determined from the size of the design aircraft and also determines the amount of fire and rescue vehicles required according to ICAO's standards. For Mopti, domestic flight operations, the aerodrome category is 4, requiring one vehicle. It is estimated in phase 2005-2010 the existing vehicle will need replacement.

Alternative I

For the Boeing 737 and 727 design aircrafts, the ICAO classification is 7 requiring 2 vehicles.

Table IV-98. ARFF Requirements

Design Aircraft	Aerodrome Category	Aircraft Overall Length	Maximum Fuselage Width	Existing	Required	New Vehicles Replacements	Year
Antonov AN-24	4	23.5		1	1	1 Replacement	2010
Boeing - 727 (*)	7	46.7m	3.4 m	1	2	1-New	2010

Note *: This is an optional expenditure to be constructed if profits from International Flights can be generated. Boeing 727 is the design aircraft due to the longer overall length when compared to Boeing 737.

4.5.5.10 Utilities

4.5.5.10.1 Water

For cost estimates, it was projected that in phase 2000-2005 a storage tank with a capacity of 14 m^3 will be required to meet the forecasted domestic water supply requirements for the passengers and employees up to the year 2020.

Alternative I

For Alternative I (international flights), the size of the water tank required was estimated from the projected increase in international passenger and employee forecast to year 2020 as 25 m^3.

The following table shows the water supply requirements.

Table IV-99. Water Requirements

		A	B	C	D	F	G
Year	Passengers Peak Hour	Arrivals 50%	Departures 50%	Transit 0%	Visitors (1 x arrivals)	@ Terminal Area	@ Maintenance Area
2005	33	16.5	16.5	0	16.5	15	10
2010	44	22	22	0	22	15	10
2015	56	28	28	0	28	15	10
2020	73	36.5	36.5	0	28	15	10

	J						I	W	
Year	(A+B+C+D)	J*20	F*250	G*450	Sum	Sum/ 1000	Existing Storage Tank	Total Req. (m^3/day)	Additional Storage Req.
2005	49.5	990	3750	4500	9240	9	0	9	9
2010	66	1320	3750	4500	9570	10	9	10	1
2015	84	1680	3750	4500	9930	10	10	10	0
2020	109.5	2190	5000	6750	13940	14	10	14	4

4.5.5.10.2 Sanitary Sewer

The estimated two existing tanks are adequate to meet the domestic flight passengers and employee forecast up to the year 2015. It was estimated that in phase 2015-2020 the treatment systems will have to be replaced.

Alternative I

For the passenger and employee forecasts for the international flights, an additional septic tank/leachent system is required.

Table IV-100 shows the sanitary sewer requirements.

Table IV-100. Sanitary Sewer Requirements

Year	Total Req. (m^3/day)	Persons Equivalent	Septic Tanks Required	Functional Existing Tanks	New Tanks Required
2005	9	23.76	2	2	0
2010	10	26.4	2	2	0
2015	10	26.4	2	2	0
2020	14	36.96	2	1	1

Note 1: Daily design flow for one person is 0.379m3/day

Note 2: New tanks sized for 20 person capacity, capacity of existing tanks assumed at 15 persons.

4.5.5.10.3 Electrical Power Supply

It was assumed that the new electrical improvements with the current planned construction will be sufficient to meet the current electrical demands for the airport until phase 2010-2015 at which time minor upgrades and new equipments will be required. Table IV-101 shows electrical supply requirements.

Table IV-101. Electrical Power Supply

Existing Facilities	2005	2010	2015	2020	Comments
Assumes new facilities provided with current airside improvements	None	None	Minor Upgrades		

Alternative I

For international flights, new electrical equipment and upgrades in the electrical power supply will be required to accommodate the additional airfield lighting, the terminal building expansion and related facilities.

4.5.5.10.4 Telephone System

The number of telephone lines required for the airport administration, faxes, computers, police, airlines, passengers, visitors and employees are calculated and summarized in the following table.

Table IV-102. Telephone System Requirements

Phase	Total Lines	Existing Lines	Additional Lines
2000-2005	15	10	5
2005-2010	22	15	7
2010-2015	22	22	0
2015-2020	29	22	7

Alternative I

For Alternative I, which includes international flights, the requirements are shown in the following table.

Table IV-103. Telephone System Requirements – Alternative I

Phase	Total Lines
2000-2005	18
2005-2010	24
2010-2015	24
2015-2020	32

4.5.5.11 Access Roads

It is assumed that any type of improvements to be done on the access road will be carried out and funded for by the government.

4.5.5.12 Vehicle Parking

The size of the parking required for the 4 phases of development was determined by using the forecasted passenger counts and the estimated number of employees. The adequacy of the passenger and employee parking for present and future phases is determined based upon an evaluation of current vehicular traffic and its relationship to peak hour passengers and is shown in the following table.

Table IV-104. Vehicle Parking Requirements

Phase	Total Required Parking (m^2)	Existing Parking (m^2)	Additional Parking (m^2)
2000-2005	1037.5	500	537.5
2005-2010	1175	1037.5	137.5
2010-2015	1675	1175	500
2015-2020	2243.75	1675	568.75

Alternative I

For international flights, additional parking spaces will be required for the increase in the passenger forecast.

4.5.6 Cost Estimates

Capital Cost Estimates of airport improvements have been prepared for four phases of development. These phases are:

Phase I - Years 2002-2005

Phase II - Years 2005-2010

Phase III - Years 2010-2015

Phase IV - Years 2015-2020

All costs are in current US Dollars, without inflation. A summary sheet of the capital cost estimates is shown in Table IV-105. The detailed cost estimates for each of the development phases are located at the end of this chapter. In preparing these estimates, unit cost information collected in Mali was utilized, as was the Consultant's own data base on international construction costs. Fifteen percent was added to all construction and equipment cost estimates to cover contingencies and the cost of engineering services.

The cost estimate shown here refers to the base case scenario as described on the precedent sections and includes only the minimum (base case) requirements as detailed on the corresponding section.

Table IV-105. Cost Estimate for Mopti Airport Improvements

ITEM	DESCRIPTION	PHASE I (2002-2005) (US $)	PHASE II (2005-2010) (US $)	PHASE III (2010-2015) (US $)	PHASE IV (2015-2020) (US $)	TOTAL (US $)
1	RUNWAY	0	0	0	0	0
2	TAXIWAY LOOP & CONNECTOR	0	0	0	0	0
3	APRON(s) (New Pavements /Rehabilitation)	477,820	11,270	11,270	11,270	511,630
4	DRAINAGE	183,200	0	174,000	0	357,200
5	TERMINAL BUILDING/EQUIPMENT	692,982	328,747	393,448	539,387	1,954,564
6	VEHICULAR PARKING (Terminal Building)	32,250	8,250	30,000	34,125	104,625
7	POTABLE WATER	25,000	0	0	0	25,000
8	SEWAGE TREATMENT	0	0	0	30,000	30,000
9	NAVAIDS	375,000	0	300,000	50,000	725,000
10	TELEPHONE SYSTEM	75,000	75,000	0	75,000	225,000
11	ELECTRICAL POWER	0	0	50,000	0	50,000
12	ARFF FACILITY	0	120,000	0	0	120,000
13	PERIMETER FENCE	0	0	0	0	0
14	CONTINGENCY & ENGINEERING 15%	279,188	81,490	143,808	110,967	615,453
	TOTAL	**$2,140,440**	**$624,757**	**$1,102,526**	**$850,749**	**$4,718,472**

TOC

4.6 Nioro Airport

4.6.1 Socioeconomic Profile

4.6.1.1 Transportation Factors

Nioro communicates with Bamako through a new earth road of 103 km up to Diema, another stretch of improved road of 168 km up to Metanbougou and a final stretch of *terre moderne* of 190 km up to Bamako. In total, 461 km are traveled for 48 hours by bus. Also, Nioro connects to Kayes with a road of *terre moderne*. It has access to the road that connects Nema and Nouakchott in Mauritania, which is 212 km to the north.

4.6.1.2 Tourism Factors

Although, Nioro is not characterized as a tourist attraction, it does have some interesting sites such as the mesquite constructed in 1854, which is today one of the biggest and most prestigious mesquites of Mali's Region I. Nioro has become famous at a national and global level and attracts hundreds of tourists each year for its mesquite and monitors. A symbol of the city of Nioro, the monitor, has become a tourist attraction. Specifically the mesquite monitor, where it has lived for many years and almost never lets itself be seen, has become a wonder and a symbol of the mesquite.

4.6.1.3 Socioeconomic Factors

Detailed economic data for Nioro was not found; however, it is mainly an agricultural region and dedicated to pasturing like Kayes.

The population of the city of Nioro as reported in the census of the year 2000 was 25,408 inhabitants.

4.6.2 Current Airport Activities

The volume of air activity generated by the Nioro airport is lower than the other domestic airports studied.

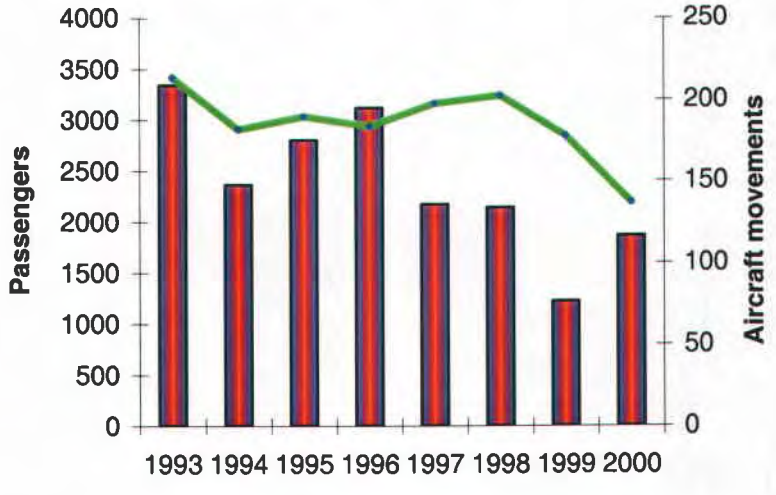
The passenger traffic trend for the past years, as shown in Graph IV-38, appears to be negative, however, the average variation from one year to the other is positive, 4.1%. The number of aircraft operations, on the other hand, shows an average growth rate of cero.

Table IV-106. Airport Activity

		1993	1994	1995	1996	1997	1998	1999	2000
Nioro	Aircraft Operations	214	182	190	184	198	203	178	137
	Passengers	3342	2361	2799	3120	2167	2138	1220	1862
	Freight (kg)	0	5	0	1289	2	0	157	0
	Mail (kg)	129	248	96	110	37	0	0	0

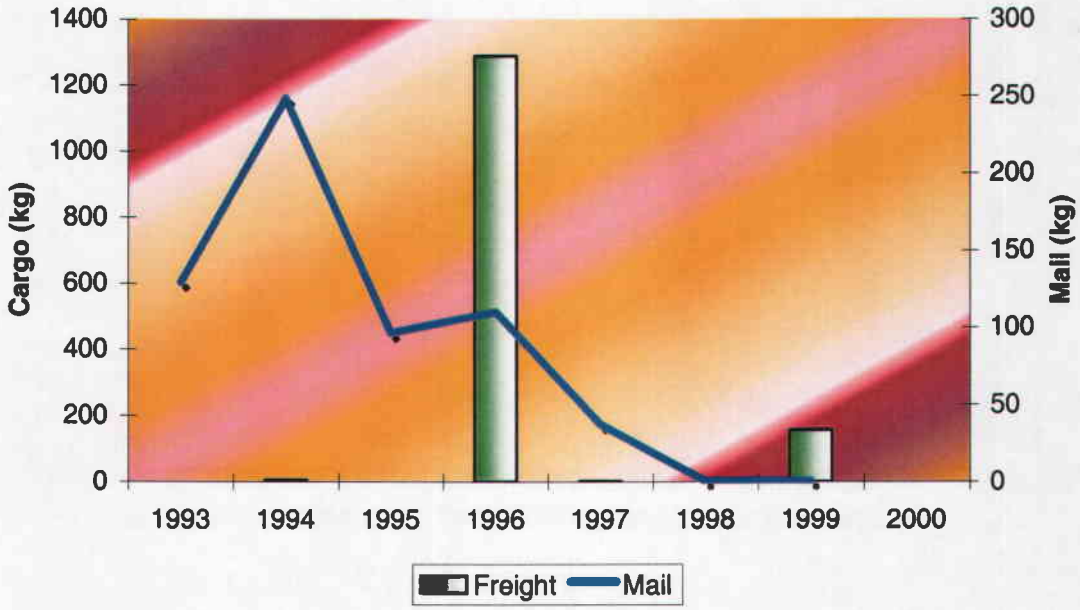
The passengers in Nioro are mainly emigrants that return to the city to see their families during the school vacation periods and also some tourists to see the Great Mesquite and surroundings.

Graph IV-38. Nioro Airport Activity



Air cargo and mail traffic has been almost nonexistent for the past years. Air mail traffic, as happened in Kayes, started in 1993 but was been reduced to zero in 1998.

Graph IV-39. Cargo and Mail Operations at Nioro Airport

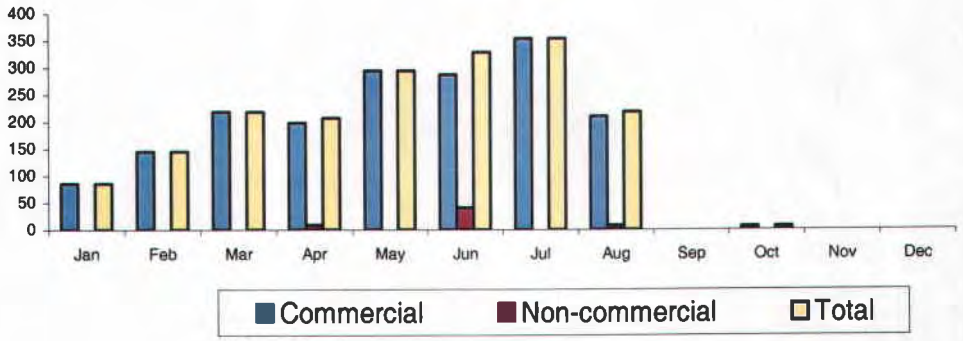


One characteristic of Nioro is the lack of traffic during the rainy season. During this time, air activity is reduced to almost none. The months with the most activity are centered among the months of May to August.

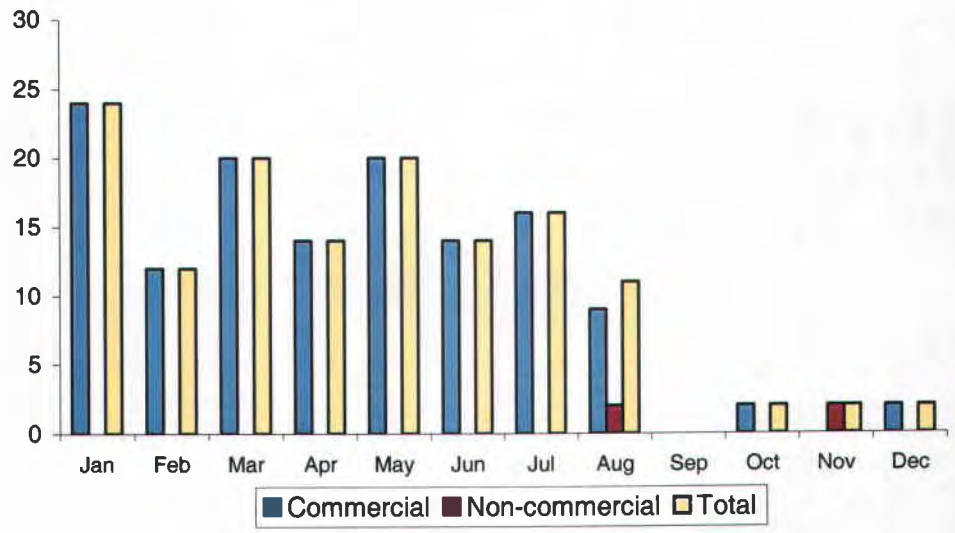
Table IV-107. Aircraft Movements and Passenger Traffic – Nioro Airport

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
	Aircraft Movements												
Commercial	24	12	20	14	20	14	16	9	0	2	0	**2**	**133**
Non-commercial	0	0	0	0	0	0	0	2	0	0	2	**0**	**4**
Total	24	12	20	14	20	14	16	11	0	2	2	**2**	**137**
	Passenger Traffic												
Commercial	86	145	219	199	295	288	355	211	0	6	0	0	**1804**
Non-commercial	0	0	0	9	0	41	0	8	0	0	0	0	**58**
Total	86	145	219	208	295	329	355	219	0	6	0	0	**1862**

Graph IV-40. Passenger Traffic – Nioro Airport



Graph IV-41. Aircraft Movements – Nioro Airport



4.6.3 Aviation Activity Forecast

4.6.3.1 Base Scenario

4.6.3.1.1 Passengers

The base scenario for the annual passenger traffic forecast at Nioro is based on the growth index carried out by the aircraft manufacturer Airbus in the western region of Africa. As observed on

Table III-8, the growth shows a trend of 4.1% between 1999 and 2009 and 4% thereafter, until the year 2020.

It is assumed that the socioeconomic conditions of the region will continue at the same rate of growth as today and there are no projected development that could affect air traffic.

4.6.3.1.2 Aircraft Movements

The calculation of the aircraft operations figures for the next 20 years has followed the same procedure as the Gao and Kayes Airports. However, due to the fact that the Nioro Airport together with the rest of the domestic airports is not important or influential, it was decided to calculate the forecast of the aircraft movements for all of those airports according to the same criteria, assuming a national average of passengers per aircraft in order to obtain the results. In the same manner as the process used for the Tombouctou and Mopti airports, the average occupancy coefficient per aircraft (at a national level) of 27% has been used. The trend will be that in the future an occupancy coefficient of 70% will be achieved. The result of the calculation was an average annual percentage growth of 2.4%.

4.6.3.1.3 Cargo

Air cargo traffic follows the same process as in the other airports that assume a growth equal to the Bamako-Senou Airport of increase 4% annually with regard to air cargo and mail.

4.6.3.2 High Scenario

4.6.3.2.1 Passengers

The growth index for this scenario takes the growth forecasts from the Boeing company for the western region of Africa. The growth percentage between 2000 and 2020 is 6.1%, as can be observed in Table III-7.

This scenario assumes that the tourism infrastructure will be improved. In addition, this scenario assumes an economic growth of Mali and Nioro to follow the growth rate of the country.

4.6.3.2.2 Aircraft Movements

This scenario, in the same way as the previous scenario, assumes an occupancy factor for aircraft of 70% for 2020. The growth is correlated to the number of domestic passengers. It is forecasted that only regular domestic flights will operate with aircraft type ATR-42 for 50 passengers. Since Region I is the one generating the greatest number of Malian population residing abroad, it is

expected that in the future special flights will be chartered from close points with medium-range aircraft that would fly directly to Nioro.

4.6.3.2.3 Cargo

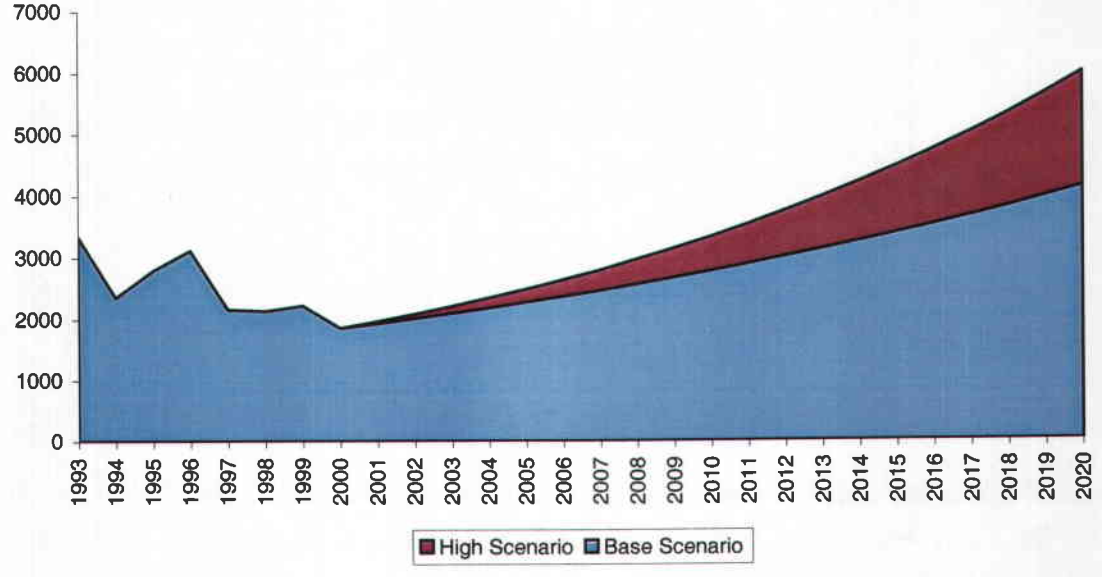
A second scenario was not developed for air cargo because it is not considered to be significant or influential in the general context.

4.6.3.3 Passenger Forecast

Table IV-108. Passenger Forecast – Nioro Airport

	Scenario	2000	2001	2002	2003	2004	2005	2006
Passengers	Base	1862	1939	2019	2102	2189	2279	2373
	High		1974	2093	2219	2353	2495	2645
	Scenario	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**
Passengers	Base	2471	2573	2679	2787	2899	3015	3136
	High	2804	2973	3152	3342	3543	3756	3982
	Scenario	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
Passengers	Base	3262	3393	3529	3671	3818	3971	4130
	High	4221	4475	4744	5029	5331	5651	5991

Graph IV-42. Passenger Forecast – Nioro Airport



The forecast of the number of passengers during peak hour is based on theoretical calculations, where the number of passengers during peak hour in a typical day represents 2% of total traffic.

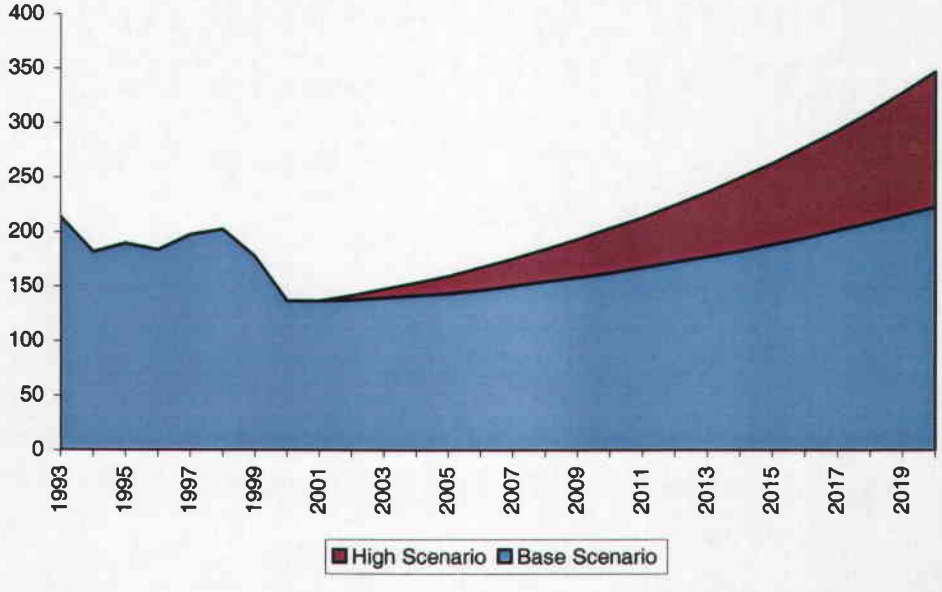
	2005	2010	2015	2020
Base	46	56	68	83
High	50	67	90	120

4.6.3.4 Aircraft Movement Forecast

Table IV-109. Aircraft Movement Forecast – Nioro Airport

	Scenario	2000	2001	2002	2003	2004	2005	2006
Aircraft Movements	Base	137	137	138	140	142	144	147
	High	137	137	142	148	154	160	168
	Scenario	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**
Aircraft Movements	Base	151	155	159	163	168	173	178
	High	176	185	194	204	214	225	237
	Scenario	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
Aircraft Movements	Base	183	189	195	202	209	216	223
	High	250	263	278	293	310	328	347

Graph IV-43. Aircraft Movement Forecast – Nioro Airport

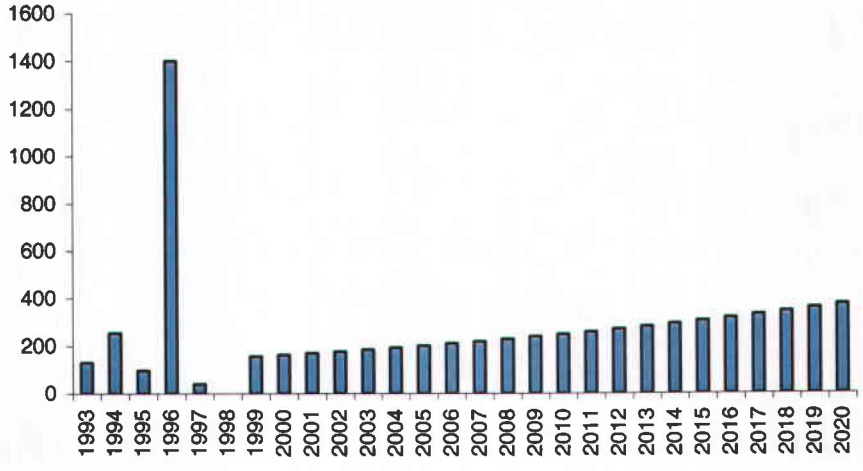


4.6.3.5 Cargo Forecast

Table IV-110. Cargo and Mail Forecast – Nioro Airport

	Scenario	2000	2001	2002	2003	2004	2005	2006
Cargo & Mail (kg)	Base	163	170	177	185	193	201	210
	High		-	-	-	-	-	-
	Scenario	2007	2008	2009	2010	2011	2012	2013
Cargo & Mail (kg)	Base	219	228	238	248	258	269	280
	High	-	-	-	-	-	-	-
	Scenario	2014	2015	2016	2017	2018	2019	2020
Cargo & Mail (kg)	Base	292	304	317	330	344	358	373
	High	-	-	-	-	-	-	-

Graph IV-44. Cargo and Mail Forecast – Nioro Airport



4.6.4 Existing Facilities and Equipment

Figure IV-15, at the end of this section, shows the current airport layout plan.

4.6.4.1 Runway

The existing runway is 1500 m in length and 30 m wide with 60 m paved overruns. No information was available on runway shoulders. A 1996 pavement analysis determined that the existing runway pavement was in poor condition.

Although not indicated on plans or report provided, it was assumed that runway edge lights and threshold lighting exists and are in good operating condition.

4.6.4.2 Connector

A 90-degree connector located 735 m from the threshold provides access from the runway to the apron. The geometric of the connector shown on the plans is 20 m wide x 91m.

4.6.4.3 Apron

A 104 m x 60 m apron is shown to exist on the apron layout plan. No other information was available on the age, thickness or condition of the pavement, which it is assumed to be in new condition.

4.6.4.4 Navaids

For the inventory and evaluation of navaids of the Nioro Airport, the recent preliminary study carried out by STUDI for the rehabilitation of the domestic airport and the report regarding aeronautical policies in Mali, from 1998, were used as reference guides.

In these two reports, the following equipment were identified:

- Marker
- Antenna HF
- Antenna VHF
- Meteo farm
- VHF Tx / Rx

The condition of the equipment appears to be accurate, although the meteorological equipment are obsolete.

4.6.4.5 Perimeter Fence

No information was available on the size, condition and amount of perimeter fence and access gates. It was assumed that there currently is no airport perimeter fence.

4.6.4.6 Airfield Drainage System

No information was available on the existing drainage system. It was assumed that the drainage system is the same type common to the other airports and consists of manmade vegetative lined drainage channels, ditches and culverts which outfall into natural drainage courses.

4.6.4.7 Terminal Building

Nioro Airport currently has a passenger terminal of 216 m^2 and a capacity of 15 passengers during peak hour. In the preliminary study carried out by STUDI, the construction of a new passenger terminal was projected, without specifying the dimensions. It has been proposed, as an objective, to provide Nioro Airport with a technical block building and control tower, and during the first phase use the lower level of the technical block as departure areas while the new terminal is being constructed. The departure area would use an area of 94 m^2 available for waiting areas, bar and restrooms.

4.6.4.8 Maintenance/Storage Building

Furthermore, the referenced study refers to a maintenance warehouse of 18 m^2 in the lower level of the control tower adjacent to the technical block.

4.6.4.9 Airport Rescue and Fire Fighting (ARFF)

An ARFF facility in good condition and of adequate capacity is assumed to exist at the airport although no specific information was available. It was assumed that this structure is a building with bays for the parking of the fire fighting vehicles and an attached office and storage building. Furthermore, it was assumed that the fire-fighting vehicles are old but in good operating condition. Also, it was estimated that above ground water storage tank exists and it is in good condition.

4.6.4.10 Utilities

4.6.4.10.1 Water

No information was available on the water supply. It is assumed that the terminal building is supplied by from a domestic waterline from town and that the existing water supply is inadequate to meet the water demand requirements for flow and pressure.

An above ground water storage tank is assumed to exist for the ARFF vehicle supply requirements.

4.6.4.10.2 Sanitary Sewer

No information was available on the amount, size and location of the wastewater treatment system. From plans and observations at other airports, the common treatment system is septic tanks that discharge into one circular leaching pit, which is the type of treatment system assumed to exist at this airport.

4.6.4.10.3 Electrical Power Supply

No information on the electrical power and supply was available, therefore, it is being assumed that the airport receives service from EDM (Electricité de Mali). It is also assumed that the existing electrical supply and equipment are in good operating condition and 2 back-up generating units of 60KVA capacity each are at the airport with good operating condition.

4.6.4.10.4 Telephone System

Information was not available on the number of telephone lines existing at the airport. It was estimated that 10 lines are provided.

4.6.4.11 Access Roads

No information was available on the location, size and condition of the existing airport access road. It was estimated that the access road is a two lane paved road with a shoulder and a ditch section.

4.6.4.12 Vehicle Parking (Terminal Building)

No information was available on the size of the existing parking lot. Based upon information on similar size airports of the study, it was assumed that 30 spaces exist at the airport (750 m^2) and that this parking lot is paved and in poor condition.

4.6.5 Evaluation of Existing Facilities

4.6.5.1 Runway

The runway geometric is adequate for ICAO minimum standards for an AN-24 design aircraft (airport reference code 3C). The 1996 pavement analysis report recommended in that year the pavement should be overlaid with 6 cm of bituminous concrete with the existing surface prepared by repairing the crack and joints prior to the overlay. It was assumed that the pavement has not been rehabilitated to the recommendations in the report and that the present pavement conditions are, obviously, more sever now than in 1996. The overlay recommendations in the

report should be carried out immediately. Table IV-111 shows the runway length and improvement requirements.

Table IV-111. Runway Requirements

Design Aircraft	Required Length	Required Width	Exist Length	Exist Width	Improvement Required	Year
AN24	1500 m	30 m	1500 m	30 m	1500m x 30m overlay	2000-2005

4.6.5.2 Connector

The width of the connector satisfies the requirements for the Category 3C – AN-24. As with the runway improvements, the summary of said pavement analysis report recommended a 6 cm bituminous concrete overlay, which should be carried out immediately. Table IV-112 shows the design requirements for the connectors.

Table IV-112. Connector Requirements

Design Aircraft	Existing Width	Existing Area	Required Width	Improvements Required	Phase Required
AN24	20m	2454 m^2	15m	Overlay (2454 m^2)	2000/2005

4.6.5.3 Apron

In order meet peak hour air traffic forecasts, the apron will need to be expanded in phases 2000-2005 an additional 1740 m^2. Table IV-113 and Figure IV-14 shows the apron requirements.

Table IV-113. Apron Requirements

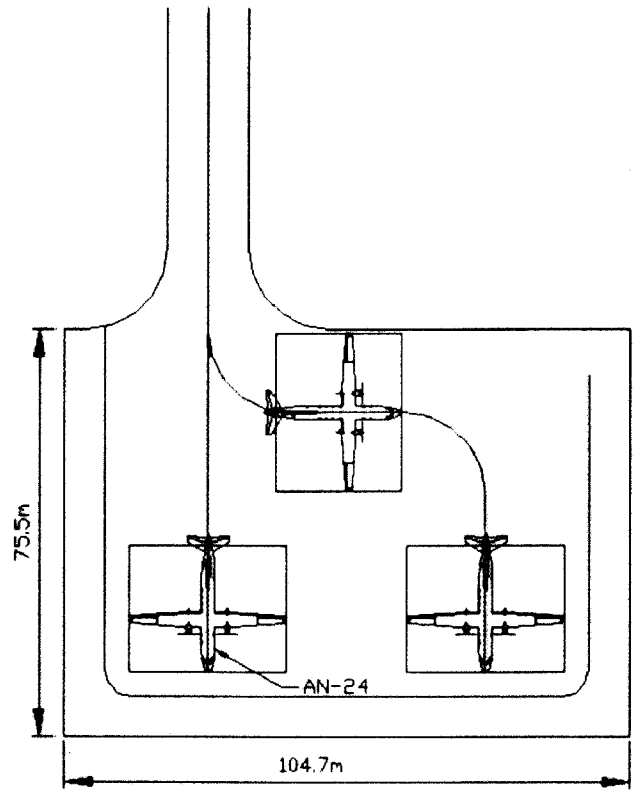
Phase	Design Aircraft	Apron Size		Improvements
		Existing	Required	
2000-2005	2 AN-24	104 m x 60 m		1 m x 60 m & 105 m x 16 m expansion (1740 m^2)
	2 AN-24		105 m x 76 m	104 m x 60 m overlay (6240 m^2)

Phase	Design Aircraft	Apron Size		Improvements
		Existing	Required	
2005-2010	2 AN-24 2 AN-24	105 m x 76 m	105 m x 76 m	105 m x 76 m crack and joint repair
2010-2015	2 AN-24 2 AN-24	105 m x 76 m	105 m x 76 m	105 m x 76 m crack and joint repair
2015-2020	2 AN-24 2 AN-24	105 m x 76 m	105 m x 76 m	105 m x 76 m crack and joint repair

Comments

1. Estimated improvements based upon the existing apron pavement being in good condition.
2. Power in - power out
3. Surry seal required on new pavement in aircraft fueling areas.
4. Pavement Marking required for all phases.

Figure IV-14. Apron Parking



4.6.5.4 Navaids

The evaluation of new navaids is based on recommendations provided by STUDI and on the theoretical useful life of the equipments.

Table IV-114. Navaids Equipment Requirements

2000-2005	2005-2010	2010-0015	2015-2020
Power generator			Meteo equipment

4.6.5.5 Perimeter Fence

Table IV-115 summarizes the fencing requirements. For Nioro, in Phase I (2000-2005) an estimated length of 4800 m of new fencing is required including new access gates. The fencing will have to meet ICAO's minimum height, size and material standards.

Table IV-115. Perimeter Fence Requirements

Fencing Required	Comments
4800m	Phase I (2000-2005), 2-4m gates, 3 personnel gates (Relocate ARFF access road- 7m x 220m new pavement) (assumes no existing fencing meeting ICAO requirements)

4.6.5.6 Airfield Drainage System

Due to the rapid infiltration of the runoff due to the soil's high permeability properties and the low amounts of annual rainfall, minimal maintenance and improvements are required for the drainage system. It is recommended that routine cleaning and clearing of the drainage ditches and channels by removing the vegetation that has accumulated inside and around the drainage improvements. Also, it is estimated that every 5 years the major drainage ditches and channels will require removal of the accumulated sediment and overgrowth to reestablished design flow lines. Table IV-116 below shows information on scheduled maintenance and improvements to the drainage system.

For Phase I (2000-2005), 105 m of new drainage channel will be required to accommodate the apron expansion.

Table IV-116. Airfield Drainage System

Phase	Improvements		Comment
	Airside	Landside	
2005	105 m		Apron Expansion – new channel
		500 m	Reestablish channel flow lines
	4750 m		Reestablish channel flow lines
2010	—	—	—
2015	4750 m		Reestablish channel flow lines
		500 m	Reestablish channel flow lines
2020	—	—	—

4.6.5.7 Terminal Building

With regard to the number of passenger during peak hour forecasted for the period of the study, the IATA method described in the Airport Development Reference Manual has been used in order to calculate the theoretical terminal dimensions and breakdown of all the different components. The following table shows these results.

Table IV-117. Gross Terminal Building Requirements

Terminal Building		**2005**	**2010**	**2015**	**2020**
Base	Design Passenger Peak Hour	15	18	22	26
	Area (m^2)	**210**	**252**	**308**	**364**
High	Design Passenger Peak Hour	16	21	30	39
	Area (m^2)	**224**	**294**	**420**	**546**

However, due to the fact that a boarding room of 94 m^2 will exist within the Nioro's technical building and the terminal space requirements shown in the Table IV-118 correspond to the total gross area. Then, we assume that the total public space needed by passenger peak hour comply with 1.7 m^2 in terms of public areas – the terminal support areas are included in the technical building space.

Regarding this assumption the maximum terminal area required for the maximum number of passenger forecasted during the peak hour (26 passengers on 2020 for the base scenario) would

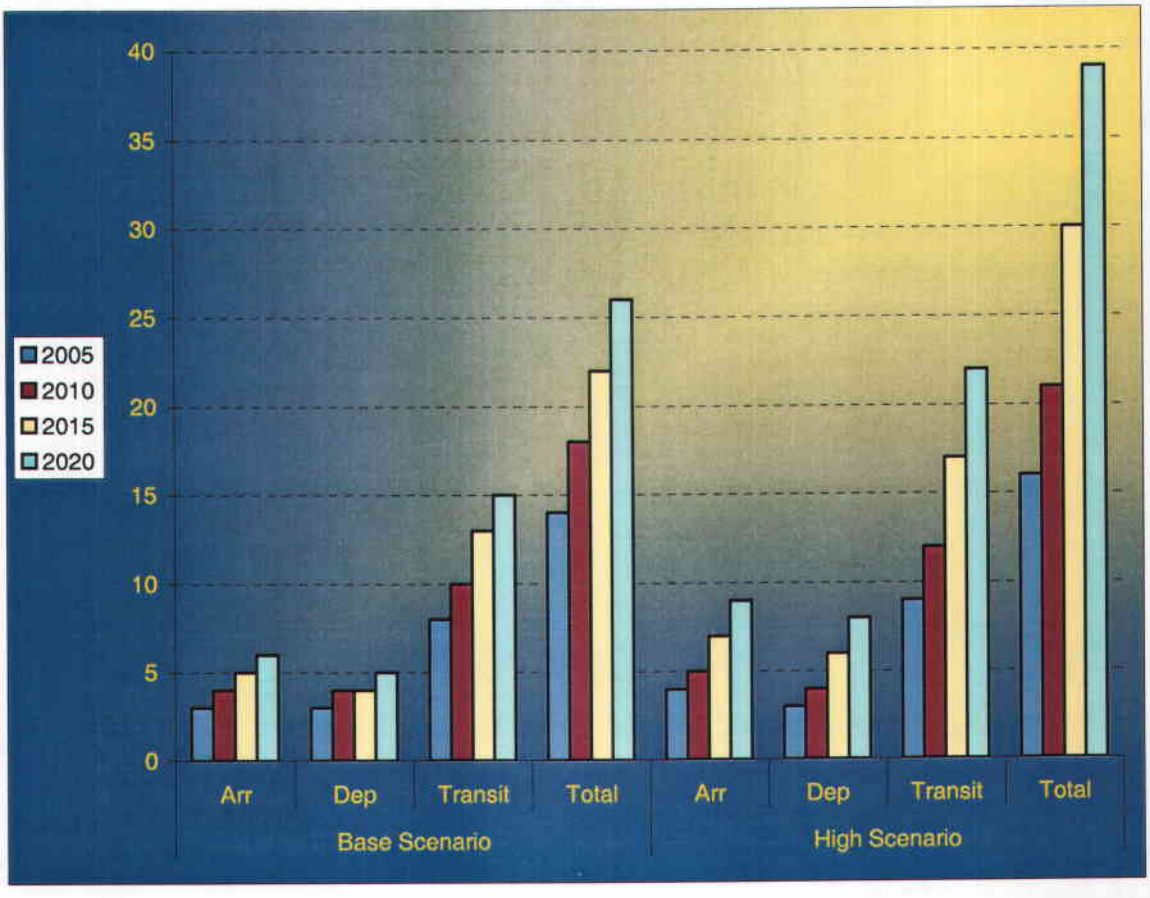
be about 50 m^2. This area results much lower than the boarding room area, which is expected to be built soon. Therefore, no terminal space improvements are required.

The number of passengers during peak hour for the study period are distributed according to the passenger flow, as follows:

Table IV-118. Peak Hour Passenger Forecast at Nioro Airport

	Base Scenario				High Scenario			
	Arrival	Departure	Transit	**Total**	Arrival	Departure	Transit	**Total**
2005	3	3	8	**14**	4	3	9	**16**
2010	4	4	10	**18**	5	4	12	**21**
2015	5	4	13	**22**	7	6	17	**30**
2020	6	5	15	**26**	9	8	22	**39**

Graph IV-45. Peak Hour Passenger Forecast at Nioro Airport



4.6.5.8 Terminal Equipment

The breakdown of all terminal facilities areas and calculation of the number of units for public service elements were obtained in the same manner and are presented in four development phases in the following table.

Table IV-119. Terminal Equipment Requirements

	BASE SCENARIO				HIGH SCENARIO			
	2005	2010	2015	2020	2005	2010	2015	2020
Check-in Desks	1	1	1	1	1	1	1	1
Security Check-Centralized	1	1	1	1	1	1	1	1
Arrival Health Check	3	3	3	3	3	3	3	3
Number of Baggage Claim Devices	1	1	1	1	1	1	1	1

4.6.5.9 Airport Rescue and Fire Fighting (ARFF)

The following table classifies the airport by an Aerodrome ICAO category determined from the size of the design aircraft and also determines the amount of fire and rescue vehicles required according to ICAO's requirements. For Nioro, the aerodrome category is 4 requiring one vehicle for the present and up to the year 2020. It is estimated that in Phase II (2005-2010), the existing vehicle will need to be replaced.

Table IV-120. ARFF Requirements

Design Aircraft	Aerodrome Category	Aircraft Overall Length	Maximum Fuselage Width	Existing	Required	New Vehicles Replacements	Year
Antonov AN-24	4	23.5 m	-----	1	1	1 - Replacement	2010

4.6.5.10 Utilities

4.6.5.10.1 Water

Currently (Phase I, 2000-2005) the water supply to the terminal building needs to be upgraded with a new 6 m^3 storage tank and booster pump which is sized for the future demand base upon the passenger and employee forecast to the year 2020. Table IV-122 shows the water supply requirements.

Table IV-121. Water Requirements

		A	B	C	D	F	G
Year	Passengers Peak Hour	Arrivals 50%	Departures 50%	Transit 0%	Visitors (1 x arrivals)	@ Terminal Area	@ Maintenance Area
2005	14	7	7	0	7	10	5
2010	18	9	9	0	9	10	5
2015	22	11	11	0	11	10	5
2020	26	13	13	0	13	10	5

	J						I	W	
Year	(A+B+C+D)	J*20	F*250	G*450	Sum	Sum/ 1000	Existing Storage Tank	Total Req. (m^3/day)	Additional Storage Req.
2005	21	420	2500	2250	5170	5	0	5	5
2010	27	540	2500	2250	5290	5	5	5	0
2015	33	660	2500	2250	5410	5	5	5	0
2020	39	780	2500	2250	5530	6	5	6	1

4.6.5.10.2 Sanitary Sewer

It was estimated that in Phase IV (2015-2020), a new septic tank and leaching pits will be needed due to the age and condition of the existing treatment system. The following table shows the sanitary sewer sizing requirements.

Table IV-122. Sanitary Sewer

Year	Total Req. (m^3/day)	Persons Equivalent	Septic Tanks Required	Functional Existing Tanks	New Tanks Required
2005	5	13.2	1	1	0
2010	5	13.2	1	1	0
2015	5	13.2	1	1	0

Year	Total Req. (m^3/day)	Persons Equivalent	Septic Tanks Required	Functional Existing Tanks	New Tanks Required
2020	6	15.84	1	0	1

Note 1: Daily design flow for one person is 0.379m3/day

Note 2: New tanks sized for 20 person capacity, capacity of existing tanks assumed at 15 persons.

4.6.5.10.3 Electrical Power Supply

It was assumed that the existing electrical supply and equipment are sufficient to meet the electrical increase in power demands for the airport until Phase III (2010-2015) at which time minor upgrades and re-conditioning of the equipment and back-up generator will be required. Table IV-124 shows the electrical supply requirements.

Table IV-123. Electrical Power Supply

Existing Facilities	2005	2010	2015	2020	Comments
Assumes new facilities provided with current airside improvements	None	None	Minor Upgrades	None	

4.6.5.10.4 Telephone System

The number of telephone lines required for the airport administration, faxes, computers, police, airlines, passengers, visitors and employees are calculated and summarized in the following table.

Table IV-124. Telephone System Requirements

Phase	Total Lines	Existing Lines	Additional Lines
2000-2005	8	10	0
2005-2010	8	10	0
2010-2015	8	10	0
2015-2020	14	10	4

4.6.5.11 Access Roads

It is assumed that any type of improvements to be done on the access road will be carried out and funded by the government.

4.6.5.12 Vehicle Parking (Terminal Building)

The size of the parking required for the four phases of development was determined by using the forecasted passenger volumes and the estimated number of employees. The adequacy of the passenger and employee parking for present and future phases is determined based upon an evaluation of current vehicular traffic and its relationship to peak hour passengers as shown in Table IV-126. It is assumed that the current parking lot (size estimated 750 m^2) will require a bituminous concrete overlay in Phase I (2000-2005).

The following is a summary of the additional parking required for the four phases of development.

Table IV-125. Vehicle Parking Requirements

Phase	Total Parking (m^2)	Existing Parking (m^2)	Additional Parking (m^2)
2000-2005	550	750	0
2005-2010	600	750	0
2010-2015	787.5	750	37.5
2015-2020	862.5	787.5	75

4.6.6 Cost Estimates

Capital Cost Estimates of airport improvements have been prepared for four phases of development. These phases are:

Phase I - Years 2002-2005

Phase II - Years 2005-2010

Phase III - Years 2010-2015

Phase IV - Years 2015-2020

All costs are in current US Dollars, without inflation. A summary sheet of the capital cost estimates is shown in Table IV-127. In preparing these estimates, unit cost information collected in Mali was utilized, as was the Consultant's own data base on international construction costs. Fifteen percent was added to all construction and equipment cost estimates to cover contingencies and the cost of engineering services.

The cost estimate shown here refers to the base case scenario as described on the precedent sections and includes only the minimum (base case) requirements as detailed on the corresponding section.

Table IV-126. Cost Estimate for Nioro Airport Improvements

ITEM	DESCRIPTION	PHASE I (2002-2005) (US $)	PHASE II (2005-2010) (US $)	PHASE III (2010-2015) (US $)	PHASE IV (2015-2020) (US $)	TOTAL (US $)
1	RUNWAY	1,360,800	0	0	0	**1,360,800**
2	TAXIWAY LOOP & CONNECTOR	111,814	0	0	0	**111,814**
3	APRON(s) (New Pavements /Rehabilitation)	142,418	11,172	11,172	11,172	**175,934**
4	DRAINAGE	113,400	0	105,000	0	**218,400**
5	TERMINAL BUILDING/EQUIPMENT	0	0	0	0	**0**
6	VEHICULAR PARKING (Terminal Building)	0	0	2,250	4,500	**6,750**
7	POTABLE WATER	25,000	0	0	0	**25,000**
8	SEWAGE TREATMENT	0	0	0	30,000	**30,000**
9	NAVAIDS	100,000	0	0	50,000	**150,000**
10	TELEPHONE SYSTEM	0	0	0	75,000	**75,000**
11	ELECTRICAL POWER	0	0	75,000	0	**75,000**
12	ARFF FACILITY	0	120,000	0	0	**120,000**
13	PERIMETER FENCE	108,250	0	0	0	**108,250**
14	CONTINGENCY & ENGINEERING 15%	72,100	240,568	29,013	25,601	**367,282**
	TOTAL	**$2,255,934**	**$150,848**	**$222,435**	**$196,273**	**$2,825,490**

TOC

4.7 Sikasso Airport

4.7.1 Socioeconomic Profile

4.7.1.1 Transportation Factors

Sikasso has a good ground communication system. Bamako connects to Sikasso with road RN7, which is a 372 km paved road in good conditions, and then connects with Abidjan with a 853 km paved road.

Sikasso is characterized for being one of the main economic poles in Mali and for having a dynamic commercial activity. As shown in Graph IV-46, Sikasso is an important consumption center besides being a producer. The main commercial interchange route is Bamako followed by Segou. These two cities are the first and second cities in population followed by Sikasso. It is obvious that Bamako, Segou and Sikasso act as distribution centers.

Graph IV-46. 1999 Domestic Cargo Road Traffic – Sikasso (metric tons)

4.7.1.2 Tourism Factors

Although, Sikasso is not characterized as a tourist attractions similar to other regions of western Africa, it does have some interesting cultural tourist activities. Some of the main cultural interest in Sikasso are:

- Sikasso Tata

- Missirikoro Caverns
- Sikasso Hillock
- Dogo Hipogée
- Sélingué Dam

4.7.1.3 Socioeconomic Factors

Sikasso is the capital of Region III and without a doubt the richest city after Bamako. Sikasso is, above all, the most dynamic and with about 125,000 inhabitants, it is the third largest city. The commerce with neighboring countries, specifically with Côte d'Ivoire, is vast.

Sikasso is experiencing a constant economic growth whose economy is mainly based in agriculture and commerce with Côte d'Ivoire and Burkina-Faso. Sikasso is, with the exception of Bamako, the only city that efficiently uses the credit system as a sign of activity of its population and, therefore, the economy.

The Sikasso region is one of the main producers of cereals and horticultural products such as potatoes, fruits, onions and other vegetables; therefore, one of the main suppliers of cereals and vegetables of the country. Cattle are also raised.

Its commercial tradition with neighboring countries makes Sikasso Mali's door for commerce with Côte d'Ivoire and Burkina-Faso.

Since the devaluation of the FCFA in 1994, Mali has become a source of supply for other western countries in Africa, such as Côte d'Ivoire and Ghana. As a consequence, some commercial liaisons have been created. Other products such as potatoes and onions are exported to Côte d'Ivoire through Sikasso.

4.7.2 Current Airport Activities

The statistics for the three airports as a group are shown in Table IV-128. This data was taken from ADM statistics and was registered as "Other Airports", which for this analysis it must be assumed that it corresponds to Sikasso, Yélimané and Kéniéba, as far as the financial analysis is concerned.

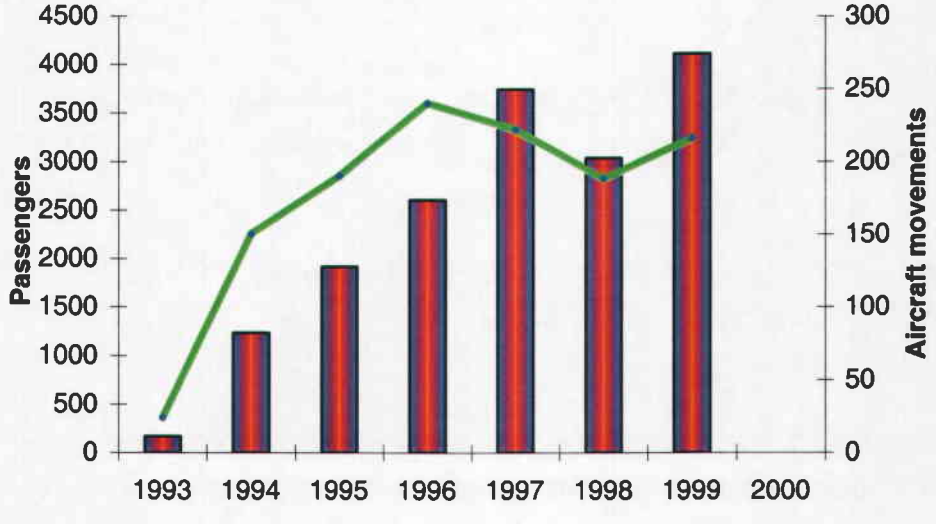
Table IV-128. Airport Activity for Yélimané, Kéniéba and Sikasso

Yélimané, Kéniéba, Sikasso

	1993	1994	1995	1996	1997	1998	1999	2000
Aircraft Operations	24	150	190	240	222	188	216	N/A
Passengers	167	1232	1917	2604	3745	3034	4115	N/A
Freight (kg)	0	0	755	655	100	0	2168	N/A
Mail (kg)	0	0	0	0	357	858	488	N/A

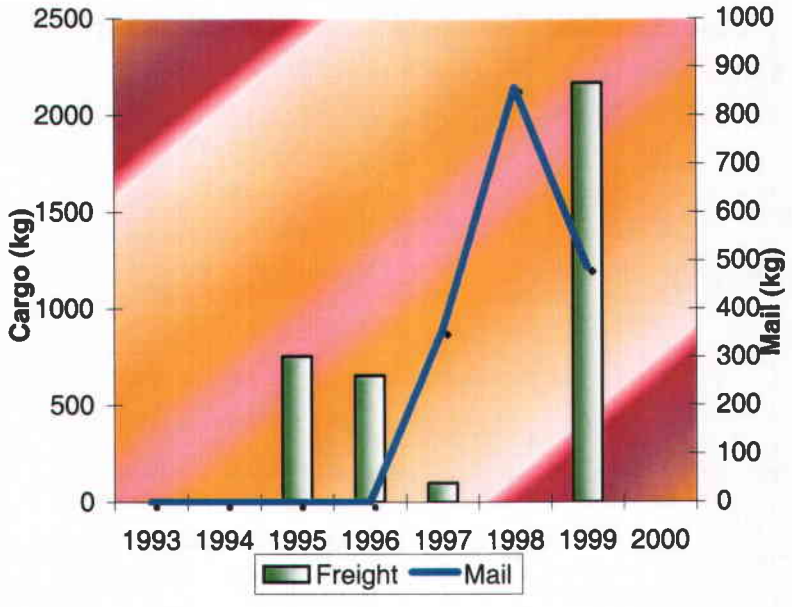
Graph IV-47 shows the constant growth experienced by the group of airports.

Graph IV-47. Sikasso, Yélimané and Kéniéba Airport Activity



The air cargo activity is not assumed to be important, as shown in Graph IV-48.

Graph IV-48. Cargo and Mail Operations – Sikasso, Yélimané and Kéniéba Airports



The Sikasso airport is catalogued by DNAC as a second category aerodrome. Currently, it does not receive regular commercial traffic and is only serviced under demand, which means private aircraft.

Unfortunately, it was not possible to obtain trustworthy data of airport activity and, therefore, its possible traffic will be analyzed together with the Yélimané and Kéniéba Airports, which fall under the same conditions.

The airport is under remodeling in order to service traffic generated by the CAN 2002 and prior to February 2002 will have a runway of 1,600 x 45 meters, for aircraft type AN-24.

Due to the commercial characteristics of Sikasso and the volume of goods exported to other points of the country and abroad, the potential development of air traffic activity of cargo transportation is projected. Although the promotion for this airport activity not only depends on investments of airport infrastructures but also on external factors combined with good organization. Transportation prices and communication with producers will be important factors in order to achieve the necessary coordination that will allow, in the short-medium term, cargo planes type L-100 "Hercules" with a capacity of 20,600 kg of useful cargo or type B-727 with a useful cargo capacity of 21,200 kg to operate in Sikasso.

The long-term forecast, starting in 2010, is the operation of aircraft with greater capacity such as the Airbus 200, with a capacity of 24,500 kg. A more detailed market study and interviews with carriers and producers should be carried out for evaluating the degree of knowledge and acceptance of air transport exploiting possibilities in order to determine, with greater accuracy, the potential of this transportation activity at the Sikasso Airport.

4.7.3 Aviation Activity Forecast

4.7.3.1 Base Scenario

4.7.3.1.1 Passengers

The base scenario for the passenger annual traffic forecast in Sikasso, Yélimané and Kéniéba is based on the growth index carried out by the aircraft manufacturer Airbus in the western region of Africa. As observed on Table III-8, the growth shows a trend of 4.1% between 1999 until 2009 and 4% thereafter, until the year 2020.

It is assumed that Sikasso will continue evolving favorably converting it into a commercial focal point and key player in Mali's economy.

4.7.3.1.2 Aircraft Movements

The calculation of the aircraft operations figures for the next 20 years has followed the same procedure as the Gao and Kayes Airports. However, due to the fact that the Sikasso, Yélimané and Kéniéba Airports together with the rest of the domestic airports is not important or influential, it was decided to calculate the forecast of aircraft movements for all of those airports according to the same criteria, assuming a national average of passengers per aircraft in order to obtain the results. In the same manner as the process used for the Tombouctou and Mopti airports, the average occupancy coefficient per aircraft, but at a national level, of 27% has been used. The trend will be that in the future an occupancy coefficient of 70% will be achieved. The result of the calculation was an average annual percentage growth of 2.4%.

The available length of the runway is 1,600 meters, designed for AN24. An extension of the runway is required in order to be able to operate medium to wide fuselage cargo planes in the future and as a center for commercial activity. Despite the good ground communications with Bamako and Abidjan, a growth in the demand for flights to Sikasso is forecasted, even if the commercial aircraft are no bigger than Dash-8 for 50 passengers, in the medium term, or ATR-72 for 70 passengers, in the long-term.

4.7.3.1.3 Cargo

Air cargo traffic follows the same process as in the other airports, which assumes a growth equal to the Bamako-Senou Airport increase of 4% annually with regard to cargo and mail.

Due to the commercial characteristics of Sikasso, the volume of goods exported to other points of the country and abroad, the potential development of air traffic activity of cargo transportation is projected. Although the promotion for this airport activity not only depends on investments of airport infrastructures but also on external factors combined with good organization. Transportation prices and communication with producers will be important factors in order to achieve the necessary coordination that will allow, in the short-medium term, cargo planes type L-100 "Hercules" with a capacity of 20,600 kg of useful cargo or type B-727 with a useful cargo capacity of 21,200 kg to operate in Sikasso.

The long-term forecast, starting in 2010, is the operation of aircraft with greater capacity such as the Airbus 200, with a capacity of 24,500 kg. A more detailed market study and interviews with carriers and producers should be carried out for evaluating the degree of knowledge and acceptance of air transport exploiting possibilities in order to determine, with greater accuracy, the potential of this transportation activity at the Sikasso Airport.

4.7.3.2 High Scenario

4.7.3.2.1 Passengers

The growth index for this scenario has been assumed the same growth as the one forecasted by the Boeing company for the western region of Africa. The growth percentage between the years 2000 and 2020 is 6.1%, as can be observed in Table III-7.

This scenario takes into account the development conditions provided in the feasibility study for the Bamako Airport for the area of Bamako. It is also assumed that Sikasso will grow in correlation with the country's level of growth and this scenario provides for an optimistic future.

4.7.3.2.2 Aircraft Movements

This scenario, in the same way as the previous scenario, assumes an occupancy factor for aircraft of 70% for 2020. The growth is correlated to the number of domestic passengers. It is forecasted that only regular domestic flights will operate with aircraft type ATR-42 for 50 passengers.

4.7.3.2.3 Cargo

A second scenario was not developed for air cargo transportation because it is not considered to be significant or influential in the general context.

However, certain conditions could be assumed in anticipation of the cargo volume that could operate. If during the period of 2005-2010, it is assumed that an average of one flight weekly of cargo planes type Hercules with a capacity of 20,600 kg and flights of up to 8,000 km with destinations to close distribution points such as Abidjan, Lomé or Accra, or even further ones such as Djhedda, Casablanca or even Paris or Marseille, the volume of cargo could elevate to 1,000 tons annually. Keeping in mind that the volume of cargo exported by ground routes to Abidjan in 1999 was 102,259 tons, while the imported volume was 1,445,506 tons from Abidjan and 7,461 tons from Lomé. The main products exported to Abidjan are cotton, sodas, fur, leather and food products, chemical products, equipment goods, vehicles and parts, construction materials and paper products.

On the other hand, for the 2010-2020 period, it is assumed that the air transportation activity was consolidated and an organization and coordination process was carried out among all the agents involved in order to favor the flow of goods within the distribution centers that are further out, and, due to the economic progress of the region and Mali, in general, a greater commercial activity. Therefore, it is projected that bigger aircraft type A-300 will operate at the airport with some frequency. If an A-300 is added monthly, as minimum, with a capacity of 30 tons the result is, basically, 1,600 tons up to 2,000 tons, if the frequency of cargo planes is increased.

Furthermore, under these development conditions, it wouldn't be unusual that the Sikasso Airport be used as an international air cargo hub, which means that the flight frequency of wider fuselage aircraft would be greater.

Without a doubt, this scenario is only guesswork because there is no foundation supporting this forecast. Therefore, it seems essential to carry out a separate analysis of the potential of Sikasso as an air transport hub.

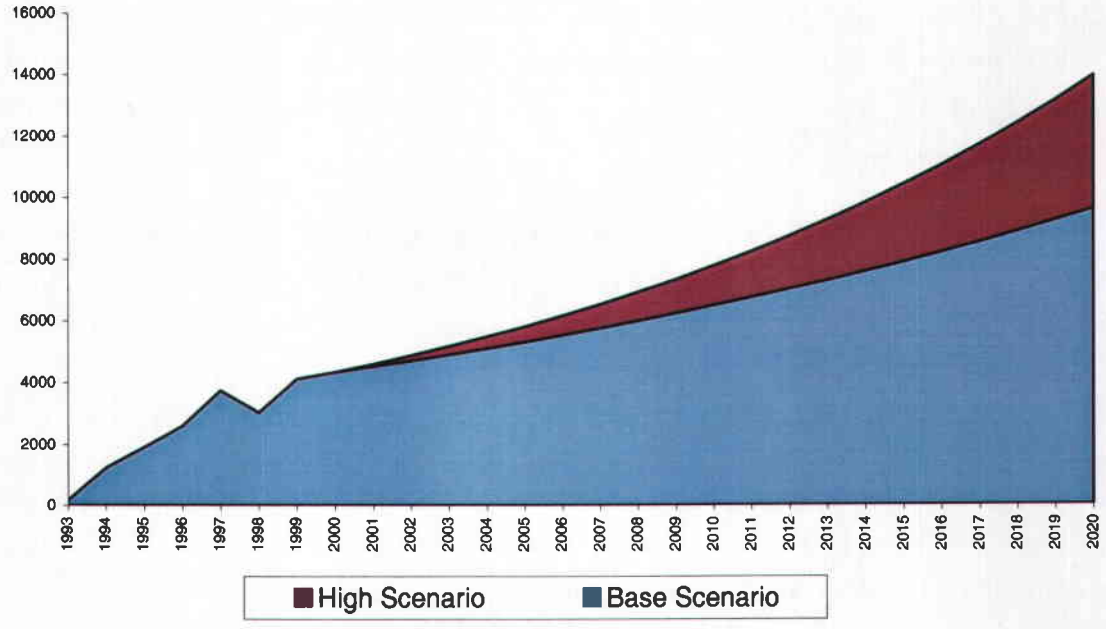
4.7.3.3 Passenger Forecast

Table IV-129. Passenger Forecast – Sikasso, Yélimané and Kéniéba Airports

	Scenario	2000	2001	2002	2003	2004	2005	2006
Passengers	Base	4342	4521	4707	4900	5101	5311	5529
	High		4603	4880	5173	5484	5814	6163

	Scenario	2007	2008	2009	2010	2011	2012	2013
Passengers	Base	5756	5992	6238	6488	6748	7018	7299
	High	6533	6925	7341	7782	8249	8744	9269
	Scenario	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
Passengers	Base	7591	7895	8211	8540	8882	9238	9608
	High	9826	10416	11041	11704	12407	13152	13942

Graph IV-49. Passenger Forecast – Sikasso, Yélimané and Kéniéba Airports

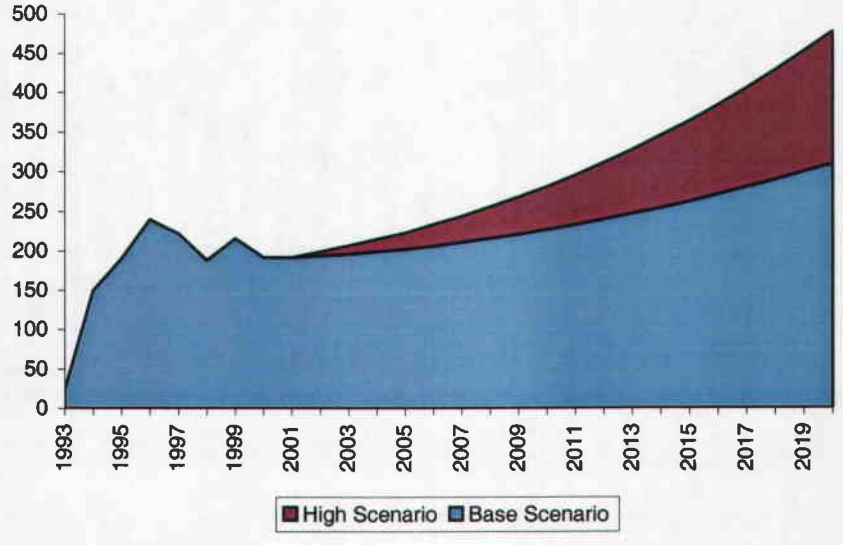


4.7.3.4 Aircraft Movement Forecast

Table IV-130. Aircraft Movement Forecast – Sikasso, Yélimané and Kéniéba Airports

	Scenario	2000	2001	2002	2003	2004	2005	2006
Aircraft Movements	Base	192	192	194	196	199	202	206
	High	192	192	199	207	215	223	234
	Scenario	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**
Aircraft Movements	Base	211	216	221	227	233	240	247
	High	244	256	268	281	295	311	327
	Scenario	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
Aircraft Movements	Base	254	262	271	280	289	299	309
	High	345	363	383	404	427	451	476

Graph IV-50. Aircraft Movement Forecast – Sikasso, Yélimané and Kéniéba Airports

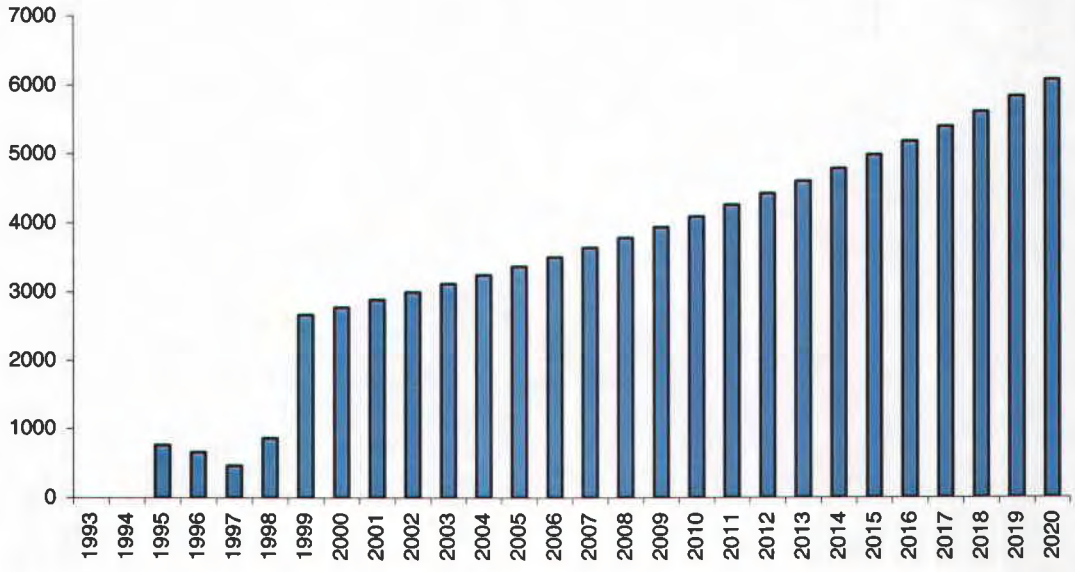


4.7.3.5 Cargo Forecast

Table IV-131. Cargo and Mail Forecast – Sikasso, Yélimané and Kéniéba Airports (kg)

	Scenario	2000	2001	2002	2003	2004	2005	2006
Cargo & Mail (kg)	Base	2762	2873	2988	3108	3233	3363	3498
	High		-	-	-	-	-	-
	Scenario	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**
Cargo & Mail (kg)	Base	3638	3784	3936	4094	4258	4429	4607
	High	-	-	-	-	-	-	-
	Scenario	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
Cargo & Mail (kg)	Base	4792	4984	5184	5392	5608	5833	6067
	High	-	-	-	-	-	-	-

Graph IV-51. Cargo and Mail Forecast – Sikasso, Yélimané and Kéniéba Airports (kg)



4.7.4 Existing Facilities and Equipment

Figure IV-17, at the end of this section, shows the current airport layout plan.

4.7.4.1 Runway

Under contract for construction is a new bituminous concrete runway 1600 m in length and 30 m wide with 7.5 m shoulders on both sides and 60 m paved runway overruns.

Although not identified in the report, it was assumed that runway edge lights and new threshold lighting are included with the construction of the new airport.

4.7.4.2 Connector

A 90-degree connector is to be constructed with the centerline located 700 m from the threshold, which provides access from the runway to the apron. The geometric of the connector was scaled to 25m wide x 175m from the available plans.

4.7.4.3 Apron

An apron is shown on the airport layout plan with scaled dimensions of 150 m x 90 m. It was assumed that this apron would be included in the new construction improvements.

4.7.4.4 Navaids

The Government of Mali is constructing a new airport in Sikasso as a result of the Soccer Championship in Africa in the year 2002. For the inventory of navaids, the preliminary review of the extension of the airport was taken as reference.

The airport currently has the necessary equipment to control airspace, such as VHF and HF transmission/receptors, runway lighting system and VOR.

4.7.4.5 Perimeter Fence

It was estimated that perimeter fence would be included with the construction of the new airport improvements to meet ICAO's minimum height, size and material standards.

4.7.4.6 Airfield Drainage System

It is assumed that the drainage system is the same type common to the other airports and consists of manmade vegetative lined drainage channels and ditches outfalling into the natural drainage courses.

4.7.4.7 Terminal Building

The first phase of the passenger terminal will have a total surface area of 1,500 m^2 with a capacity of 62 passenger during peak hour. In a later phase, the terminal will be expanded to 4,250 m^2 with a capacity for 177 passengers during peak hour.

These dimensions and calculations of passengers during peak hour are the ones provided in the preliminary plan for the construction of the new airport. The consultants' expectations differ somewhat from the prior ones, as can be seen in Table IV-129.

4.7.4.8 Cargo Terminal

A new cargo movement area of 1,800 m^2 with a capacity of 5,400 annual tons during the first phase, is projected for the new airport. For later phases, an area of 5,000 m^2 has been reserved to process the air cargo. This surface would be a minimum of 15,000 tons annually.

4.7.4.9 Airport Rescue and Fire Fighting (ARFF)

An ARFF facility in good condition and of adequate capacity is assumed to exist at the airport or to be included with the airport construction although no information was available. It was assumed that this structure is/will be constructed of reinforced concrete consisting of bays for the

parking of the fire fighting vehicles with an attached office building and storage for equipment and chemicals. Also, it was assumed that the fire-fighting vehicles are in good operating condition and that above ground water storage tank exists and is in good condition.

4.7.4.10 Utilities

4.7.4.10.1 Water

Although not identified in the report, it was assumed that adequate water service will be provided with the new construction and that the water supply facilities are sized to meet the additional future flow requirements. Also, it was estimated that the new construction will also provide a new water storage tank for the exclusive use for ARFF vehicles.

4.7.4.10.2 Sanitary Sewer

No information was available on the amount, size and location of the wastewater treatment system. It was assumed that an adequate sanitary sewer system would be provided with the new construction.

4.7.4.10.3 Electrical Power Supply

No information was available on the size and type of electrical power supply for the airport. It was estimated that adequate electrical facilities and upgrades in the electrical equipment and supply will be made with the planned construction and that there are back up generators at the airport with adequate capacity and in good operating condition.

4.7.4.10.4 Telephone System

Information was not available on the number of telephone lines that will be in place after the current airport improvements. For cost estimates, it was estimated that 10 lines would be provided.

4.7.4.11 Access Roads

From information available[1], it was estimated that the airport access road would be improved with the new construction to a length of 5000 m and 6 m in width. It was assumed that this road will be two lanes with a shoulder and ditch cross-section and constructed with bituminous concrete.

[1] Dossier d'Avant Projet Sommaire, Aeroport de Sikasso-Volet Genie: Chaussess Aeronautiques et VRD

4.7.4.12 Vehicle Parking

No information was available on the size of the new parking lot to be constructed. Based upon information on similar size airports in the study, it was estimated that 30 spaces will be provided (750 m^2) and that this parking lot will be constructed of bituminous concrete.

4.7.5 Evaluation of Existing Facilities

4.7.5.1 Runway

The new runway geometric is adequate for ICAO minimum requirements for an AN-24 design aircraft (airport reference code 3C). Based upon the pavement conditional observations and studies at the other Malian domestic airports, the new pavement should not required any major rehabilitations in the 20-year study period.

Table IV-132. Runway Requirements

Design Aircraft	Required Length	Required Width	Exist Length	Exist Width	Improvement Required	Year
AB300	1500m	30m	1600 m	45 m	none	2005 – 2010

4.7.5.2 Connector

The width of the connector satisfies the requirements for the Category 3C – AN-24 with no improvements in dimensions required now or in the future forecast. As with the runway improvements, it is anticipated that no major improvements or pavement rehabilitations will be required in the 20-year study period.

Table IV-133. Connector Requirements

Design Aircraft	Existing Width	Existing Area	Required Width	Improvements Required	Phase Required
AN24(AB300)	25m	5096 m^2	23 m (AB300)	none	N/A

4.7.5.3 Apron

The apron size scaled on the plans is more than adequate to meet the parking for the peak hour air traffic forecasts until Phase IV (2015-2020). Table IV-134 shows the apron sizing requirements and Figure IV-16 for aircraft parking and movement requirements.

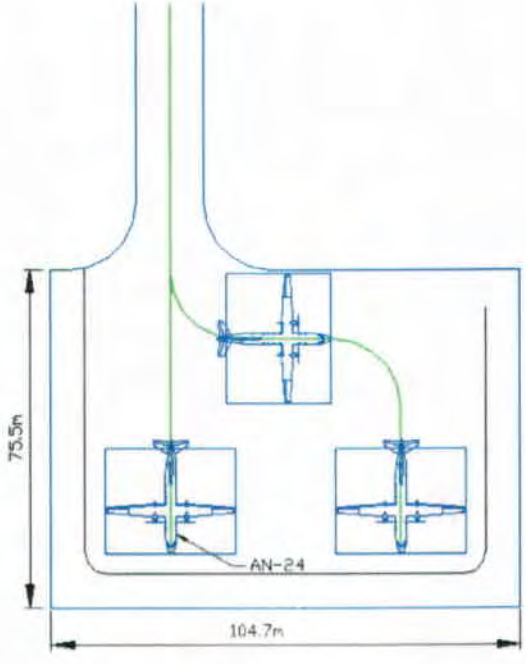
Table IV-134. Apron Requirements

Phase	Design Aircraft	Apron Size		Improvements
		Existing	Required	
2000-2005	2 AN-24 2 AN-24	150 m x 90 m	105 m x 76 m	None
2005-2010	2 AN-24 2 AN-24	150 m x 90 m	105 m x 76 m	150 m x 90 m crack and joint repair
2010-2015	2 AN-24 2 AN-24	150 m x 90 m	105 m x 76 m	150 m x 90 m crack and joint repair
2015-2020	2 AN-24 2 AN-24	150 m x 90 m	105 m x 76 m	150 m x 90 m crack and joint repair

Comments

1. Estimated improvements based upon the existing apron pavement being in good condition.
2. Power in - power out
3. Surry seal required on new pavement in aircraft fueling areas.
4. Pavement Marking required for all phases.

Figure IV-16. Apron Parking



4.7.5.4 Navaids

The preliminary report is not specific but it is assumed that Sikasso Airport will have air control service and a surveillance position. In any case, due to the traffic volume projected for the next few years, a control tower is not essential for the airport.

4.7.5.5 Perimeter Fence

No new fence is forecasted for the Sikasso Airport.

4.7.5.6 Airfield Drainage System

Due to the rapid infiltration of the runoff due to the soil's high permeability properties and the low amounts of annual rainfall, minimal maintenance and improvements are required for the drainage system. It is recommended that routine cleaning and clearing of the drainage ditches and channels by removing the vegetation that has accumulated inside and around the drainage improvements. Also, it is estimated that every five years the major drainage ditches and channels will require removal of the accumulated sediment and overgrowth to reestablish design flow lines.

The following table shows the future requirements for the airfield drainage system for Sikasso Airport.

Table IV-135. Airfield Drainage System Requirements

Phase	Improvements		Comment
	Airside	Landside	
2005	4750 m		Reestablish channel flow lines
		500 m	Reestablish channel flow lines
2010	6600 m (*)		Runway: 1500 m extension, 60 m overrun & 1500 m additional width (both sides), 600 m offsite – new channel
	115 m (*)		Apron Expansion – New channel
	500		Reestablish channel flow lines
		500 m	Reestablish channel flow lines
2015	—	—	—
2020	7455 m (*)		Reestablish channel flow lines (airside-alternative 1)
	4455 m		Reestablish channel flow lines (airside-base costs)
		500 m	Reestablish channel flow lines

Note *: This is an alternative expenditure not included with base costs and recommended to be constructed when revenues from air cargo expansions can support the construction improvements.

4.7.5.7 Terminal Building

With regard to the number of passengers during peak hour forecasted for the period of the study, the IATA method described in the Airport Development Reference Manual has been used in order to calculate the theoretical terminal dimensions and breakdown of all the different components. The following table shows these results.

Table IV-136. Terminal Building Requirements

Terminal Building		2005	2010	2015	2020
Base	Design Passenger Peak Hour	15	18	22	26
	Area (m^2)	**210**	**252**	**308**	**364**
High	Design Passenger Peak Hour	16	22	30	39
	Area (m^2)	**224**	**308**	**420**	**546**

These numbers are covered during the whole study period for the new terminal under construction of 1,500 m^2.

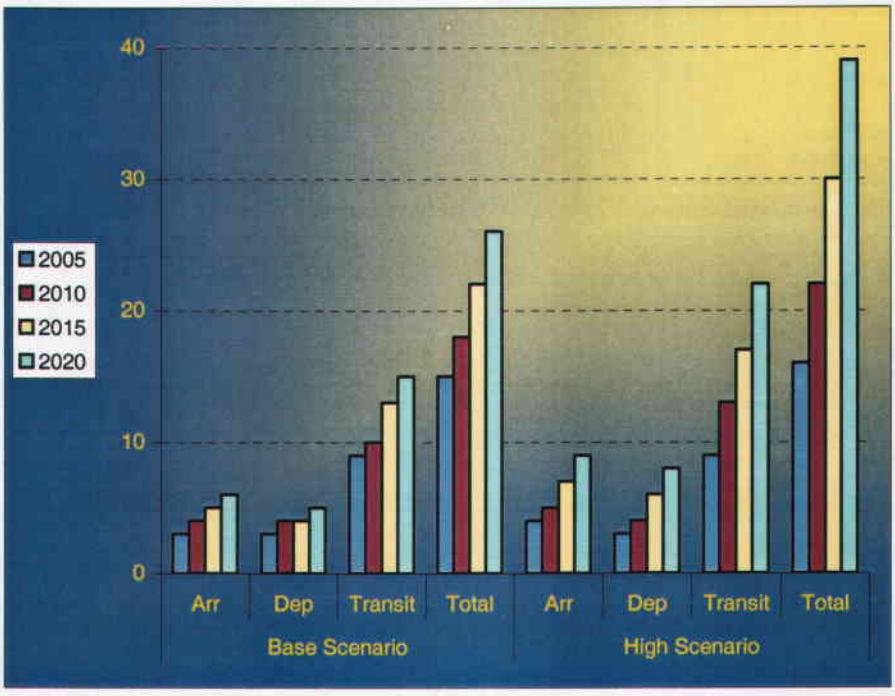
No terminal improvements are required.

The number of passengers during peak hour for the study period are distributed according to the passenger flow, as follows:

Table IV-137. Peak Hour Passenger Forecast – Sikasso Airport

	Base Scenario				High Scenario			
	Arrival	Departure	Transit	**Total**	Arrival	Departure	Transit	**Total**
2005	3	3	9	**15**	4	3	9	**16**
2010	4	4	10	**18**	5	4	13	**22**
2015	5	4	13	**22**	7	6	17	**30**
2020	6	5	15	**26**	9	8	22	**39**

Graph IV-52. Peak Hour Passenger Forecast – Sikasso Airport



4.7.5.8 Terminal Equipment

The breakdown of all terminal facilities area and measurement of the number of units for public service elements were obtained in the same manner and are presented in four development phases in the following table.

Table IV-138. Terminal Equipment Requirements

	BASE SCENARIO				HIGH SCENARIO			
	2005	2010	2015	2020	2005	2010	2015	2020
Check-in Desks	1	1	1	1	1	1	1	1
Security Check-Centralized	1	1	1	1	1	1	1	1
Arrival Health Check	3	3	3	3	3	3	3	3
Number of Baggage Claim Devices	1	1	1	1	1	1	1	1

4.7.5.9 Cargo Terminal

It is assumed that during the 2005-2010 period, an average of one flight per week of cargo aircraft type Hercules with a capacity of 20,600 kg and flight distance of 8,000 km with such near destinations as Abidjan, Lomé or Accra, or even further destinations as Djhedda, Casablanca or even Paris or Marsella, the volume of cargo would reach 1,000 annual tons. This

amount would need a cargo handling area of 75 m^2. In order to move 1,000 tons per year, in terms of design peak hour, day and month, the following figures are calculated.

Peak Month	120000	Kg
Peak Day Traffic	5500	Kg
Peak Hour Traffic	1375	Kg

The justification for cargo handling areas and zones are broken down as follows:

Table IV-139. Cargo Handling Area Requirements 2005-2010

	BASE SCENARIO
Overall Requirements	*Domestic/Export*
a Total area (m^2)	75
b Land side truck doors	1
c Build-up/breakdown positions	1
d Pallet staging rack	3
e Bins	25
Space breakdown	*Area (m^2)*
a Cold room	1
e Toilets	1
f Changing rooms/staff facilities	1
g Fragile cage	1
h Reception and dispatch office	6
I Customs clearance	5
j ULD breakdown & build up	11
k Maintenance	4
L Circulation and storage	45
	75

Even though these development assumptions for the calculation of a cargo terminal area are repeated in the high scenario, they seem necessary in order to justify them.

For the 2010-2020 period, it is assumed that the air transportation activity would be consolidated and it is projected that bigger aircraft type A-300 will operate at the airport with some frequency. If an A-300 is added monthly, as minimum, with a capacity of 30 tons the result is, basically, 1,600 tons up to 2,000 tons, if the frequency of cargo planes is increased. The total area necessary would increase to 149 m^2.

The cargo volume for said period would be as follows:

Peak Month	240000	Kg
Peak Day Traffic	11000	Kg
Peak Hour Traffic	2750	Kg

The handling areas are as follows:

Table IV-140. Cargo Handling Area Requirements 2010-2020

	HIGH SCENARIO
Overall Requirements	*Domestic/Export*
a Total area (m^2)	149
b Land side truck doors	1
c Build-up/breakdown positions	2
d Pallet staging rack	5
e Bins	49
Space breakdown	*Area (m^2)*
a Cold room	1
b Strong room	1
e Toilets	1
f Changing rooms/staff facilities	1
g Fragile cage	1

h	Reception and dispatch office	12
I	Customs clearance	10
j	ULD breakdown & build up	22
k	Maintenance	7
L	Circulation and storage	89
		149

In order to calculate the area, the following design factors have been used.

Table IV-141. Design Factors

Throughput per unit		**Domestic & Export**
Floor area	$Kg/m^2/year$	13500
Landside truck loading & unloading doors		
	kg/door/hr	3500
Airside door capacity		
	Bypass pallets/door/hour	15
	Processed pallets/door/hour	20
	Average pallets/container weight (kg)	1800
	Average bin weight (kg)	225
Built-up/breakdown floor area		
	Kg/building unit/hour	2000

4.7.5.10 Maintenance/Storage Building

Table IV-142. Maintenance/Storage Building Requirements

Maintenance/Storage	2005	2010	2015	2020
Area (m^2)	4	5	7	8

4.7.5.11 Airport Rescue and Fire Fighting (ARFF)

The following table classifies the airport by an Aerodrome ICAO category determined from the size of the design aircraft and also determines the amount of fire and rescue vehicles required according to ICAO's standards.

For Sikasso Airport, the aerodrome category is 4, which requires one vehicle. It is estimated that in Phase IV (2015-2020), the existing vehicle in each of the airports will need to be replaced.

Table IV-143. ARFF Requirements

Design Aircraft	Aerodrome Category	Aircraft Overall Length	Maximum Fuselage Width	Existing	Required	New Vehicles Replacements	Year
Antonov AN-24	4	23.5 m	-----	1	1	1 – New	2010

4.7.5.12 Utilities

4.7.5.12.1 Water

For cost estimates, it was estimated that in Phase IV (2015-2020) an additional storage tank with a capacity of 6 m^3 will be required with an additional booster pump to serve the increase in passenger and employee demand.

Table IV-144. Water Requirements

		A	B	C	D	F	G
Year	**Passengers Peak Hour**	**Arrivals 50%**	**Departures 50%**	**Transit 0%**	**Visitors (1 x arrivals)**	**@ Terminal Area**	**@ Maintenance Area**
2005	15	7.5	7.5	0	7.5	10	5
2010	18	9	9	0	9	10	5
2015	22	11	11	0	11	10	5
2020	26	13	13	0	13	10	5

	J						I	W	
Year	**(A+B+C+D)**	**J*20**	**F*250**	**G*450**	**Sum**	**Sum/ 1000**	**Existing Storage Tank**	**Total Req. (m^3/day)**	**Additional Storage Req.**
2005	22.5	450	2500	2250	5200	5	0	5	5
2010	27	540	2500	2250	5290	5	5	5	0
2015	33	660	2500	2250	5410	5	5	5	0
2020	39	780	2500	2250	5530	6	5	6	1

4.7.5.12.2 Sanitary Sewer

It is estimated that in Phase II (2005-2010), a septic tank and septic pit will be required to replace the existing system for all three airports.

Table IV-145. Sanitary Sewer Requirements

Year	Total Req. (m^3/day)	Persons Equivalent	Septic Tanks Required	Functional Existing Tanks	New Tanks Required
2005	5	13.2	1	1	0
2010	9	13.2	1	0	1
2015	9	13.2	1	1	0
2020	9	15.84	1	1	0

Note 1: Daily design flow for one person is 0.379 m^3/day

Note 2: New tanks sized for 20 person capacity, capacity of existing tanks assumed at 15 persons.

4.7.5.12.3 Electrical Power Supply

No major investments in the electrical power supply will be required if the electrical equipment and facilities are properly maintained until phase 2005-2010 at which time there will be minor upgrades in the electrical supply and equipment due to the condition and increase in demand.

Table IV-146. Electrical Power Supply

Existing Facilities	2005	2010	2015	2020	Comments
Assumes new facilities provided with current airside improvements	None	Minor Upgrades	None	None	Planned expansion for air cargo - apron and storage buildings

4.7.5.12.4 Telephone System

The number of telephone lines required for the airport administration, faxes, computers, police, airlines, passengers, visitors and employees are calculated and summarized in Table IV-147.

Table IV-147. Telephone System Requirements

Phase	Total Line Requirements	Existing Lines	Additional Lines
2000-2005	8	10	0
2005-2010	8	10	0
2010-2015	8	10	0
2015-2020	14	10	4

4.7.5.13 Access Roads

As with the other airports, it is assumed that any type of maintenance and improvements to be done on the access road on Sikasso Airport (after the new construction), will be carried out and funded by the government.

4.7.5.14 Vehicle Parking

The size of the parking required for the four phases of development was determined by using the forecasted passenger volume and the estimated number of employees. The adequacy of the passenger and employee parking for present and future phases is determined based upon an

evaluation of current vehicular traffic and its relationship to peak hour passengers as shown in the following table.

Table IV-148. Vehicle Parking Requirements

Phase	Total Required Parking (m^2)	Existing Parking (m^2)	Additional Parking (m^2)
2000-2005	562.5	750	0
2005-2010	600	750	0
2010-2015	787.5	750	37.5
2015-2020	862.5	787.5	75

4.7.6 Cost Estimates

Capital Cost Estimates of airport improvements have been prepared for four phases of development. These phases are:

Phase I - Years 2002-2005

Phase II - Years 2005-2010

Phase III - Years 2010-2015

Phase IV - Years 2015-2020

All costs are in current US Dollars, without inflation. A summary sheet of the capital cost estimates is shown in Table IV-149. In preparing these estimates, unit cost information collected in Mali was utilized, as was the Consultant's own data base on international construction costs. Fifteen percent was added to all construction and equipment cost estimates to cover contingencies and the cost of engineering services.

The cost estimate shown here refers to the base case scenario as described on the precedent sections and includes only the minimum (base case) requirements as detailed on the corresponding section.

Table IV-149. Cost Estimate for Sikasso Airport Improvements

ITEM	DESCRIPTION	PHASE I (2000-2005) (US $)	PHASE II (2005-2010) (US $)	PHASE III (2010-2015) (US $)	PHASE IV (2015-2020) (US $)	TOTAL (US $)
1	RUNWAY	0	0	0	0	**0**
2	TAXIWAY LOOP & CONNECTOR	0	0	0	0	**0**
3	APRON(s) (New Pavements /Rehabilitation)	3,192	18,900	18,900	18,900	**59,892**
4	DRAINAGE	105,000	10,000	0	99,100	**214,100**
5	TERMINAL BUILDING/EQUIPMENT	0	0	0	0	**0**
6	VEHICULAR PARKING (Terminal Building)	0	0	2,250	1,500	**3,750**
7	**POTABLE WATER**	0	0	0	25,000	**25,000**
8	SEWAGE TREATMENT	0	30,000	0	30,000	**60,000**
9	VISUAL / NAVIGATIONAL AIDS	0	0	200,000	0	**200,000**
10	TELEPHONE SYSTEM	0	0	0	75,000	**75,000**
11	ELECTRICAL POWER	0	75,000	0	0	**75,000**
12	ARFF FACILITY	0	0	0	370,250	**370,250**
13	PERIMETER FENCE	0	0	0	0	**0**
14	CONTINGENCY & ENGINEERING 15%	16,229	20,085	33,173	92,963	**162,449**
	TOTAL	**$124,421**	**$153,985**	**$254,323**	**$712,713**	**$1,245,441**

TOC

4.8 Tombouctou Airport

4.8.1 Socioeconomic Profile

4.8.1.1 Transportation Factors

Tombouctou is located approximately 944 km from the capital of Mali, Bamako. Access through roadway takes approximately two and a half days during the dry season, the rest of the year the roadway is almost impossible to access. The need to construct a new paved and accessible road at any time of the year was identified in 1990. However, this project has never taken place despite the region's obvious need for ground communication and also to promote the country's decentralization process.

The main products exported to other important sectors of Mali are salt, arriving in Tombouctou from Taoudenni, and the rice, cultivated on the boundaries of the Niger River between the Goundam and Tombouctou localities. In 1999, nine tons of salt were transported through railroad from Bamako, which are assumed to come from north of the region.

Tombouctou exports by ground mainly to Bamako, Segou and Mopti, which in 1999 represented 44 tons of goods, while imports from the same locations have been 3,600 tons. Bamako, Mopti and Segou serve as distribution centers of goods from the Tombouctou region to other sectors of the country.

Another alternative is the river; Port Kabara is located 10 km from the city. However, the Niger River is only navigational from Koulikoro to Tombouctou from August to November and it takes five days to get to Bamako.

The only year-round operational access way is airway, despite some sandstorms that make the airport close due to low visibility.

The price of a plane ticket between Bamako and Tombouctou is 63,600 FCFA for a flight of almost two hours, while a bus ticket is 19,000 FCFA but it takes two days to arrive from Bamako. The ratio of passenger-km-time of travel between airplane and bus is 120, but the price of a plane ticket is not within reach for the local population, considering that the GDP per person is about 175,000 FCFA (290 US$). Air Mali's uncertainty on regular flights causes work travel to be done with private aircraft, most of the time, while tourists prefer the bus from Bamako to the region of Mopti to visit the Pays Dogon and then fly roundtrip for 80,700 FCFA from Mopti to Tombouctou staying overnight in the city when arriving on a Wednesday or Saturday since the AN24 aircraft from Air Mali only comes twice a week around eleven o'clock in the morning

from Bamako-Mopti (Wednesday and Saturday) and the following day (Thursday and Sunday) back at 8:30 a.m. to Mopti-Bamako.

As a result of the difficulty of accessing Tombouctou, it should be mentioned that there exist a lack of fuel supply for aircraft. Despite the two development phases of the airport and the planning of a fuel storage and supply, the airport does not have this type of facility, which is a barrier for accommodating long-range aircraft.

Sources from the Mobil company expressed their desire to get to Tombouctou as long as there was a real demand. In order to supply fuel to the Tombouctou Airport, it is necessary to use Cistern 4x4 trucks equipped for circulating through sand with a capacity of 15,000 liters with a transportation price of 63.68 FCFA/m^3-km. The fuel is mainly transported from Abidjan, which is located 2,170 km from Tombouctou.

4.8.1.2 Tourism Factors

The city of Tombouctou was founded in the XII century and represents one of the main tourism centers of Mali. Tombouctou has a strong attraction due to its historical port. Some monuments still show its extraordinary past: the Djingareiber, Sankoré and Sidi Yahiya Mesquites, the old houses with typical architecture, and the original markets, among others.

Currently, UNESCO has declared Tombouctou human patrimony. As proof of its wonderful cultural past it is possible to visit the Ahmed Baba Cultural Center, which houses Islamic documents dating from the XIV century, besides other attractions such as the House of Explorers, the Tuareg, Azalais camps, camel caravans and Faguibine Lake.

Air traffic in Tombouctou is essentially for tourism reasons and, therefore, only seasonal. Tourists do not seem to stay more than one night in Tombouctou, very few tour trips are organized and travelers that wish to get to Tombouctou depend almost exclusively on Air Mali's regular flight, with the added uncertainty of not knowing if the return will be on the day scheduled. This transportation inconvenience keeps a lot of tourists from visiting Tombouctou.

Even then, without a doubt, Tombouctou possesses a great tourist potential that depends on good coordination and organization of the agents involved in all sectors of the tourism industry. Furthermore, good planning is required in order to implement an investment system for the tourism infrastructure development plus a set of governmental measures that promote and facilitate movements of tour groups.

4.8.1.3 Socioeconomic Factors

Tombouctou is part of two very different environmental regions: the Sahara Desert and the Niger zone. The desert zone is characterized by the absence of regular rain. Rain only appears in the summer months, but does not even penetrate the dry soil. Subterraneous water is the only available source of water. This zone typically consists of raw and sandy soil not suitable for agriculture. In some areas such as Taoudenni, 670 km from Tombouctou, the soil contains a great amount of salt. Rare natural vegetation limits the livestock and cultivation activities. The distances between the few existing areas of cultivation are extremely long. The Niger zone near Tombouctou has special conditions for agriculture. In this zone rice, vegetable and cereals are mainly cultivated.

Tombouctou is a distribution point and a commercial center, where the grand north-south communication connects crossing the Sahara towards Niger River direction. Currently its economy is very dependent on tourism, crafts and livestock, and suffers due to the lack of city development and some consequences of upheavals that shook the region during the beginning of the 90s.

4.8.2 Current Airport Activities

The Tombouctou Airport is commercially serviced by aircraft type Antonov 24 twice a week. The flight itinerary for the national company Air Mali S.A. schedules the arrival to Tombouctou on Wednesday and Saturday coming from Bamako, Thursday coming from Gao towards Bamako and on Sundays it leaves Tombouctou to Bamako. However, this schedule is irregular and with no confirmation, Air Mali can cancel some flights for vague reasons: some times for bad weather, other for serving the government needs, and other for aircraft malfunction.

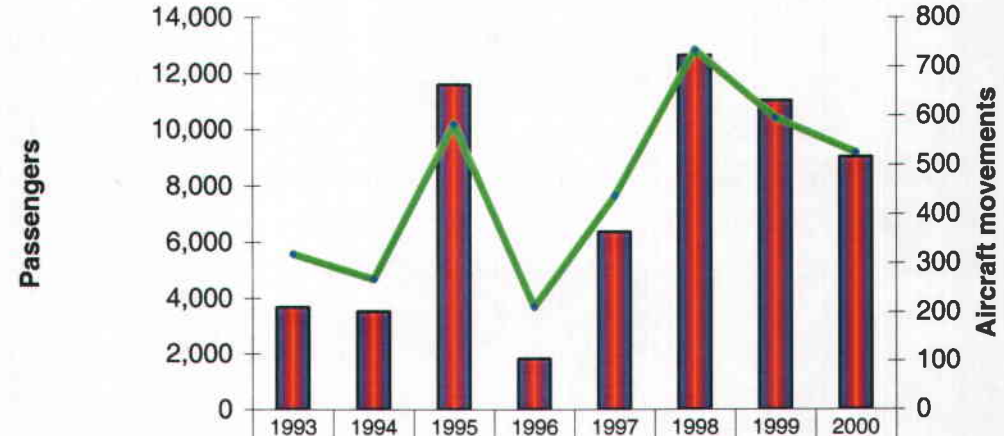
Table IV-150 shows the historical chart of air traffic at Tombouctou Airport.

Table IV-150. Air Traffic

	1993	1994	1995	1996	1997	1998	1999	2000
Aircraft Operations	320	268	584	212	438	735	596	526
Passengers	3 670	3 530	11 612	1 829	6 359	12 654	11 035	9 020
Freight (kg)	12 244	907	91 943	768	5 436	72 527	7 013	6 979
Mail (kg)	334	395	672	668	35	605	82	400

The Tombouctou Airport has shown a fluctuating historic evolution since 1993 until 2000 with regard to air traffic. Passenger traffic has experienced considerable growths and declines from 1,829 passengers in 1996 to a maximum of 12,654 passengers in 1998. The reasons for the abrupt changes could be outside factors of the airport itself, such as the rebellion of 1992 in the north part of the country, which caused a continuous decrease of air traffic, economic and political instability and the disappearance of the national company STA Mali. In 1995, it experienced an abrupt growth of 229% mainly motivated by the devaluation of the FCFA during 1994 and the implementation of regular flights by Air Mali S.A. In addition, the first phase of the airport renovation was being completed so new facilities allowed it to accommodate a greater demand. Traffic decreased again to 84% the following year (1996) and increase to its peak point in 1998. From this year on, traffic has been decreasing at a 15% rhythm due to the increasingly bad situation of Air Mali and their uncertain flight schedule. Graph IV-53 shows the correlation between the number of aircraft and volume of passengers, increasing and decreasing at the same rate.

Graph IV-53. Tombouctou Airport Activity



	1993	1994	1995	1996	1997	1998	1999	2000
Passengers	3,670	3,530	11,612	1,829	6,359	12,654	11,035	9,020
Aircraft Operations	320	268	584	212	438	735	596	526

According to Air Mali's flight schedule, Tombouctou is serviced four times a week, which represents 8 weekly operations, therefore, 416 commercial operations annually. During 2000, ASECNA registered 265 commercial operations at the airport, 50% of the total operation of that year and 37% less of the theoretical operations as a result of the frequent cancellations of flights

by Air Mali. During 1998, the year of most activity of aircraft movements in the past ten years, 735 annual operations were logged, it is assumed that Air Mali serviced Tombouctou on a regular basis. Therefore, it is assumed that 56% (416) of those operations corresponded to Air Mali's commercial flight since there is no other air company currently operating with the category of regular commercial airline.

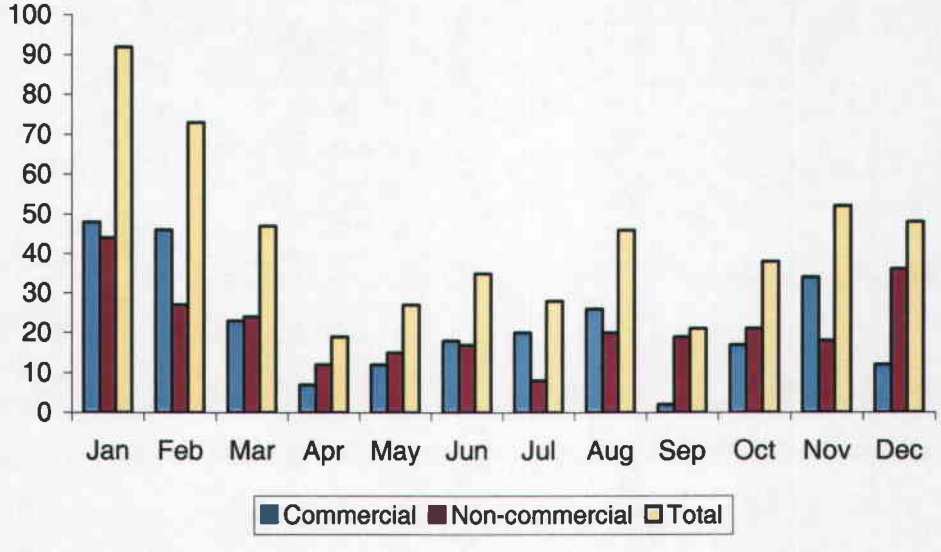
In addition, the great importance of noncommercial aviation is evident, in the case of general aviation, in Tombouctou's air traffic, particularly, and the rest of the domestic airports in general.

Table IV-151 shows the monthly variation of aircraft traffic during 2000, divided into commercial and noncommercial flights. It was not possible to find a more detailed break down by type of aircraft or type of operation: general aviation, military, regular, charter, etc. Furthermore, it is assumed that commercial flights correspond exclusively to Air Mali.

Table IV-151. Aircraft Movements at Tombouctou Airport – Year 2000

	Total	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Commercial	265	48	46	23	7	12	18	20	26	2	17	34	12
Non-commercial	261	44	27	24	12	15	17	8	20	19	21	18	36
Total	526	92	73	47	19	27	35	28	46	21	38	52	48

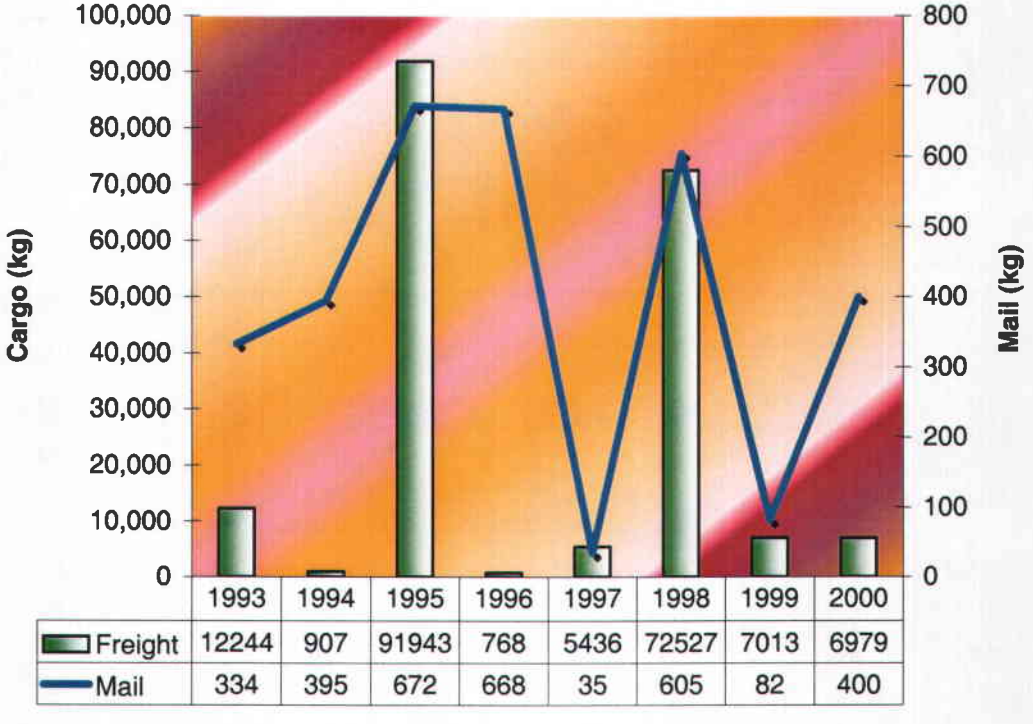
Graph IV-54. Aircraft Movements at Tombouctou Airport – Year 2000



On the other hand, the air cargo volume processed through the airport is very unstable, with increases and decreases of about 1000%, from one year to the next, as shown in Graph IV-55. The reasons for these fluctuations should be found in the two development phases of the airport. Tombouctou does not have good communication through roadways and the dependency on airplanes forces for transfer of goods, in case of real necessity, to be done through air and those peaks correspond to the periods of supply of equipment and material for the construction of the airport.

During 1995 and 1998, arrival and departure of cargo operations was divided in 50% with regard to total traffic, while in 1993, 1997 and 1999 the ratio between arrival and departure of cargo was 75% for arrival and 25% for departures. The mail operations is very low with regard to goods traffic, therefore, it is included in the same analysis.

Graph IV-55. Cargo and Mail Operations at Tombouctou Airport



	1993	1994	1995	1996	1997	1998	1999	2000
Freight	12244	907	91943	768	5436	72527	7013	6979
Mail	334	395	672	668	35	605	82	400

Table IV-152 shows the evolution of air cargo and mail operations divided into arrival and departures.

Table IV-152. Cargo and Mail Operations

	Cargo (kg)			Mail (kg)			Cargo+Mail (kg)		
	A	D	T	A	D	T	A	D	T
1993	2,186	1,484	3,670	187	147	334	2,373	1,631	4,004
1994	1,925	1,605	3,530	212	183	395	2,137	1,788	3,925
1995	4,481	7,131	11,612	423	249	672	4,904	7,380	12,284
1996	909	920	1,829	413	255	668	1,322	1,175	2,497
1997	2,809	3,550	6,359	4	31	35	2,813	3,581	6,394
1998	5,886	6,678	12,564	386	219	605	6,272	6,897	13,169
1999	5,660	5,375	11,035	60	22	82	5,720	5,397	11,117

4.8.3 Aviation Activity Forecast

4.8.3.1 Base Scenario

4.8.3.1.1 Passengers

Passenger traffic in Tombouctou Airport mainly depends on the number of tourists. The arrival of tourists can only be accomplished, almost exclusively, by air travel. This dependency does not appear to be able to be resolved by the construction of operating roadways in a short or medium term, even though the project might be a priority in the Government's strategy in order to allow the region's development and country's decentralization.

The passenger traffic forecast is based on the growth expectations of tourist activity in the region carried out by the World Tourism Office (WTO), as was explained in the section regarding tourism factors. During the next 20 years, this growth is forecasted to be around 5.5% for the western region of Africa.

Tombouctou mainly depends on the tourism industry and the airport is the key tool that allows for the development of this activity. This 5.5% annual growth represents a basic and general scenario for the entire region, consequently, Tombouctou's tourism perspective will assume that growth for its region.

On the other hand, it is necessary to illustrate other assumptions that support this growth hypothesis. Certain economic and cultural aspects should be taken into consideration in order to provide a real value. Tombouctou's main source of income, and basically the only one, is tourism; however, the airport itself does not function as a generator of tourism activity but as interchanger. The prices of domestic plane tickets are not low enough for a tourist or group of tourists to organize a two-way same day trip, or in case domestic air transport liberalization gives

into airline competition, and later reducing the price of tickets and, in this way, resolving the insufficiency hotel infrastructure situation.

Tombouctou has a strong demand but it is limited by the flight area dimension. The second development phase for Tombouctou has put in service a 2,100 x 30 meters runway. The runway was designed at first for aircraft Code 4C, specifically design aircraft Boeing 727. Due to budget constraints, the design length of 2,700 meters has been reduced to accommodate aircraft type AN24 of Code 3C, which are the ones currently operating at the airport. It is obvious that this limitation restricts access of long-range aircraft and, therefore, does not allow for any charter aircraft to come from Europe. However, the basic scenario planning is based on the assumption that the projections will follow the same trend that the actual context. In this case, it is simple to forecast that during the high tourist season flights from Bamako or Mopti will keep flying to Tombouctou by aircraft type ATR-72 with capacity for 68 passengers.

This basic forecast determines the base scenario in which the implementation of strategies and infrastructure needs out of the control of the airport follow a similar development as the current one, in which investment priorities by the Government are centered towards covering the basic population's necessities, improving certain infrastructures with own funds and foreign funds, and promoting the economy. This means that Mali's growth rate must follow WTO forecasts and business strategies must be handled by the concessionaire.

4.8.3.1.2 Aircraft Movements

The aircraft movement forecast has been carried out with available data and in correlation with passenger traffic. During the Feasibility Study for the Bamako-Senou Airport, private aircraft operations were forecasted to grow at a rate of 4% annually. Keeping in mind that general aviation traffic in Bamako-Senou corresponds to noncommercial traffic of domestic airports, its relationship with non-commercial traffic from Tombouctou is obvious. Therefore, having as a base the data from Tables IV-150 and IV-151 with regard to noncommercial aircraft movement for the year 2000 (261 operations) and the number of noncommercial passengers of the same year (2409 passengers), a 4% annual growth will be applied. For the number of passenger for noncommercial private aircraft an occupancy rate factor, identified in Table III-8 of 9 passenger per aircraft will be used. This seems to be a coherent factor for the general aviation aircraft dimensions operating in the country and that are assumed to continue operating in the future. In order to calculate the total number of aircraft movement, the occupancy factor for commercial aircraft has been used. Currently this factor is 49% and it is forecasted that at the end of this study the factor will reach 70%.

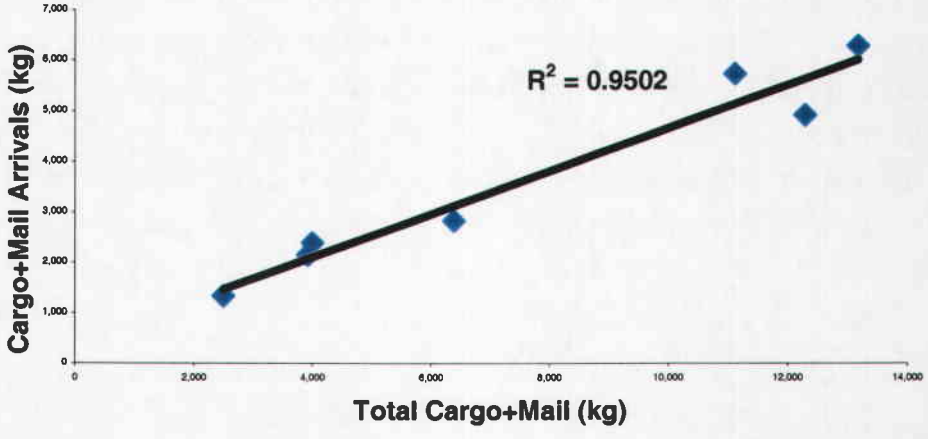
4.8.3.1.3 Cargo

The base scenario for air cargo traffic growth is related to the scenario planned for the Bamako Airport, whose growth was established at 4% annually, of which 9% corresponds to mail cargo.

On the other hand, the relation between arrivals and total cargo movement of the Tombouctou Airport adjusts to a correlation (R^2) of 0.95 as shown in Graph IV-56, whose tangent adjusts to the following equation:

$$\text{Arrival} = 0.5 \times \text{Total} - 4$$

Graph IV-56. Cargo Movement



4.8.3.2 High Scenario

4.8.3.2.1 Passengers

This scenario for passenger traffic represents a great challenge for commercial activities of the airport operator and tourism sector technical personnel of the Government. A large investment is projected for tourism and transport infrastructure and the development of activities through the coordination of all agents involved in the industry. The WTO forecasts developed in the base scenario represent a natural growth of tourism for the specified regions. However, this scenario shows an alternative in which tourism activities must follow their development potential in Tombouctou. The most important development is hotel availability for the city. As explained in the section regarding tourism factors, Graph II-1 shows a historical evolution of the hotel availability in Mali.

This scenario forecasts a development correlated between passenger traffic and number of hotels available, whose growth adjust to the following equation curve:

$$\text{Passengers} = 0.2 \times e^{0.087 \times \text{Year}}$$

4.8.3.2.2 Aircraft Movements

In the same way as the base scenario, a correlation has been established between the number of passenger, the 4% growth of general aviation and the occupancy rate of 49% up to 70%. The total growth shows an average of 6.7% annually.

4.8.3.2.3 Cargo

This scenario takes into consideration the general growth of the region and the development of new infrastructures in order to improve service to tourism and increase life expectancy. The communication through air travel is important for Tombouctou, therefore, a scenario with a higher demand of materials, goods and equipment that must reach Tombouctou is planned. The average distribution of arrival and departure of air cargo during the last ten years has been included, 63% and 47% respectively. Cargo traffic is considered even more important than in the base scenario.

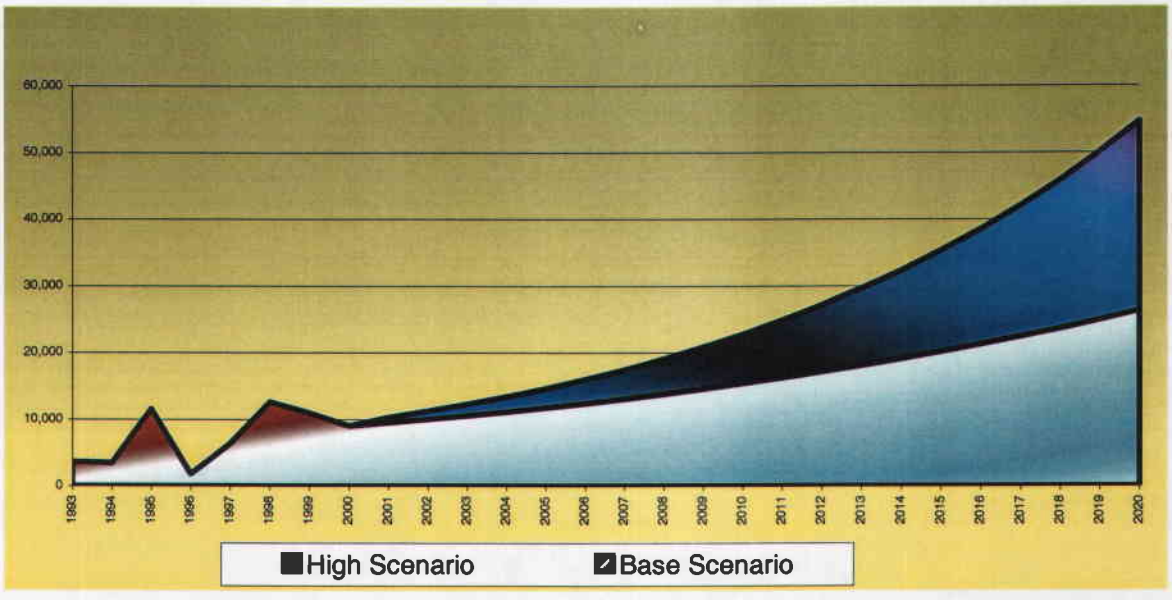
Mail cargo still represents 9% of total cargo.

4.8.3.3 Passenger Forecast

Table IV-153. Passenger Forecast

	Scenario	2000	2001	2002	2003	2004	2005	2006
Passengers	Base	9,020	9517	10041	10594	11177	11792	12441
	High		10331	11298	12339	13454	14644	16057
	Scenario	2007	2008	2009	2010	2011	2012	2013
Passengers	Base	13126	13848	14610	15414	16262	17157	18101
	High	17470	19106	20816	22749	24831	27104	29620
	Scenario	2014	2015	2016	2017	2018	2019	2020
Passengers	Base	19097	20148	21257	22427	23661	24963	26336
	High	32298	35301	38466	42037	45852	50073	54699

Graph IV-57. Passenger Forecast at Tombouctou Airport



The forecast for the number of passengers during peak hour is based on theoretical calculations, where the number of passengers during peak hour in a typical day represent 0.3% of total traffic.

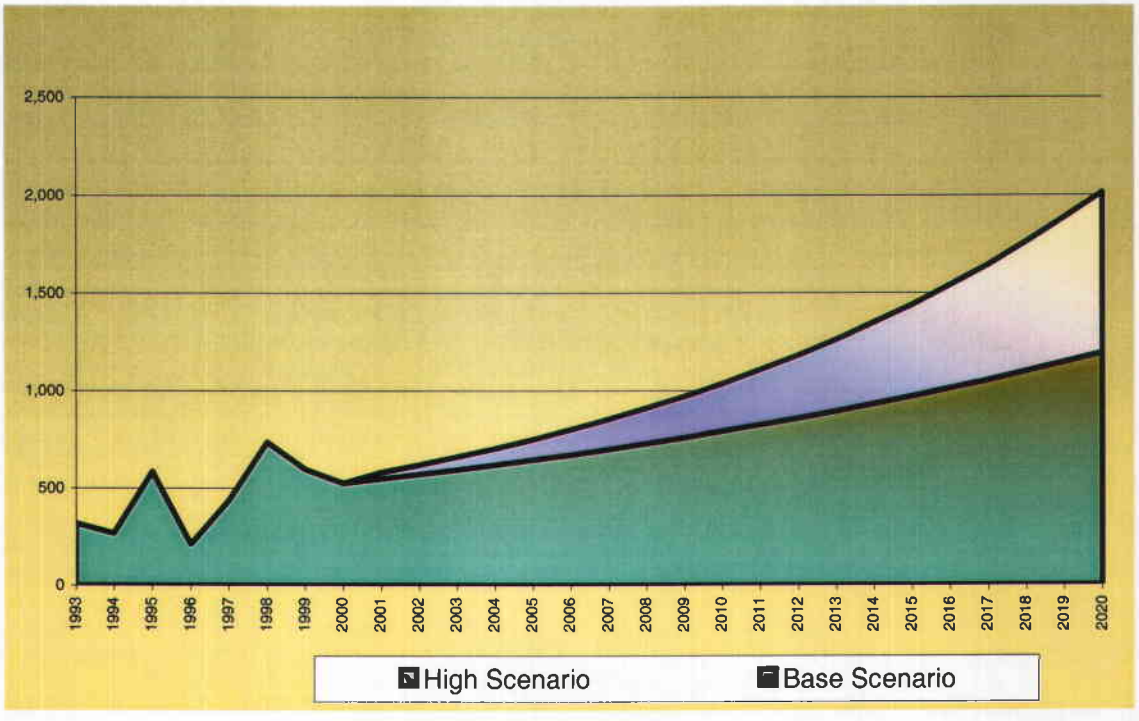
	2005	2010	2015	2020
Base	38	49	65	85
High	47	72	113	174

4.8.3.4 Aircraft Movements Forecast

Table IV-154. Aircraft Movements Forecast

	Scenario	2000	2001	2002	2003	2004	2005	2006
Aircraft Movements	Base	526	549	571	595	619	645	671
	High	526	581	620	661	704	750	801
	Scenario	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**
Aircraft Movements	Base	698	728	758	790	824	857	893
	High	853	911	970	1035	1106	1181	1261
	Scenario	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
Aircraft Movements	Base	931	970	1011	1053	1098	1144	1193
	High	1349	1439	1540	1644	1760	1884	2013

Graph IV-58. Aircraft Movement Forecast at Tombouctou Airport

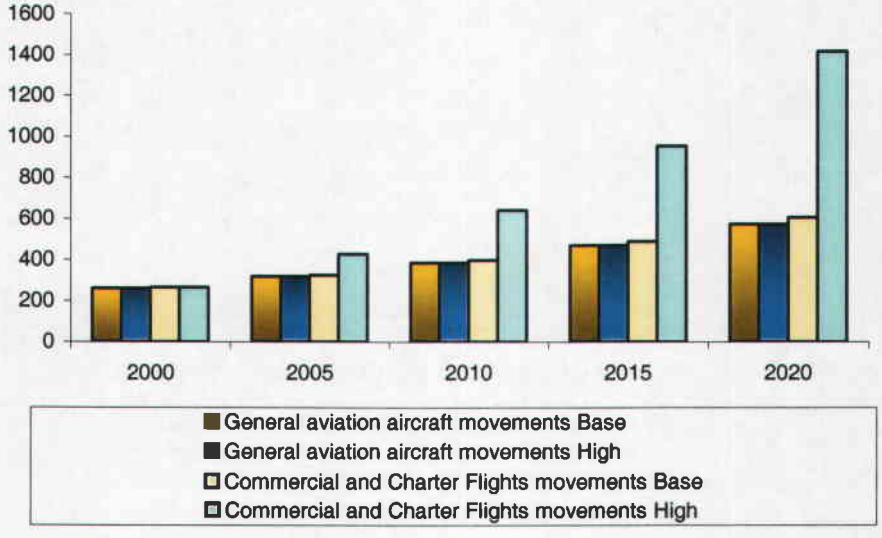


The break down between commercial and noncommercial aircraft movement on Table IV-155 in reality shows the aircraft forecast for general aviation with a capacity of less than 15 passengers and aircraft with a capacity greater than 15 passengers. It is mainly due to the fact that in the latter category that B737 charter flights coming from Europe have been included.

Table IV-155. General Aviation, Commercial and Charter Flights

	General Aviation Aircraft Movements		Commercial and Charter Flights Movements	
	Base	**High**	**Base**	**High**
2000	261	261	265	265
2005	318	318	325	429
2010	386	386	398	642
2015	470	470	490	954
2020	572	572	605	1414

Graph IV-59. General Aviation, Commercial and Charter Flights

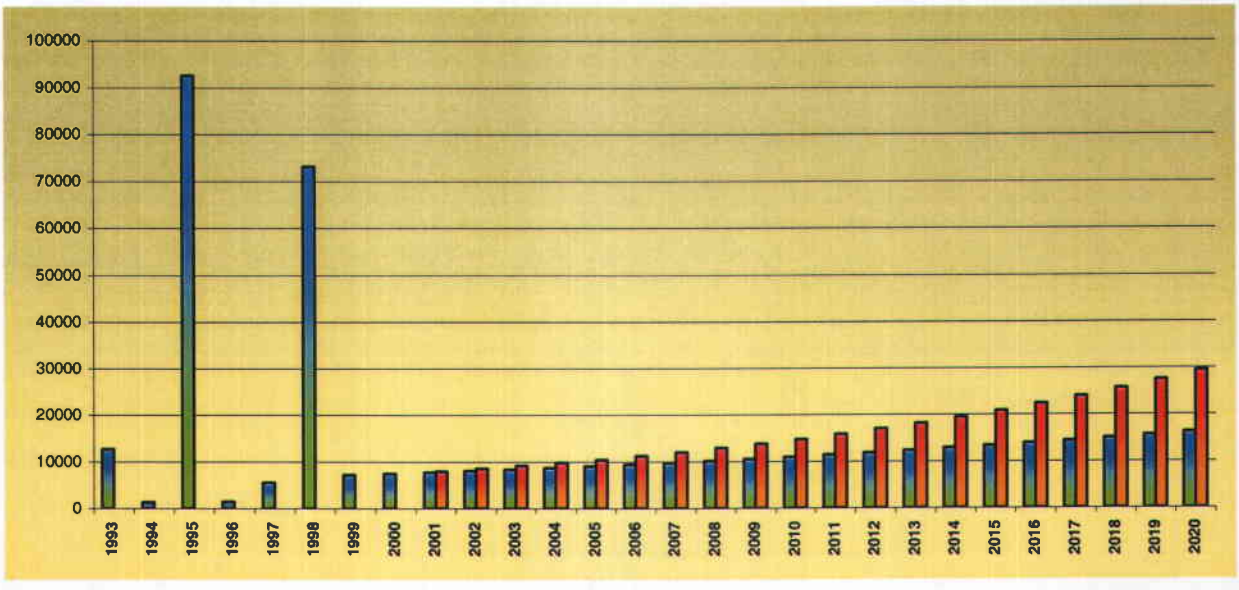


4.8.3.5 Cargo Forecast

Table IV-156. Cargo Forecast

Cargo & Mail (kg)	Scenario		2000	2001	2002	2003	2004	2005	2006
	Base	Arrivals	4089	4237	4391	4551	4717	4890	5070
		Departures	3289	3437	3591	3751	3917	4090	4270
		Total	**7379**	**7675**	**7982**	**8302**	**8635**	**8981**	**9341**
	High	Arrivals	4783	5118	5495	5891	6306	6737	7253
		Departures	3568	3818	4099	4395	4704	5026	5411
		Total	**7379**	**7896**	**8477**	**9089**	**9729**	**10395**	**11190**
Cargo & Mail (kg)	Scenario		2007	2008	2009	2010	2011	2012	2013
	Base	Arrivals	5257	5452	5654	5865	6084	6311	6548
		Departures	4457	4652	4854	5065	5284	5511	5748
		Total	**9715**	**10104**	**10509**	**10930**	**11368**	**11823**	**12296**
	High	Arrivals	7746	8317	8895	9543	10226	10971	11744
		Departures	5779	6204	6636	7120	7629	8185	8761
		Total	**11951**	**12831**	**13723**	**14723**	**15776**	**16925**	**18117**
Cargo & Mail (kg)	Scenario		2014	2015	2016	2017	2018	2019	2020
	Base	Arrivals	6794	7050	7316	7593	7881	8180	8492
		Departures	5994	6250	6516	6793	7081	7380	7692
		Total	**12788**	**13300**	**13832**	**14386**	**14962**	**15561**	**16184**
	High	Arrivals	12601	13479	14462	15485	16601	17803	19058
		Departures	20002	21396	22955	24579	26350	28258	30251
		Total	**19439**	**20794**	**22309**	**23887**	**25608**	**27462**	**29399**

Graph IV-60. Cargo and Mail Forecast at Tombouctou Airport



4.8.4 Existing Facilities and Equipment

Figure IV-19, at the end of this section, shows the current airport layout plan.

4.8.4.1 Runway

The construction of the runway improvements was recently carried out for a new section 2100 m in length and 30 m wide with 5 m stabilized shoulders as well as grading and drainage improvements. New runway edge lights and elevated threshold lights were included with the improvements.

4.8.4.2 Connector

A 90-degree connector was recently reconstructed providing access from the runway to the apron. The dimensions of the connector, scaled from the plan[1], are 15 m wide x 135 m.

[1] Plans-Extension et Rehabilitation de L' Aeroport de Tombouctou, Lot I Infrastructures, 2-1996, Lot 2 Batiment, 2-1996, Studi International

4.8.4.3 Apron

The existing 115 m x 75 m apron was recently overlaid and an apron expansion of 215 m x 95 m was included in the new construction. The apron was sized for the parking of three Boeing 727's and 3 AN-24's. Pole mounted apron lighting was also recently installed.

4.8.4.4 Navaids

Tombouctou Airport has new facilities and equipments. The equipment for navaids, such as the control tower, VOR and lighting system will be in working condition starting April 2001. As observed with the other airports in this study, for a more detailed analysis of existing, projected and programmed facilities, it is worth referring to the study carried out for STUDI airport consultant firm.

Tombouctou Airport is being completely remodeled and it is currently in its second phase of development. The airport should start normal service in the middle of the 2001.

The airport has the following navaids equipment:

- New control Tower of 12 m height
- Control tower equipment
- NDB MF Marker
- VHF Transmitter / Receiver equipment
- VOR/DME
- RVR system
- HF Transmitter-Receiver
- HI/BI Threshold lighting
- Taxiway lighting
- Runway lighting
- PAPI

- Obstacle lighting
- CCRs
- Transformers
- Radiosonde station
- Transmitter station to meteo satellites
- PABX
- Meteo equipment
    - Hydrogen generator
    - Observation station
    - Optic theodolite
    - Wind
    - Barometer
    - Barograph
    - Thermograph
    - Power generator

The meteorological measurement equipment has not been updated and is still located in the same area where it was located before the development.

On the other hand, the controller position for the control tower has a single console table completely equipped and modernized: communication devices, transmission/reception of data through an AFTN line specific for this task (in this aspect, the Tombouctou Airport is technologically advanced compared to Bamako Airport, since in 1998 ASECNA identified the need to provide all airports and control centers a specialized ATN network but until now it does not have it). There is also an HF voice communication line with Bamako for security purposes.

4.8.4.5 Perimeter Fence

Perimeter and security fence was installed with the recent airport construction.

4.8.4.6 Airfield Drainage System

The drainage is predominantly grass lined drainage ditches, channels and culverts that collect the surface runoff from the runway, connector, aprons and buildings and discharge the runoff down stream into natural drainage courses.

4.8.4.7 Terminal Building

The airport has passenger terminal facilities constructed since the first development phase. However, they have not been opened or used by the public. The terminal has a total area of 1,562 m^2 with separated arrival and departure lounges, 4 public restrooms, custom inspection stations, and 9 offices, 2 boutiques and a baggage room are included. The passenger throughput is computed on 111 passengers peak hour.

4.8.4.8 Airport Rescue and Fire Fighting (ARFF)

A new ARFF facility was recently constructed on the airport. The facility is reinforced concrete and consists of four high roof structure bays for the parking of the fire fighting equipment and an attached office building. Two ARFF pumper vehicles are currently used, one in new condition, the other pumper vehicle is old but in good operating condition. An ARFF rescue vehicle is also at the facility. A recently constructed well supplied above ground water storage tank is used exclusively for ARFF operations.

4.8.4.9 Utilities

4.8.4.9.1 Water

Two recently constructed wells provide the potable and ARFF water supply to the airport. An above ground potable water storage tank on the landside and an ARFF above ground water storage tank on the airside were recently constructed with the airport improvements.

4.8.4.9.2 Sanitary Sewer

From the aforementioned layout plan, the new terminal building is served by 3 septic tanks/leaching pits and three additional tanks are assumed to exist for the other buildings and facilities.

4.8.4.9.3 Electrical Power Supply

With the construction of the airfield improvements, the technical/control tower building and the new terminal building were provided with new electrical facilities and equipment.

An electrical substation was recently constructed on the airport to meet the electrical supply requirements. Three new back-up generators with fuel supply tanks are provided. The back-up generators function within a 7 second delay for the main electrical installations, after a 15 second delay all installations will be operating from the back-up generators. Battery back up is also provided.

4.8.4.9.4 Telephone System

No information was available on the number of telephone lines that currently exist at the airport. With the recent construction of the new buildings and facilities it was assumed that 15 lines exist for public and employees use.

4.8.4.10 Access Roads

The access road has recently been improved with the airport construction. The road section is a two lane bituminous concrete pavement with concrete curbs and street lighting included. A circulation loop was constructed in front of the new terminal building.

4.8.4.11 Vehicle Parking

Public parking is provided by a new parking lot with 32 parking places with direct entrance from the new access road. There are 11 additional parking spaces to be constructed adjacent to the side of the terminal building.

4.8.5 Evaluation of Existing Facilities

4.8.5.1 Runway

The new runway geometry meets the minimum requirements for the AN-24 design aircraft (airport category 3C) for the traffic forecasts for all phases. Based upon the pavement conditional observations and studies at the other Malian domestic airports, the new pavement should not require any major rehabilitation until after the year 2020. The following table shows runway length and improvement requirements.

Alternative I

For the international flights alternative, the runway does not meet the geometric requirements for the Boeing 737 design aircraft (airport reference code 4C). The runway will need to be extended 500 m for a total length of 2600 m and widened from 30 m to 45 m with recommended 7.5 m paved shoulders on both sides. For the widening of the runway to 45 m, the runway edge lights and threshold lights will have to be relocated.

Table IV-157. Runway Requirements

Design Aircraft	Required Length	Required Width	Exist Length	Exist Width	Improvement Required	Year
B737	1500m/2600m	30m/45m	2100 m	30 m	500m extension, 15 m width increase (*)	2005 - 2010

Note *: Runway length determined by using reduced operating range to 1400 nautical miles to Paris. This is an optional expenditure and will to be constructed if profits from International Flights can be generated.

4.8.5.2 Connector

The width of the connector satisfies the requirements for both the AN-24 design aircraft for domestic flights and the Boeing 737 design aircraft for international flights with no improvements in dimensions required. The recent pavement reconstruction of the connector should require no major pavement improvements until after the year 2020.

Table IV-158. Connector Requirements

Design Aircraft	Existing Width	Existing Area	Required Width	Improvements Required	Phase Required
B737	15m	3317 m^2	15 m	none	N/A

4.8.5.3 Apron

For the domestic flights, the apron size is more than adequate to meet the peak demand for all phases. There should be no major pavement improvements required until the year 2020. Figure IV-18 shows the apron parking requirements.

Alternative I

For the international flights alternative with the Boeing 737 design aircraft, the apron will need to be expanded an additional 1,935 m^2.

Table IV-159. Apron Requirements

Phase	Design Aircraft	Apron Size		Improvements
		Existing	Required	
2000-2005	2 AN-24 2 AN-24 2 AN-24	215 m x 95 m 115 m x 75 m	 105 m x 76 m	None
2005-2010	2 AN-24 2 AN-24	215 m x 95 m 115 m x 75 m	 105 m x 76 m	 215 m x 95 m & 115 m x 75 m crack and joint repair
2010-2015	2 AN-24 2 AN-24	215 m x 95 m 115 m x 75 m	 105 m x 76 m	 215 m x 95 m & 115 m x 75 m crack and joint repair
2015-2020	2 AN-24 2 AN-24	215 m x 95 m 115 m x 75 m	 105 m x 76 m	 215 m x 95 m & 115 m x 75 m crack and joint repair

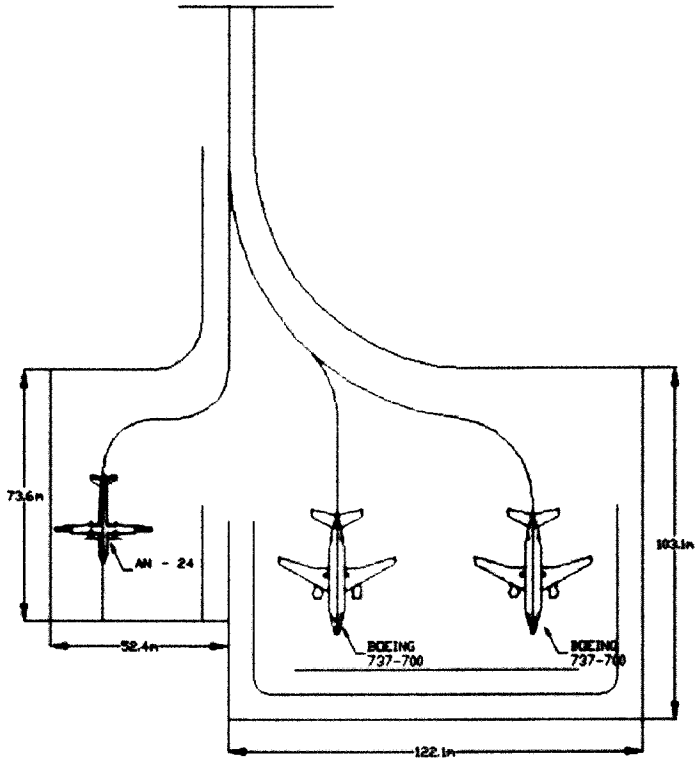
Comments

1. Existing apron size is more than adequate to meet parking requirements for domestic operations.
2. Airport has existing apron lighting, no improvements required for domestic operations.
3. Estimated improvements based upon the existing apron pavement being in good condition.
4. Power in - power out
5. Surry seal required on new pavement in aircraft fueling areas.
6. Pavement Marking required all phases.

Table IV-160. Apron Requirements – Alternative for International Arrivals

Phase	Design Aircraft	Apron Size		Improvements
		Existing	Required	
2010	2 737's 1 AN-24	215 m x 95 m 115 m x 75 m	123 m x 104 m 53 m x 74 m	215 m x 9 m expansion (1,935 m^2)

Figure IV-18. Apron Parking



4.8.5.4 Navaids

The working conditions of the navaids equipment are excellent.

The study carried out by STUDI identified the need to replace the meteorological measurement equipment, for which a parcel in the airport has been reserved in order to locate there the new instruments.

Furthermore, the visibility problem is well known in Tombouctou due to the sand storms. In other occasions, a sand fogginess obstructs sidelong visibility due to the refraction of solar rays, while the vertical and horizontal visibility is relatively good. This problem is well known among pilots who have been for some time now requesting that the Tombouctou Airport provide a category I instrumental landing system (ILS). This device is fundamental for medium fuselage aircraft operations, however, the device's investment is not justified in terms of the aircraft use forecasted at Tombouctou airport. It is assumed that aircraft type ATR 72 will be accommodated at the airport to operate only domestic flights maximum once a day.

4.8.5.5 Perimeter Fence

Table IV-161 summarizes the fence requirements. For Tombouctou, no additional fencing or improvements are needed for domestic flight operations.

Alternative I

For international flights, the runway will have to be extended which will require an estimated additional 1500 m of perimeter fence.

Table IV-161. Perimeter Fencing Requirements

Fencing Required	Comments
1500m (*)	Phase 2005-2010, required for runway extension

Note *: This is an alternate expenditure not included with base costs and recommended to be constructed when revenues from international flights can support the construction improvements.

4.8.5.6 Airfield Drainage System

Due to the rapid infiltration of the runoff because of the soil's high permeability properties and the low amounts of annual rainfall, minimal maintenance and improvements are required for the drainage system. It is recommended that routine cleaning and clearing of the drainage ditches and channels by removing the vegetation that has accumulated inside and around the drainage improvements. Also, it is estimated that every 5 years the major drainage ditches and channels will require removal of the accumulated sediment and that the design flow lines be reestablished.

No additional drainage improvements are required for all phases.

Alternative 1

For international flights, the runway extension will require an estimated 5,440 m of new infield drainage channels.

Table IV-162. Airfield Drainage System Requirements

Phase	Improvements		Comment
	Airside	Landside	
2005	5440 m (*)		Runway: 500 m extension, 60 m overrun and 2100 m additional width – new channel
2010	—	—	—

Phase	Improvements		Comment
	Airside	Landside	
2015	6000 m		Reestablish channel flow lines
		2400 m	Reestablish channel flow lines
2020	—	—	—

4.8.5.7 Terminal Building

Our dimensions are based on calculations related to the number of passengers during peak hour that will use the facilities. The results, calculated based on the IATA requirements for terminal dimensions, are as follows:

Table IV-163. Terminal Building Requirements

Terminal Building		2005	2010	2015	2020
Base	Design Passenger Peak Hour	38	49	65	85
	Area (m^2)	**532**	**686**	**910**	**1190**
High	Design Passenger Peak Hour	47	72	113	174
	Area (m^2)	**658**	**1008**	**1582**	**2436**

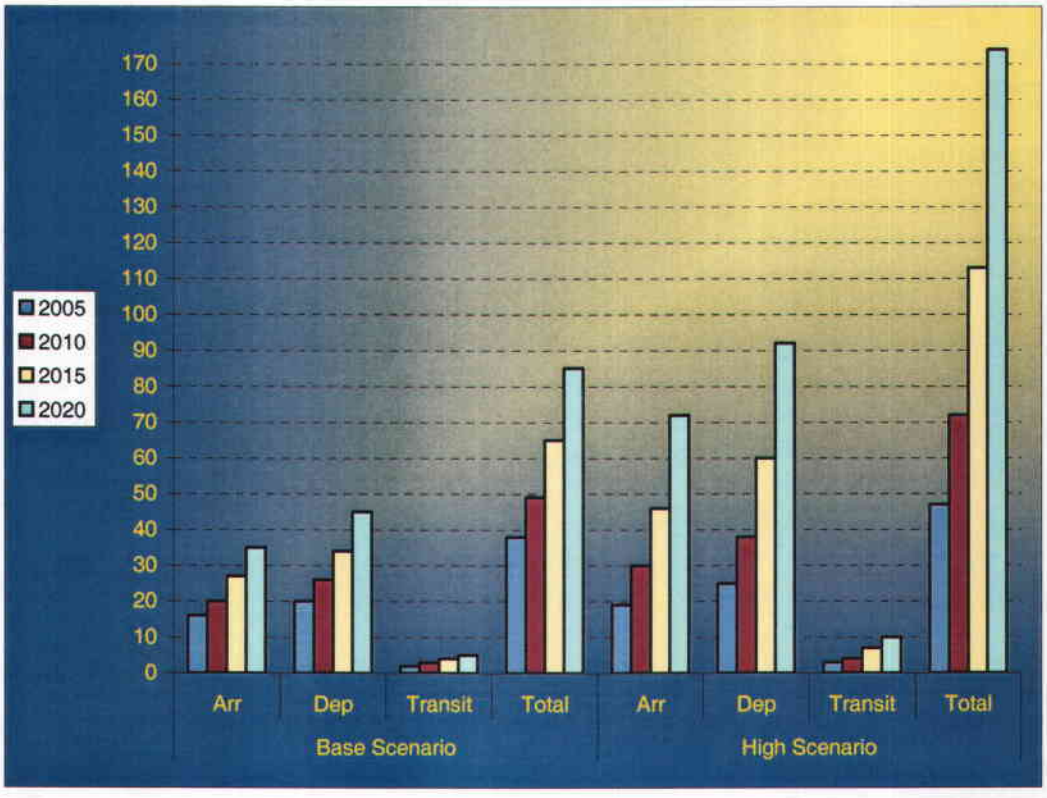
Only for the high scenario, the existing terminal area will be exceeded. Taking into account the baseline, no terminal extensions are required in any of the four phases of development.

The number of passengers during peak hour for the study period are distributed according to the passenger flow, as follows:

Table IV-164. Peak Hour Passengers

	Base Scenario				High Scenario			
	Arrival	Departure	Transit	**Total**	Arrival	Departure	Transit	**Total**
2005	16	20	2	**38**	19	25	3	**47**
2010	20	26	3	**49**	30	38	4	**72**
2015	27	34	4	**65**	46	60	7	**113**
2020	35	45	5	**85**	72	92	10	**174**

Graph IV-61. Forecast of Peak Hour Passenger at Tombouctou Airport



4.8.5.8 Terminal Equipment

The breakdown of all terminal facilities area and measurement of the number of units for public service elements were obtained in the same manner and are presented in four development phases in the following table.

Table IV-165. Terminal Equipment Requirements

	BASE SCENARIO				HIGH SCENARIO			
	2005	2010	2015	2020	2005	2010	2015	2020
Check-in Desks	2	2	3	4	2	3	6	8
Security Check-Centralized	1	1	1	1	1	1	1	1
Arrival Health Check	3	3	3	3	3	3	3	3
Number of Baggage Claim Devices	1	1	1	1	1	1	1	1

4.8.5.9 Airport Rescue and Fire Fighting (ARFF)

Table IV-167 classifies the airport by an Aerodrome ICAO category determined from the size of the design aircraft and also determines the amount of fire and rescue vehicles required according to ICAO's requirements. For Tombouctou domestic flight operations, the aerodrome category is

4, requiring one vehicle up to the year 2020. It is estimated that in Phase II (2005-2010) a pumper vehicle will have to be replaced.

Alternative I

For the Boeing 737 and 727 design aircrafts for international flight operations, the ICAO classification is 7 requiring two vehicles.

Table IV-166. ARFF Requirements

Design Aircraft	Aerodrome Category	Aircraft Overall Length	Maximum Fuselage Width	Existing	Required	New Vehicles Replacements	Year
Antonov AN-24	4	23.5		2	1	1 - Replacement	2010
Boeing – 727 (*)	7	46.7	3.4 m	2	2	1 - Replacement	2010

Note *: This is an optional expenditure to be constructed if profits from International Flights can be generated. Boeing 727 is the design aircraft due to the longer overall length when compared to Boeing 737.

4.8.5.10 Utilities

4.8.5.10.1 Water

For the cost estimates, it was estimated that the capacity of the existing storage tank to be 30 m^3, which is more than adequate for meeting the peak water supply demand requirements for the passengers and employees to the year 2020.

Alternative I

For Alternative I (international flights), the size of the water tank required was estimated from the projected increase in international passenger and employee forecast to the year 2020 as 25 m^3, which requires no increase in capacity of the existing storage tank.

Table IV-167. Water Requirements

		A	B	C	D	F	G
Year	Passengers Peak Hour	Arrivals 50%	Departures 50%	Transit 0%	Visitors (1 x arrivals)	@ Terminal Area	@ Maintenance Area
2005	38	19	19	0	19	15	10
2010	49	24.5	24.5	0	24.5	15	10
2015	65	32.5	32.5	0	32.5	15	10
2020	85	42.5	42.5	0	42.5	15	10

	J						I	W	
Year	(A+B+C+D)	J*20	F*250	G*450	Sum	Sum/ 1000	Existing Storage Tank	Total Req. (m^3/day)	Additional Storage Req.
2005	57	1140	3750	4500	9390	9	30	9	0
2010	73.5	1470	3750	4500	9720	10	30	10	0
2015	97.5	1950	3750	4500	10200	10	30	10	0
2020	127.5	2550	5000	6750	14300	14	30	14	0

4.8.5.10.2 Sanitary Sewer

The estimated six septic tanks/leaching pits are adequate to meet the requirements for the domestic flights passenger and employee forecast to the year 2020. It is anticipated that in Phase IV (2015-2020) one of the existing septic tanks/ leaching pits will need to be replaced.

Alternative I

For the additional increases in passenger and employee forecasts for the international flights, no additional septic tanks/leaching systems are anticipated.

Table IV-168. Sanitary Sewer Requirements

Year	Total Req. (m^3/day)	Persons Equivalent	Septic Tanks Required	Functional Existing Tanks	New Tanks Required
2005	9	23.76	2	6	0
2010	10	26.4	2	6	0
2015	10	26.4	2	6	0
2020	14	36.96	2	5	1 (*)

Note *: Septic tank replacement anticipated due to the age of the existing.
Note 1: Daily design flow for one person is 0.379m3/day
Note 2: New tanks sized for 20 person capacity, capacity of existing tanks assumed at 15 persons.

4.8.5.10.3 Electrical Power Supply

The new electrical improvements will be sufficient to meet the electrical demands for the airport until Phase III (2010-2015) at which time minor upgrades and new equipment are anticipated. The following table shows the electrical supply requirements.

Alternative I

For international flights, new electrical equipment and minor upgrades in the electrical power supply will be required to accommodate the additional airfield lighting, the terminal building expansion and related facilities.

Table IV-169. Electrical Power Supply

Existing Facilities	2005	2010	2015	2020	Comments
New Building, equipment 3 stand-by generators	None	None	Minor Upgrades	None	

4.8.5.10.4 Telephone System

The amount of telephone lines required for the airport administration, faxes, computers, police, airlines, passengers, visitors and employees for Tombouctou are calculated and summarized in the following table.

Table IV-170. Telephone System Requirements

Phase	Total Lines	Existing Lines	Additional Lines
2000-2005	15	15	0
2005-2010	22	15	7
2010-2015	22	22	0
2015-2020	29	22	7

Alternative I

For Alternative I, which includes international flights, the requirements are shown in the following table.

Table IV-171. Telephone System Requirements – Alternative I

Phase	Total Lines
2000-2005	18
2005-2010	24
2010-2015	24
2015-2020	32

4.8.5.11 Access Roads

The two-lane pavement section is adequate for the increases in forecasted passengers and employees for the domestic flights and the international flights alternative for all phases.

4.8.5.12 Vehicular Parking

The size of the parking required for the four phases of development was determined by using the forecasted passenger volume and the estimated number of employees. The adequacy of the passenger and employee parking for present and future phases is determined based upon an

evaluation of current vehicular traffic and its relationship to peak hour passengers and is shown in the following table.

Table IV-172. Vehicle Parking Requirements

Phase	Total Required Parking (m^2)	Existing Parking (m^2)	Additional Parking (m^2)
2000-2005	1100	1075	25
2005-2010	1237.5	1100	137.5
2010-2015	1843.75	1237.5	606.25
2015-2020	2468.75	1843.75	625

Alternative I

For international flights, additional parking spaces will be required for the increase in the passenger forecast.

4.8.6 Cost Estimates

Capital Cost Estimates of airport improvements have been prepared for four phases of development. These phases are:

Phase I - Years 2002-2005

Phase II - Years 2005-2010

Phase III - Years 2010-2015

Phase IV - Years 2015-2020

All costs are in current US Dollars, without inflation. A summary sheet of the capital cost estimates is shown in Table IV-174 on the page, which follows. In preparing these estimates, unit cost information collected in Mali was utilized, as was the Consultant's own data base on international construction costs. Fifteen percent was added to all construction and equipment cost estimates to cover contingencies and the cost of engineering services.

The cost estimate shown here refers to the base case scenario as described on the precedent sections and includes only the minimum (base case) requirements as detailed on the corresponding section.

Table IV-173. Cost Estimate for Tombouctou Airport Improvements

ITEM	DESCRIPTION	PHASE I (2000-2005) (US $)	PHASE II (2005-2010) (US $)	PHASE III (2010-2015) (US $)	PHASE IV (2015-2020) (US $)	TOTAL (US $)
1	RUNWAY	0	0	0	0	0
2	TAXIWAY/CONNECTOR	0	0	0	0	0
3	APRON(s) (New Pavements /Rehabilitation)	11,620	40,670	40,670	40,670	133,630
4	DRAINAGE	0	0	168,000	0	168,000
5	TERMINAL BUILDING/EQUIPMENT	0	0	0	0	0
6	VEHICULAR PARKING (Terminal Building)	1,500	8,250	36,375	37,500	83,625
7	POTABLE WATER	0	0	0	0	0
8	SEWAGE TREATMENT	0	0	0	30,000	30,000
9	NAVAIDS	50,000	0	650,000	0	700,000
10	TELEPHONE SYSTEM	75,000	75,000	0	75,000	225,000
11	ELECTRICAL POWER	0	0	50,000	0	50,000
12	ARFF FACILITY	0	120,000	0	0	120,000
13	PERIMETER FENCE	0	0	0	0	0
14	CONTINGENCY & ENGINEERING 15%	20,718	36,588	141,757	27,476	226,538
	TOTAL	**$158,838**	**$280,508**	**$1,086,802**	**$210,646**	1,736,793

TOC

4.9 Yélimané Airport

4.9.1 Socioeconomic Profile

4.9.1.1 Transportation Factors

Yélimané is located between Kayes, 136 km away, and Nioro, 60 km away, connected by an earth road.

4.9.1.2 Socioeconomic Factors

Yélimané is located in Region I of Mali and its economic and social activity is similar to Kayes and Nioro. One of the characteristics of this region is the strong emigration it has experienced.

4.9.2 Current Airport Activities

The statistics for the three airports as a group are shown in Table IV-175. This data was taken from ADM statistics and was registered as "Other Airports", which for this analysis it must be assumed that it corresponds to Sikasso, Yélimané and Kéniéba, as far as the financial analysis is concerned.

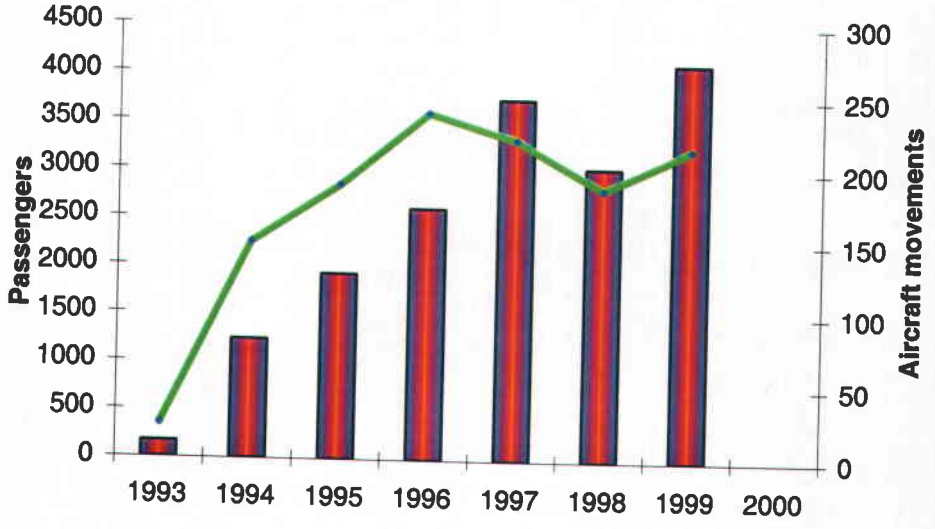
Table IV-175. Airport Activity for Yélimané, Kéniéba and Sikasso

Yélimané, Kéniéba, Sikasso

	1993	1994	1995	1996	1997	1998	1999	2000
Aircraft Operations	24	150	190	240	222	188	216	N/A
Passengers	167	1232	1917	2604	3745	3034	4115	N/A
Freight (kg)	0	0	755	655	100	0	2168	N/A
Mail (kg)	0	0	0	0	357	858	488	N/A

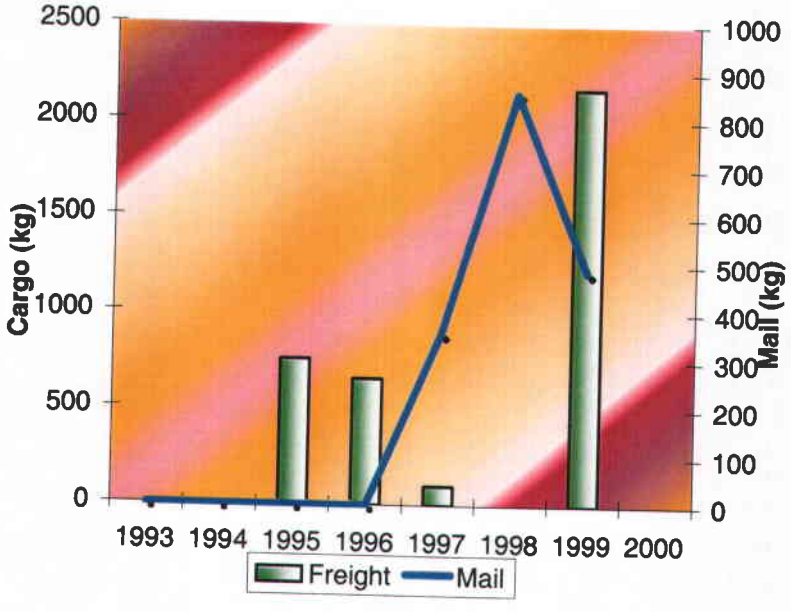
Graph IV-62 shows the constant growth experienced by the group of airports.

Graph IV-62. Sikasso, Yélimané and Kéniéba Airport Activity



The air cargo activity is not assumed to be important, as shown in Graph IV-63.

Graph IV-63. Cargo and Mail Operations – Sikasso, Yélimané and Kéniéba Airports



4.9.3 Aviation Activity Forecast

4.9.3.1 Base Scenario

4.9.3.1.1 Passengers

The base scenario for the annual passenger traffic forecast at Sikasso, Yélimané and Kéniéba is based on the growth index carried out by the aircraft manufacturer Airbus in the western region of Africa. As observed on Table III-8, the growth shows a trend of 4.1% between 1999 until 2009 and 4% thereafter, until 2020.

4.9.3.1.2 Aircraft Movements

The calculation of the number of aircraft operations for the next 20 years has followed the same procedure as the ones for Gao and Kayes Airports. However, due to the fact that the Sikasso, Yélimané and Kéniéba Airports together with the rest of the domestic airports is not important or influential, it was decided to calculate the forecast of aircraft movements for all of those airports according to the same criteria, assuming a national average of passengers per aircraft in order to obtain the results. In the same manner as the process used for the Tombouctou and Mopti airports, the average occupancy coefficient per aircraft (at a national level) of 27% has been used. The trend will be that in the future an occupancy coefficient of 70% will be achieved. The result of the calculation was an average annual percentage growth of 2.4%.

4.9.3.1.3 Cargo

Air cargo traffic follows the same process as in the other airports, which assumes a growth equal to the Bamako-Sénou Airport increase of 4% annually with regard to cargo and mail.

4.9.3.2 High Scenario

4.9.3.2.1 Passengers

The growth index for this scenario takes the growth forecasts from the Boeing company for the western region of Africa. The growth percentage between 2000 and 2020 is 6.1%, as can be observed in Table III-7.

4.9.3.2.2 Aircraft Movements

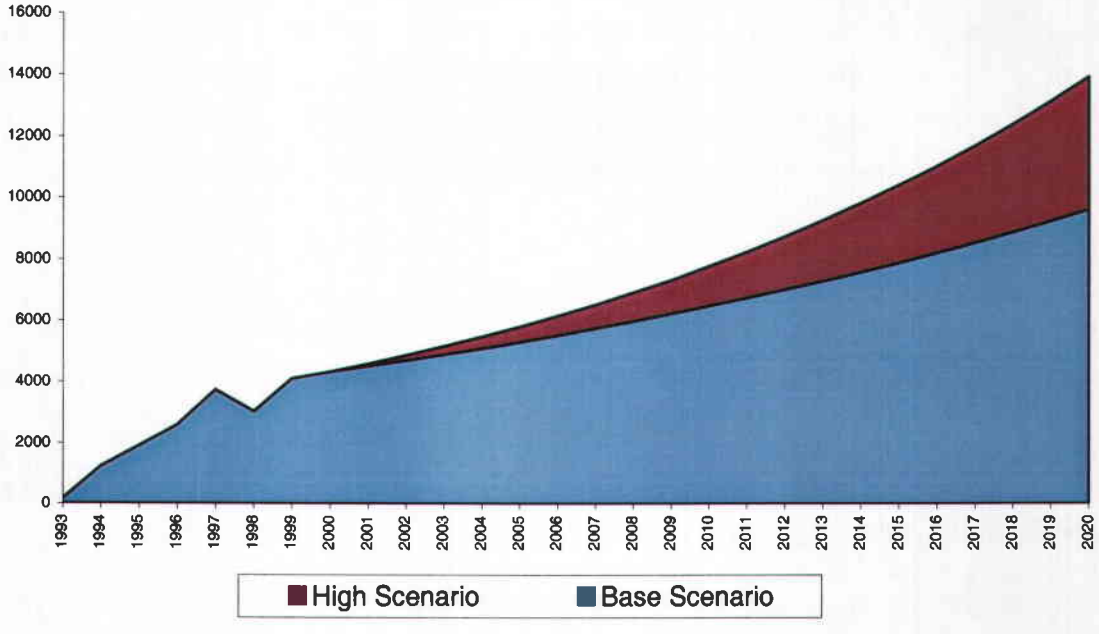
This scenario, in the same way as the previous scenario, assumes an occupancy factor for aircraft of 70% for 2020. The growth is correlated to the number of domestic passengers. It is forecasted that only regular domestic flights will operate with aircraft type ATR-42 for 50 passengers.

4.9.3.3 Passenger Forecast

Table IV-176. Passenger Forecast – Sikasso, Yélimané and Kéniéba Airports

	Scenario	2000	2001	2002	2003	2004	2005	2006
Passengers	Base	4342	4521	4707	4900	5101	5311	5529
	High		4603	4880	5173	5484	5814	6163
	Scenario	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**
Passengers	Base	5756	5992	6238	6488	6748	7018	7299
	High	6533	6925	7341	7782	8249	8744	9269
	Scenario	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
Passengers	Base	7591	7895	8211	8540	8882	9238	9608
	High	9826	10416	11041	11704	12407	13152	13942

Graph IV-64. Passenger Forecast – Sikasso, Yélimané and Kéniéba Airports



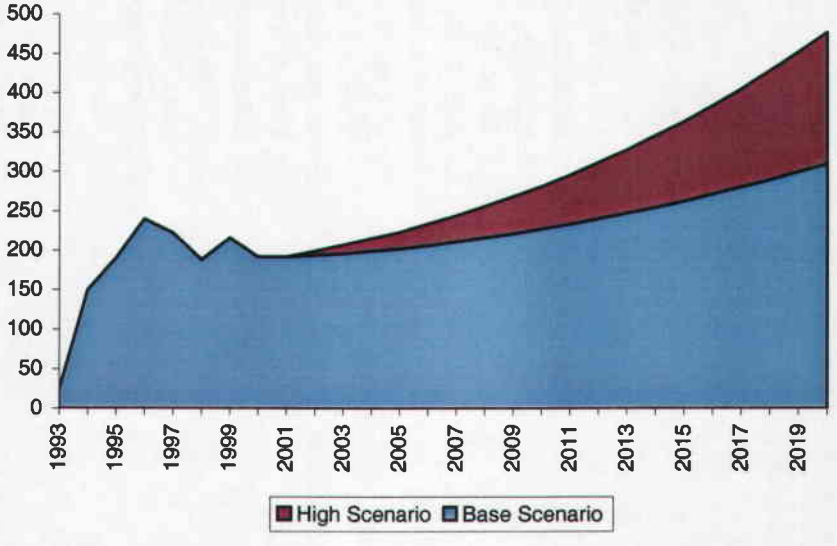
4.9.3.4 Aircraft Movement Forecast

Table IV-177. Aircraft Movement Forecast – Sikasso, Yélimané and Kéniéba Airports

	Scenario	2000	2001	2002	2003	2004	2005	2006
Aircraft Movements	Base	192	192	194	196	199	202	206
	High	192	192	199	207	215	223	234

	Scenario	2007	2008	2009	2010	2011	2012	2013
Aircraft Movements	Base	211	216	221	227	233	240	247
	High	244	256	268	281	295	311	327
	Scenario	2014	2015	2016	2017	2018	2019	2020
Aircraft Movements	Base	254	262	271	280	289	299	309
	High	345	363	383	404	427	451	476

Graph IV-65. Aircraft Movement Forecast – Sikasso, Yélimané and Kéniéba Airports

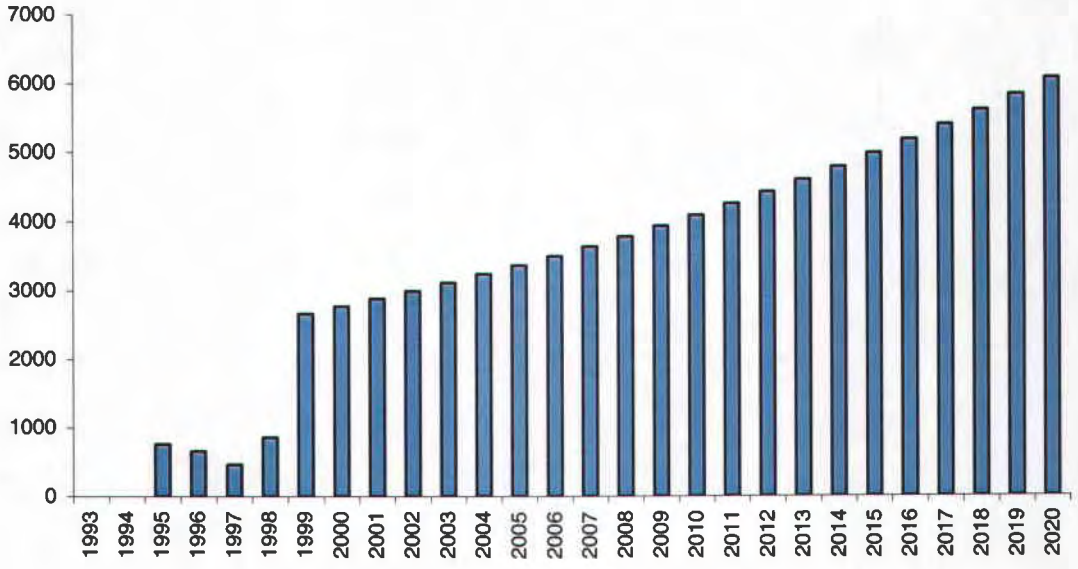


4.9.3.5 Cargo Forecast

Table IV-178. Cargo and Mail Forecast – Sikasso, Yélimané and Kéniéba Airports (kg)

	Scenario	2000	2001	2002	2003	2004	2005	2006
Cargo & Mail (kg)	Base	2762	2873	2988	3108	3233	3363	3498
	High		-	-	-	-	-	-
	Scenario	2007	2008	2009	2010	2011	2012	2013
Cargo & Mail (kg)	Base	3638	3784	3936	4094	4258	4429	4607
	High	-	-	-	-	-	-	-
	Scenario	2014	2015	2016	2017	2018	2019	2020
Cargo & Mail (kg)	Base	4792	4984	5184	5392	5608	5833	6067
	High	-	-	-	-	-	-	-

Graph IV-66. Cargo and Mail Forecast – Sikasso, Yélimané and Kéniéba Airports (kg)



4.9.4 Existing Facilities and Equipment

Figure IV-21, at the end of this section, shows the current airport layout plan.

4.9.4.1 Runway

The runway is 1600 m in length and 45 m wide with a 50 m and an 80 m paved overrun from information shown on the layout plan[1]. No information was available on the shoulders or the condition of the runway pavement. It was assumed that the pavement is in poor condition.

Although not identified on the plans, it was assumed that runway edge lights and threshold lighting exist.

4.9.4.2 Connector

The plans provided show an existing 90-degree connector with the runway centerline scaled at 544 m from the threshold, which provides access from the runway to the apron. The geometric of the connector are shown to be 15 m wide x 83 m in length.

[1] Plan-Representation du Mali, Aerodrome de Yélimané, ASECNA

4.9.4.3 Apron

The existing apron shown on the plans is 75 m x 45 m. No information was available on the existing pavement condition, therefore, it was assumed that the pavement is in poor condition.

4.9.4.4 Navaids

In order to analyze the navaids of these airports, we refer back to the referenced preliminary plan carried out by STUDI because there is no other detailed information.

The airport has an NDB, meteorological farm and equipment, VHF and HF transmitter/receivers.

4.9.4.5 Perimeter Fence

No information was available on the size, condition and length of the perimeter fence and access gates. It was assumed that there currently is no airport perimeter fence.

4.9.4.6 Airfield Drainage System

No information was available for this airport. It was assumed that the drainage system is the same type common to the other airports and consists of manmade vegetative lined drainage channels and ditches outfalling into the natural drainage courses.

4.9.4.7 Terminal Building

The preliminary plan already mentioned describes a new passenger terminal yet to be exploited.

4.9.4.8 Airport Rescue and Fire Fighting (ARFF)

An ARFF facility in good condition and of adequate capacity is assumed to exist at the airport although no information was available. It was assumed that this structure is a building with bays for the parking of the fire fighting vehicles and an attached office and storage building. Also, it was estimated that the fire-fighting vehicles are in old but in good operating condition and that an above ground water storage tank exists and is in good condition.

4.9.4.9 Utilities

4.9.4.9.1 Water

Although no information was available on either airport on the water supply, it was assumed that the current water supply is not adequate for the peak hour demand for the forecasted passengers and employees. Also, it was assumed that an adequate storage tank exists for the ARFF vehicles.

4.9.4.9.2 Sanitary Sewer

No information was available on the amount, size and location of the existing wastewater treatment system. From plans and observations at other airports, the common treatment system is septic tanks that discharge into cylindrical leaching pits, which is the type of treatment system used for costs estimates for this airport. It is estimated that one tank exists with adequate storage volumes and in good condition.

4.9.4.9.3 Electrical Power Supply

No information was available on the size and type of electrical power supply for the airport. It was estimated that current improvements are required, including new equipment and upgrades and that the stand-by generators, if existing, are old and need to be replaced.

4.9.4.9.4 Telephone System

Information was not available on the number of telephone lines or the condition of the telephone equipment. For cost estimates, it was estimated that 5 working lines exist at each airport.

4.9.4.10 Access Roads

No information was available on either airport on the location, size and condition of the existing airport access road. It was estimated that the access road is a 2 lane paved road with a shoulder and a ditch section.

4.9.4.11 Vehicle Parking

No information was available on the size of the existing parking lot. Based upon information on similar size airports in the study, it was estimated that 15 spaces are provided (375 m^2) for each airport and that this parking lot is paved and in poor condition.

4.9.5 Evaluation of Existing Facilities

4.9.5.1 Runway

The existing runway geometric is adequate for ICAO minimum requirements for the AN-24 design aircraft (airport reference code 3C). For the 2005-2010 phase, it was forecasted that the runway would require rehabilitation by a bituminous concrete overlay. It was estimated that this overlay would be sufficient without major improvements to the year 2020.

Table IV-179. Runway Requirements

Design Aircraft	Required Length	Required Width	Exist Length	Exist Width	Improvement Required	Year
AN24	1500 m	30 m	1600 m	45 m	1600m x 45m overlay	2005-2010

4.9.5.2 Connector

The width of the connector satisfies the minimum 15 m requirements for the Category 3C – AN24 design aircraft with no improvements in dimensions required now or in the future forecast.

As with the runway improvements, it is anticipated the connector will have to be rehabilitated in Phase II (2005-2010) with a bituminous concrete overlay, which should require no major pavement improvements until the year 2020.

Table IV-180. Connector Requirements

Design Aircraft	Existing Width	Existing Area	Required Width	Improvements Required	Phase Required
AN24	15m	1802 m^2	15 m	Overlay (1802 m^2)	2005-2010

4.9.5.3 Apron

The apron will need to be expanded to 105 m x 76 m in the 2000-2005 phase. This expansion will require 4,605 m^2 of new pavement and the existing pavement (3,375m) to be overlaid. Figure IV-20 shows the apron parking requirements.

Table IV-181. Apron Requirements

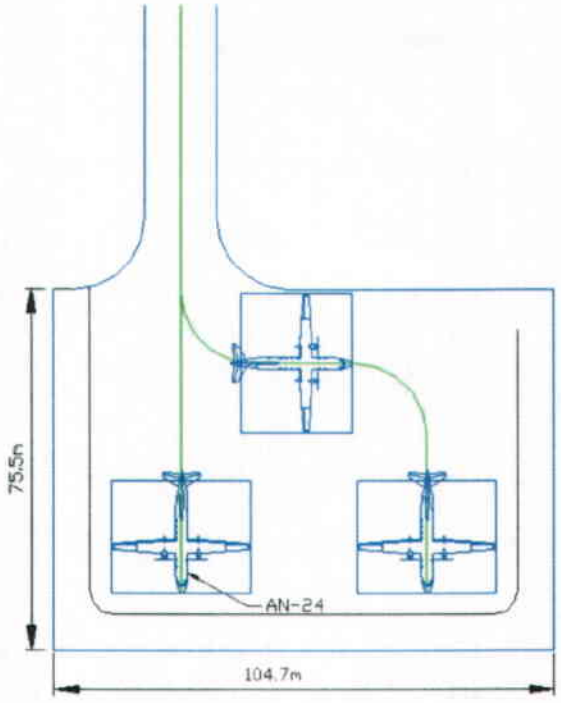
Phase	Design Aircraft	Apron Size		Improvements
		Existing	Required	
2000-2005	2 AN-24 2 AN-24	75 m x 45 m	105 m x 76 m	30 m x 45 m & 31 m x 105 m expansion (4,605 m^2) & 75 m x 45 m overlay (3,375 m^2)

Phase	Design Aircraft	Apron Size		Improvements
		Existing	Required	
2005-2010	2 AN-24 2 AN-24	105 m x 76 m	105 m x 76 m	105 m x 76 m crack and joint repair
2010-2015	2 AN-24 2 AN-24	105 m x 76 m	105 m x 76 m	105 m x 76 m crack and joint repair
2015-2020	2 AN-24 2 AN-24	105 m x 76 m	105 m x 76 m	105 m x 76 m crack and joint repair

Comments

1. Estimated improvements based upon the existing apron pavement being in good condition.
2. Power in - power out
3. Surry seal required on new pavement in aircraft fueling areas.
4. Pavement Marking required for all phases.

Figure IV-20. Apron Parking



4.9.5.4 Navaids

The recommendations for equipment and navaids systems are summarized in the following table:

Table IV-182. Navaids Requirements

2000-2005	2005-2010	2010-2015	2015-2020
HF Tx / Rx NDB Meteo equipment		VHF Tx / Rx	Meteo equipment

For the air traffic volume, the installation of a basic runway lighting system activated by the pilot is recommended.

4.9.5.5 Perimeter Fence

For the Yélimané Airport, in Phase I (2000-2005) an estimated length of 5480 m of new fence is required including new access gates. The fence will have to meet ICAO's minimum height, size and material standards.

The following table summarizes the fencing requirements for the airport.

Table IV-183. Perimeter Fencing Requirements

Fencing Required	Comments
5480m	Phase I (2000-2005), 2-4m gates, 3 personnel gates (assumes no existing fencing meeting ICAO requirements)

4.9.5.6 Airfield Drainage System

Due to the rapid infiltration of the runoff due to the soil's high permeability properties and the low amounts of annual rainfall, minimal maintenance and improvements are required for the drainage system. It is recommended that routine cleaning and clearing of the drainage ditches and channels by removing the vegetation that has accumulated inside and around the drainage improvements. Also, it is estimated that every five years the major drainage ditches and channels will require removal of the accumulated sediment and overgrowth to reestablish design flow lines.

In Phase I (2000-2005), the apron expansion on both airports will require 135 m of new drainage ditch construction.

Table IV-184. Airfield Drainage System

Phase	Improvements		Comment
	Airside	Landside	
2005	135 m 4645 m	 500 m	Apron Expansion – new channel Reestablish channel flow lines Reestablish channel flow lines
2010	—	—	—
2015	4645 m	 500 m	Reestablish channel flow lines Reestablish channel flow lines
2020	—	—	—

4.9.5.7 Terminal Building

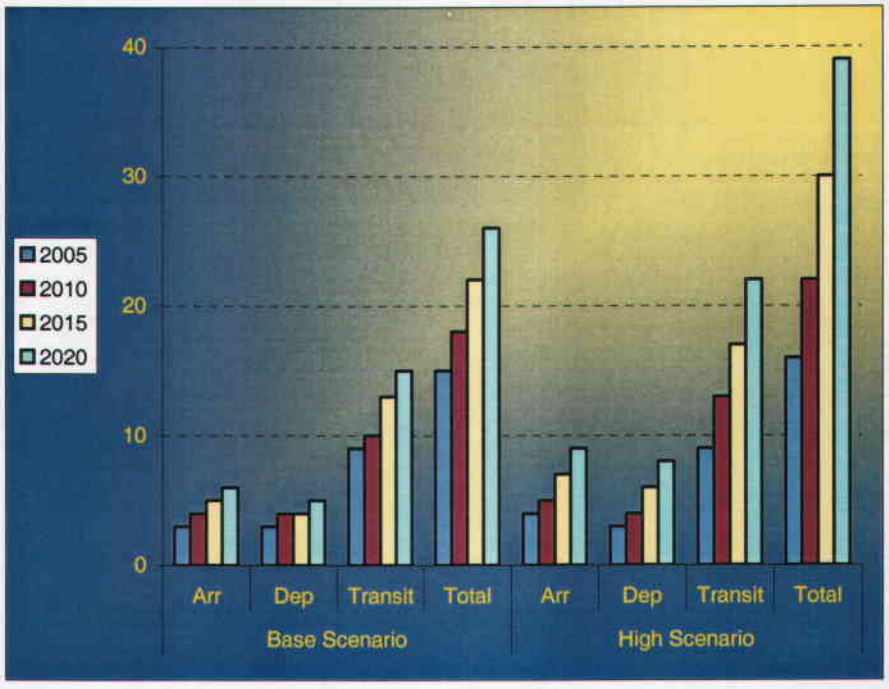
As displayed in Table IV-185, the number of passengers on peak hour does not justify any major investment in terms of terminal requirements.

The number of passengers during peak hour for the study period are distributed according to the passenger flow, as follows:

Table IV-185. Peak Hour Passenger Forecast – Yélimané Airport

	Base Scenario				High Scenario			
	Arrival	Departure	Transit	**Total**	Arrival	Departure	Transit	**Total**
2005	3	3	9	**15**	4	3	9	**16**
2010	4	4	10	**18**	5	4	13	**22**
2015	5	4	13	**22**	7	6	17	**30**
2020	6	5	15	**26**	9	8	22	**39**

Graph IV-67. Peak Hour Passenger Forecast – Yélimané Airport



4.9.5.8 Airport Rescue and Fire Fighting (ARFF)

The following table classifies the airport by an Aerodrome ICAO category determined from the size of the design aircraft and also determines the amount of fire and rescue vehicles required according to ICAO's standards.

For Yélimané, the aerodrome category is 4, which requires one vehicle. It is estimated that in Phase IV (2015-2020) the existing vehicle in each of the airports will need to be replaced.

Table IV-186. ARFF Requirements

Design Aircraft	Aerodrome Category	Aircraft Overall Length	Maximum Fuselage Width	Existing	Required	New Vehicles Replacements	Year
Antonov AN-24	4	23.5 m	-----	1	1	1 - Replacement	2010

4.9.5.9 Utilities

4.9.5.9.1 Water

For cost estimates for the airport, it was estimated that in Phase I (2000-2005) a storage tank with a capacity of 6 m^3 will be required to meet the forecasted domestic water supply requirements for the passengers and employees to the year 2020.

Table IV-187. Water Requirements

		A	B	C	D	F	G
Year	**Passengers Peak Hour**	**Arrivals 50%**	**Departures 50%**	**Transit 0%**	**Visitors (1 x arrivals)**	**@ Terminal Area**	**@ Maintenance Area**
2005	15	7.5	7.5	0	7.5	10	5
2010	18	9	9	0	9	10	5
2015	22	11	11	0	11	10	5
2020	26	13	13	0	13	10	5

	J						I	W	
Year	**(A+B+C+D)**	**J*20**	**F*250**	**G*450**	**Sum**	**Sum/ 1000**	**Existing Storage Tank**	**Total Req. (m^3/day)**	**Additional Storage Req.**
2005	22.5	450	2500	2250	5200	5	0	5	5
2010	27	540	2500	2250	5290	5	5	5	0
2015	33	660	2500	2250	5410	5	5	5	0
2020	39	780	2500	2250	5530	6	5	6	1

4.9.5.9.2 Sanitary Sewer

It is estimated that in Phase II (2005-2010), a septic tank and septic pit will be required to replace the existing system for all three airports.

Table IV-188. Sanitary Sewer Requirements

Year	Total Req. (m^3/day)	Persons Equivalent	Septic Tanks Required	Functional Existing Tanks	New Tanks Required
2005	5	13.2	1	1	0
2010	5	13.2	1	0	1
2015	5	13.2	1	1	0
2020	6	15.84	1	1	0

Note 1: Daily design flow for one person is 0.379 m^3/day

Note 2: New tanks sized for 20 person capacity, capacity of existing tanks assumed at 15 persons.

4.9.5.9.3 Electrical Power Supply

It is forecasted that in Phase I (2000-2005), major upgrades will be required in the electrical supply system and equipment and that two stand-by generators will be needed. In Phase IV (2015-2020) minor upgrades will be required due to the increase in electrical power demand and also the age of the existing facilities.

Table IV-189. Electrical Power Supply

Existing Facilities	2005	2010	2015	2020	Comments
Conditions unknown assumes improvement required	Major Upgrades	None	None	Minor Upgrades	2005 - New Transformers, regulators, stand-by generators, distribution

4.9.5.9.4 Telephone System

The number of telephone lines required for the airport administration, faxes, computers, police, airlines, passengers, visitors and employees are calculated and summarized in Table IV-190.

Table IV-190. Telephone System Requirements

Phase	Total Line Requirements	Existing Lines	Additional Lines
2005	8	5	3
2010	8	8	0
2015	8	8	0
2020	14	8	6

4.9.5.10 Access Roads

As with the other airports, it is assumed that any type of maintenance and improvements to be done on the access road on Yélimané Airport, will be carried out and funded for by the government.

4.9.5.11 Vehicle Parking

The size of the parking required for the 4 phases of development was determined by using the forecasted passenger volume and the estimated number of employees. The adequacy of the passenger and employee parking for present and future phases is determined based upon an evaluation of current vehicular traffic and its relationship to peak hour passengers as shown in the following table.

For Yélimané Airport, it was assumed that the current parking lot (size estimated 375 m^2) would require a bituminous concrete overlay in Phase I (2000-2005).

Table IV-191. Vehicle Parking Requirements

Phase	Total Required Parking (m^2)	Existing Parking (m^2)	Additional Parking (m^2)
2005	562.5	375	187.5
2010	600	562.5	37.5
2015	787.5	600	187.5
2020	862.5	787.5	75

4.9.6 Cost Estimates

Capital Cost Estimates of airport improvements have been prepared for four phases of development. These phases are:

Phase I - Years 2002-2005

Phase II - Years 2005-2010

Phase III - Years 2010-2015

Phase IV - Years 2015-2020

All costs are in current US Dollars, without inflation. A summary sheet of the capital cost estimates is shown in Table IV-192. In preparing these estimates, unit cost information collected in Mali was utilized, as was the Consultant's own data base on international construction costs. Fifteen percent was added to all construction and equipment cost estimates to cover contingencies and the cost of engineering services.

The cost estimate shown here refers to the base case scenario as described on the precedent sections and includes only the minimum (base case) requirements as detailed on the corresponding section.

Table IV-192. Cost Estimate for Yélimané Airport Improvements

ITEM	DESCRIPTION	PHASE I (2000-2005) (US $)	PHASE II (2005-2010) (US $)	PHASE III (2010-2015) (US $)	PHASE IV (2015-2020) (US $)	TOTAL (US $)
1	RUNWAY	0	2,177,280	0	0	**2,177,280**
2	TAXIWAY LOOP & CONNECTOR	0	82,106	0	0	**82,106**
3	APRON(s) (New Pavements /Rehabilitation)	505,620	11,172	11,172	11,172	**539,136**
4	DRAINAGE	113,700	0	102,900	0	**216,600**
5	TERMINAL BUILDING/EQUIPMENT	0	135,000	0	135,000	**270,000**
6	VEHICULAR PARKING (Terminal Building)	11,250	2,250	11,250	4,500	**29,250**
7	POTABLE WATER	25,000	0	0	0	**25,000**
8	SEWAGE TREATMENT	0	30,000	0	0	**30,000**
9	VISUAL/NAVIGATIONAL AIDS	175,000	0	50,000	50,000	**275,000**
10	TELEPHONE SYSTEM	75,000	0	0	75,000	**150,000**
11	ELECTRICAL POWER	175,000	0	0	25,000	**200,000**
12	ARFF FACILITY	0	120,000	0	0	**120,000**
13	PERIMETER FENCE	121,850	0	0	0	**121,850**
14	CONTINGENCY & ENGINEERING 15%	180,363	383,671	26,298	45,101	**635,433**
	TOTAL	**$1,382,784**	**$2,941,480**	**$201,620**	**$345,773**	**$4,871,656**

TOC

V. FINANCIAL ANALYSIS

5.1 Introduction

This chapter contains the financial analysis of the feasibility of the development and operation of Bamako-Sénou Airport and the nine domestic airports under a concession arrangement between the government and a private entity. Included in this chapter are a summary of the air traffic forecasts and the capital costs of the development program for these airports, which were developed in Chapter IV. Also included in this chapter are descriptions of the existing and proposed financial structure of these airports, an analysis and projections of airport operating and maintenance costs, an analysis and projections of airport revenues, discussion of a financing plan based on concessioning the development and operation of these airports, and a financial and cash flow analysis of various alternatives in terms of investment, revenues and costs with the Net Present Value (referred to as "NPV") and the Internal Rate of Return (referred to as "IRR") calculated for each alternative.

The critical end process of the financial analysis is the calculation of the IRR. Based on experience with airport concessions in a number of developing countries, the Consultants believe that achieving an IRR of 20 percent or better will be necessary in order to attract qualified private investor/operators.

The values used in the financial analysis are stated in U.S. Dollars, using an average 2000 exchange rate of FCFA 663 to U.S. $1.00. The revenue and cost projections, as well as the financing plan, reflect the approach that, the Consultants believe, would likely be taken by a private concessionaire. As is standard with this type of analysis, the projections do not incorporate any inflation over the time period of the project, consistent with the exclusion of inflation in the capital cost estimates

As will be seen, a twenty-year period was selected for the cash flow analysis. It was apparent, in view of the amount of investment required at the airport, and based on the air traffic forecasts, that a shorter concession period was not likely to be feasible in terms of developing an adequate rate of return. A longer period for the term of the concession would likely render the project more attractive; therefore, the present analysis should be considered conservative from this standpoint.

Following standard practice for concession studies, the projections do not include estimates of amounts or forms of payments from the successful concessionaire to the government for the concession of these airports over the twenty-year period, reflecting the expectation that these

arrangements would be determined as part of the selection process and could not be accurately predicted by the Consultant at this time.

The Consultant's financial analysis has been undertaken in several steps, some of which relate to the previous phases of the study, which evaluated the feasibility of the concession of Bamako-Sénou International Airport as a stand-alone project. The present analysis should be considered as a complement to the previous evaluation. These steps can be described as follows:

- *Step 1* consisted of development of aviation activity forecasts for Bamako-Sénou Airport and the nine domestic airports, each of which includes passengers, aircraft operations and cargo. These forecasts were developed in Chapter III of the Bamako-Sénou Airport Feasibility Expansion Study for the Bamako-Sénou International Airport and in Chapter IV of this report for each one of the nine domestic airports. Also, they are summarized in Section 5.1.

- *Step 2* consisted of the development of the facility requirements for Bamako-Sénou and the nine domestic airports, each of which includes plans and capital cost estimates covering the expansion and improvements of both airside and landside facilities. The airport requirements were developed in Chapter V, the Layout Plans in Chapter VI and the capital costs in Chapter VIII of the Bamako-Sénou Airport Feasibility Expansion Study for the Bamako-Sénou International Airport and in Chapter IV of this report for each one of the nine domestic airports; the resulting costs are summarized in Section 5.3.

- *Step 3,* contained in this Chapter, consists of determination of the airport financial structure, including discussions of existing arrangements prior to the establishment of a concession and identification of three alternative arrangements following the concession of the airports (referred to as Baseline Case, Alternative A Case and Alternative B Case). This information is presented in Section 5.2.

- *Step 4*, contained in this Chapter, consists of the development of a financing plan, including the investment and debt service requirements of the concessionaire, also presenting separate finance plans for Bamako-Sénou and the domestic airports. This information is presented in Section 5.3.

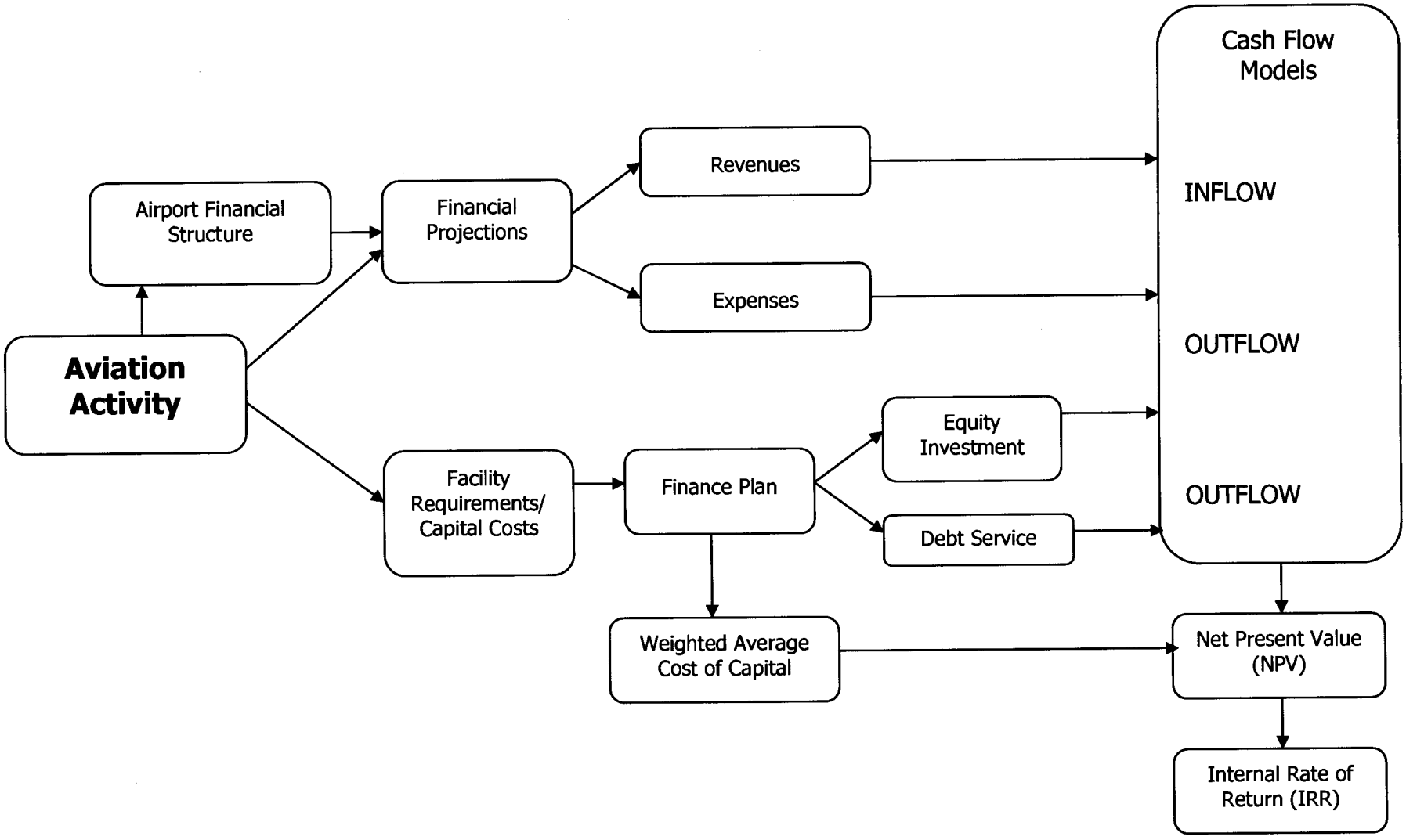
- *Step 5*, contained in this Chapter, consists of the analysis of existing operational and maintenance costs and the development of projections, presenting these costs separately for Bamako-Sénou and the domestic airports. This information is presented in Section 5.4.

- *Step 6*, contained in this Chapter, consists of the analysis of existing revenues and the development of revenue projections, likewise presenting these revenues separately for Bamako-Sénou and the domestic airports. This information is presented in Section 5.5

- *Step 7*, contained in this Chapter, consists of the development of cash flow models, which analyze the financial performance of different investment, revenue and cost alternatives. The financial models combine the inflow and outflow of funds into cash flow projections, and calculate the net present value (NPV) and internal rate of return (IRR) for each alternative. At the end of this process the Consultants discuss the alternatives and make recommendations for the next step of the concessioning process. This critical information is presented in Section 5.6.

The various steps in the Consultant's approach are illustrated in Figure V-1, Summary of Aviation Activity, Development Alternatives and Capital Costs.

Figure V-1. Financial Analysis Approach



5.1.1 Aviation Activity

High, low and medium forecasts of aviation activity were made, the details of which are located in Chapter III of the report. These forecasts are summarized below. While the financial analysis has been mainly based on the medium forecast a cash flow analysis of various development alternatives was also made based on the low activity forecast.

Table V-1.Total Passenger Forecast

	Bamako	Gao	Goundam	Kayes	Kéniéba, Sikasso, Yélimané	Mopti	Nioro	Tombouctou
2000	428694	4367	1288	1904	4342	9542	1862	9020
2001	456560	4828	1341	1983	4521	9972	1939	9517
2002	536236	5026	1396	2064	4707	10521	2019	10041
2003	517841	5233	1454	2150	4900	11100	2102	10594
2004	551501	5448	1514	2239	5101	11711	2189	11177
2005	587348	5672	1577	2331	5311	12356	2279	11792
2006	625526	5905	1642	2427	5529	13036	2373	12441
2007	666185	6148	1710	2527	5756	13753	2471	13126
2008	709487	6401	1781	2631	5992	14510	2573	13848
2009	755604	6664	1855	2739	6239	15309	2679	14610
2010	804718	6931	1930	2849	6488	16151	2787	15414
2011	857025	7209	2008	2963	6748	17040	2899	16262
2012	912731	7498	2089	3082	7018	17978	3015	17157
2013	972059	7798	2173	3206	7299	18967	3136	18101
2014	1030382	8110	2260	3335	7591	20011	3262	19097
2015	1089114	8435	2351	3469	7895	21112	3393	20148
2016	1149015	8773	2446	3608	8211	22274	3529	21257
2017	1208764	9124	2544	3763	8540	23500	3671	22427
2018	1269202	9489	2646	3904	8882	24793	3818	23661
2019	1328855	9869	2752	4061	9238	26157	3971	24963
2020	1400000	10264	2863	4224	9608	27596	4130	26336

Table V-2.Cargo Forecast

	Bamako	Gao	Goundam	Kayes	Kéniéba, Sikasso, Yélimané	Mopti	Nioro	Tombouctou
2000	4645168	973	500	3377	2762	3442	163	7379
2001	4923879	1013	520	3512	2873	3581	170	7675
2002	5219311	1054	541	3653	2988	3725	177	7982

2003	5428084	1097	563	3800	3108	3874	185	8302
2004	5645208	1141	586	3952	3233	4029	193	8635
2005	5871015	1187	610	4111	3363	4191	201	8981
2006	6105856	1235	635	4276	3498	4359	210	9341
2007	6350090	1285	661	4448	3638	4534	219	9715
2008	6604094	1337	688	4626	3784	4716	228	10104
2009	6868258	1391	716	4812	3936	4905	238	10509
2010	7142988	1447	745	5005	4094	5102	248	10930
2011	7428709	1505	775	5206	4258	5307	258	11368
2012	7725856	1566	806	5415	4429	5520	269	11823
2013	8034891	1629	839	5632	4607	5741	280	12296
2014	8356285	1695	873	5858	4792	5971	292	12788
2015	8690537	1763	908	6093	4984	6210	304	13300
2016	8951253	1834	945	6337	5184	6459	317	13832
2017	9219790	1908	983	6591	5392	6718	330	14386
2018	9496384	1985	1023	6855	5608	6987	344	14962
2019	9781276	2065	1064	7130	5833	7267	358	15561
2020	10074715	2148	1107	7416	6067	7558	373	16184

Table V-3. Total Aircraft Operations Forecast

	Bamako	Gao	Goundam	Kayes	Kéniéba, Sikasso, Yélimané	Mopti	Nioro	Tombouctou
2000	13681	467	270	527	192	809	137	526
2001	14503	467	270	527	192	809	137	549
2002	16360	471	272	531	194	826	138	571
2003	16296	476	275	537	196	846	140	595
2004	17272	483	279	544	199	868	142	619
2005	18305	490	283	552	202	892	144	645
2006	19400	499	289	562	206	917	147	671
2007	20487	510	296	574	211	943	151	698
2008	21710	522	303	587	216	971	155	728
2009	23006	534	310	600	221	1002	159	758
2010	24379	547	318	615	227	1033	163	790
2011	25657	562	327	631	233	1067	168	824
2012	27188	578	337	649	240	1101	173	857
2013	28615	595	347	668	247	1138	178	893
2014	30178	612	357	687	254	1177	183	931
2015	31522	630	368	707	262	1216	189	970
2016	33087	650	380	729	271	1259	195	1011
2017	34400	671	393	753	280	1304	202	1053

	Bamako	Gao	Goundam	Kayes	Kéniéba, Sikasso, Yélimané	Mopti	Nioro	Tombouctou
2018	35938	693	406	778	289	1350	209	1098
2019	37189	716	419	803	299	1398	216	1144
2020	38616	739	433	1223	309	1447	223	1193

5.1.2 Development Alternatives

The airport development alternatives considered were based on three different types of new international passenger terminal for the Bamako-Sénou International Airport. In each of these alternatives, the existing passenger terminal will be converted to domestic operations, once the new terminal is constructed. The new terminal will take some time to design and construct, and for that reason some interim improvement is proposed to the existing terminal. The alternatives considered for the new international terminal were a single level terminal with buses, a split-level terminal with a combination of loading bridges and buses, and a two level terminal with all loading bridges. Layout plans of each of these alternatives were prepared and are contained in Chapter VII of the Bamako-Sénou Airport Feasibility Expansion Study for the Bamako-Sénou International Airport Report.

The development costs of the three different terminal types varied widely because of differences in the terminal space required, the requirements for additional aircraft parking apron (the split level and two level terminal can make only very limited use of the existing apron) and other higher costs for loading bridges and a second level roadway. From an operational and passenger convenience point of view, the two-level terminal is the most desirable, followed in order by the split-level terminal and the single level terminal However, there are significant cost differences between the terminal alternatives, which have an important effect on the financial internal rate of return, as will be seen. At the same time, it should be noted that these options for the development concept of the terminal represent possible examples for the purpose of the present feasibility study. The concessionaire may propose a different alternative, which would nevertheless satisfy the requirements of the Government.

5.1.3 Capital Costs of Airport Development

The total costs of airport development over the twenty-year period for the three optional passenger terminal concepts, in addition to the rest of the airport requirements, which remains constant all alternatives, can be summarized as follows:

	Bamako-Sénou	Domestic Airports
• Alternative 1 (Single Level Terminal - BKO)		
Airside	$26,586,354	$23,606,894
Landside	$39,093,100	$ 6,360,867
Total	$65,679,454	$29,967,761
• Alternative 2 (Split Level Terminal - BKO)		
Airside	$25,505,525	$23,606,894
Landside	$51,256,478	$ 6,360,894
Total	$76,762,003	$29,967,761
• Alternative 3 (Two Level Terminal - BKO)		
Airside	$25,505,525	$23,606,894
Landside	$62,332,128	$ 6,360,867
Total	$87,837,653	$29,967,761

In the case of the single level terminal, its cost represents 32% of the total airports system project development cost over twenty years, while in the case the two level terminal, its cost represents 42% of this cost. The total airside development costs vary from 53% to 42%.

5.2 Airport Financial Structure

5.2.1 Existing Financial Structure

Bamako-Sénou and the nine domestic airports are owned by the Government of Mali. In general, they are operated, maintained and developed by both ADM (Aéroports du Mali), a Government corporation and by ASECNA *(Agence pour la Sécurité de la Navigation Aérienne en Afrique et à Madagascar)*, a multinational agency. The specific roles and activities of these and other stakeholders are detailed in Chapter 2 (Section 2.5, Institutional Framework) and summarized below:

- *ADM (Aéroports du Mali)* – ADM is responsible for the operation and maintenance of the landside activities and facilities of Bamako-Sénou and the domestic airports. The total ADM staff in 1999 was 243. ADM collects passenger facility charges, cargo charges, fueling charges and all non-aeronautical revenues (i.e., rentals, concession fees and miscellaneous charges) generated at these airports and pays all operating and maintenance expenses for the landside activities and facilities at these airports. Also, ADM is responsible for the development of both landside facilities at these airports, although it does not receive any portion of the landing fee, aircraft parking and airfield lighting fee revenues.

- *ASECNA (L'Agence pour la Sécurite de la Navigation Aérienne en Afrique et à Madagascar)* – ASECNA, consistent with its role throughout most of Francophone Africa, is responsible for providing aeronautical communications and air navigation services at Bamako-Sénou and other airports in Mali. ASECNA receives the bulk of the aeronautical revenues (i.e., landing fees, aircraft parking fees, airfield lighting fees and en-route traffic fees) and pays all operating and maintenance expenses for the communications and navigation facilities, as well as the airside infrastructure at these airports.

- *Airlines (Compagnies Aériennes)* – The multinational airline Air Afrique provides aircraft, passenger and cargo handling services at Bamako-Sénou, receiving revenues from other airline customers for these services and paying rent and cargo fees to ADM for the use of facilities for these activities. Air Mali also provides aircraft handling services at the airport, essentially from other sub-regional carriers.

- *General Aviation Companies (Enterprises Privées de Transport Aérien)* – These commercial businesses provide services to users of these airports, receiving revenues from these users and paying rent to the airport and landing fees (where applicable) to ASECNA for the privilege of operating at these airports.

- *DNAC (Direction Nationale de l'Aéronautique Civile)* – DNAC regulates aviation activities at these airports, including implementing policy and procedures governing the safety and security of airport activities. It also has responsibility for the management of the airports development program on behalf of the State. DNAC funds its activities through the general budget of the Government of Mali.

5.2.2 Financial Structure Following Establishment of the Concession

Under a concession arrangement, the concessionaire would become responsible for the operation and development of the airports, definitely changing the role of ADM and potentially changing the role of ASECNA depending on the split of responsibilities for development and

maintenance/upkeep of the airside facilities of the airports as well as the assignment of revenues. The Consultant has examined three possible alternatives, representing different arrangements for the development of the airside facilities and access to landing fee, aircraft parking and airfield lighting fee revenues to support such airside development requirements. The financial implications of each of these alternatives are summarized in this section, with the exact outcomes (NPVs and IRRs) presented in Section 5.5.

5.2.3 Baseline Case

In general, the Baseline Case would represent continuation of the existing arrangements for development of the airside facilities and access to landing fee, aircraft parking and airfield lighting fee revenues at the airports, as follows:

- *ADM* – ADM would convey its existing operating rights and development responsibilities to the concessionaire during the concession period. ADM would cease to exist as a State Corporation at that time. It is expected that some of the current ADM personnel would then join DNAC, which would have the responsibility as the State regulatory agency to review and approve all development plans and tariffs and provide general oversight of the concession. These activities could be funded from the concession fee received from the concessionaire.

- *Concessionaire* – The concessionaire would be responsible for the operation and maintenance, as well as the development, of both landside and airside activities and facilities of the airports under a concession contract. The concessionaire would receive all of the revenues and pay all of the expenses formerly received and paid by ADM for the operation, maintenance and development of these airports. The concessionaire would provide all financing for the development of the landside and airside facilities, including investing its own resources and borrowing from external sources as required. The concessionaire also would pay a fee to the Government for the privilege of operating the airports during the concession period. The exact composition of the proposed concessionaire will be determined according to Government preference and project requirements. If entirely private, it is likely to consist of an entity involving several private parties (a construction contractor, a professional airport operator and possible a financier); or it could involve some government ownership, which might help to keep the financing costs down in terms of guarantees.

- *ASECNA* – ASECNA would continue to be responsible for providing the communications and air navigation and airside maintenance services for the airports, funding these activities from the landing fees, aircraft parking fees, airfield lighting fees and en-route traffic fees.

Airside development plans of the concessionaire would have to be coordinated with ASECNA.

- *Commercial Airlines* - The airlines would continue to provide passenger and cargo services at the airports, receiving revenues from customers for these services and paying rent and cargo fees to the concessionaire for the use of these facilities. In addition, Air Mali and Air Afrique would be charged a fee by the concessionaire for the privilege providing handling of aircraft for other carriers.

- *General Aviation* - These commercial businesses would continue to provide services to users of the airports, receiving revenues for these services and paying rent to the concessionaire for the facilities used for these activities and aeronautical fees to ASECNA.

- *DNAC* – DNAC would continue to regulate aviation activities at the airport, including implementing policy and procedures governing the safety and security of airport activities as well as management of the concession contract, including review and approval of tariffs, etc.

5.2.4 Alternative A Case

Under the Alternative A Case, the concessionaire would be responsible for only the landside development requirements, with ASECNA responsible for the airside development requirements and continuing to receive 100 percent of the landing fee and airfield lighting fee revenues to support its air navigation activities and the airside development requirements in Mali. Otherwise, the responsibilities of the other entities would be the same under the Alternative A as under the Baseline Case

5.2.5 Alternative B Case

Under the Alternative B Case, the concessionaire would be responsible for both the landside and airside development requirements, with ASECNA and the concessionaire sharing appropriate proportions of the landing fee, aircraft parking fee and airfield lighting fee revenues to support their respective airside responsibilities on an equitable basis. Otherwise, the responsibilities of the other entities would be the same under the Alternative B as under the Baseline Case

5.3 Financing Plan

The financing plan for the airport capital development program contained in this subsection identifies the equity investment and debt repayment requirements, which represent outflows in the cash flow analysis (including the NPV and IRR calculations) presented later in this Chapter.

The financing plan applies to the development costs for Bamako-Sénou Airport, consisting of three alternatives for the terminal component of the development program as presented in Chapter VII of the Bamako-Sénou Airport Feasibility Expansion Study. Terminal Alternative 1 consists of the single level terminal with a 400-meter extension of the runway to 3,100 meter, which would cost approximately US$ 65,679,000 over twenty years as previously mentioned. The financing plan also applies to the investments required for the cash flow analysis of Terminal Alternatives 2 and Alternatives 3, whose only difference from Terminal Alternative 1 consists of the split level terminal in the case of Terminal Alternative 2, and the dual level terminal in the case of Terminal Alternative 3. Terminal Alternative 2 would cost approximately US$ 76,762,000, while Terminal Alternative 3 would cost approximately US$ 87,837,000, obviously generating poorer financial outcomes than Terminal Alternative 1, since there is no indication that these alternatives would have a measurable impact on revenues. The financing plan also applies to the development costs for the nine domestic airports, which include a variety of landside and airside projects costing $29,967,761, without any alternatives.

The financing plan presented in this subsection also incorporates the four development stages as presented in Section VII of the Bamako-Sénou Airport Feasibility Expansion Study, applicable to both Bamako-Sénou and the nine domestic airports. Specifically, investment during Stage 1 would occur during the 2002-2003 period, Stage 2 would occur during 2007-2008, Stage 3 would occur during 2011-2012 and Stage 4 would occur during 2016-2017.

5.3.1 Funding Sources

This analysis assumes that the concessionaire would fund the capital development program from three sources. First, it would invest its own resources, representing an equity investment on the balance sheet of the concessionaire. Second, it would borrow from financial institutions, representing long-term loans on the concessionaire's balance sheet. Third, it would borrow from suppliers of imported elements, possibly supported by guarantees of financial institutions, representing short-term loans on the concessionaire's balance sheet.

The analysis also assumes that the concessionaire would make equity investments in Stages 1 through 4, accompanied by long-term and short-term borrowing for Stages 1 and 2. In addition, the analysis assumes that the debt to equity ratio would be 70:30 for Stages 1 and 2, which when combined with 100 percent equity financing for Stages 3 and 4 would result in an overall debt to equity ratio of approximately 50:50 for all four stages of development. In the consultant's opinion, these ratios would represent acceptable criteria for financing this type of development program.

Based on these assumptions, Table V-4 presents the funding sources for the capital development program for Alternative 1 at Bamako-Sénou Airport. During Stage 1, the concessionaire would invest US$ 5,109,000 and borrow US$ 11,921,000. During Stage 2, it would invest US$ 8,910,000, borrowing US$ 20,790,000. During stages 3 and 4, its equity investment would be US$ 4,116,000 and US$ 14,833,000, respectively. Overall, the concessionaire would invest US$ 32,968,000 and borrow US$ 32,712,000, representing an overall debt to equity ratio of 50:50. As indicated above, the equity investment requirements represent outflows in the cash flow analysis presented later in this Chapter.

Based on these assumptions, Table V-5 presents the funding sources for the capital development program at the nine airports. During Stage 1, the concessionaire would invest US$ 4,682,000 and borrow US$ 10,924,000. During Stage 2, it would invest US$ 2,097,000, borrowing US$ 4,893,000. During stages 3 and 4, its equity investment would be US$ 3,970,000 and US$ 3,402,000, respectively. Overall, the concessionaire would invest US$ 14,151,000 and borrow US$ 15,817,000, representing an overall debt to equity ratio of 53:47. Likewise, the equity investment requirements represent outflows in the cash flow analysis presented later in this Chapter.

Table V-4.Funding Sources – Alternative 1 Bamako-Sénou Airport

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Phase I - Equity	$-	$2,554,550	$2,554,550	$-	$-	$-	$-	$-	$-	$-	$-
Phase I - Capital Market Loan	$-	$4,768,494	$4,768,494	$-	$-	$-	$-	$-	$-	$-	$-
Phase I - Supplier Credits	$-	$1,192,123	$1,192,123	$-	$-	$-	$-	$-	$-	$-	$-
Phase II - Equity	$-	$-	$-	$-	$-	$-	$4,455,087	$4,455,087	$-	$-	$-
Phase II - Capital Market Loan	$-	$-	$-	$-	$-	$-	$7,796,403	$7,796,403	$-	$-	$-
Phase II - Supplier Credits	$-	$-	$-	$-	$-	$-	$2,598,801	$2,598,801	$-	$-	$-
Phase III - Equity	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-
Phase IV - Equity	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-
Total Funding Requirements	$-	$8,515,167	$8,515,167	$-	$-	$-	$14,850,291	$14,850,291	$-	$-	$-

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total 2000-2020	Total Equity	Total Debt
Phase I - Equity	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	$5,109,100	$5,109,100	
Phase I - Capital Market Loan	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	$9,536,987		
Phase I - Supplier Credits	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	$2,384,247		$11,921,234
Phase II - Equity	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	$8,910,175	$8,910,175	
Phase II - Capital Market Loan	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	$15,592,806		
Phase II - Supplier Credits	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	$5,197,602		$20,790,407
Phase III - Equity	$2,057,962	$2,057,962	$-	$-	$-	$-	$-	$-	$-	$-	$4,115,924	$4,115,924	
Phase IV - Equity	$-	$-	$-	$-	$-	$7,416,307	$7,416,307	$-	$-	$-	$14,832,614	$14,832,614	
Total Funding Requirements	$2,057,962	$2,057,962	$-	$-	$-	$7,416,307	$7,416,307	$-	$-	$-	$65,679,454	$32,967,813	$32,711,641

Table V-5.Funding Sources – Domestic Airports

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Phase I - Equity	$-	$2,340,900	$2,340,900	$-	$-	$-	$-	$-	$-	$-	$-
Phase I - Capital Market Loan	$-	$4,369,679	$4,369,679	$-	$-	$-	$-	$-	$-	$-	$-
Phase I - Supplier Credits	$-	$1,092,420	$1,092,420	$-	$-	$-	$-	$-	$-	$-	$-
Phase II - Equity	$-	$-	$-	$-	$-	$-	$1,048,392	$1,048,392	$-	$-	$-
Phase II - Capital Market Loan	$-	$-	$-	$-	$-	$-	$1,834,687	$1,834,687	$-	$-	$-
Phase II - Supplier Credits	$-	$-	$-	$-	$-	$-	$611,562	$611,562	$-	$-	$-
Phase III - Equity	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-
Phase IV - Equity	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-
Total Funding Requirements	$-	$7,802,999	$7,802,999	$-	$-	$-	$3,494,641	$3,494,641	$-	$-	$-

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total 2000-2020	Total Equity	Total Debt
Phase I - Equity	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	$4,681,799	$4,681,799	
Phase I - Capital Market Loan	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	$8,739,359		
Phase I - Supplier Credits	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	$2,184,840		$10,924,199
Phase II - Equity	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	$2,096,785	$2,096,785	
Phase II - Capital Market Loan	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	$3,669,373		
Phase II - Supplier Credits	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	$1,223,124		$4,892,497
Phase III - Equity	$1,985,041	$1,985,041	$-	$-	$-	$-	$-	$-	$-	$-	$3,970,081	$3,970,081	
Phase IV - Equity	$-	$-	$-	$-	$-	$1,701,200	$1,701,200	$-	$-	$-	$3,402,400	$3,402,400	
Total Funding Requirements	$1,985,041	$1,985,041	$-	$-	$-	$1,701,200	$1,701,200	$-	$-	$-	$29,967,761	$14,151,065	$15,816,696

5.3.2 Debt Service Schedules

It is assumed that the concessionaire will be able to obtain long-term loans for the local construction requirements (labor and materials) based on a maturity of 14 years (including interest only for 2 years) and an interest rate of 12 percent. Also, it is assumed that supplier credits would be available for the imported requirements (equipment and systems) based on a maturity period of 7 years (including interest only for 2 years) and an interest rate of 14 percent.

Based on these assumptions, the debt service schedules for the financing requirements at Bamako-Sénou Airport are presented in Table V-6. The debt service requirements would extend from 2001 through 2019, ranging from a low of US$ 1,478,000 in 2001 and 2002 to a high of US$ 5,571,000 in 2008 through 2012. As indicated above, the debt service requirements represent outflows in the cash flow analysis presented later in this Chapter.

Based on these assumptions, the debt service schedules for the financing requirements at the nine domestic airports are presented in Table V-7. The debt service requirements would extend from 2001 through 2019, ranging from a low of US$ 2,047,000 in 2001 and 2002 to a high of US$ 2,996,000 in 2006 through 2007. Likewise, the debt service requirements represent outflows in the cash flow analysis presented later in this Chapter.

Table V-6.Debt Service Schedules – Bamako-Sénou Airport

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Debt Repayment Schedule:											
Phase I Capital Market Loan - Interest	$-	$1,144,438	$1,144,438	$1,144,438	$1,097,017	$1,043,904	$984,418	$917,794	$843,175	$759,601	$665,999
Phase I Capital Market Loan - Principal	$-	$-	$-	$395,182	$442,604	$495,717	$555,203	$621,827	$696,446	$780,020	$873,622
Phase I Supplier Credits - Interest	$-	$333,795	$333,795	$333,795	$283,297	$225,730	$160,103	$85,288	$-	$-	$-
Phase I Supplier Credits - Principal	$-	$-	$-	$360,697	$411,195	$468,762	$534,389	$609,203	$-	$-	$-
Phase II Capital Market Loan - Interest	$-	$-	$-	$-	$-	$-	$1,871,137	$1,871,137	$1,871,137	$1,793,603	$1,706,765
Phase II Capital Market Loan - Principal	$-	$-	$-	$-	$-	$-	$-	$-	$646,116	$723,650	$810,488
Phase II Supplier Credits - Interest	$-	$-	$-	$-	$-	$-	$769,986	$769,986	$727,664	$617,581	$492,085
Phase II Supplier Credits – Principal	$-	$-	$-	$-	$-	$-	$-	$-	$786,312	$896,395	$1,021,891
Total Debt Service Requirements	$-	$1,478,233	$1,478,233	$2,234,113	$2,234,113	$2,234,113	$4,875,236	$4,875,236	$5,570,850	$5,570,850	$5,570,850
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	
Debt Repayment Schedule:											
Phase I Capital Market Loan - Interest	$561,164	$443,749	$312,245	$164,959	$-	$-	$-	$-	$-	$-	
Phase I Capital Market Loan - Principal	$978,457	$1,095,872	$1,227,376	$1,374,661	$-	$-	$-	$-	$-	$-	
Phase I Supplier Credits - Interest	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	
Phase I Supplier Credits - Principal	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	
Phase II Capital Market Loan - Interest	$1,609,506	$1,500,577	$1,378,575	$1,241,934	$1,088,896	$917,493	$725,522	$510,514	$269,706	$-	
Phase II Capital Market Loan - Principal	$907,747	$1,016,676	$1,138,677	$1,275,319	$1,428,357	$1,599,760	$1,791,731	$2,006,739	$2,247,547	$-	
Phase II Supplier Credits - Interest	$349,021	$185,927	$-	$-	$-	$-	$-	$-	$-	$-	
Phase II Supplier Credits – Principal	$1,164,955	$1,328,049	$-	$-	$-	$-	$-	$-	$-	$-	
Total Debt Service Requirements	$5,570,850	$5,570,850	$4,056,874	$4,056,874	$2,517,253	$2,517,253	$2,517,253	$2,517,253	$2,517,253	$-	

Table V-7.Debt Service Schedules – Domestic Airports

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Debt Repayment Schedule:											
Phase I Capital Market Loan - Interest	$-	$1,410,854	$1,410,854	$1,048,723	$1,005,267	$956,597	$902,086	$841,034	$772,655	$696,071	$610,298
Phase I Capital Market Loan - Principal	$-	$-	$-	$362,131	$405,587	$454,257	$508,768	$569,820	$638,199	$714,783	$800,556
Phase I Supplier Credits - Interest	$-	$636,408	$636,408	$305,878	$259,603	$206,851	$146,713	$78,155	$-	$-	$-
Phase I Supplier Credits - Principal	$-	$-	$-	$330,530	$376,805	$429,557	$489,695	$558,253	$-	$-	$-
Phase II Capital Market Loan - Interest	$-	$-	$-	$-	$-	$-	$592,372	$592,372	$440,325	$422,079	$401,644
Phase II Capital Market Loan - Principal	$-	$-	$-	$-	$-	$-	$-	$-	$152,047	$170,293	$190,728
Phase II Supplier Credits - Interest	$-	$-	$-	$-	$-	$-	$356,276	$356,276	$171,237	$145,332	$115,800
Phase II Supplier Credits – Principal	$-	$-	$-	$-	$-	$-	$-	$-	$185,039	$210,944	$240,476
Total Debt Service Requirements	$-	$2,047,262	$2,047,262	$2,047,262	$2,047,262	$2,047,262	$2,995,910	$2,995,910	$2,359,502	$2,359,502	$2,359,502
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	
Debt Repayment Schedule:											
Phase I Capital Market Loan - Interest	$514,231	$406,636	$286,130	$151,161	$-	$-	$-	$-	$-	$-	
Phase I Capital Market Loan - Principal	$896,623	$1,004,218	$1,124,724	$1,259,693	$-	$-	$-	$-	$-	$-	
Phase I Supplier Credits - Interest	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	
Phase I Supplier Credits - Principal	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	
Phase II Capital Market Loan - Interest	$378,757	$353,123	$324,413	$292,258	$256,244	$215,909	$170,733	$120,137	$63,468	$-	
Phase II Capital Market Loan - Principal	$213,615	$239,249	$267,959	$300,114	$336,128	$376,463	$421,639	$472,235	$528,903	$-	
Phase II Supplier Credits - Interest	$82,133	$43,753	$-	$-	$-	$-	$-	$-	$-	$-	
Phase II Supplier Credits – Principal	$274,143	$312,522	$-	$-	$-	$-	$-	$-	$-	$-	
Total Debt Service Requirements	$2,359,502	$2,359,501	$2,003,226	$2,003,226	$592,372	$592,372	$592,372	$592,372	$592,371	$-	

5.4 Operating and Maintenance Expenses

This subsection covers the operation and maintenance expenses for Bamako-Sénou and the nine domestic airports, identifying the types of operating and maintenance expenses that would be involved under the proposed concession arrangement, and including projections of these expenses over the proposed 20-year concession period. The operation and maintenance expenses represent outflows in the cash flow analysis presented later in this Chapter.

The historical (2000) operation and maintenance expenses were obtained from the trial balance for all of the airports as provided by ADM, including balances for all of the individual accounts. The expenses for Bamako-Sénou airport were derived by subtracting the corresponding account balances for the nine domestic airports, also as provided by ADM. These operations and maintenance expenses were then reclassified into 15 categories that were useful for projecting such expenses into the future. This data, showing the expenses for Bamako-Sénou and the nine domestic airports separately, is contained in an appendix at the end of this Chapter of the report.

The projections (2001 through 2020) of operation and maintenance expenses reflect several key assumptions. The first assumption is that the airports would be operated in accordance with international aviation safety and security standards, with certain expenses established to satisfy these requirements. The second assumption is that the airports would be expanded and improved, with certain expenses increasing as the result of the need to operate and maintain expanded facilities while other expenses would decrease as the result of a more efficient operation and more efficient facilities. The third assumption is that the airports would be operated collectively as a business enterprise, with the concessionaire curtailing certain expenses in order to maximize profitability. The operation and maintenance expense projections, which follow, constitute a Base-line Scenario for purposes of the cash flow analysis.

In the Consultant's opinion, the Base-line Scenario for expenses is not likely to change significantly in total amount for Terminal Alternatives 2 and 3 in comparison with Terminal Alternative 1 at Bamako-Sénou Airport. In the case of Terminal Alternatives 2 and 3, the expenses for operating a mix of loading bridges and buses are likely to be somewhat less than that of an all-bus system, while the maintenance and power costs of the larger terminals are likely to be somewhat greater, with one type of expense off-setting the other.

Operation and maintenance expenses are presented in Table V-8, showing the expenses for Bamako-Sénou Airport and the nine domestic airports separately. As shown, actual operation and maintenance expenses were US$ 2,184,000 in 2000 and are projected to increase to US$ 4,011,000 in 2020 (the final year of the proposed concession period), representing an

average annual growth rate of 3.09 percent. On a per enplanement basis, these expenses are projected to decrease from $8.85 in 2000 to $5.15 in 2020, representing an average annual growth rate of minus 2.67 percent. This growth rate focuses on the expense-containments measures that the Consultant expects would be implemented by the proposed concessionaire to improve the financial performance of the airports following concessioning (i.e., centralized administration, common service contracts, etc.), eliminating the impact of activity growth on expenses generation at these airports. The expense components, as well as the basis for the projections, are described below:

- *Personnel* – In 2000, this component included the costs of salaries, insurance and benefits for the 243 employees of ADM. Projections reflect an estimated reduction in the number of employees by 40 percent when the proposed concessionaire assumes responsibility in 2001.

- *Maintenance* – In 2000, this component included the costs of obtaining contract services for the maintenance of buildings, buses, and equipment, as well as the airfield equipment. Projections reflect the expansion of the buildings, buses and equipment, with increases occurring when the new international terminal at Bamako-Sénou Airport opens in 2008, and when the expansion thereof is completed in 2018. Projections also reflect the extension of the runway at Bamako-Sénou Airport when completed in 2003 and the construction of the parallel taxiway thereto when completed in 2018.

- *Commodities* – In 2000, this component included the costs of purchasing maintenance supplies for the buildings, buses and equipment, as well as the aviation fuel, and electricity and water utilities acquired for resale and/or internal use. Projections of maintenance supplies and electricity and water utilities reflect the expansion of the buildings, buses and equipment, with increases occurring when the new international terminal at Bamako-Sénou Airport opens in 2008 and when the expansion thereof is completed in 2018. Projections of aviation fuel reflect the increase in aircraft operations throughout the projection period.

- *Services* – In 2000, this component reflects the costs of obtaining services such as insurance, telephone and training services from private entities and police services from government entities. Projections of police services reflect the new terminal building at Bamako-Sénou Airport when opened in 2008 and when expanded in 2018.

- *Finance Charges* – In 2000, this component included costs of bank accounts and other fiscal services. Projections assume that this cost will be constant throughout the projections period.

- *Taxes* - In 2000, this component included costs of municipal taxes, for which the airports were not exempt. Projections assume that this cost will be constant throughout the

projections period. Income taxes, which the Consultant assumes would be applicable to the proposed concessionaire, are addressed in the cash flow analysis later in this section.

- *Depreciation* - In 2000, and previously there was a line item for depreciation. The Consultants have not made projections for this cost. It is assumed that further study could establish a basis for depreciation of the existing airport assets, as well as the new construction, which would then become an expense item for the concessionaire to be deducted as part of his costs, which would in turn reduce the amount of profit subject to tax. It is not anticipated that this will materially affect the IRR's of the various financial analyses, all of which take into account income taxes on the gross operating margins without depreciation.

- *Other* - In 2000, this component included miscellaneous costs, such as contributions and reserves. Projections assume that this cost will be constant throughout the projection period.

Table V-8.Operation and Maintenance Expenses

Description:	Projection Basis:	Actual 1999	Actual 2000	Projected 2001	Projected 2002	Projected 2003	Projected 2004	Projected 2005	Projected 2006	Projected 2007	Projected 2008	Projected 2009	Projected 2010
Personnel	Staffing Adjustment in 2001	$706,117	$621,371	$372,823	$372,823	$372,823	$372,823	$372,823	$372,823	$372,823	$372,823	$372,823	$372,823
Maintenance - Terminal	Terminal Space Adjustments in 2003, 2008 & 2017	$173,244	$175,409	$175,409	$175,409	$206,983	$206,983	$206,983	$206,983	$206,983	$519,527	$519,527	$519,527
Maintenance - Salon	Constant	$168,852	$4,658	$4,658	$4,658	$4,658	$4,658	$4,658	$4,658	$4,658	$4,658	$4,658	$4,658
Maintenance - Other Buildings	Cargo Space Adjustments in 2008 & 2017	$205,971	$196,910	$196,910	$196,910	$393,820	$393,820	$393,820	$393,820	$393,820	$393,820	$393,820	$393,820
Maintenance - Buses	US100k per bus amortized over 10 years starting 2003	$-	$-	$-	$-	$90,000	$90,000	$90,000	$90,000	$90,000	$150,000	$150,000	$150,000
Maintenance - Airfield	RW/TW Space Adjustments in 2003, 2008, 2013 & 2017	$52,360	$113,085	$113,085	$113,085	$135,702	$135,702	$135,702	$135,702	$135,702	$137,060	$137,060	$137,060
Maintenance - Other	Constant	$99,201	$124,321	$124,321	$124,321	$124,321	$124,321	$124,321	$124,321	$124,321	$124,321	$124,321	$124,321
Purchases - Maintenance Supplies	Terminal Space Adjustments in 2003, 2008 & 2017	$75,627	$50,472	$50,472	$50,472	$59,557	$59,557	$59,557	$59,557	$59,557	$149,487	$149,487	$149,487
Purchases - Electricity & Water	Terminal Space Adjustments in 2003, 2008 & 2017	$168,639	$150,900	$150,900	$150,900	$178,062	$178,062	$178,062	$178,062	$178,062	$446,936	$446,936	$446,936
Purchases - Fuel & Lubricants	Operations	$119,607	$77,372	$82,015	$92,517	$92,160	$97,674	$103,533	$109,709	$115,857	$122,784	$130,108	$137,873
Purchases - Other	Constant	$221,186	$285,440	$285,440	$285,440	$285,440	$285,440	$285,440	$285,440	$285,440	$285,440	$285,440	$285,440
Services - Security	Terminal Space Adjustments in 2003, 2008 & 2017	$84,721	$147,859	$147,859	$147,859	$174,474	$174,474	$174,474	$174,474	$174,474	$437,929	$437,929	$437,929
Services - Other	Constant	$178,480	$170,294	$170,294	$170,294	$170,294	$170,294	$170,294	$170,294	$170,294	$170,294	$170,294	$170,294
Finance Charges	Constant	$5,858	$7,989	$7,989	$7,989	$7,989	$7,989	$7,989	$7,989	$7,989	$7,989	$7,989	$7,989
Taxes	Constant	$7,882	$3,982	$3,982	$3,982	$3,982	$3,982	$3,982	$3,982	$3,982	$3,982	$3,982	$3,982
Other Charges	Constant	$4,184	$2,384	$2,384	$2,384	$2,384	$2,384	$2,384	$2,384	$2,384	$2,384	$2,384	$2,384
Subtotal Bamako-Sénou Airport		*$2,271,929*	*$2,132,448*	*$1,888,542*	*$1,899,044*	*$2,302,650*	*$2,308,164*	*$2,314,023*	*$2,320,199*	*$2,326,346*	*$3,329,435*	*$3,336,759*	*$3,344,524*
Personnel (Domestic Airports)	Staffing Adjustment in 2001	$2,562	$40,552	$24,331	$24,331	$24,331	$24,331	$24,331	$24,331	$24,331	$24,331	$24,331	$24,331
Maintenance - Terminal (Domestic Airports)	Completion of Terminal Projects in 2003	$10,538	$6,998	$6,998	$6,998	$8,257	$8,257	$8,257	$8,257	$8,257	$20,726	$20,726	$20,726
Maintenance - Buses (Domestic Airports)	Completion of Terminal Projects in 2003	$3,298	$90	$90	$90	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000
Maintenance - Airfield (Domestic Airports)	Constant	$-	$-	$-	$-	$10,000	$10,000	$10,000	$10,000	$10,000	$10,100	$10,100	$10,100
Purchases - Fuel & Lubricants (Domestic Airports)	Activity	$4,342	$3,773	$3,802	$3,869	$3,949	$4,038	$4,133	$4,240	$4,359	$4,485	$4,618	$4,758
Purchases - Other (Domestic Airports)	Constant	$17	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-
Services - Other (Domestic Airports)	Constant	$955	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-
Subtotal Domestic Airports		*$21,712*	*$51,412*	*$35,221*	*$35,288*	*$56,537*	*$56,626*	*$56,722*	*$56,829*	*$56,947*	*$69,642*	*$69,775*	*$69,915*
Total Operations & Maintenance Expenses	**Total Operations & Maintenance Expenses**	**$2,293,640**	**$2,183,859**	**$1,923,763**	**$1,934,332**	**$2,359,188**	**$2,364,791**	**$2,370,745**	**$2,377,027**	**$2,383,293**	**$3,399,077**	**$3,406,534**	**$3,414,439**
Total O&M Expenses Per Enplanement			$9	$7	$6	$8	$8	$7	$7	$6	$8	$8	$8

Table V-8. Operation and Maintenance Expenses - Continued

Description:	Projection Basis:	Projected 2011	Projected 2012	Projected 2013	Projected 2014	Projected 2015	Projected 2016	Projected 2017	Projected 2018	Projected 2019	Projected 2020	Average Ann. Growth Rate 2000-2020
Personnel	Staffing Adjustment in 2001	$372,823	$372,823	$372,823	$372,823	$372,823	$372,823	$372,823	$372,823	$372,823	$372,823	-2.52%
Maintenance - Terminal	Terminal Space Adjustments in 2003, 2008 & 2017	$519,527	$519,527	$519,527	$519,527	$519,527	$519,527	$519,527	$675,386	$675,386	$675,386	6.97%
Maintenance - Salon	Constant	$4,658	$4,658	$4,658	$4,658	$4,658	$4,658	$4,658	$4,658	$4,658	$4,658	0.00%
Maintenance - Other Buildings	Cargo Space Adjustments in 2008 & 2017	$393,820	$393,820	$393,820	$393,820	$393,820	$393,820	$393,820	$393,820	$393,820	$393,820	3.53%
Maintenance - Buses	US100k per bus amortized over 10 years starting 2003	$150,000	$150,000	$150,000	$150,000	$150,000	$150,000	$150,000	$150,000	$150,000	$150,000	-
Maintenance - Airfield	RW/TW Space Adjustments in 2003, 2008, 2013 & 2017	$137,060	$137,060	$148,024	$148,024	$148,024	$148,024	$148,024	$176,149	$176,149	$176,149	2.24%
Maintenance - Other	Constant	$124,321	$124,321	$124,321	$124,321	$124,321	$124,321	$124,321	$124,321	$124,321	$124,321	0.00%
Purchases - Maintenance Supplies	Terminal Space Adjustments in 2003, 2008 & 2017	$149,487	$149,487	$149,487	$149,487	$149,487	$149,487	$149,487	$194,333	$194,333	$194,333	6.97%
Purchases - Electricity & Water	Terminal Space Adjustments in 2003, 2008 & 2017	$446,936	$446,936	$446,936	$446,936	$446,936	$446,936	$446,936	$581,017	$581,017	$581,017	6.97%
Purchases - Fuel & Lubricants	Operations	$145,101	$153,759	$161,824	$170,669	$178,270	$187,132	$194,546	$203,250	$210,325	$218,389	5.33%
Purchases - Other	Constant	$285,440	$285,440	$285,440	$285,440	$285,440	$285,440	$285,440	$285,440	$285,440	$285,440	0.00%
Services - Security	Terminal Space Adjustments in 2003, 2008 & 2017	$437,929	$437,929	$437,929	$437,929	$437,929	$437,929	$437,929	$569,308	$569,308	$569,308	6.97%
Services - Other	Constant	$170,294	$170,294	$170,294	$170,294	$170,294	$170,294	$170,294	$170,294	$170,294	$170,294	0.00%
Finance Charges	Constant	$7,989	$7,989	$7,989	$7,989	$7,989	$7,989	$7,989	$7,989	$7,989	$7,989	0.00%
Taxes	Constant	$3,982	$3,982	$3,982	$3,982	$3,982	$3,982	$3,982	$3,982	$3,982	$3,982	0.00%
Other Charges	Constant	$2,384	$2,384	$2,384	$2,384	$2,384	$2,384	$2,384	$2,384	$2,384	$2,384	0.00%
Subtotal Bamako-Sénou Airport		*$3,351,752*	*$3,360,410*	*$3,379,439*	*$3,388,284*	*$3,395,885*	*$3,404,747*	*$3,412,161*	*$3,915,154*	*$3,922,229*	*$3,930,293*	*3.10%*
Personnel (Domestic Airports)	Staffing Adjustment in 2001	$24,331	$24,331	$24,331	$24,331	$24,331	$24,331	$24,331	$24,331	$24,331	$24,331	-2.52%
Maintenance - Terminal (Domestic Airports)	Completion of Terminal Projects in 2003	$20,726	$20,726	$20,726	$20,726	$20,726	$20,726	$20,726	$26,944	$26,944	$26,944	6.97%
Maintenance - Buses (Domestic Airports)	Completion of Terminal Projects in 2003	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	26.58%
Maintenance - Airfield (Domestic Airports)	Constant	$10,100	$10,100	$10,908	$10,908	$10,908	$10,908	$10,908	$12,981	$12,981	$12,981	-
Purchases - Fuel & Lubricants (Domestic Airports)	Activity	$4,911	$5,070	$5,239	$5,413	$5,594	$5,791	$5,999	$6,214	$6,436	$6,665	2.89%
Purchases - Other (Domestic Airports)	Constant	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	-
Services - Other (Domestic Airports)	Constant	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	-
Subtotal Domestic Airports		*$70,068*	*$70,227*	*$71,204*	*$71,378*	*$71,559*	*$71,756*	*$71,964*	*$80,469*	*$80,691*	*$80,920*	*2.29%*
Total Operations & Maintenance Expenses	**Total Operations & Maintenance Expenses**	**$3,421,820**	**$3,430,637**	**$3,450,643**	**$3,459,662**	**$3,467,445**	**$3,476,504**	**$3,484,125**	**$3,995,623**	**$4,002,920**	**$4,011,214**	**3.09%**
Total O&M Expenses Per Enplanement		$7	$7	$6	$6	$6	$5	$5	$6	$5	$5	-2.67%

5.5 Revenues

This subsection analyzes the revenues of Bamako-Sénou and the nine domestic airports. The types of revenues that would be involved under the proposed concession arrangement are identified, and projections are made for these revenues over the proposed 20-year concession period. These revenues represent inflows in the cash flow analysis presented later in this Chapter.

The historical (2000) revenues were analyzed from the trial balance for all of the airports as provided by ADM, including balances for all of the individual accounts. The revenues for Bamako-Sénou were derived by subtracting the corresponding account balances for the nine domestic airports, also as provided by ADM. These revenues were then reclassified into 17 categories that were useful for future projections. This data, showing the revenues for Bamako-Sénou and the nine domestic airports separately, is contained in an appendix at the end of this Chapter.

The projections (2001 through 2020) of revenues reflect several key assumptions. The first assumption is that the airports will be expanded and improved, with certain existing revenues being increased based on the expanded facilities and expanded passenger and cargo traffic. The second assumption was that under a concession, the airports would be operated collectively as a business enterprise, and that certain rates and charges could be increased in order to enhance airport profitability and make a concession financially feasible. The revenue projections, which follow constitute a Base-line Scenario for purposes of the cash flow analysis.

Revenues are presented in Table V-9. As shown, actual revenues were US$ 2,890,000 in 2000 and are projected to increase to US$ 27,914,000 in 2020 (the final year of the proposed concession period), representing an average annual growth rate of 12.01 percent. On a per enplanement basis, these revenues are projected to increase from $11.71 in 2000 to $35.82 in 2020, representing an average annual growth rate of 5.75 percent. This growth rate focuses on the revenue-enhancement measures that the Consultant expects would be implemented by the proposed concessionaire to improve the financial performance of the airports following privatization (i.e., tariff rate increases, new revenue sources, etc.), eliminating the impact of activity growth on revenue generation. The revenue components, as well as the basis for the projections, are described below:

- *Fees* – In 2000, this component included fees paid by passengers, fuel suppliers, and for cargo operators. As previously noted, no fees are currently paid to the airports for aircraft handling rights on their aprons. The projections for this component include the addition of a US$ 3.00 fee per commercial aircraft operation to be paid to the concessionaire. Projections also reflect the addition of fees paid by cargo shippers and fuel suppliers. The most important fee in this category, the passenger service charge, is projected to increase over the twenty year concession

period, from its current average of US$ 6.35 per enplaned passenger in 2000, to approximately US$ 10.00 in 2001, to US$ 15.00 in 2003, and to US$ 20.00 in 2008. These adjustments are timed to coincide with the takeover by the proposed concessionaire in 2001, completion of the existing terminal expansion and improvement at Bamako-Sénou Airport in 2003 and completion of the new international terminal there in 2008. It should be noted that the current international passenger service charges in Mali are in-line with those in other West African countries, with the same levels as Benin, Cote d'Ivoire, and Togo, and lower levels than Ghana.

- *Rents* – In 2000, this component included rents from terminal tenants. Projections reflect the expansion of revenue-producing terminal space at Bamako-Sénou Airport, as well as rate increases (from approximately US$ 30 per meter per year currently to US$ 60 per square meter when the new international terminal there is opened in 2008).

- *Terminal Concessions* – In 2000, this component included percentages of gross revenues for snack bars and gift shops at Bamako-Sénou Airport and the domestic airports. Projections reflect the addition of duty free and restaurant concessions at Bamako-Sénou and certain tourist-related domestic airports (Gao, Mopti and Tombouctou), the growth of aviation activity and higher concession yields (from approximately US$ 0.30 per enplaned passenger currently to US$ 2.00 and US$ 3.00 per enplaned passenger when the existing terminal at Bamako-Sénou Airport is expanded in 2003 and the new international terminal is opened there in 2008, respectively).

- *Other Concessions* – In 2000, this component included the percentages of gross revenues for bus operations and automobile parking lot. Projections reflect the addition of rental car and catering concessions in the future, the growth of aviation activity and standard yields from these other concession sources (approximately US$ 1.20 per enplaned passenger when the new international terminal at Bamako-Sénou Airport is opened in 2008).

- *Electricity and Water* – In 2000, this component included resale of these utilities to terminal tenants. Projections reflect the recovery of 60 percent of the projected cost of these utilities, which in-turn reflects the proportion of the terminal space that is rentable.

- *Security* – In 2000, this component included security charges paid by the airlines. Projections reflect the increase in aviation activity, based on the current split of these revenues.

- *Interest Income* – In 2000, this component included interest income from bank deposits. Projections reflect a continuation of this revenue source without increase.

Table V-9.Revenues

Description:	Projection Basis:	Actual 1999	Projected 2000	Projected 2001	Projected 2002	Projected 2003	Projected 2004	Projected 2005	Projected 2006	Projected 2007	Projected 2008	Projected 2009	Projected 2010
Passenger Service Charge	Enplanements, Rate Adjustments in 2003 and 2018	$1,567,538	$1,567,351	$2,503,842	$2,940,803	$4,259,883	$4,536,778	$4,831,673	$5,145,726	$5,480,196	$7,295,511	$7,769,712	$8,274,752
Fuel Charge	Operations, Rate Adjustment in 2001	$190,133	$128,233	$679,642	$766,671	$763,718	$809,412	$857,965	$909,142	$960,084	$1,017,494	$1,078,185	$1,142,531
Cargo Charge	Kilograms	$190,594	$129,631	$137,409	$145,654	$151,480	$157,539	$163,841	$170,394	$177,210	$184,299	$191,670	$199,337
Aircraft Handling Charge (New)	Operations, Rate Established in 2001	$-	$-	$29,880	$32,589	$33,000	$34,686	$36,471	$38,346	$40,113	$42,192	$44,385	$46,701
Rent - Terminal	Terminal Space, Rate Adjustment in 2008	$217,768	$178,880	$178,880	$178,880	$211,078	$211,078	$211,078	$211,078	$211,078	$1,059,613	$1,059,613	$1,059,613
Rent - Other	Cargo Space, Rate Adjustment in 2008	$82,744	$97,543	$97,543	$97,543	$1,170,514	$1,170,514	$1,170,514	$1,170,514	$1,170,514	$1,170,514	$1,170,514	$1,170,514
Terminal Concession - Bar	Enplanements, Rate Adjustments in 2003 and 2008	$731	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-
Terminal Concession - Other	Enplanements, Rate Adjustments in 2003 and 2008	$32,980	$74,749	$79,608	$93,500	$541,757	$576,972	$614,476	$654,416	$696,953	$927,818	$988,126	$1,052,355
Terminal Concession - Duty Free (New)	Enplanements, Rate Established in 2008	$-	$-	$-	$-	$-	$-	$-	$-	$-	$164,956	$175,678	$187,097
Terminal Concession - Restaurant (New)	Enplanements, Rate Established in 2008	$-	$-	$-	$-	$-	$-	$-	$-	$-	$106,423	$113,340	$120,708
Other Concession - Bus	Buses, $50K per Bus Amortized over 10 Years	$15,292	$5,351	$5,351	$5,351	$90,000	$90,000	$90,000	$90,000	$90,000	$150,000	$150,000	$150,000
Other Concession - Parking	Enplanements, Rate Adjustments in 2003 and 2008	$(15,281)	$28,615	$30,475	$35,794	$207,397	$220,877	$235,235	$250,525	$266,809	$355,189	$378,276	$402,864
Other Concession - Car Rental (New)	Enplanements, Rate Established in 2003	$-	$-	$-	$-	$24,209	$25,783	$27,459	$29,243	$30,978	$32,991	$35,136	$37,419
Other Concession - Catering (New)	Enplanements, Rate Established in 2003	$-	$-	$-	$-	$51,784	$55,150	$58,735	$62,553	$66,619	$70,949	$75,560	$80,472
Reimbursement - Electricity & Water	60% of Electricity & Water Expense, Starting in 2001	$101,274	$115,379	$90,540	$90,540	$106,837	$106,837	$106,837	$106,837	$106,837	$268,162	$268,162	$268,162
Security Income	Operations	$451,667	$455,970	$485,608	$570,354	$550,789	$586,591	$624,720	$665,326	$708,572	$754,629	$803,679	$855,919
Interest Income	Constant	$38,623	$56,093	$56,093	$56,093	$56,093	$56,093	$56,093	$56,093	$56,093	$56,093	$56,093	$56,093
Subtotal Bamako-Sénou Airport		*$2,874,063*	*$2,837,794*	*$4,374,870*	*$5,013,772*	*$8,218,539*	*$8,638,310*	*$9,085,094*	*$9,560,191*	*$10,062,054*	*$13,656,832*	*$14,358,129*	*$15,104,536*
Passenger Service Charge (Domestic Airports) (New)	Start Charging in 2001; Rate Adjustments in 2003 & 2018	$-	$-	$142,542	$149,540	$235,332	$246,906	$259,064	$271,823	$285,229	$374,131	$392,612	$411,861
Fuel Charge (Domestic Airports)	Operations, Rate Adjustment in 2001	$-	$3,092	$15,580	$15,855	$16,182	$16,546	$16,937	$17,375	$17,861	$18,378	$18,922	$19,497
Aircraft Handling Charge (New)	Operations, Rate Established in 2001	$-	$-	$8,853	$9,009	$9,195	$9,402	$9,624	$9,873	$10,149	$10,443	$10,752	$11,079
Rent - Other (Domestic Airports)	Terminal Space, Rate Adjustment in 2008	$-	$6,259	$6,259	$6,259	$6,259	$6,259	$6,259	$6,259	$6,259	$6,259	$6,259	$6,259
Terminal Concession - Bar (Domestic Airports)	Enplanements, Rate Adjustments in 2003 and 2008	$5,559	$3,279	$3,440	$3,609	$22,715	$23,832	$25,006	$26,237	$27,531	$36,112	$37,896	$39,754
Terminal Concession - Duty Free (New)	Enplanements, Rate Established in 2008	$-	$-	$-	$-	$-	$-	$-	$-	$-	$23,868	$25,047	$26,275
Terminal Concession - Restaurant (New)	Enplanements, Rate Established in 2008	$-	$-	$-	$-	$-	$-	$-	$-	$-	$14,321	$15,028	$15,765
Other Concession - Bus (Domestic Airports)	Buses, $50K per Bus Amortized over 10 Years	$3,106	$88	$88	$88	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000
Other Concession - Parking (domestic Airports)	Enplanements, Rate Adjustments in 2003 and 2008	$37,987	$26,314	$27,606	$28,962	$182,309	$191,276	$200,694	$210,578	$220,963	$289,835	$304,152	$319,064
Other Concession - Car Rental (New)	Enplanements, Rate Established in 2003	$-	$-	$-	$-	$3,753	$3,938	$4,132	$4,335	$4,549	$4,774	$5,009	$5,255
Other Concession - Catering (New)	Enplanements, Rate Established in 2003	$-	$-	$-	$-	$7,507	$7,876	$8,264	$8,671	$9,098	$9,547	$10,019	$10,510
Security Income (Domestic Airports)	Operations	$24,319	$12,934	$13,569	$14,235	$14,934	$15,669	$16,440	$17,250	$18,101	$18,994	$19,932	$20,909
Interest Income (Domestic Airports)	Constant	$49	$68	$68	$68	$68	$68	$68	$68	$68	$68	$68	$68
Subtotal Domestic Airports		*$71,020*	*$52,033*	*$218,005*	*$227,623*	*$508,254*	*$531,772*	*$556,487*	*$582,470*	*$609,808*	*$816,730*	*$855,697*	*$896,297*
Total Revenues	**Total Revenues**	**$2,945,083**	**$2,889,828**	**$4,592,875**	**$5,241,395**	**$8,726,794**	**$9,170,082**	**$9,641,581**	**$10,142,662**	**$10,671,862**	**$14,473,562**	**$15,213,825**	**$16,000,833**
Total Revenues Per Enplanement			$12	$18	$17	$29	$29	$29	$28	$28	$36	$36	$35

Table V-9. Revenues - Continued

Description:	Projection Basis:	Projected 2011	Projected 2012	Projected 2013	Projected 2014	Projected 2015	Projected 2016	Projected 2017	Projected 2018	Projected 2019	Projected 2020	Average Ann Growth Rate 2000-2020
Passenger Service Charge	Enplanements, Rate Adjustments in 2003 and 2018	$8,812,614	$9,385,428	$9,995,475	$10,595,209	$11,199,138	$11,815,078	$12,429,475	$13,050,947	$13,664,347	$14,279,237	11.68%
Fuel Charge	Operations, Rate Adjustment in 2001	$1,202,425	$1,274,176	$1,341,006	$1,414,304	$1,477,291	$1,550,729	$1,612,169	$1,684,295	$1,742,924	$1,809,754	14.15%
Cargo Charge	Kilograms	$207,311	$215,603	$224,227	$233,196	$242,524	$249,800	$257,294	$265,013	$272,963	$281,152	3.95%
Aircraft Handling Charge (New)	Operations, Rate Established in 2001	$48,615	$51,165	$53,271	$55,818	$57,687	$60,177	$61,905	$64,287	$65,826	$67,884	-
Rent - Terminal	Terminal Space, Rate Adjustment in 2008	$1,059,613	$1,059,613	$1,059,613	$1,059,613	$1,059,613	$1,059,613	$1,059,613	$2,754,995	$2,754,995	$2,754,995	14.65%
Rent - Other	Cargo Space, Rate Adjustment in 2008	$1,170,514	$1,170,514	$1,170,514	$1,170,514	$1,170,514	$1,170,514	$1,170,514	$1,170,514	$1,170,514	$1,170,514	13.23%
Terminal Concession - Bar	Enplanements, Rate Adjustments in 2003 and 2008	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	-
Terminal Concession - Other	Enplanements, Rate Adjustments in 2003 and 2008	$1,120,758	$1,193,607	$1,588,988	$1,684,328	$1,780,335	$1,878,252	$1,975,923	$2,074,719	$2,172,231	$2,269,981	18.61%
Terminal Concession - Duty Free (New)	Enplanements, Rate Established in 2008	$197,116	$209,928	$276,429	$293,015	$306,313	$323,161	$336,188	$352,997	$365,435	$381,880	-
Terminal Concession - Restaurant (New)	Enplanements, Rate Established in 2008	$128,554	$136,910	$145,809	$154,557	$163,367	$172,352	$181,315	$190,380	$199,328	$208,298	-
Other Concession - Bus	Buses, $50K per Bus Amortized over 10 Years	$150,000	$150,000	$150,000	$150,000	$150,000	$150,000	$150,000	$150,000	$150,000	$150,000	18.14%
Other Concession - Parking	Enplanements, Rate Adjustments in 2003 and 2008	$429,051	$456,939	$608,299	$644,797	$681,551	$719,036	$756,426	$794,247	$831,577	$868,998	18.61%
Other Concession - Car Rental (New)	Enplanements, Rate Established in 2003	$39,423	$41,986	$44,229	$46,882	$49,010	$51,706	$53,790	$56,480	$58,470	$61,101	-
Other Concession - Catering (New)	Enplanements, Rate Established in 2003	$85,703	$91,273	$97,206	$103,038	$108,911	$114,901	$120,876	$126,920	$132,886	$138,865	-
Reimbursement - Electricity & Water	60% of Electricity & Water Expense, Starting in 2001	$268,162	$268,162	$268,162	$268,162	$268,162	$268,162	$268,162	$348,610	$348,610	$348,610	5.68%
Security Income	Operations	$911,554	$970,804	$1,033,906	$1,095,941	$1,158,410	$1,222,121	$1,285,672	$1,349,956	$1,413,404	$1,477,007	6.05%
Interest Income	Constant	$56,093	$56,093	$56,093	$56,093	$56,093	$56,093	$56,093	$56,093	$56,093	$56,093	0.00%
Subtotal Bamako-Sénou Airport		*$15,887,504*	*$16,732,199*	*$18,113,226*	*$19,025,468*	*$19,928,920*	*$20,861,693*	*$21,775,415*	*$24,490,452*	*$25,399,602*	*$26,324,368*	*11.78%*
Passenger Service Charge (Domestic Airports) (New)	Start Charging in 2001; Rate Adjustments in 2003 & 2018	$432,074	$453,297	$475,580	$498,982	$539,244	$549,393	$576,519	$605,000	$634,924	$666,352	-
Fuel Charge (Domestic Airports)	Operations, Rate Adjustment in 2001	$20,126	$20,775	$21,467	$22,179	$22,924	$23,732	$24,582	$25,463	$26,371	$27,311	11.51%
Aircraft Handling Charge (New)	Operations, Rate Established in 2001	$11,436	$11,805	$12,198	$12,603	$13,026	$13,485	$13,968	$14,469	$14,985	$15,519	-
Rent - Other (Domestic Airports)	Terminal Space, Rate Adjustment in 2008	$6,259	$6,259	$6,259	$6,259	$6,259	$6,259	$6,259	$6,259	$6,259	$6,259	0.00%
Terminal Concession - Bar (Domestic Airports)	Enplanements, Rate Adjustments in 2003 and 2008	$41,705	$43,754	$57,381	$60,204	$65,062	$66,287	$69,559	$72,996	$76,606	$80,398	17.35%
Terminal Concession - Duty Free (New)	Enplanements, Rate Established in 2008	$27,565	$28,919	$37,925	$39,791	$43,002	$43,811	$45,974	$48,246	$50,632	$53,138	-
Terminal Concession - Restaurant (New)	Enplanements, Rate Established in 2008	$16,539	$17,351	$18,204	$19,100	$20,641	$21,029	$22,068	$23,158	$24,303	$25,506	-
Other Concession - Bus (Domestic Airports)	Buses, $50K per Bus Amortized over 10 Years	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	26.73%
Other Concession - Parking (domestic Airports)	Enplanements, Rate Adjustments in 2003 and 2008	$334,723	$351,164	$460,533	$483,195	$522,182	$532,011	$558,278	$585,859	$614,835	$645,269	17.35%
Other Concession - Car Rental (New)	Enplanements, Rate Established in 2003	$5,513	$5,784	$6,068	$6,367	$6,880	$7,010	$7,356	$7,719	$8,101	$8,502	-
Other Concession - Catering (New)	Enplanements, Rate Established in 2003	$11,026	$11,567	$12,136	$12,733	$13,761	$14,020	$14,712	$15,439	$16,202	$17,004	-
Security Income (Domestic Airports)	Operations	$21,936	$23,013	$24,144	$25,333	$27,377	$27,892	$29,269	$30,715	$32,234	$33,830	4.92%
Interest Income (Domestic Airports)	Constant	$68	$68	$68	$68	$68	$68	$68	$68	$68	$68	0.00%
Subtotal Domestic Airports		*$938,968*	*$983,757*	*$1,141,962*	*$1,196,815*	*$1,290,425*	*$1,314,996*	*$1,378,612*	*$1,445,390*	*$1,515,521*	*$1,589,157*	*18.64%*
Total Revenues	**Total Revenues**	**$16,826,472**	**$17,715,956**	**$19,255,189**	**$20,222,283**	**$21,219,345**	**$22,176,689**	**$23,154,027**	**$25,935,842**	**$26,915,124**	**$27,913,526**	**12.01%**
Total Revenues Per Enplanement		$35	$34	$35	$35	$35	$34	$34	$36	$36	$36	5.75%

5.6 Cash Flow

This subsection contains three sets of cash flow projections, with each set demonstrating the financial performance of a 20-year concession for the airports, providing the results in net present values and internal rates of return.

The first set represents the Baseline Case (existing arrangements whereby the concessionaire would be responsible for all airside and landside development and ASECNA would receive all landing fee, aircraft parking and airfield lighting fee revenues, as explained in Subsection 10.2.3 of the Bamako-Sénou Airport Feasibility Expansion Study) and includes 12 outcomes, as follows:

- Baseline Expenses and Revenues for Bamako-Sénou Terminal Alternatives 1, 2 and 3 (3 outcomes)
- Lower Activity for Bamako-Sénou Terminal Alternatives 1, 2 and 3 (3 outcomes)
- Higher Expenses (+ 10 percent) for Bamako-Sénou Terminal Alternatives 1, 2 and 3 (3 outcomes)
- Lower Revenues (- 10 percent) for Bamako-Sénou Terminal Alternatives 1, 2 and 3 (3 outcomes)

The second set focuses on the Alternative A Case (revised arrangements with the concessionaire responsible for landside development requirements and ASECNA responsible for the airside development requirements and with ASECNA receiving all of the landing fee and airfield lighting fee revenues in support thereof), likewise with 12 outcomes as above.

The third set focuses on the Alternative B Case (revised arrangements with the concessionaire responsible for both the airside and landside development requirements and the concessionaire and ASECNA splitting the landing fee, aircraft parking fee and airfield lighting fee revenues to support their respective airside development responsibilities in an equitable manner), also with 12 outcomes as above. The third set also identifies the percentages of these revenue sources the concessionaire would have to receive in order for the concessionaire to realize a minimum IRR of 20 percent for the three terminal alternatives at Bamako-Sénou Airport.

In general, the capital development program for the airports generate exclusively outflows consisting of equity investments (see Table V-4) and debt service requirements (see Table V-5) on the one part of the concessionaire. Also, the operations of the airports generate both inflows and outflows. The outflows include the operation and maintenance expenses experienced by the

airports (see Table V-6). The outflows also include profit taxes, which are assumed to be 30 percent of the operating profit (i.e., corresponding to the difference between revenues and operation and maintenance expenses). The inflows consist of the revenues realized by the airports (see Table V-7).

When these inflows and outflows are combined, the outcomes represent either surpluses or deficits, but neither takes into consideration the time value of money, which the proposed concessionaire would need to determine in order to compare this investment opportunity with other available investment alternatives.

NPV takes into consideration the time value of money, representing one measure of the relative worth of alternative investment options. NPV represents the worth of the investment in terms of its monetary value at the present time, using the cost of capital required for the capital investment program as the discount factor (i = interest rate) and the 20-year concession period as the time factor (n = number of compound periods).

IRR also takes into consideration the time value of money, representing another measure of the relative worth of alternative investment options. IRR represents the worth of the investment in terms of its percentage yield over the 20-year concession period. The internal rate of return will be positive if the cash flow is positive, but the NPV will be positive only if the IRR exceeds the cost of capital.

5.6.1 Baseline Case Cash Flows

The cash flows for the Baseline Case are summarized in Table V-10, representing a matrix showing the gross cash flow, the NPV and the IRR for the each of the 12 variations of the Baseline Case. As noted earlier, an investor would discard any investment opportunity with a negative NPV, meaning that its average cost of capital exceeded its IRR. In effect, the financial cost of implementing such an investment opportunity would exceed the financial return from it.

Based on this reasoning and the target level of at least 20 percent previously established for the IRR, the proposed concessionaire would not consider the Baseline Case to be feasible because IRRs are below 20 percent under each terminal alternative, with IRRs of 6.39 percent under Terminal Alternative 1, 3.04 percent under Terminal Alternative 2 and a negative percentage under Terminal Alternative 3. Essentially, this demonstrates that the existing financial structure whereby the concessionaire would become responsible for both airside and landside capital development while ASECNA would continue to realize 100 percent of airside (landing fee and airfield lighting fee) revenues would not represent an acceptable basis for the concession of Bamako-Sénou and the nine domestic airports.

The details for each of the 12 cash flow scenarios are presented in Tables V-11 through V-22, with baseline activity, expense and revenue scenarios reflected in Tables V-11 through V-13, with lower activity sensitivity scenarios reflected in Tables V-14 through V-16, with higher expense sensitivity scenarios reflected in Tables V-17 through V-19, and with lower revenue sensitivity scenarios reflected in Tables V-20 through V-22.

Table V-10. Baseline Case Cash Flows

Concession Responsible for all Airside & Landside Development and Receives 0% of Landing Fee Revenue	Alternative 1 Single-Level Terminal (Bamako) Cost (Bamako) $65,679,454 Cost (Domestic) $29,967,761	Alternative 2 Split-Level Terminal (Bamako) Cost (Bamako) $76,762,003 Cost (Domestic) $29,967,761	Alternative 3 Two-Level Terminal (Bamako) Cost (Bamako) $87,837,653 Cost (Domestic) $29,967,761
Baseline Scenario			
Gross Cash Flow	$34,571,115	$17,540,270	$520,027
Net Present Value (NPV)	(8,397,517)	(13,172,928)	(17,945,366)
Internal Rate of Return (IRR)	6.39%	3.04%	Negative
Lower Activity Scenario			
Gross Cash Flow	$30,165,122	$13,134,277	$(3,885,966)
Net Present Value (NPV)	(9,348,903)	(14,124,314)	(18,896,752)
Internal Rate of Return (IRR)	5.56%	2.28%	Negative
Higher Expense Scenario			
Gross Cash Flow	$30,068,880	$13,038,035	$(3,982,208)
Net Present Value (NPV)	(9,633,907)	(14,409,318)	(19,181,756)
Internal Rate of Return (IRR)	5.48%	2.24%	Negative
Lower Revenue Scenario			
Gross Cash Flow	$11,604,132	$(6,339,330)	$(22,446,956)
Net Present Value (NPV)	(13,393,223)	(18,403,486)	(22,941,072)
Internal Rate of Return (IRR)	2.17%	Negative	Negative

Table V-11. Baseline Cash Flow – Baseline Activity Scenario, Alternative 1

Inflows & Outflows:	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
From Development Program:											
Investor Equity Invest - Stages I, II, III & IV (Bamako)	$-	$(2,554,550)	$(2,554,550)	$-	$-	$-	$(4,455,087)	$(4,455,087)	$-	$-	$-
Dev. Bank Debt Service - Stage I (Bamako)	$-	$(1,144,438)	$(1,144,438)	$(1,539,621)	$(1,539,621)	$(1,539,621)	$(1,539,621)	$(1,539,621)	$(1,539,621)	$(1,539,621)	$(1,539,621)
Supp. Credit Repayment - Stage I (Bamako)	$-	$(333,795)	$(333,795)	$(694,492)	$(694,492)	$(694,492)	$(694,492)	$(694,492)	$-	$-	$-
Dev. Bank Debt Service - Stage II (Bamako)	$-	$-	$-	$-	$-	$-	$(1,871,137)	$(1,871,137)	$(2,517,253)	$(2,517,253)	$(2,517,253)
Supp. Credit Repayment - Stage II (Bamako)	$-	$-	$-	$-	$-	$-	$(769,986)	$(769,986)	$(1,513,976)	$(1,513,976)	$(1,513,976)
Investor Equity Invest - Stages I, II, III & IV (Domestic)	$-	$(2,340,900)	$(2,340,900)	$-	$-	$-	$(1,048,392)	$(1,048,392)	$-	$-	$-
Dev. Bank Debt Service - Stage I (Domestic)	$-	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)
Supp. Credit Repayment - Stage I (Domestic)	$-	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$-	$-	$-
Dev. Bank Debt Service - Stage II (domestic)	$-	$-	$-	$-	$-	$-	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)
Supp. Credit Repayment - Stage II (Domestic)	$-	$-	$-	$-	$-	$-	$(356,276)	$(356,276)	$(356,276)	$(356,276)	$(356,276)
From Operations:											
Revenues (Bamako)	$2,837,794	$4,374,870	$5,013,772	$8,218,539	$8,638,310	$9,085,094	$9,560,191	$10,062,054	$13,656,832	$14,358,129	$15,104,536
Expenses (Bamako)	$(2,132,448)	$(1,888,542)	$(1,899,044)	$(2,302,650)	$(2,308,164)	$(2,314,023)	$(2,320,199)	$(2,326,346)	$(3,329,435)	$(3,336,759)	$(3,344,524)
Profit Taxes (Bamako)	$(211,604)	$(745,898)	$(934,418)	$(1,774,767)	$(1,899,044)	$(2,031,321)	$(2,171,998)	$(2,320,712)	$(3,098,219)	$(3,306,411)	$(3,528,004)
Revenues (Domestic)	$52,033	$218,005	$227,623	$508,254	$531,772	$556,487	$582,470	$609,808	$816,730	$855,697	$896,297
Expenses (Domestic)	$(51,412)	$(35,221)	$(35,288)	$(56,537)	$(56,626)	$(56,722)	$(56,829)	$(56,947)	$(69,642)	$(69,775)	$(69,915)
Profit Taxes (Domestic)	$(186)	$(54,835)	$(57,701)	$(135,515)	$(142,544)	$(149,930)	$(157,692)	$(165,858)	$(224,126)	$(235,777)	$(247,914)
Annual Gross Cash Flow	*$494,178*	*$(6,552,566)*	*$(6,106,001)*	*$175,950*	*$482,330*	*$808,211*	*$(7,938,681)*	*$(7,572,627)*	*$(178,212)*	*$334,752*	*$880,124*

Inflows & Outflows:	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total 2000-2020
From Development Program:											
Investor Equity Invest - Stages I, II, III & IV (Bamako)	$(2,057,962)	$(2,057,962)	$-	$-	$-	$(7,416,307)	$(7,416,307)	$-	$-	$-	$(32,967,813)
Dev. Bank Debt Service - Stage I (Bamako)	$(1,539,621)	$(1,539,621)	$(1,539,621)	$(1,539,621)	$-	$-	$-	$-	$-	$-	$(20,764,325)
Supp. Credit Repayment - Stage I (Bamako)	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	$(4,140,050)
Dev. Bank Debt Service - Stage II (Bamako)	$(2,517,253)	$(2,517,253)	$(2,517,253)	$(2,517,253)	$(2,517,253)	$(2,517,253)	$(2,517,253)	$(2,517,253)	$(2,517,253)	$-	$(33,949,308)
Supp. Credit Repayment - Stage II (Bamako)	$(1,513,976)	$(1,513,976)	$-	$-	$-	$-	$-	$-	$-	$-	$(9,109,852)
Investor Equity Invest - Stages I, II, III & IV (Domestic)	$(1,985,041)	$(1,985,041)	$-	$-	$-	$(1,701,200)	$(1,701,200)	$-	$-	$-	$(14,151,065)
Dev. Bank Debt Service - Stage I (Domestic)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$-	$-	$-	$-	$-	$-	$(19,751,956)
Supp. Credit Repayment - Stage I (Domestic)	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	$(4,454,856)
Dev. Bank Debt Service - Stage II (domestic)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,371)	$-	$(8,293,207)
Supp. Credit Repayment - Stage II (Domestic)	$(356,276)	$(356,275)	$-	$-	$-	$-	$-	$-	$-	$-	$(2,493,931)
From Operations:											
Revenues (Bamako)	$15,887,504	$16,732,199	$18,113,226	$19,025,468	$19,928,920	$20,861,693	$21,775,415	$24,490,452	$25,399,602	$26,324,368	$309,448,970
Expenses (Bamako)	$(3,351,752)	$(3,360,410)	$(3,379,439)	$(3,388,284)	$(3,395,885)	$(3,404,747)	$(3,412,161)	$(3,915,154)	$(3,922,229)	$(3,930,293)	$(62,962,490)
Profit Taxes (Bamako)	$(3,760,726)	$(4,011,537)	$(4,420,136)	$(4,691,155)	$(4,959,910)	$(5,237,084)	$(5,508,976)	$(6,172,589)	$(6,443,212)	$(6,718,222)	$(73,945,944)
Revenues (Domestic)	$938,968	$983,757	$1,141,962	$1,196,815	$1,290,425	$1,314,996	$1,378,612	$1,445,390	$1,515,521	$1,589,157	$18,650,780
Expenses (Domestic)	$(70,068)	$(70,227)	$(71,204)	$(71,378)	$(71,559)	$(71,756)	$(71,964)	$(80,469)	$(80,691)	$(80,920)	$(1,355,151)
Profit Taxes (Domestic)	$(260,670)	$(274,059)	$(321,228)	$(337,631)	$(365,660)	$(372,972)	$(391,994)	$(409,476)	$(430,449)	$(452,471)	$(5,188,689)
Annual Gross Cash Flow	*$(2,590,098)*	*$(1,973,629)*	*$5,003,082*	*$5,673,735*	*$9,316,705*	*$862,998*	*$1,541,799*	*$12,248,529*	*$12,928,919*	*$16,731,618*	*$34,571,115*
Weighted Average Cost of Capital (WACC)											13.74%
Net Present Value (NPV)											$(8,397,517)
Internal Rate of Return (IRR)											6.39%

Table V-12. Baseline Cash Flow Scenario – Baseline Activity Scenario, Alternative 2

Inflows & Outflows:	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
From Development Program:											
Investor Equity Invest - Stages I, II, III & IV (Bamako)	$-	$(2,985,597)	$(2,985,597)	$-	$-	$-	$(5,206,825)	$(5,206,825)	$-	$-	$-
Dev. Bank Debt Service - Stage I (Bamako)	$-	$(1,337,547)	$(1,337,547)	$(1,799,412)	$(1,799,412)	$(1,799,412)	$(1,799,412)	$(1,799,412)	$(1,799,412)	$(1,799,412)	$(1,799,412)
Supp. Credit Repayment - Stage I (Bamako)	$-	$(390,119)	$(390,119)	$(811,678)	$(811,678)	$(811,678)	$(811,678)	$(811,678)	$-	$-	$-
Dev. Bank Debt Service - Stage II (Bamako)	$-	$-	$-	$-	$-	$-	$(2,186,867)	$(2,186,867)	$(2,942,006)	$(2,942,006)	$(2,942,006)
Supp. Credit Repayment - Stage II (Bamako)	$-	$-	$-	$-	$-	$-	$(899,911)	$(899,911)	$(1,769,440)	$(1,769,440)	$(1,769,440)
Investor Equity Invest - Stages I, II, III & IV (Domestic)	$-	$(2,340,900)	$(2,340,900)	$-	$-	$-	$(1,048,392)	$(1,048,392)	$-	$-	$-
Dev. Bank Debt Service - Stage I (Domestic)	$-	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)
Supp. Credit Repayment - Stage I (Domestic)	$-	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$-	$-	$-
Dev. Bank Debt Service - Stage II (domestic)	$-	$-	$-	$-	$-	$-	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)
Supp. Credit Repayment - Stage II (Domestic)	$-	$-	$-	$-	$-	$-	$(356,276)	$(356,276)	$(356,276)	$(356,276)	$(356,276)
From Operations:											
Revenues (Bamako)	$2,837,794	$4,374,870	$5,013,772	$8,218,539	$8,638,310	$9,085,094	$9,560,191	$10,062,054	$13,656,832	$14,358,129	$15,104,536
Expenses (Bamako)	$(2,132,448)	$(1,888,542)	$(1,899,044)	$(2,302,650)	$(2,308,164)	$(2,314,023)	$(2,320,199)	$(2,326,346)	$(3,329,435)	$(3,336,759)	$(3,344,524)
Profit Taxes (Bamako)	$(211,604)	$(745,898)	$(934,418)	$(1,774,767)	$(1,899,044)	$(2,031,321)	$(2,171,998)	$(2,320,712)	$(3,098,219)	$(3,306,411)	$(3,528,004)
Revenues (Domestic)	$52,033	$218,005	$227,623	$508,254	$531,772	$556,487	$582,470	$609,808	$816,730	$855,697	$896,297
Expenses (Domestic)	$(51,412)	$(35,221)	$(35,288)	$(56,537)	$(56,626)	$(56,722)	$(56,829)	$(56,947)	$(69,642)	$(69,775)	$(69,915)
Profit Taxes (Domestic)	$(186)	$(54,835)	$(57,701)	$(135,515)	$(142,544)	$(149,930)	$(157,692)	$(165,858)	$(224,126)	$(235,777)	$(247,914)
Annual Gross Cash Flow	$494,178	$(7,233,046)	$(6,786,480)	$(201,028)	$105,352	$431,233	$(9,513,051)	$(9,146,997)	$(1,118,220)	$(605,256)	$(59,884)

Inflows & Outflows:	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total 2000-2020
From Development Program:											
Investor Equity Invest - Stages I, II, III & IV (Bamako)	$(2,405,216)	$(2,405,216)	$-	$-	$-	$(8,667,712)	$(8,667,712)	$-	$-	$-	$(38,530,700)
Dev. Bank Debt Service - Stage I (Bamako)	$(1,799,412)	$(1,799,412)	$(1,799,412)	$(1,799,412)	$-	$-	$-	$-	$-	$-	$(24,268,033)
Supp. Credit Repayment - Stage I (Bamako)	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	$(4,838,629)
Dev. Bank Debt Service - Stage II (Bamako)	$(2,942,006)	$(2,942,006)	$(2,942,006)	$(2,942,006)	$(2,942,006)	$(2,942,006)	$(2,942,006)	$(2,942,006)	$(2,942,006)	$-	$(39,677,810)
Supp. Credit Repayment - Stage II (Bamako)	$(1,769,440)	$(1,769,440)	$-	$-	$-	$-	$-	$-	$-	$-	$(10,647,020)
Investor Equity Invest - Stages I, II, III & IV (Domestic)	$(1,985,041)	$(1,985,041)	$-	$-	$-	$(1,701,200)	$(1,701,200)	$-	$-	$-	$(14,151,065)
Dev. Bank Debt Service - Stage I (Domestic)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$-	$-	$-	$-	$-	$-	$(19,751,956)
Supp. Credit Repayment - Stage I (Domestic)	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	$(4,454,856)
Dev. Bank Debt Service - Stage II (domestic)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,371)	$-	$(8,293,207)
Supp. Credit Repayment - Stage II (Domestic)	$(356,276)	$(356,275)	$-	$-	$-	$-	$-	$-	$-	$-	$(2,493,931)
From Operations:											
Revenues (Bamako)	$15,887,504	$16,732,199	$18,113,226	$19,025,468	$19,928,920	$20,861,693	$21,775,415	$24,490,452	$25,399,602	$26,324,368	$309,448,970
Expenses (Bamako)	$(3,351,752)	$(3,360,410)	$(3,379,439)	$(3,388,284)	$(3,395,885)	$(3,404,747)	$(3,412,161)	$(3,915,154)	$(3,922,229)	$(3,930,293)	$(62,962,490)
Profit Taxes (Bamako)	$(3,760,726)	$(4,011,537)	$(4,420,136)	$(4,691,155)	$(4,959,910)	$(5,237,084)	$(5,508,976)	$(6,172,589)	$(6,443,212)	$(6,718,222)	$(73,945,944)
Revenues (Domestic)	$938,968	$983,757	$1,141,962	$1,196,815	$1,290,425	$1,314,996	$1,378,612	$1,445,390	$1,515,521	$1,589,157	$18,650,780
Expenses (Domestic)	$(70,068)	$(70,227)	$(71,204)	$(71,378)	$(71,559)	$(71,756)	$(71,964)	$(80,469)	$(80,691)	$(80,920)	$(1,355,151)
Profit Taxes (Domestic)	$(260,670)	$(274,059)	$(321,228)	$(337,631)	$(365,660)	$(372,972)	$(391,994)	$(409,476)	$(430,449)	$(452,471)	$(5,188,689)
Annual Gross Cash Flow	$(3,877,360)	$(3,260,892)	$4,318,538	$4,989,190	$8,891,952	$(813,160)	$(134,359)	$11,823,775	$12,504,165	$16,731,618	$17,540,270
Weighted Average Cost of Capital (WACC)											13.74%
Net Present Value (NPV)											$(13,172,928)
Internal Rate of Return (IRR)											3.04%

Table V-13. Baseline Cash Flow – Baseline Activity Scenario, Alternative 3

Inflows & Outflows:	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
From Development Program:											
Investor Equity Invest - Stages I, II, III & IV (Bamako)	$-	$(3,416,376)	$(3,416,376)	$-	$-	$-	$(5,958,095)	$(5,958,095)	$-	$-	$-
Dev. Bank Debt Service - Stage I (Bamako)	$-	$(1,530,536)	$(1,530,536)	$(2,059,041)	$(2,059,041)	$(2,059,041)	$(2,059,041)	$(2,059,041)	$(2,059,041)	$(2,059,041)	$(2,059,041)
Supp. Credit Repayment - Stage I (Bamako)	$-	$(446,407)	$(446,407)	$(928,792)	$(928,792)	$(928,792)	$(928,792)	$(928,792)	$-	$-	$-
Dev. Bank Debt Service - Stage II (Bamako)	$-	$-	$-	$-	$-	$-	$(2,502,400)	$(2,502,400)	$(3,366,495)	$(3,366,495)	$(3,366,495)
Supp. Credit Repayment - Stage II (Bamako)	$-	$-	$-	$-	$-	$-	$(1,029,755)	$(1,029,755)	$(2,024,744)	$(2,024,744)	$(2,024,744)
Investor Equity Invest - Stages I, II, III & IV (Domestic)	$-	$(2,340,900)	$(2,340,900)	$-	$-	$-	$(1,048,392)	$(1,048,392)	$-	$-	$-
Dev. Bank Debt Service - Stage I (Domestic)	$-	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)
Supp. Credit Repayment - Stage I (Domestic)	$-	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$-	$-	$-
Dev. Bank Debt Service - Stage II (domestic)	$-	$-	$-	$-	$-	$-	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)
Supp. Credit Repayment - Stage II (Domestic)	$-	$-	$-	$-	$-	$-	$(356,276)	$(356,276)	$(356,276)	$(356,276)	$(356,276)
From Operations:											
Revenues (Bamako)	$2,837,794	$4,374,870	$5,013,772	$8,218,539	$8,638,310	$9,085,094	$9,560,191	$10,062,054	$13,656,832	$14,358,129	$15,104,536
Expenses (Bamako)	$(2,132,448)	$(1,888,542)	$(1,899,044)	$(2,302,650)	$(2,308,164)	$(2,314,023)	$(2,320,199)	$(2,326,346)	$(3,329,435)	$(3,336,759)	$(3,344,524)
Profit Taxes (Bamako)	$(211,604)	$(745,898)	$(934,418)	$(1,774,767)	$(1,899,044)	$(2,031,321)	$(2,171,998)	$(2,320,712)	$(3,098,219)	$(3,306,411)	$(3,528,004)
Revenues (Domestic)	$52,033	$218,005	$227,623	$508,254	$531,772	$556,487	$582,470	$609,808	$816,730	$855,697	$896,297
Expenses (Domestic)	$(51,412)	$(35,221)	$(35,288)	$(56,537)	$(56,626)	$(56,722)	$(56,829)	$(56,947)	$(69,642)	$(69,775)	$(69,915)
Profit Taxes (Domestic)	$(186)	$(54,835)	$(57,701)	$(135,515)	$(142,544)	$(149,930)	$(157,692)	$(165,858)	$(224,126)	$(235,777)	$(247,914)
Annual Gross Cash Flow	$494,178	$(7,913,102)	$(7,466,536)	$(577,770)	$(271,390)	$54,491	$(11,086,441)	$(10,720,387)	$(2,057,643)	$(1,544,678)	$(999,306)

Inflows & Outflows:	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total 2000-2020
From Development Program:											
Investor Equity Invest - Stages I, II, III & IV (Bamako)	$(2,752,254)	$(2,752,254)	$-	$-	$-	$(9,918,338)	$(9,918,338)	$-	$-	$-	$(44,090,124)
Dev. Bank Debt Service - Stage I (Bamako)	$(2,059,041)	$(2,059,041)	$(2,059,041)	$(2,059,041)	$-	$-	$-	$-	$-	$-	$(27,769,560)
Supp. Credit Repayment - Stage I (Bamako)	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	$(5,536,773)
Dev. Bank Debt Service - Stage II (Bamako)	$(3,366,495)	$(3,366,495)	$(3,366,495)	$(3,366,495)	$(3,366,495)	$(3,366,495)	$(3,366,495)	$(3,366,495)	$(3,366,495)	$-	$(45,402,745)
Supp. Credit Repayment - Stage II (Bamako)	$(2,024,744)	$(2,024,744)	$-	$-	$-	$-	$-	$-	$-	$-	$(12,183,231)
Investor Equity Invest - Stages I, II, III & IV (Domestic)	$(1,985,041)	$(1,985,041)	$-	$-	$-	$(1,701,200)	$(1,701,200)	$-	$-	$-	$(14,151,065)
Dev. Bank Debt Service - Stage I (Domestic)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$-	$-	$-	$-	$-	$-	$(19,751,956)
Supp. Credit Repayment - Stage I (Domestic)	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	$(4,454,856)
Dev. Bank Debt Service - Stage II (domestic)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,371)	$-	$(8,293,207)
Supp. Credit Repayment - Stage II (Domestic)	$(356,276)	$(356,275)	$-	$-	$-	$-	$-	$-	$-	$-	$(2,493,931)
From Operations:											
Revenues (Bamako)	$15,887,504	$16,732,199	$18,113,226	$19,025,468	$19,928,920	$20,861,693	$21,775,415	$24,490,452	$25,399,602	$26,324,368	$309,448,970
Expenses (Bamako)	$(3,351,752)	$(3,360,410)	$(3,379,439)	$(3,388,284)	$(3,395,885)	$(3,404,747)	$(3,412,161)	$(3,915,154)	$(3,922,229)	$(3,930,293)	$(62,962,490)
Profit Taxes (Bamako)	$(3,760,726)	$(4,011,537)	$(4,420,136)	$(4,691,155)	$(4,959,910)	$(5,237,084)	$(5,508,976)	$(6,172,589)	$(6,443,212)	$(6,718,222)	$(73,945,944)
Revenues (Domestic)	$938,968	$983,757	$1,141,962	$1,196,815	$1,290,425	$1,314,996	$1,378,612	$1,445,390	$1,515,521	$1,589,157	$18,650,780
Expenses (Domestic)	$(70,068)	$(70,227)	$(71,204)	$(71,378)	$(71,559)	$(71,756)	$(71,964)	$(80,469)	$(80,691)	$(80,920)	$(1,355,151)
Profit Taxes (Domestic)	$(260,670)	$(274,059)	$(321,228)	$(337,631)	$(365,660)	$(372,972)	$(391,994)	$(409,476)	$(430,449)	$(452,471)	$(5,188,689)
Annual Gross Cash Flow	$(5,163,821)	$(4,547,352)	$3,634,420	$4,305,072	$8,467,463	$(2,488,275)	$(1,809,474)	$11,399,286	$12,079,676	$16,731,618	$520,027
Weighted Average Cost of Capital (WACC)											13.74%
Net Present Value (NPV)											$(17,945,366)
Internal Rate of Return (IRR)											Negative

Table V-14. Baseline Cash Flow – Lower Activity Scenario, Alternative 1

Inflows & Outflows:	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
From Development Program:											
Investor Equity Invest - Stages I, II, III & IV (Bamako)	$-	$(2,554,550)	$(2,554,550)	$-	$-	$-	$(4,455,087)	$(4,455,087)	$-	$-	$-
Dev. Bank Debt Service - Stage I (Bamako)	$-	$(1,144,438)	$(1,144,438)	$(1,539,621)	$(1,539,621)	$(1,539,621)	$(1,539,621)	$(1,539,621)	$(1,539,621)	$(1,539,621)	$(1,539,621)
Supp. Credit Repayment - Stage I (Bamako)	$-	$(333,795)	$(333,795)	$(694,492)	$(694,492)	$(694,492)	$(694,492)	$(694,492)	$-	$-	$-
Dev. Bank Debt Service - Stage II (Bamako)	$-	$-	$-	$-	$-	$-	$(1,871,137)	$(1,871,137)	$(2,517,253)	$(2,517,253)	$(2,517,253)
Supp. Credit Repayment - Stage II (Bamako)	$-	$-	$-	$-	$-	$-	$(769,986)	$(769,986)	$(1,513,976)	$(1,513,976)	$(1,513,976)
Investor Equity Invest - Stages I, II, III & IV (Domestic)	$-	$(2,340,900)	$(2,340,900)	$-	$-	$-	$(1,048,392)	$(1,048,392)	$-	$-	$-
Dev. Bank Debt Service - Stage I (Domestic)	$-	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)
Supp. Credit Repayment - Stage I (Domestic)	$-	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$-	$-	$-
Dev. Bank Debt Service - Stage II (domestic)	$-	$-	$-	$-	$-	$-	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)
Supp. Credit Repayment - Stage II (Domestic)	$-	$-	$-	$-	$-	$-	$(356,276)	$(356,276)	$(356,276)	$(356,276)	$(356,276)
From Operations:											
Revenues (Bamako)	$2,899,343	$4,592,875	$4,929,866	$8,002,446	$8,439,986	$8,860,183	$9,342,831	$9,829,678	$12,662,625	$14,028,658	$14,758,211
Expenses (Bamako)	$(2,271,929)	$(1,887,808)	$(1,898,538)	$(2,211,023)	$(2,306,825)	$(2,312,470)	$(2,318,796)	$(2,324,908)	$(3,267,940)	$(3,335,210)	$(3,342,915)
Profit Taxes (Bamako)	$(188,224)	$(811,520)	$(909,398)	$(1,737,427)	$(1,839,948)	$(1,964,314)	$(2,107,211)	$(2,251,431)	$(2,818,405)	$(3,208,034)	$(3,424,589)
Revenues (Domestic)	$52,033	$218,005	$227,623	$508,254	$531,772	$556,487	$582,470	$609,808	$816,730	$855,697	$896,297
Expenses (Domestic)	$(51,412)	$(35,221)	$(35,288)	$(56,537)	$(56,626)	$(56,722)	$(56,829)	$(56,947)	$(69,642)	$(69,775)	$(69,915)
Profit Taxes (Domestic)	$(186)	$(54,835)	$(57,701)	$(135,515)	$(142,544)	$(149,930)	$(157,692)	$(165,858)	$(224,126)	$(235,777)	$(247,914)
Annual Gross Cash Flow	$439,625	$(6,399,449)	$(6,164,381)	$88,823	$344,440	$651,860	$(8,089,851)	$(7,734,284)	$(831,110)	$105,207	$638,823

Inflows & Outflows:	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total 2000-2020
From Development Program:											
Investor Equity Invest - Stages I, II, III & IV (Bamako)	$(2,057,962)	$(2,057,962)	$-	$-	$-	$(7,416,307)	$(7,416,307)	$-	$-	$-	$(32,967,813)
Dev. Bank Debt Service - Stage I (Bamako)	$(1,539,621)	$(1,539,621)	$(1,539,621)	$(1,539,621)	$-	$-	$-	$-	$-	$-	$(20,764,325)
Supp. Credit Repayment - Stage I (Bamako)	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	$(4,140,050)
Dev. Bank Debt Service - Stage II (Bamako)	$(2,517,253)	$(2,517,253)	$(2,517,253)	$(2,517,253)	$(2,517,253)	$(2,517,253)	$(2,517,253)	$(2,517,253)	$(2,517,253)	$-	$(33,949,308)
Supp. Credit Repayment - Stage II (Bamako)	$(1,513,976)	$(1,513,976)	$-	$-	$-	$-	$-	$-	$-	$-	$(9,109,852)
Investor Equity Invest - Stages I, II, III & IV (Domestic)	$(1,985,041)	$(1,985,041)	$-	$-	$-	$(1,701,200)	$(1,701,200)	$-	$-	$-	$(14,151,065)
Dev. Bank Debt Service - Stage I (Domestic)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$-	$-	$-	$-	$-	$-	$(19,751,956)
Supp. Credit Repayment - Stage I (Domestic)	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	$(4,454,856)
Dev. Bank Debt Service - Stage II (domestic)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,371)	$-	$(8,293,207)
Supp. Credit Repayment - Stage II (Domestic)	$(356,276)	$(356,275)	$-	$-	$-	$-	$-	$-	$-	$-	$(2,493,931)
From Operations:											
Revenues (Bamako)	$15,515,041	$16,349,593	$17,690,273	$18,663,167	$19,584,952	$20,546,380	$21,486,461	$23,603,672	$25,183,209	$26,152,350	$303,121,800
Expenses (Bamako)	$(3,350,201)	$(3,358,716)	$(3,377,827)	$(3,386,932)	$(3,394,936)	$(3,403,780)	$(3,411,662)	$(3,914,634)	$(3,922,229)	$(3,930,316)	$(62,929,595)
Profit Taxes (Bamako)	$(3,649,452)	$(3,897,263)	$(4,293,734)	$(4,582,871)	$(4,857,005)	$(5,142,780)	$(5,422,440)	$(5,906,711)	$(6,378,294)	$(6,666,610)	$(72,057,661)
Revenues (Domestic)	$938,968	$983,757	$1,141,962	$1,196,815	$1,290,425	$1,314,996	$1,378,612	$1,445,390	$1,515,521	$1,589,157	$18,650,780
Expenses (Domestic)	$(70,068)	$(70,227)	$(71,204)	$(71,378)	$(71,559)	$(71,756)	$(71,964)	$(80,469)	$(80,691)	$(80,920)	$(1,355,151)
Profit Taxes (Domestic)	$(260,670)	$(274,059)	$(321,228)	$(337,631)	$(365,660)	$(372,972)	$(391,994)	$(409,476)	$(430,449)	$(452,471)	$(5,188,689)
Annual Gross Cash Flow	$(2,849,737)	$(2,240,268)	$4,708,143	$5,421,071	$9,076,592	$642,956	$1,339,881	$11,628,146	$12,777,443	$16,611,190	$30,165,122
Weighted Average Cost of Capital (WACC)											13.74%
Net Present Value (NPV)											$(9,348,903)
Internal Rate of Return (IRR)											5.56%

Table V-15. Baseline Cash Flow – Lower Activity Scenario, Alternative 2

Inflows & Outflows:	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
From Development Program:											
Investor Equity Invest - Stages I, II, III & IV (Bamako)	$-	$(2,985,597)	$(2,985,597)	$-	$-	$-	$(5,206,825)	$(5,206,825)	$-	$-	$-
Dev. Bank Debt Service - Stage I (Bamako)	$-	$(1,337,547)	$(1,337,547)	$(1,799,412)	$(1,799,412)	$(1,799,412)	$(1,799,412)	$(1,799,412)	$(1,799,412)	$(1,799,412)	$(1,799,412)
Supp. Credit Repayment - Stage I (Bamako)	$-	$(390,119)	$(390,119)	$(811,678)	$(811,678)	$(811,678)	$(811,678)	$(811,678)	$-	$-	$-
Dev. Bank Debt Service - Stage II (Bamako)	$-	$-	$-	$-	$-	$-	$(2,186,867)	$(2,186,867)	$(2,942,006)	$(2,942,006)	$(2,942,006)
Supp. Credit Repayment - Stage II (Bamako)	$-	$-	$-	$-	$-	$-	$(899,911)	$(899,911)	$(1,769,440)	$(1,769,440)	$(1,769,440)
Investor Equity Invest - Stages I, II, III & IV (Domestic)	$-	$(2,340,900)	$(2,340,900)	$-	$-	$-	$(1,048,392)	$(1,048,392)	$-	$-	$-
Dev. Bank Debt Service - Stage I (Domestic)	$-	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)
Supp. Credit Repayment - Stage I (Domestic)	$-	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$-	$-	$-
Dev. Bank Debt Service - Stage II (domestic)	$-	$-	$-	$-	$-	$-	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)
Supp. Credit Repayment - Stage II (Domestic)	$-	$-	$-	$-	$-	$-	$(356,276)	$(356,276)	$(356,276)	$(356,276)	$(356,276)
From Operations:											
Revenues (Bamako)	$2,899,343	$4,592,875	$4,929,866	$8,002,446	$8,439,986	$8,860,183	$9,342,831	$9,829,678	$12,662,625	$14,028,658	$14,758,211
Expenses (Bamako)	$(2,271,929)	$(1,887,808)	$(1,898,538)	$(2,211,023)	$(2,306,825)	$(2,312,470)	$(2,318,796)	$(2,324,908)	$(3,267,940)	$(3,335,210)	$(3,342,915)
Profit Taxes (Bamako)	$(188,224)	$(811,520)	$(909,398)	$(1,737,427)	$(1,839,948)	$(1,964,314)	$(2,107,211)	$(2,251,431)	$(2,818,405)	$(3,208,034)	$(3,424,589)
Revenues (Domestic)	$52,033	$218,005	$227,623	$508,254	$531,772	$556,487	$582,470	$609,808	$816,730	$855,697	$896,297
Expenses (Domestic)	$(51,412)	$(35,221)	$(35,288)	$(56,537)	$(56,626)	$(56,722)	$(56,829)	$(56,947)	$(69,642)	$(69,775)	$(69,915)
Profit Taxes (Domestic)	$(186)	$(54,835)	$(57,701)	$(135,515)	$(142,544)	$(149,930)	$(157,692)	$(165,858)	$(224,126)	$(235,777)	$(247,914)
Annual Gross Cash Flow	$439,625	$(7,079,929)	$(6,844,860)	$(288,154)	$(32,537)	$274,883	$(9,664,221)	$(9,308,654)	$(1,771,118)	$(834,801)	$(301,185)

Inflows & Outflows:	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total 2000-2020
From Development Program:											
Investor Equity Invest - Stages I, II, III & IV (Bamako)	$(2,405,216)	$(2,405,216)	$-	$-	$-	$(8,667,712)	$(8,667,712)	$-	$-	$-	$(38,530,700)
Dev. Bank Debt Service - Stage I (Bamako)	$(1,799,412)	$(1,799,412)	$(1,799,412)	$(1,799,412)	$-	$-	$-	$-	$-	$-	$(24,268,033)
Supp. Credit Repayment - Stage I (Bamako)	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	$(4,838,629)
Dev. Bank Debt Service - Stage II (Bamako)	$(2,942,006)	$(2,942,006)	$(2,942,006)	$(2,942,006)	$(2,942,006)	$(2,942,006)	$(2,942,006)	$(2,942,006)	$(2,942,006)	$-	$(39,677,810)
Supp. Credit Repayment - Stage II (Bamako)	$(1,769,440)	$(1,769,440)	$-	$-	$-	$-	$-	$-	$-	$-	$(10,647,020)
Investor Equity Invest - Stages I, II, III & IV (Domestic)	$(1,985,041)	$(1,985,041)	$-	$-	$-	$(1,701,200)	$(1,701,200)	$-	$-	$-	$(14,151,065)
Dev. Bank Debt Service - Stage I (Domestic)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$-	$-	$-	$-	$-	$-	$(19,751,956)
Supp. Credit Repayment - Stage I (Domestic)	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	$(4,454,856)
Dev. Bank Debt Service - Stage II (domestic)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,371)	$-	$(8,293,207)
Supp. Credit Repayment - Stage II (Domestic)	$(356,276)	$(356,275)	$-	$-	$-	$-	$-	$-	$-	$-	$(2,493,931)
From Operations:											
Revenues (Bamako)	$15,515,041	$16,349,593	$17,690,273	$18,663,167	$19,584,952	$20,546,380	$21,486,461	$23,603,672	$25,183,209	$26,152,350	$303,121,800
Expenses (Bamako)	$(3,350,201)	$(3,358,716)	$(3,377,827)	$(3,386,932)	$(3,394,936)	$(3,403,780)	$(3,411,662)	$(3,914,634)	$(3,922,229)	$(3,930,316)	$(62,929,595)
Profit Taxes (Bamako)	$(3,649,452)	$(3,897,263)	$(4,293,734)	$(4,582,871)	$(4,857,005)	$(5,142,780)	$(5,422,440)	$(5,906,711)	$(6,378,294)	$(6,666,610)	$(72,057,661)
Revenues (Domestic)	$938,968	$983,757	$1,141,962	$1,196,815	$1,290,425	$1,314,996	$1,378,612	$1,445,390	$1,515,521	$1,589,157	$18,650,780
Expenses (Domestic)	$(70,068)	$(70,227)	$(71,204)	$(71,378)	$(71,559)	$(71,756)	$(71,964)	$(80,469)	$(80,691)	$(80,920)	$(1,355,151)
Profit Taxes (Domestic)	$(260,670)	$(274,059)	$(321,228)	$(337,631)	$(365,660)	$(372,972)	$(391,994)	$(409,476)	$(430,449)	$(452,471)	$(5,188,689)
Annual Gross Cash Flow	$(4,136,999)	$(3,527,531)	$4,023,599	$4,736,527	$8,651,839	$(1,033,202)	$(336,278)	$11,203,393	$12,352,690	$16,611,190	$13,134,277
Weighted Average Cost of Capital (WACC)											13.74%
Net Present Value (NPV)											$(14,124,314)
Internal Rate of Return (IRR)											2.28%

Table V-16. Baseline Cash Flow – Lower Activity Scenario, Alternative 3

Inflows & Outflows:	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
From Development Program:											
Investor Equity Invest - Stages I, II, III & IV (Bamako)	$-	$(3,416,376)	$(3,416,376)	$-	$-	$-	$(5,958,095)	$(5,958,095)	$-	$-	$-
Dev. Bank Debt Service - Stage I (Bamako)	$-	$(1,530,536)	$(1,530,536)	$(2,059,041)	$(2,059,041)	$(2,059,041)	$(2,059,041)	$(2,059,041)	$(2,059,041)	$(2,059,041)	$(2,059,041)
Supp. Credit Repayment - Stage I (Bamako)	$-	$(446,407)	$(446,407)	$(928,792)	$(928,792)	$(928,792)	$(928,792)	$(928,792)	$-	$-	$-
Dev. Bank Debt Service - Stage II (Bamako)	$-	$-	$-	$-	$-	$-	$(2,502,400)	$(2,502,400)	$(3,366,495)	$(3,366,495)	$(3,366,495)
Supp. Credit Repayment - Stage II (Bamako)	$-	$-	$-	$-	$-	$-	$(1,029,755)	$(1,029,755)	$(2,024,744)	$(2,024,744)	$(2,024,744)
Investor Equity Invest - Stages I, II, III & IV (Domestic)	$-	$(2,340,900)	$(2,340,900)	$-	$-	$-	$(1,048,392)	$(1,048,392)	$-	$-	$-
Dev. Bank Debt Service - Stage I (Domestic)	$-	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)
Supp. Credit Repayment - Stage I (Domestic)	$-	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$-	$-	$-
Dev. Bank Debt Service - Stage II (domestic)	$-	$-	$-	$-	$-	$-	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)
Supp. Credit Repayment - Stage II (Domestic)	$-	$-	$-	$-	$-	$-	$(356,276)	$(356,276)	$(356,276)	$(356,276)	$(356,276)
From Operations:											
Revenues (Bamako)	$2,899,343	$4,592,875	$4,929,866	$8,002,446	$8,439,986	$8,860,183	$9,342,831	$9,829,678	$12,662,625	$14,028,658	$14,758,211
Expenses (Bamako)	$(2,271,929)	$(1,887,808)	$(1,898,538)	$(2,211,023)	$(2,306,825)	$(2,312,470)	$(2,318,796)	$(2,324,908)	$(3,267,940)	$(3,335,210)	$(3,342,915)
Profit Taxes (Bamako)	$(188,224)	$(811,520)	$(909,398)	$(1,737,427)	$(1,839,948)	$(1,964,314)	$(2,107,211)	$(2,251,431)	$(2,818,405)	$(3,208,034)	$(3,424,589)
Revenues (Domestic)	$52,033	$218,005	$227,623	$508,254	$531,772	$556,487	$582,470	$609,808	$816,730	$855,697	$896,297
Expenses (Domestic)	$(51,412)	$(35,221)	$(35,288)	$(56,537)	$(56,626)	$(56,722)	$(56,829)	$(56,947)	$(69,642)	$(69,775)	$(69,915)
Profit Taxes (Domestic)	$(186)	$(54,835)	$(57,701)	$(135,515)	$(142,544)	$(149,930)	$(157,692)	$(165,858)	$(224,126)	$(235,777)	$(247,914)
Annual Gross Cash Flow	$439,625	$(7,759,985)	$(7,524,916)	$(664,897)	$(409,280)	$(101,860)	$(11,237,611)	$(10,882,044)	$(2,710,541)	$(1,774,223)	$(1,240,608)

Inflows & Outflows:	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total 2000-2020
From Development Program:											
Investor Equity Invest - Stages I, II, III & IV (Bamako)	$(2,752,254)	$(2,752,254)	$-	$-	$-	$(9,918,338)	$(9,918,338)	$-	$-	$-	$(44,090,124)
Dev. Bank Debt Service - Stage I (Bamako)	$(2,059,041)	$(2,059,041)	$(2,059,041)	$(2,059,041)	$-	$-	$-	$-	$-	$-	$(27,769,560)
Supp. Credit Repayment - Stage I (Bamako)	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	$(5,536,773)
Dev. Bank Debt Service - Stage II (Bamako)	$(3,366,495)	$(3,366,495)	$(3,366,495)	$(3,366,495)	$(3,366,495)	$(3,366,495)	$(3,366,495)	$(3,366,495)	$(3,366,495)	$-	$(45,402,745)
Supp. Credit Repayment - Stage II (Bamako)	$(2,024,744)	$(2,024,744)	$-	$-	$-	$-	$-	$-	$-	$-	$(12,183,231)
Investor Equity Invest - Stages I, II, III & IV (Domestic)	$(1,985,041)	$(1,985,041)	$-	$-	$-	$(1,701,200)	$(1,701,200)	$-	$-	$-	$(14,151,065)
Dev. Bank Debt Service - Stage I (Domestic)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$-	$-	$-	$-	$-	$-	$(19,751,956)
Supp. Credit Repayment - Stage I (Domestic)	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	$(4,454,856)
Dev. Bank Debt Service - Stage II (domestic)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,371)	$-	$(8,293,207)
Supp. Credit Repayment - Stage II (Domestic)	$(356,276)	$(356,275)	$-	$-	$-	$-	$-	$-	$-	$-	$(2,493,931)
From Operations:											
Revenues (Bamako)	$15,515,041	$16,349,593	$17,690,273	$18,663,167	$19,584,952	$20,546,380	$21,486,461	$23,603,672	$25,183,209	$26,152,350	$303,121,800
Expenses (Bamako)	$(3,350,201)	$(3,358,716)	$(3,377,827)	$(3,386,932)	$(3,394,936)	$(3,403,780)	$(3,411,662)	$(3,914,634)	$(3,922,229)	$(3,930,316)	$(62,929,595)
Profit Taxes (Bamako)	$(3,649,452)	$(3,897,263)	$(4,293,734)	$(4,582,871)	$(4,857,005)	$(5,142,780)	$(5,422,440)	$(5,906,711)	$(6,378,294)	$(6,666,610)	$(72,057,661)
Revenues (Domestic)	$938,968	$983,757	$1,141,962	$1,196,815	$1,290,425	$1,314,996	$1,378,612	$1,445,390	$1,515,521	$1,589,157	$18,650,780
Expenses (Domestic)	$(70,068)	$(70,227)	$(71,204)	$(71,378)	$(71,559)	$(71,756)	$(71,964)	$(80,469)	$(80,691)	$(80,920)	$(1,355,151)
Profit Taxes (Domestic)	$(260,670)	$(274,059)	$(321,228)	$(337,631)	$(365,660)	$(372,972)	$(391,994)	$(409,476)	$(430,449)	$(452,471)	$(5,188,689)
Annual Gross Cash Flow	$(5,423,460)	$(4,813,991)	$3,339,481	$4,052,409	$8,227,350	$(2,708,317)	$(2,011,393)	$10,778,904	$11,928,201	$16,611,190	$(3,885,966)
Weighted Average Cost of Capital (WACC)											13.74%
Net Present Value (NPV)											$(18,896,752)
Internal Rate of Return (IRR)											Negative

Table V-17. Baseline Cash Flow – Higher Expense Scenario, Alternative 1

Inflows & Outflows:	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
From Development Program:											
Investor Equity Invest - Stages I, II, III & IV (Bamako)	$-	$(2,554,550)	$(2,554,550)	$-	$-	$-	$(4,455,087)	$(4,455,087)	$-	$-	$-
Dev. Bank Debt Service - Stage I (Bamako)	$-	$(1,144,438)	$(1,144,438)	$(1,539,621)	$(1,539,621)	$(1,539,621)	$(1,539,621)	$(1,539,621)	$(1,539,621)	$(1,539,621)	$(1,539,621)
Supp. Credit Repayment - Stage I (Bamako)	$-	$(333,795)	$(333,795)	$(694,492)	$(694,492)	$(694,492)	$(694,492)	$(694,492)	$-	$-	$-
Dev. Bank Debt Service - Stage II (Bamako)	$-	$-	$-	$-	$-	$-	$(1,871,137)	$(1,871,137)	$(2,517,253)	$(2,517,253)	$(2,517,253)
Supp. Credit Repayment - Stage II (Bamako)	$-	$-	$-	$-	$-	$-	$(769,986)	$(769,986)	$(1,513,976)	$(1,513,976)	$(1,513,976)
Investor Equity Invest - Stages I, II, III & IV (Domestic)	$-	$(2,340,900)	$(2,340,900)	$-	$-	$-	$(1,048,392)	$(1,048,392)	$-	$-	$-
Dev. Bank Debt Service - Stage I (Domestic)	$-	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)
Supp. Credit Repayment - Stage I (Domestic)	$-	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$-	$-	$-
Dev. Bank Debt Service - Stage II (domestic)	$-	$-	$-	$-	$-	$-	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)
Supp. Credit Repayment - Stage II (Domestic)	$-	$-	$-	$-	$-	$-	$(356,276)	$(356,276)	$(356,276)	$(356,276)	$(356,276)
From Operations:											
Revenues (Bamako)	$2,837,794	$4,374,870	$5,013,772	$8,218,539	$8,638,310	$9,085,094	$9,560,191	$10,062,054	$13,656,832	$14,358,129	$15,104,536
Expenses (Bamako)	$(2,345,692)	$(2,077,396)	$(2,088,949)	$(2,532,915)	$(2,538,981)	$(2,545,425)	$(2,552,219)	$(2,558,981)	$(3,662,379)	$(3,670,435)	$(3,678,976)
Profit Taxes (Bamako)	$(147,631)	$(689,242)	$(877,447)	$(1,705,687)	$(1,829,799)	$(1,961,901)	$(2,102,392)	$(2,250,922)	$(2,998,336)	$(3,206,308)	$(3,427,668)
Revenues (Domestic)	$52,033	$218,005	$227,623	$508,254	$531,772	$556,487	$582,470	$609,808	$816,730	$855,697	$896,297
Expenses (Domestic)	$(56,553)	$(38,743)	$(38,816)	$(62,191)	$(62,289)	$(62,394)	$(62,512)	$(62,642)	$(76,606)	$(76,752)	$(76,907)
Profit Taxes (Domestic)	$1,356	$(53,779)	$(56,642)	$(133,819)	$(140,845)	$(148,228)	$(155,988)	$(164,150)	$(222,037)	$(233,683)	$(245,817)
Annual Gross Cash Flow	$341,307	$(6,687,230)	$(6,241,404)	$10,806	$316,794	$642,259	$(8,105,073)	$(7,739,457)	$(416,148)	$96,295	$641,114

Inflows & Outflows:	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total 2000-2020
From Development Program:											
Investor Equity Invest - Stages I, II, III & IV (Bamako)	$(2,057,962)	$(2,057,962)	$-	$-	$-	$(7,416,307)	$(7,416,307)	$-	$-	$-	$(32,967,813)
Dev. Bank Debt Service - Stage I (Bamako)	$(1,539,621)	$(1,539,621)	$(1,539,621)	$(1,539,621)	$-	$-	$-	$-	$-	$-	$(20,764,325)
Supp. Credit Repayment - Stage I (Bamako)	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	$(4,140,050)
Dev. Bank Debt Service - Stage II (Bamako)	$(2,517,253)	$(2,517,253)	$(2,517,253)	$(2,517,253)	$(2,517,253)	$(2,517,253)	$(2,517,253)	$(2,517,253)	$(2,517,253)	$-	$(33,949,308)
Supp. Credit Repayment - Stage II (Bamako)	$(1,513,976)	$(1,513,976)	$-	$-	$-	$-	$-	$-	$-	$-	$(9,109,852)
Investor Equity Invest - Stages I, II, III & IV (Domestic)	$(1,985,041)	$(1,985,041)	$-	$-	$-	$(1,701,200)	$(1,701,200)	$-	$-	$-	$(14,151,065)
Dev. Bank Debt Service - Stage I (Domestic)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$-	$-	$-	$-	$-	$-	$(19,751,956)
Supp. Credit Repayment - Stage I (Domestic)	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	$(4,454,856)
Dev. Bank Debt Service - Stage II (domestic)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,371)	$-	$(8,293,207)
Supp. Credit Repayment - Stage II (Domestic)	$(356,276)	$(356,275)	$-	$-	$-	$-	$-	$-	$-	$-	$(2,493,931)
From Operations:											
Revenues (Bamako)	$15,887,504	$16,732,199	$18,113,226	$19,025,468	$19,928,920	$20,861,693	$21,775,415	$24,490,452	$25,399,602	$26,324,368	$309,448,970
Expenses (Bamako)	$(3,686,927)	$(3,696,451)	$(3,717,383)	$(3,727,113)	$(3,735,474)	$(3,745,222)	$(3,753,378)	$(4,306,669)	$(4,314,451)	$(4,323,323)	$(69,258,739)
Profit Taxes (Bamako)	$(3,660,173)	$(3,910,725)	$(4,318,753)	$(4,589,507)	$(4,858,034)	$(5,134,941)	$(5,406,611)	$(6,055,135)	$(6,325,545)	$(6,600,314)	$(72,057,069)
Revenues (Domestic)	$938,968	$983,757	$1,141,962	$1,196,815	$1,290,425	$1,314,996	$1,378,612	$1,445,390	$1,515,521	$1,589,157	$18,650,780
Expenses (Domestic)	$(77,075)	$(77,250)	$(78,324)	$(78,515)	$(78,715)	$(78,932)	$(79,160)	$(88,516)	$(88,760)	$(89,012)	$(1,490,666)
Profit Taxes (Domestic)	$(258,568)	$(271,952)	$(319,091)	$(335,490)	$(363,513)	$(370,819)	$(389,835)	$(407,062)	$(428,028)	$(450,044)	$(5,148,034)
Annual Gross Cash Flow	$(2,829,625)	$(2,213,774)	$4,761,537	$5,431,558	$9,073,984	$619,643	$1,297,910	$11,968,835	$12,648,715	$16,450,833	$30,068,880
Weighted Average Cost of Capital (WACC)											13.74%
Net Present Value (NPV)											$(9,633,907)
Internal Rate of Return (IRR)											5.48%

Table V-18. Baseline Cash Flow – Higher Expense Scenario, Alternative 2

Inflows & Outflows:	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
From Development Program:											
Investor Equity Invest - Stages I, II, III & IV (Bamako)	$-	$(2,985,597)	$(2,985,597)	$-	$-	$-	$(5,206,825)	$(5,206,825)	$-	$-	$-
Dev. Bank Debt Service - Stage I (Bamako)	$-	$(1,337,547)	$(1,337,547)	$(1,799,412)	$(1,799,412)	$(1,799,412)	$(1,799,412)	$(1,799,412)	$(1,799,412)	$(1,799,412)	$(1,799,412)
Supp. Credit Repayment - Stage I (Bamako)	$-	$(390,119)	$(390,119)	$(811,678)	$(811,678)	$(811,678)	$(811,678)	$(811,678)	$-	$-	$-
Dev. Bank Debt Service - Stage II (Bamako)	$-	$-	$-	$-	$-	$-	$(2,186,867)	$(2,186,867)	$(2,942,006)	$(2,942,006)	$(2,942,006)
Supp. Credit Repayment - Stage II (Bamako)	$-	$-	$-	$-	$-	$-	$(899,911)	$(899,911)	$(1,769,440)	$(1,769,440)	$(1,769,440)
Investor Equity Invest - Stages I, II, III & IV (Domestic)	$-	$(2,340,900)	$(2,340,900)	$-	$-	$-	$(1,048,392)	$(1,048,392)	$-	$-	$-
Dev. Bank Debt Service - Stage I (Domestic)	$-	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)
Supp. Credit Repayment - Stage I (Domestic)	$-	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$-	$-	$-
Dev. Bank Debt Service - Stage II (domestic)	$-	$-	$-	$-	$-	$-	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)
Supp. Credit Repayment - Stage II (Domestic)	$-	$-	$-	$-	$-	$-	$(356,276)	$(356,276)	$(356,276)	$(356,276)	$(356,276)
From Operations:											
Revenues (Bamako)	$2,837,794	$4,374,870	$5,013,772	$8,218,539	$8,638,310	$9,085,094	$9,560,191	$10,062,054	$13,656,832	$14,358,129	$15,104,536
Expenses (Bamako)	$(2,345,692)	$(2,077,396)	$(2,088,949)	$(2,532,915)	$(2,538,981)	$(2,545,425)	$(2,552,219)	$(2,558,981)	$(3,662,379)	$(3,670,435)	$(3,678,976)
Profit Taxes (Bamako)	$(147,631)	$(689,242)	$(877,447)	$(1,705,687)	$(1,829,799)	$(1,961,901)	$(2,102,392)	$(2,250,922)	$(2,998,336)	$(3,206,308)	$(3,427,668)
Revenues (Domestic)	$52,033	$218,005	$227,623	$508,254	$531,772	$556,487	$582,470	$609,808	$816,730	$855,697	$896,297
Expenses (Domestic)	$(56,553)	$(38,743)	$(38,816)	$(62,191)	$(62,289)	$(62,394)	$(62,512)	$(62,642)	$(76,606)	$(76,752)	$(76,907)
Profit Taxes (Domestic)	$1,356	$(53,779)	$(56,642)	$(133,819)	$(140,845)	$(148,228)	$(155,988)	$(164,150)	$(222,037)	$(233,683)	$(245,817)
Annual Gross Cash Flow	$341,307	$(7,367,709)	$(6,921,884)	$(366,171)	$(60,183)	$265,281	$(9,679,443)	$(9,313,827)	$(1,356,156)	$(843,713)	$(298,894)

Inflows & Outflows:	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total 2000-2020
From Development Program:											
Investor Equity Invest - Stages I, II, III & IV (Bamako)	$(2,405,216)	$(2,405,216)	$-	$-	$-	$(8,667,712)	$(8,667,712)	$-	$-	$-	$(38,530,700)
Dev. Bank Debt Service - Stage I (Bamako)	$(1,799,412)	$(1,799,412)	$(1,799,412)	$(1,799,412)	$-	$-	$-	$-	$-	$-	$(24,268,033)
Supp. Credit Repayment - Stage I (Bamako)	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	$(4,838,629)
Dev. Bank Debt Service - Stage II (Bamako)	$(2,942,006)	$(2,942,006)	$(2,942,006)	$(2,942,006)	$(2,942,006)	$(2,942,006)	$(2,942,006)	$(2,942,006)	$(2,942,006)	$-	$(39,677,810)
Supp. Credit Repayment - Stage II (Bamako)	$(1,769,440)	$(1,769,440)	$-	$-	$-	$-	$-	$-	$-	$-	$(10,647,020)
Investor Equity Invest - Stages I, II, III & IV (Domestic)	$(1,985,041)	$(1,985,041)	$-	$-	$-	$(1,701,200)	$(1,701,200)	$-	$-	$-	$(14,151,065)
Dev. Bank Debt Service - Stage I (Domestic)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$-	$-	$-	$-	$-	$-	$(19,751,956)
Supp. Credit Repayment - Stage I (Domestic)	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	$(4,454,856)
Dev. Bank Debt Service - Stage II (domestic)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,371)	$-	$(8,293,207)
Supp. Credit Repayment - Stage II (Domestic)	$(356,276)	$(356,275)	$-	$-	$-	$-	$-	$-	$-	$-	$(2,493,931)
From Operations:											
Revenues (Bamako)	$15,887,504	$16,732,199	$18,113,226	$19,025,468	$19,928,920	$20,861,693	$21,775,415	$24,490,452	$25,399,602	$26,324,368	$309,448,970
Expenses (Bamako)	$(3,686,927)	$(3,696,451)	$(3,717,383)	$(3,727,113)	$(3,735,474)	$(3,745,222)	$(3,753,378)	$(4,306,669)	$(4,314,451)	$(4,323,323)	$(69,258,739)
Profit Taxes (Bamako)	$(3,660,173)	$(3,910,725)	$(4,318,753)	$(4,589,507)	$(4,858,034)	$(5,134,941)	$(5,406,611)	$(6,055,135)	$(6,325,545)	$(6,600,314)	$(72,057,069)
Revenues (Domestic)	$938,968	$983,757	$1,141,962	$1,196,815	$1,290,425	$1,314,996	$1,378,612	$1,445,390	$1,515,521	$1,589,157	$18,650,780
Expenses (Domestic)	$(77,075)	$(77,250)	$(78,324)	$(78,515)	$(78,715)	$(78,932)	$(79,160)	$(88,516)	$(88,760)	$(89,012)	$(1,490,666)
Profit Taxes (Domestic)	$(258,568)	$(271,952)	$(319,091)	$(335,490)	$(363,513)	$(370,819)	$(389,835)	$(407,062)	$(428,028)	$(450,044)	$(5,148,034)
Annual Gross Cash Flow	$(4,116,887)	$(3,501,036)	$4,076,993	$4,747,014	$8,649,231	$(1,056,516)	$(378,248)	$11,544,082	$12,223,961	$16,450,833	$13,038,035
Weighted Average Cost of Capital (WACC)											13.74%
Net Present Value (NPV)											$(14,409,318)
Internal Rate of Return (IRR)											2.24%

Table V-19. Baseline Cash Flow – Higher Expense Scenario, Alternative 3

Inflows & Outflows:	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
From Development Program:											
Investor Equity Invest - Stages I, II, III & IV (Bamako)	$-	$(3,416,376)	$(3,416,376)	$-	$-	$-	$(5,958,095)	$(5,958,095)	$-	$-	$-
Dev. Bank Debt Service - Stage I (Bamako)	$-	$(1,530,536)	$(1,530,536)	$(2,059,041)	$(2,059,041)	$(2,059,041)	$(2,059,041)	$(2,059,041)	$(2,059,041)	$(2,059,041)	$(2,059,041)
Supp. Credit Repayment - Stage I (Bamako)	$-	$(446,407)	$(446,407)	$(928,792)	$(928,792)	$(928,792)	$(928,792)	$(928,792)	$-	$-	$-
Dev. Bank Debt Service - Stage II (Bamako)	$-	$-	$-	$-	$-	$-	$(2,502,400)	$(2,502,400)	$(3,366,495)	$(3,366,495)	$(3,366,495)
Supp. Credit Repayment - Stage II (Bamako)	$-	$-	$-	$-	$-	$-	$(1,029,755)	$(1,029,755)	$(2,024,744)	$(2,024,744)	$(2,024,744)
Investor Equity Invest - Stages I, II, III & IV (Domestic)	$-	$(2,340,900)	$(2,340,900)	$-	$-	$-	$(1,048,392)	$(1,048,392)	$-	$-	$-
Dev. Bank Debt Service - Stage I (Domestic)	$-	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)
Supp. Credit Repayment - Stage I (Domestic)	$-	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$-	$-	$-
Dev. Bank Debt Service - Stage II (domestic)	$-	$-	$-	$-	$-	$-	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)
Supp. Credit Repayment - Stage II (Domestic)	$-	$-	$-	$-	$-	$-	$(356,276)	$(356,276)	$(356,276)	$(356,276)	$(356,276)
From Operations:											
Revenues (Bamako)	$2,837,794	$4,374,870	$5,013,772	$8,218,539	$8,638,310	$9,085,094	$9,560,191	$10,062,054	$13,656,832	$14,358,129	$15,104,536
Expenses (Bamako)	$(2,345,692)	$(2,077,396)	$(2,088,949)	$(2,532,915)	$(2,538,981)	$(2,545,425)	$(2,552,219)	$(2,558,981)	$(3,662,379)	$(3,670,435)	$(3,678,976)
Profit Taxes (Bamako)	$(147,631)	$(689,242)	$(877,447)	$(1,705,687)	$(1,829,799)	$(1,961,901)	$(2,102,392)	$(2,250,922)	$(2,998,336)	$(3,206,308)	$(3,427,668)
Revenues (Domestic)	$52,033	$218,005	$227,623	$508,254	$531,772	$556,487	$582,470	$609,808	$816,730	$855,697	$896,297
Expenses (Domestic)	$(56,553)	$(38,743)	$(38,816)	$(62,191)	$(62,289)	$(62,394)	$(62,512)	$(62,642)	$(76,606)	$(76,752)	$(76,907)
Profit Taxes (Domestic)	$1,356	$(53,779)	$(56,642)	$(133,819)	$(140,845)	$(148,228)	$(155,988)	$(164,150)	$(222,037)	$(233,683)	$(245,817)
Annual Gross Cash Flow	$341,307	$(8,047,765)	$(7,601,939)	$(742,914)	$(436,926)	$(111,461)	$(11,252,833)	$(10,887,217)	$(2,295,579)	$(1,783,136)	$(1,238,317)

Inflows & Outflows:	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total 2000-2020
From Development Program:											
Investor Equity Invest - Stages I, II, III & IV (Bamako)	$(2,752,254)	$(2,752,254)	$-	$-	$-	$(9,918,338)	$(9,918,338)	$-	$-	$-	$(44,090,124)
Dev. Bank Debt Service - Stage I (Bamako)	$(2,059,041)	$(2,059,041)	$(2,059,041)	$(2,059,041)	$-	$-	$-	$-	$-	$-	$(27,769,560)
Supp. Credit Repayment - Stage I (Bamako)	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	$(5,536,773)
Dev. Bank Debt Service - Stage II (Bamako)	$(3,366,495)	$(3,366,495)	$(3,366,495)	$(3,366,495)	$(3,366,495)	$(3,366,495)	$(3,366,495)	$(3,366,495)	$(3,366,495)	$-	$(45,402,745)
Supp. Credit Repayment - Stage II (Bamako)	$(2,024,744)	$(2,024,744)	$-	$-	$-	$-	$-	$-	$-	$-	$(12,183,231)
Investor Equity Invest - Stages I, II, III & IV (Domestic)	$(1,985,041)	$(1,985,041)	$-	$-	$-	$(1,701,200)	$(1,701,200)	$-	$-	$-	$(14,151,065)
Dev. Bank Debt Service - Stage I (Domestic)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$-	$-	$-	$-	$-	$-	$(19,751,956)
Supp. Credit Repayment - Stage I (Domestic)	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	$(4,454,856)
Dev. Bank Debt Service - Stage II (domestic)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,371)	$-	$(8,293,207)
Supp. Credit Repayment - Stage II (Domestic)	$(356,276)	$(356,275)	$-	$-	$-	$-	$-	$-	$-	$-	$(2,493,931)
From Operations:											
Revenues (Bamako)	$15,887,504	$16,732,199	$18,113,226	$19,025,468	$19,928,920	$20,861,693	$21,775,415	$24,490,452	$25,399,602	$26,324,368	$309,448,970
Expenses (Bamako)	$(3,686,927)	$(3,696,451)	$(3,717,383)	$(3,727,113)	$(3,735,474)	$(3,745,222)	$(3,753,378)	$(4,306,669)	$(4,314,451)	$(4,323,323)	$(69,258,739)
Profit Taxes (Bamako)	$(3,660,173)	$(3,910,725)	$(4,318,753)	$(4,589,507)	$(4,858,034)	$(5,134,941)	$(5,406,611)	$(6,055,135)	$(6,325,545)	$(6,600,314)	$(72,057,069)
Revenues (Domestic)	$938,968	$983,757	$1,141,962	$1,196,815	$1,290,425	$1,314,996	$1,378,612	$1,445,390	$1,515,521	$1,589,157	$18,650,780
Expenses (Domestic)	$(77,075)	$(77,250)	$(78,324)	$(78,515)	$(78,715)	$(78,932)	$(79,160)	$(88,516)	$(88,760)	$(89,012)	$(1,490,666)
Profit Taxes (Domestic)	$(258,568)	$(271,952)	$(319,091)	$(335,490)	$(363,513)	$(370,819)	$(389,835)	$(407,062)	$(428,028)	$(450,044)	$(5,148,034)
Annual Gross Cash Flow	$(5,403,348)	$(4,787,497)	$3,392,875	$4,062,896	$8,224,742	$(2,731,631)	$(2,053,363)	$11,119,592	$11,799,472	$16,450,833	$(3,982,208)
Weighted Average Cost of Capital (WACC)											13.74%
Net Present Value (NPV)											$(19,181,756)
Internal Rate of Return (IRR)											Negative

Table V-20. Baseline Cash Flow – Lower Revenue Scenario, Alternative 1

Inflows & Outflows:	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
From Development Program:											
Investor Equity Invest - Stages I, II, III & IV (Bamako)	$-	$(2,554,550)	$(2,554,550)	$-	$-	$-	$(4,455,087)	$(4,455,087)	$-	$-	$-
Dev. Bank Debt Service - Stage I (Bamako)	$-	$(1,144,438)	$(1,144,438)	$(1,539,621)	$(1,539,621)	$(1,539,621)	$(1,539,621)	$(1,539,621)	$(1,539,621)	$(1,539,621)	$(1,539,621)
Supp. Credit Repayment - Stage I (Bamako)	$-	$(333,795)	$(333,795)	$(694,492)	$(694,492)	$(694,492)	$(694,492)	$(694,492)	$-	$-	$-
Dev. Bank Debt Service - Stage II (Bamako)	$-	$-	$-	$	$-	$-	$(1,871,137)	$(1,871,137)	$(2,517,253)	$(2,517,253)	$(2,517,253)
Supp. Credit Repayment - Stage II (Bamako)	$-	$-	$-	$-	$-	$-	$(769,986)	$(769,986)	$(1,513,976)	$(1,513,976)	$(1,513,976)
Investor Equity Invest - Stages I, II, III & IV (Domestic)	$-	$(2,340,900)	$(2,340,900)	$-	$-	$-	$(1,048,392)	$(1,048,392)	$-	$-	$-
Dev. Bank Debt Service - Stage I (Domestic)	$-	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)
Supp. Credit Repayment - Stage I (Domestic)	$-	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$-	$-	$-
Dev. Bank Debt Service - Stage II (domestic)	$-	$-	$-	$-	$-	$-	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)
Supp. Credit Repayment - Stage II (Domestic)	$-	$-	$-	$-	$-	$-	$(356,276)	$(356,276)	$(356,276)	$(356,276)	$(356,276)
From Operations:											
Revenues (Bamako)	$2,554,015	$3,937,383	$4,512,395	$7,396,685	$7,774,479	$8,176,584	$8,604,172	$9,055,849	$12,291,148	$12,922,316	$13,594,083
Expenses (Bamako)	$(2,132,448)	$(1,888,542)	$(1,899,044)	$(2,302,650)	$(2,308,164)	$(2,314,023)	$(2,320,199)	$(2,326,346)	$(3,329,435)	$(3,336,759)	$(3,344,524)
Profit Taxes (Bamako)	$(126,470)	$(614,652)	$(784,005)	$(1,528,211)	$(1,639,895)	$(1,758,768)	$(1,885,192)	$(2,018,851)	$(2,688,514)	$(2,875,667)	$(3,074,868)
Revenues (Domestic)	$46,830	$196,204	$204,860	$457,429	$478,595	$500,838	$524,223	$548,827	$735,057	$770,127	$806,667
Expenses (Domestic)	$(51,412)	$(35,221)	$(35,288)	$(56,537)	$(56,626)	$(56,722)	$(56,829)	$(56,947)	$(69,642)	$(69,775)	$(69,915)
Profit Taxes (Domestic)	$1,375	$(48,295)	$(50,872)	$(120,267)	$(126,591)	$(133,235)	$(140,218)	$(147,564)	$(199,625)	$(210,106)	$(221,026)
Annual Gross Cash Flow	$291,890	$(6,874,068)	$(6,472,899)	$(434,926)	$(159,576)	$133,300	$(8,648,668)	$(8,319,657)	$(1,191,362)	$(730,215)	$(239,934)

Inflows & Outflows:	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total 2000-2020
From Development Program:											
Investor Equity Invest - Stages I, II, III & IV (Bamako)	$(2,057,962)	$(2,057,962)	$-	$-	$-	$(7,416,307)	$(7,416,307)	$-	$-	$-	$(32,967,813)
Dev. Bank Debt Service - Stage I (Bamako)	$(1,539,621)	$(1,539,621)	$(1,539,621)	$(1,539,621)	$-	$-	$-	$-	$-	$-	$(20,764,325)
Supp. Credit Repayment - Stage I (Bamako)	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	$(4,140,050)
Dev. Bank Debt Service - Stage II (Bamako)	$(2,517,253)	$(2,517,253)	$(2,517,253)	$(2,517,253)	$(2,517,253)	$(2,517,253)	$(2,517,253)	$(2,517,253)	$(2,517,253)	$-	$(33,949,308)
Supp. Credit Repayment - Stage II (Bamako)	$(1,513,976)	$(1,513,976)	$-	$-	$-	$-	$-	$-	$-	$-	$(9,109,852)
Investor Equity Invest - Stages I, II, III & IV (Domestic)	$(1,985,041)	$(1,985,041)	$-	$-	$-	$(1,701,200)	$(1,701,200)	$-	$-	$-	$(14,151,065)
Dev. Bank Debt Service - Stage I (Domestic)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$-	$-	$-	$-	$-	$-	$(19,751,956)
Supp. Credit Repayment - Stage I (Domestic)	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	$(4,454,856)
Dev. Bank Debt Service - Stage II (domestic)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,371)	$-	$(8,293,207)
Supp. Credit Repayment - Stage II (Domestic)	$(356,276)	$(356,275)	$-	$-	$-	$-	$-	$-	$-	$-	$(2,493,931)
From Operations:											
Revenues (Bamako)	$14,298,754	$15,058,980	$16,301,904	$17,122,921	$17,936,028	$18,775,524	$19,597,873	$22,041,407	$22,859,642	$23,691,931	$278,504,073
Expenses (Bamako)	$(3,351,752)	$(3,360,410)	$(3,379,439)	$(3,388,284)	$(3,395,885)	$(3,404,747)	$(3,412,161)	$(3,915,154)	$(3,922,229)	$(3,930,293)	$(62,962,490)
Profit Taxes (Bamako)	$(3,284,101)	$(3,509,571)	$(3,876,739)	$(4,120,391)	$(4,362,043)	$(4,611,233)	$(4,855,714)	$(5,437,876)	$(5,681,224)	$(5,928,491)	$(64,662,475)
Revenues (Domestic)	$845,071	$885,381	$1,027,766	$1,077,133	$1,161,383	$1,183,497	$1,240,751	$1,300,851	$1,363,969	$1,430,242	$16,785,702
Expenses (Domestic)	$(70,068)	$(70,227)	$(71,204)	$(71,378)	$(71,559)	$(71,756)	$(71,964)	$(80,469)	$(80,691)	$(80,920)	$(1,355,151)
Profit Taxes (Domestic)	$(232,501)	$(244,546)	$(286,969)	$(301,727)	$(326,947)	$(333,522)	$(350,636)	$(366,115)	$(384,984)	$(404,796)	$(4,629,165)
Annual Gross Cash Flow	$(3,767,951)	$(3,213,746)	$3,655,219	$4,258,175	$7,831,351	$(689,370)	$(78,983)	$10,433,020	$11,044,860	$14,777,672	$11,604,132
Weighted Average Cost of Capital (WACC)											13.74%
Net Present Value (NPV)											$(13,393,223)
Internal Rate of Return (IRR)											2.17%

Table V-21. Baseline Cash Flow – Lower Revenue Scenario, Alternative 2

Inflows & Outflows:	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
From Development Program:											
Investor Equity Invest - Stages I, II, III & IV (Bamako)	$-	$(2,985,597)	$(2,985,597)	$-	$-	$-	$(5,206,825)	$(5,206,825)	$-	$-	$-
Dev. Bank Debt Service - Stage I (Bamako)	$-	$(1,337,547)	$(1,337,547)	$(1,799,412)	$(1,799,412)	$(1,799,412)	$(1,799,412)	$(1,799,412)	$(1,799,412)	$(1,799,412)	$(1,799,412)
Supp. Credit Repayment - Stage I (Bamako)	$-	$(390,119)	$(390,119)	$(811,678)	$(811,678)	$(811,678)	$(811,678)	$(811,678)	$-	$-	$-
Dev. Bank Debt Service - Stage II (Bamako)	$-	$-	$-	$-	$-	$-	$(2,186,867)	$(2,186,867)	$(2,942,006)	$(2,942,006)	$(2,942,006)
Supp. Credit Repayment - Stage II (Bamako)	$-	$-	$-	$-	$-	$-	$(899,911)	$(899,911)	$(1,769,440)	$(1,769,440)	$(1,769,440)
Investor Equity Invest - Stages I, II, III & IV (Domestic)	$-	$(2,340,900)	$(2,340,900)	$-	$-	$-	$(1,048,392)	$(1,048,392)	$-	$-	$-
Dev. Bank Debt Service - Stage I (Domestic)	$-	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)
Supp. Credit Repayment - Stage I (Domestic)	$-	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$-	$-	$-
Dev. Bank Debt Service - Stage II (domestic)	$-	$-	$-	$-	$-	$-	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)
Supp. Credit Repayment - Stage II (Domestic)	$-	$-	$-	$-	$-	$-	$(356,276)	$(356,276)	$(356,276)	$(356,276)	$(356,276)
From Operations:											
Revenues (Bamako)	$2,554,015	$3,937,383	$4,512,395	$7,396,685	$7,774,479	$8,176,584	$8,604,172	$9,055,849	$12,291,148	$12,922,316	$13,594,083
Expenses (Bamako)	$(2,132,448)	$(1,923,763)	$(1,934,332)	$(2,359,188)	$(2,364,791)	$(2,370,745)	$(2,377,027)	$(2,383,293)	$(3,399,077)	$(3,406,534)	$(3,414,439)
Profit Taxes (Bamako)	$(126,470)	$(604,086)	$(773,419)	$(1,511,249)	$(1,622,907)	$(1,741,752)	$(1,868,143)	$(2,001,767)	$(2,667,621)	$(2,854,735)	$(3,053,893)
Revenues (Domestic)	$46,830	$196,204	$204,860	$457,429	$478,595	$500,838	$524,223	$548,827	$735,057	$770,127	$806,667
Expenses (Domestic)	$(51,412)	$(35,221)	$(35,288)	$(56,537)	$(56,626)	$(56,722)	$(56,829)	$(56,947)	$(69,642)	$(69,775)	$(69,915)
Profit Taxes (Domestic)	$1,375	$(48,295)	$(50,872)	$(120,267)	$(126,591)	$(133,235)	$(140,218)	$(147,564)	$(199,625)	$(210,106)	$(221,026)
Annual Gross Cash Flow	$291,890	$(7,579,201)	$(7,178,079)	$(851,480)	$(576,192)	$(283,382)	$(10,262,818)	$(9,933,890)	$(2,180,119)	$(1,719,066)	$(1,228,883)

Inflows & Outflows:	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total 2000-2020
From Development Program:											
Investor Equity Invest - Stages I, II, III & IV (Bamako)	$(2,405,216)	$(2,405,216)	$-	$-	$-	$(8,667,712)	$(8,667,712)	$-	$-	$-	$(38,530,700)
Dev. Bank Debt Service - Stage I (Bamako)	$(1,799,412)	$(1,799,412)	$(1,799,412)	$(1,799,412)	$-	$-	$-	$-	$-	$-	$(24,268,033)
Supp. Credit Repayment - Stage I (Bamako)	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	$(4,838,629)
Dev. Bank Debt Service - Stage II (Bamako)	$(2,942,006)	$(2,942,006)	$(2,942,006)	$(2,942,006)	$(2,942,006)	$(2,942,006)	$(2,942,006)	$(2,942,006)	$(2,942,006)	$-	$(39,677,810)
Supp. Credit Repayment - Stage II (Bamako)	$(1,769,440)	$(1,769,440)	$-	$-	$-	$-	$-	$-	$-	$-	$(10,647,020)
Investor Equity Invest - Stages I, II, III & IV (Domestic)	$(1,985,041)	$(1,985,041)	$-	$-	$-	$(1,701,200)	$(1,701,200)	$-	$-	$-	$(14,151,065)
Dev. Bank Debt Service - Stage I (Domestic)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$-	$-	$-	$-	$-	$-	$(19,751,956)
Supp. Credit Repayment - Stage I (Domestic)	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	$(4,454,856)
Dev. Bank Debt Service - Stage II (domestic)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,371)	$-	$(8,293,207)
Supp. Credit Repayment - Stage II (Domestic)	$(356,276)	$(356,275)	$-	$-	$-	$-	$-	$-	$-	$-	$(2,493,931)
From Operations:											
Revenues (Bamako)	$14,298,754	$15,058,980	$16,301,904	$17,122,921	$17,936,028	$18,775,524	$19,597,873	$22,041,407	$22,859,642	$23,691,931	$278,504,073
Expenses (Bamako)	$(3,421,820)	$(3,430,637)	$(3,450,643)	$(3,459,662)	$(3,467,445)	$(3,476,504)	$(3,484,125)	$(3,995,623)	$(4,002,920)	$(4,011,214)	$(64,266,229)
Profit Taxes (Bamako)	$(3,263,080)	$(3,488,503)	$(3,855,378)	$(4,098,978)	$(4,340,575)	$(4,589,706)	$(4,834,124)	$(5,413,735)	$(5,657,017)	$(5,904,215)	$(64,271,353)
Revenues (Domestic)	$845,071	$885,381	$1,027,766	$1,077,133	$1,161,383	$1,183,497	$1,240,751	$1,300,851	$1,363,969	$1,430,242	$16,785,702
Expenses (Domestic)	$(70,068)	$(70,227)	$(71,204)	$(71,378)	$(71,559)	$(71,756)	$(71,964)	$(80,469)	$(80,691)	$(80,920)	$(1,355,151)
Profit Taxes (Domestic)	$(232,501)	$(244,546)	$(286,969)	$(301,727)	$(326,947)	$(333,522)	$(350,636)	$(366,115)	$(384,984)	$(404,796)	$(4,629,165)
Annual Gross Cash Flow	$(5,104,261)	$(4,550,167)	$2,920,832	$3,523,666	$7,356,506	$(2,415,758)	$(1,805,516)	$9,951,938	$10,563,623	$14,721,027	$(6,339,330)
Weighted Average Cost of Capital (WACC)											13.74%
Net Present Value (NPV)											$(18,403,486)
Internal Rate of Return (IRR)											Negative

Table V-22. Baseline Cash Flow – Lower Revenue Scenario, Alternative 3

Inflows & Outflows:	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
From Development Program:											
Investor Equity Invest - Stages I, II, III & IV (Bamako)	$-	$(3,416,376)	$(3,416,376)	$-	$-	$-	$(5,958,095)	$(5,958,095)	$-	$-	$-
Dev. Bank Debt Service - Stage I (Bamako)	$-	$(1,530,536)	$(1,530,536)	$(2,059,041)	$(2,059,041)	$(2,059,041)	$(2,059,041)	$(2,059,041)	$(2,059,041)	$(2,059,041)	$(2,059,041)
Supp. Credit Repayment - Stage I (Bamako)	$-	$(446,407)	$(446,407)	$(928,792)	$(928,792)	$(928,792)	$(928,792)	$(928,792)	$-	$-	$-
Dev. Bank Debt Service - Stage II (Bamako)	$-	$-	$-	$-	$-	$-	$(2,502,400)	$(2,502,400)	$(3,366,495)	$(3,366,495)	$(3,366,495)
Supp. Credit Repayment - Stage II (Bamako)	$-	$-	$-	$-	$-	$-	$(1,029,755)	$(1,029,755)	$(2,024,744)	$(2,024,744)	$(2,024,744)
Investor Equity Invest - Stages I, II, III & IV (Domestic)	$-	$(2,340,900)	$(2,340,900)	$-	$-	$-	$(1,048,392)	$(1,048,392)	$-	$-	$-
Dev. Bank Debt Service - Stage I (Domestic)	$-	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)
Supp. Credit Repayment - Stage I (Domestic)	$-	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$-	$-	$-
Dev. Bank Debt Service - Stage II (domestic)	$-	$-	$-	$-	$-	$-	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)
Supp. Credit Repayment - Stage II (Domestic)	$-	$-	$-	$-	$-	$-	$(356,276)	$(356,276)	$(356,276)	$(356,276)	$(356,276)
From Operations:											
Revenues (Bamako)	$2,554,015	$3,937,383	$4,512,395	$7,396,685	$7,774,479	$8,176,584	$8,604,172	$9,055,849	$12,291,148	$12,922,316	$13,594,083
Expenses (Bamako)	$(2,132,448)	$(1,888,542)	$(1,899,044)	$(2,302,650)	$(2,308,164)	$(2,314,023)	$(2,320,199)	$(2,326,346)	$(3,329,435)	$(3,336,759)	$(3,344,524)
Profit Taxes (Bamako)	$(126,470)	$(614,652)	$(784,005)	$(1,528,211)	$(1,639,895)	$(1,758,768)	$(1,885,192)	$(2,018,851)	$(2,688,514)	$(2,875,667)	$(3,074,868)
Revenues (Domestic)	$46,830	$196,204	$204,860	$457,429	$478,595	$500,838	$524,223	$548,827	$735,057	$770,127	$806,667
Expenses (Domestic)	$(51,412)	$(35,221)	$(35,288)	$(56,537)	$(56,626)	$(56,722)	$(56,829)	$(56,947)	$(69,642)	$(69,775)	$(69,915)
Profit Taxes (Domestic)	$1,375	$(48,295)	$(50,872)	$(120,267)	$(126,591)	$(133,235)	$(140,218)	$(147,564)	$(199,625)	$(210,106)	$(221,026)
Annual Gross Cash Flow	$291,890	$(8,234,603)	$(7,833,434)	$(1,188,646)	$(913,296)	$(620,420)	$(11,796,428)	$(11,467,417)	$(3,070,793)	$(2,609,646)	$(2,119,365)

Inflows & Outflows:	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total 2000-2020
From Development Program:											
Investor Equity Invest - Stages I, II, III & IV (Bamako)	$(2,752,254)	$(2,752,254)	$-	$-	$-	$(9,918,338)	$(9,918,338)	$-	$-	$-	$(44,090,124)
Dev. Bank Debt Service - Stage I (Bamako)	$(2,059,041)	$(2,059,041)	$(2,059,041)	$(2,059,041)	$-	$-	$-	$-	$-	$-	$(27,769,560)
Supp. Credit Repayment - Stage I (Bamako)	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	$(5,536,773)
Dev. Bank Debt Service - Stage II (Bamako)	$(3,366,495)	$(3,366,495)	$(3,366,495)	$(3,366,495)	$(3,366,495)	$(3,366,495)	$(3,366,495)	$(3,366,495)	$(3,366,495)	$-	$(45,402,745)
Supp. Credit Repayment - Stage II (Bamako)	$(2,024,744)	$(2,024,744)	$-	$-	$-	$-	$-	$-	$-	$-	$(12,183,231)
Investor Equity Invest - Stages I, II, III & IV (Domestic)	$(1,985,041)	$(1,985,041)	$-	$-	$-	$(1,701,200)	$(1,701,200)	$-	$-	$-	$(14,151,065)
Dev. Bank Debt Service - Stage I (Domestic)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$-	$-	$-	$-	$-	$-	$(19,751,956)
Supp. Credit Repayment - Stage I (Domestic)	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	$(4,454,856)
Dev. Bank Debt Service - Stage II (domestic)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,371)	$-	$(8,293,207)
Supp. Credit Repayment - Stage II (Domestic)	$(356,276)	$(356,275)	$-	$-	$-	$-	$-	$-	$-	$-	$(2,493,931)
From Operations:											
Revenues (Bamako)	$14,298,754	$15,058,980	$16,301,904	$17,122,921	$17,936,028	$18,775,524	$19,597,873	$22,041,407	$22,859,642	$23,691,931	$278,504,073
Expenses (Bamako)	$(3,351,752)	$(3,360,410)	$(3,379,439)	$(3,388,284)	$(3,395,885)	$(3,404,747)	$(3,412,161)	$(3,915,154)	$(3,922,229)	$(3,930,293)	$(62,962,490)
Profit Taxes (Bamako)	$(3,284,101)	$(3,509,571)	$(3,876,739)	$(4,120,391)	$(4,362,043)	$(4,611,233)	$(4,855,714)	$(5,437,876)	$(5,681,224)	$(5,928,491)	$(64,662,475)
Revenues (Domestic)	$845,071	$885,381	$1,027,766	$1,077,133	$1,161,383	$1,183,497	$1,240,751	$1,300,851	$1,363,969	$1,430,242	$16,785,702
Expenses (Domestic)	$(70,068)	$(70,227)	$(71,204)	$(71,378)	$(71,559)	$(71,756)	$(71,964)	$(80,469)	$(80,691)	$(80,920)	$(1,355,151)
Profit Taxes (Domestic)	$(232,501)	$(244,546)	$(286,969)	$(301,727)	$(326,947)	$(333,522)	$(350,636)	$(366,115)	$(384,984)	$(404,796)	$(4,629,165)
Annual Gross Cash Flow	$(6,341,674)	$(5,787,469)	$2,286,557	$2,889,512	$6,982,109	$(4,040,644)	$(3,430,256)	$9,583,777	$10,195,618	$14,777,672	$(22,446,956)
Weighted Average Cost of Capital (WACC)											13.74%
Net Present Value (NPV)											$(22,941,072)
Internal Rate of Return (IRR)											Negative

5.6.2 *Alternative A Case Cash Flows*

The cash flows for the Alternative A Case are summarized in Table V-23, representing a matrix showing the gross cash flow, the NPV and the IRR for the 12 variations of the Alternative A Case. Based on the same criteria as noted above, the Alternative A Case would be considered to be feasible from the concessionaires standpoint for Terminal Alternatives 1 and 2 because the IRRs exceed 20 percent for Terminal Alternatives 1 and 2, with 47.67 percent and 29.71, respectively (Terminal Alternative 3 would not be acceptable, with an IRR of 15.69 percent). Essentially, this demonstrates that the revised financial structure whereby the concessionaire would become responsible for only the landside capital development requirements and ASECNA would continue to realize 100 percent of airside (landing fee and lighting fee) revenues would represent an acceptable basis for the concession of Bamako-Sénou and the nine domestic airports, at least for Terminal Alternatives 1 and 2.

The details for each of these various cash flows are presented in Tables V-24 through V-35, with baseline activity, expense and revenue scenarios reflected in Tables V-24 through V-26, with lower activity sensitivity scenarios reflected in Tables V-27 through V-29, with higher expense sensitivity scenarios reflected in Tables V-30 through V-32, and with lower revenue sensitivity scenarios reflected in Tables V-33 through V-35.

Table V-23. Alternative A Case Cash Flows

Concession Responsible for Only Landside Development and Receives 0% of Landing Fee Revenue	Alternative 1 Single-Level Terminal (Bamako) Cost (Bamako) $39,093,100 Cost (Domestic) $6,360,867	Alternative 2 Split-Level Terminal (Bamako) Cost (Bamako) $51,256,478 Cost (Domestic) $6,360,867	Alternative 3 Two- Level Terminal (Bamako) Cost (Bamako) $62,332,128 Cost (Domestic) $6,360,867
Baseline Scenario			
Gross Cash Flow	$84,039,271	$64,830,438	$47,339,382
Net Present Value (NPV)	9,557,411	5,076,948	932,744
Internal Rate of Return (IRR)	47.67%	29.71%	15.69%
Lower Activity Scenario			
Gross Cash Flow	$79,633,278	$60,424,445	$42,933,390
Net Present Value (NPV)	8,676,763	4,125,561	(18,642)
Internal Rate of Return (IRR)	44.54%	25.45%	13.70%
Higher Expense Scenario			
Gross Cash Flow	$79,537,036	$60,328,203	$42,837,148
Net Present Value (NPV)	8,391,759	3,840,557	(303,646)
Internal Rate of Return (IRR)	48.67%	23.04%	13.17%

Concession Responsible for Only Landside Development and Receives 0% of Landing Fee Revenue	Alternative 1 Single-Level Terminal (Bamako) Cost (Bamako) $39,093,100 Cost (Domestic) $6,360,867	Alternative 2 Split-Level Terminal (Bamako) Cost (Bamako) $51,256,478 Cost (Domestic) $6,360,867	Alternative 3 Two- Level Terminal (Bamako) Cost (Bamako) $62,332,128 Cost (Domestic) $6,360,867
Lower Revenue Scenario			
Gross Cash Flow	$61,072,289	$40,950,838	$24,372,400
Net Present Value (NPV)	4,632,443	(153,611)	(4,062,962)
Internal Rate of Return (IRR)	25.68%	13.44%	7.02%

Table V-24. Alternative A Cash Flow – Baseline Activity Scenario, Alternative 1

Inflows & Outflows:	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
From Development Program:											
Investor Equity Invest - Stages I, II, III & IV (Bamako)	$-	$(426,938)	$(426,938)	$-	$-	$-	$(4,111,710)	$(4,111,710)	$-	$-	$-
Dev. Bank Debt Service - Stage I (Bamako)	$-	$(191,268)	$(191,268)	$(257,314)	$(257,314)	$(257,314)	$(257,314)	$(257,314)	$(257,314)	$(257,314)	$(257,314)
Supp. Credit Repayment - Stage I (Bamako)	$-	$(55,786)	$(55,786)	$(116,069)	$(116,069)	$(116,069)	$(116,069)	$(116,069)	$-	$-	$-
Dev. Bank Debt Service - Stage II (Bamako)	$-	$-	$-	$-	$-	$-	$(1,726,918)	$(1,726,918)	$(2,323,234)	$(2,323,234)	$(2,323,234)
Supp. Credit Repayment - Stage II (Bamako)	$-	$-	$-	$-	$-	$-	$(671,579)	$(671,579)	$(1,397,285)	$(1,397,285)	$(1,397,286)
Investor Equity Invest - Stages I, II, III & IV (Domestic)	$-	$(349,396)	$(349,396)	$-	$-	$-	$(182,850)	$(182,850)	$-	$-	$-
Dev. Bank Debt Service - Stage I (Domestic)	$-	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)
Supp. Credit Repayment - Stage I (Domestic)	$-	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$-	$-	$-
Dev. Bank Debt Service - Stage II (domestic)	$-	$-	$-	$-	$-	$-	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)
Supp. Credit Repayment - Stage II (Domestic)	$-	$-	$-	$-	$-	$-	$(356,276)	$(356,276)	$(356,276)	$(356,276)	$(356,276)
From Operations:											
Revenues (Bamako)	$2,837,794	$4,374,870	$5,013,772	$8,218,539	$8,638,310	$9,085,094	$9,560,191	$10,062,054	$13,656,832	$14,358,129	$15,104,536
Expenses (Bamako)	$(2,132,448)	$(1,888,542)	$(1,899,044)	$(2,302,650)	$(2,308,164)	$(2,314,023)	$(2,320,199)	$(2,326,346)	$(3,329,435)	$(3,336,759)	$(3,344,524)
Profit Taxes (Bamako)	$(211,604)	$(745,898)	$(934,418)	$(1,774,767)	$(1,899,044)	$(2,031,321)	$(2,171,998)	$(2,320,712)	$(3,098,219)	$(3,306,411)	$(3,528,004)
Revenues (Domestic)	$52,033	$218,005	$227,623	$508,254	$531,772	$556,487	$582,470	$609,808	$816,730	$855,697	$896,297
Expenses (Domestic)	$(51,412)	$(35,221)	$(35,288)	$(56,537)	$(56,626)	$(56,722)	$(56,829)	$(56,947)	$(69,642)	$(69,775)	$(69,915)
Profit Taxes (Domestic)	$(186)	$(54,835)	$(57,701)	$(135,515)	$(142,544)	$(149,930)	$(157,692)	$(165,858)	$(224,126)	$(235,777)	$(247,914)
Annual Gross Cash Flow	$494,178	$(1,202,271)	$(755,705)	$2,036,679	$2,343,059	$2,668,940	$(4,626,406)	$(4,260,352)	$1,414,804	$1,927,769	$2,473,140

Inflows & Outflows:	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total 2000-2020
From Development Program:											
Investor Equity Invest - Stages I, II, III & IV (Bamako)	$-	$-	$-	$-	$-	$(4,417,725)	$(4,417,725)	$-	$-	$-	$(17,912,745)
Dev. Bank Debt Service - Stage I (Bamako)	$(257,314)	$(257,314)	$(257,314)	$(257,314)	$-	$-	$-	$-	$-	$-	$(3,470,304)
Supp. Credit Repayment - Stage I (Bamako)	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	$(691,917)
Dev. Bank Debt Service - Stage II (Bamako)	$(2,323,234)	$(2,323,234)	$(2,323,234)	$(2,323,234)	$(2,323,234)	$(2,323,234)	$(2,323,234)	$(2,323,234)	$(2,323,235)	$-	$(31,332,645)
Supp. Credit Repayment - Stage II (Bamako)	$(1,397,286)	$(1,397,285)	$-	$-	$-	$-	$-	$-	$-	$-	$(8,329,585)
Investor Equity Invest - Stages I, II, III & IV (Domestic)	$(313,059)	$(313,059)	$-	$-	$-	$(1,093,226)	$(1,093,226)	$-	$-	$-	$(3,877,059)
Dev. Bank Debt Service - Stage I (Domestic)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$-	$-	$-	$-	$-	$-	$(19,751,956)
Supp. Credit Repayment - Stage I (Domestic)	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	$(4,454,856)
Dev. Bank Debt Service - Stage II (domestic)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,371)	$-	$(8,293,207)
Supp. Credit Repayment - Stage II (Domestic)	$(356,276)	$(356,275)	$-	$-	$-	$-	$-	$-	$-	$-	$(2,493,931)
From Operations:											
Revenues (Bamako)	$15,887,504	$16,732,199	$18,113,226	$19,025,468	$19,928,920	$20,861,693	$21,775,415	$24,490,452	$25,399,602	$26,324,368	$309,448,970
Expenses (Bamako)	$(3,351,752)	$(3,360,410)	$(3,379,439)	$(3,388,284)	$(3,395,885)	$(3,404,747)	$(3,412,161)	$(3,915,154)	$(3,922,229)	$(3,930,293)	$(62,962,490)
Profit Taxes (Bamako)	$(3,760,726)	$(4,011,537)	$(4,420,136)	$(4,691,155)	$(4,959,910)	$(5,237,084)	$(5,508,976)	$(6,172,589)	$(6,443,212)	$(6,718,222)	$(73,945,944)
Revenues (Domestic)	$938,968	$983,757	$1,141,962	$1,196,815	$1,290,425	$1,314,996	$1,378,612	$1,445,390	$1,515,521	$1,589,157	$18,650,780
Expenses (Domestic)	$(70,068)	$(70,227)	$(71,204)	$(71,378)	$(71,559)	$(71,756)	$(71,964)	$(80,469)	$(80,691)	$(80,920)	$(1,355,151)
Profit Taxes (Domestic)	$(260,670)	$(274,059)	$(321,228)	$(337,631)	$(365,660)	$(372,972)	$(391,994)	$(409,476)	$(430,449)	$(452,471)	$(5,188,689)
Annual Gross Cash Flow	$2,732,862	$3,349,331	$6,479,408	$7,150,060	$9,510,724	$4,663,573	$5,342,374	$12,442,547	$13,122,937	$15,675,852	$84,039,271
Weighted Average Cost of Capital (WACC)											13.74%
Net Present Value (NPV)											$9,557,411
Internal Rate of Return (IRR)											47.67%

Table V-25. Alternative A Cash Flow Scenario – Baseline Activity Scenario, Alternative 2

Inflows & Outflows:	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
From Development Program:											
Investor Equity Invest - Stages I, II, III & IV (Bamako)	$-	$(559,774)	$(559,774)	$-	$-	$-	$(5,391,022)	$(5,391,022)	$-	$-	$-
Dev. Bank Debt Service - Stage I (Bamako)	$-	$(250,779)	$(250,779)	$(337,374)	$(337,374)	$(337,374)	$(337,374)	$(337,374)	$(337,374)	$(337,374)	$(337,374)
Supp. Credit Repayment - Stage I (Bamako)	$-	$(73,143)	$(73,143)	$(152,183)	$(152,183)	$(152,183)	$(152,183)	$(152,183)	$-	$-	$-
Dev. Bank Debt Service - Stage II (Bamako)	$-	$-	$-	$-	$-	$-	$(2,264,229)	$(2,264,229)	$(3,046,082)	$(3,046,082)	$(3,046,082)
Supp. Credit Repayment - Stage II (Bamako)	$-	$-	$-	$-	$-	$-	$(880,533)	$(880,533)	$(1,832,034)	$(1,832,034)	$(1,832,036)
Investor Equity Invest - Stages I, II, III & IV (Domestic)	$-	$(349,396)	$(349,396)	$-	$-	$-	$(182,850)	$(182,850)	$-	$-	$-
Dev. Bank Debt Service - Stage I (Domestic)	$-	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)
Supp. Credit Repayment - Stage I (Domestic)	$-	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$-	$-	$-
Dev. Bank Debt Service - Stage II (domestic)	$-	$-	$-	$-	$-	$-	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)
Supp. Credit Repayment - Stage II (Domestic)	$-	$-	$-	$-	$-	$-	$(356,276)	$(356,276)	$(356,276)	$(356,276)	$(356,276)
From Operations:											
Revenues (Bamako)	$2,837,794	$4,374,870	$5,013,772	$8,218,539	$8,638,310	$9,085,094	$9,560,191	$10,062,054	$13,656,832	$14,358,129	$15,104,536
Expenses (Bamako)	$(2,132,448)	$(1,888,542)	$(1,899,044)	$(2,302,650)	$(2,308,164)	$(2,314,023)	$(2,320,199)	$(2,326,346)	$(3,329,435)	$(3,336,759)	$(3,344,524)
Profit Taxes (Bamako)	$(211,604)	$(745,898)	$(934,418)	$(1,774,767)	$(1,899,044)	$(2,031,321)	$(2,171,998)	$(2,320,712)	$(3,098,219)	$(3,306,411)	$(3,528,004)
Revenues (Domestic)	$52,033	$218,005	$227,623	$508,254	$531,772	$556,487	$582,470	$609,808	$816,730	$855,697	$896,297
Expenses (Domestic)	$(51,412)	$(35,221)	$(35,288)	$(56,537)	$(56,626)	$(56,722)	$(56,829)	$(56,947)	$(69,642)	$(69,775)	$(69,915)
Profit Taxes (Domestic)	$(186)	$(54,835)	$(57,701)	$(135,515)	$(142,544)	$(149,930)	$(157,692)	$(165,858)	$(224,126)	$(235,777)	$(247,914)
Annual Gross Cash Flow	$494,178	$(1,411,976)	$(965,410)	$1,920,505	$2,226,885	$2,552,766	$(6,768,158)	$(6,402,103)	$177,146	$690,111	$1,235,482

Inflows & Outflows:	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total 2000-2020
From Development Program:											
Investor Equity Invest - Stages I, II, III & IV (Bamako)	$-	$-	$-	$-	$-	$(5,792,250)	$(5,792,250)	$-	$-	$-	$(23,486,094)
Dev. Bank Debt Service - Stage I (Bamako)	$(337,374)	$(337,374)	$(337,374)	$(337,374)	$-	$-	$-	$-	$-	$-	$(4,550,050)
Supp. Credit Repayment - Stage I (Bamako)	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	$(907,199)
Dev. Bank Debt Service - Stage II (Bamako)	$(3,046,082)	$(3,046,082)	$(3,046,082)	$(3,046,082)	$(3,046,082)	$(3,046,082)	$(3,046,082)	$(3,046,082)	$(3,046,083)	$-	$(41,081,445)
Supp. Credit Repayment - Stage II (Bamako)	$(1,832,036)	$(1,832,034)	$-	$-	$-	$-	$-	$-	$-	$-	$(10,921,242)
Investor Equity Invest - Stages I, II, III & IV (Domestic)	$(313,059)	$(313,059)	$-	$-	$-	$(1,093,226)	$(1,093,226)	$-	$-	$-	$(3,877,059)
Dev. Bank Debt Service - Stage I (Domestic)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$-	$-	$-	$-	$-	$-	$(19,751,956)
Supp. Credit Repayment - Stage I (Domestic)	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	$(4,454,856)
Dev. Bank Debt Service - Stage II (domestic)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,371)	$-	$(8,293,207)
Supp. Credit Repayment - Stage II (Domestic)	$(356,276)	$(356,275)	$-	$-	$-	$-	$-	$-	$-	$-	$(2,493,931)
From Operations:											
Revenues (Bamako)	$15,887,504	$16,732,199	$18,113,226	$19,025,468	$19,928,920	$20,861,693	$21,775,415	$24,490,452	$25,399,602	$26,324,368	$309,448,970
Expenses (Bamako)	$(3,351,752)	$(3,360,410)	$(3,379,439)	$(3,388,284)	$(3,395,885)	$(3,404,747)	$(3,412,161)	$(3,915,154)	$(3,922,229)	$(3,930,293)	$(62,962,490)
Profit Taxes (Bamako)	$(3,760,726)	$(4,011,537)	$(4,420,136)	$(4,691,155)	$(4,959,910)	$(5,237,084)	$(5,508,976)	$(6,172,589)	$(6,443,212)	$(6,718,222)	$(73,945,944)
Revenues (Domestic)	$938,968	$983,757	$1,141,962	$1,196,815	$1,290,425	$1,314,996	$1,378,612	$1,445,390	$1,515,521	$1,589,157	$18,650,780
Expenses (Domestic)	$(70,068)	$(70,227)	$(71,204)	$(71,378)	$(71,559)	$(71,756)	$(71,964)	$(80,469)	$(80,691)	$(80,920)	$(1,355,151)
Profit Taxes (Domestic)	$(260,670)	$(274,059)	$(321,228)	$(337,631)	$(365,660)	$(372,972)	$(391,994)	$(409,476)	$(430,449)	$(452,471)	$(5,188,689)
Annual Gross Cash Flow	$1,495,204	$2,111,673	$5,676,499	$6,347,152	$8,787,876	$2,566,200	$3,245,001	$11,719,699	$12,400,088	$16,731,618	$64,830,438
Weighted Average Cost of Capital (WACC)											13.74%
Net Present Value (NPV)											$5,076,948
Internal Rate of Return (IRR)											29.71%

Table V-26. Alternative A Cash Flow – Baseline Activity Scenario, Alternative 3

Inflows & Outflows:	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
From Development Program:											
Investor Equity Invest - Stages I, II, III & IV (Bamako)	$-	$(680,732)	$(680,732)	$-	$-	$-	$(6,555,930)	$(6,555,930)	$-	$-	$-
Dev. Bank Debt Service - Stage I (Bamako)	$-	$(304,968)	$(304,968)	$(410,275)	$(410,275)	$(410,275)	$(410,275)	$(410,275)	$(410,275)	$(410,275)	$(410,275)
Supp. Credit Repayment - Stage I (Bamako)	$-	$(88,948)	$(88,948)	$(185,067)	$(185,067)	$(185,067)	$(185,067)	$(185,067)	$-	$-	$-
Dev. Bank Debt Service - Stage II (Bamako)	$-	$-	$-	$-	$-	$-	$(2,753,490)	$(2,753,490)	$(3,704,288)	$(3,704,288)	$(3,704,288)
Supp. Credit Repayment - Stage II (Bamako)	$-	$-	$-	$-	$-	$-	$(1,070,801)	$(1,070,801)	$(2,227,906)	$(2,227,906)	$(2,227,907)
Investor Equity Invest - Stages I, II, III & IV (Domestic)	$-	$(349,396)	$(349,396)	$-	$-	$-	$(182,850)	$(182,850)	$-	$-	$-
Dev. Bank Debt Service - Stage I (Domestic)	$-	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)
Supp. Credit Repayment - Stage I (Domestic)	$-	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$-	$-	$-
Dev. Bank Debt Service - Stage II (domestic)	$-	$-	$-	$-	$-	$-	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)
Supp. Credit Repayment - Stage II (Domestic)	$-	$-	$-	$-	$-	$-	$(356,276)	$(356,276)	$(356,276)	$(356,276)	$(356,276)
From Operations:											
Revenues (Bamako)	$2,837,794	$4,374,870	$5,013,772	$8,218,539	$8,638,310	$9,085,094	$9,560,191	$10,062,054	$13,656,832	$14,358,129	$15,104,536
Expenses (Bamako)	$(2,132,448)	$(1,888,542)	$(1,899,044)	$(2,302,650)	$(2,308,164)	$(2,314,023)	$(2,320,199)	$(2,326,346)	$(3,329,435)	$(3,336,759)	$(3,344,524)
Profit Taxes (Bamako)	$(211,604)	$(745,898)	$(934,418)	$(1,774,767)	$(1,899,044)	$(2,031,321)	$(2,171,998)	$(2,320,712)	$(3,098,219)	$(3,306,411)	$(3,528,004)
Revenues (Domestic)	$52,033	$218,005	$227,623	$508,254	$531,772	$556,487	$582,470	$609,808	$816,730	$855,697	$896,297
Expenses (Domestic)	$(51,412)	$(35,221)	$(35,288)	$(56,537)	$(56,626)	$(56,722)	$(56,829)	$(56,947)	$(69,642)	$(69,775)	$(69,915)
Profit Taxes (Domestic)	$(186)	$(54,835)	$(57,701)	$(135,515)	$(142,544)	$(149,930)	$(157,692)	$(165,858)	$(224,126)	$(235,777)	$(247,914)
Annual Gross Cash Flow	$494,178	$(1,602,927)	$(1,156,362)	$1,814,720	$2,121,100	$2,446,982	$(8,718,380)	$(8,352,325)	$(949,832)	$(436,868)	$108,503

Inflows & Outflows:	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total 2000-2020
From Development Program:											
Investor Equity Invest - Stages I, II, III & IV (Bamako)	$-	$-	$-	$-	$-	$(7,043,857)	$(7,043,857)	$-	$-	$-	$(28,561,038)
Dev. Bank Debt Service - Stage I (Bamako)	$(410,275)	$(410,275)	$(410,275)	$(410,275)	$-	$-	$-	$-	$-	$-	$(5,533,238)
Supp. Credit Repayment - Stage I (Bamako)	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	$(1,103,229)
Dev. Bank Debt Service - Stage II (Bamako)	$(3,704,288)	$(3,704,288)	$(3,704,288)	$(3,704,288)	$(3,704,288)	$(3,704,288)	$(3,704,288)	$(3,704,288)	$(3,704,290)	$-	$(49,958,444)
Supp. Credit Repayment - Stage II (Bamako)	$(2,227,907)	$(2,227,906)	$-	$-	$-	$-	$-	$-	$-	$-	$(13,281,136)
Investor Equity Invest - Stages I, II, III & IV (Domestic)	$(313,059)	$(313,059)	$-	$-	$-	$(1,093,226)	$(1,093,226)	$-	$-	$-	$(3,877,059)
Dev. Bank Debt Service - Stage I (Domestic)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$-	$-	$-	$-	$-	$-	$(19,751,956)
Supp. Credit Repayment - Stage I (Domestic)	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	$(4,454,856)
Dev. Bank Debt Service - Stage II (domestic)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,371)	$-	$(8,293,207)
Supp. Credit Repayment - Stage II (Domestic)	$(356,276)	$(356,275)	$-	$-	$-	$-	$-	$-	$-	$-	$(2,493,931)
From Operations:											
Revenues (Bamako)	$15,887,504	$16,732,199	$18,113,226	$19,025,468	$19,928,920	$20,861,693	$21,775,415	$24,490,452	$25,399,602	$26,324,368	$309,448,970
Expenses (Bamako)	$(3,351,752)	$(3,360,410)	$(3,379,439)	$(3,388,284)	$(3,395,885)	$(3,404,747)	$(3,412,161)	$(3,915,154)	$(3,922,229)	$(3,930,293)	$(62,962,490)
Profit Taxes (Bamako)	$(3,760,726)	$(4,011,537)	$(4,420,136)	$(4,691,155)	$(4,959,910)	$(5,237,084)	$(5,508,976)	$(6,172,589)	$(6,443,212)	$(6,718,222)	$(73,945,944)
Revenues (Domestic)	$938,968	$983,757	$1,141,962	$1,196,815	$1,290,425	$1,314,996	$1,378,612	$1,445,390	$1,515,521	$1,589,157	$18,650,780
Expenses (Domestic)	$(70,068)	$(70,227)	$(71,204)	$(71,378)	$(71,559)	$(71,756)	$(71,964)	$(80,469)	$(80,691)	$(80,920)	$(1,355,151)
Profit Taxes (Domestic)	$(260,670)	$(274,059)	$(321,228)	$(337,631)	$(365,660)	$(372,972)	$(391,994)	$(409,476)	$(430,449)	$(452,471)	$(5,188,689)
Annual Gross Cash Flow	$368,225	$984,695	$4,945,392	$5,616,045	$8,129,670	$656,387	$1,335,188	$11,061,493	$11,741,882	$16,731,618	$47,339,382
Weighted Average Cost of Capital (WACC)											13.74%
Net Present Value (NPV)											$932,744
Internal Rate of Return (IRR)											15.69%

Table V-27. Alternative A Cash Flow – Lower Activity Scenario, Alternative 1

Inflows & Outflows:	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
From Development Program:											
Investor Equity Invest - Stages I, II, III & IV (Bamako)	$-	$(426,938)	$(426,938)	$-	$-	$-	$(4,111,710)	$(4,111,710)	$-	$-	$-
Dev. Bank Debt Service - Stage I (Bamako)	$-	$(191,268)	$(191,268)	$(257,314)	$(257,314)	$(257,314)	$(257,314)	$(257,314)	$(257,314)	$(257,314)	$(257,314)
Supp. Credit Repayment - Stage I (Bamako)	$-	$(55,786)	$(55,786)	$(116,069)	$(116,069)	$(116,069)	$(116,069)	$(116,069)	$-	$-	$-
Dev. Bank Debt Service - Stage II (Bamako)	$-	$-	$-	$-	$-	$-	$(1,726,918)	$(1,726,918)	$(2,323,234)	$(2,323,234)	$(2,323,234)
Supp. Credit Repayment - Stage II (Bamako)	$-	$-	$-	$-	$-	$-	$(671,579)	$(671,579)	$(1,397,285)	$(1,397,285)	$(1,397,286)
Investor Equity Invest - Stages I, II, III & IV (Domestic)	$-	$(349,396)	$(349,396)	$-	$-	$-	$(182,850)	$(182,850)	$-	$-	$-
Dev. Bank Debt Service - Stage I (Domestic)	$-	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)
Supp. Credit Repayment - Stage I (Domestic)	$-	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$-	$-	$-
Dev. Bank Debt Service - Stage II (domestic)	$-	$-	$-	$-	$-	$-	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)
Supp. Credit Repayment - Stage II (Domestic)	$-	$-	$-	$-	$-	$-	$(356,276)	$(356,276)	$(356,276)	$(356,276)	$(356,276)
From Operations:											
Revenues (Bamako)	$2,899,343	$4,592,875	$4,929,866	$8,002,446	$8,439,986	$8,860,183	$9,342,831	$9,829,678	$12,662,625	$14,028,658	$14,758,211
Expenses (Bamako)	$(2,271,929)	$(1,887,808)	$(1,898,538)	$(2,211,023)	$(2,306,825)	$(2,312,470)	$(2,318,796)	$(2,324,908)	$(3,267,940)	$(3,335,210)	$(3,342,915)
Profit Taxes (Bamako)	$(188,224)	$(811,520)	$(909,398)	$(1,737,427)	$(1,839,948)	$(1,964,314)	$(2,107,211)	$(2,251,431)	$(2,818,405)	$(3,208,034)	$(3,424,589)
Revenues (Domestic)	$52,033	$218,005	$227,623	$508,254	$531,772	$556,487	$582,470	$609,808	$816,730	$855,697	$896,297
Expenses (Domestic)	$(51,412)	$(35,221)	$(35,288)	$(56,537)	$(56,626)	$(56,722)	$(56,829)	$(56,947)	$(69,642)	$(69,775)	$(69,915)
Profit Taxes (Domestic)	$(186)	$(54,835)	$(57,701)	$(135,515)	$(142,544)	$(149,930)	$(157,692)	$(165,858)	$(224,126)	$(235,777)	$(247,914)
Annual Gross Cash Flow	$439,625	$(1,049,154)	$(814,085)	$1,949,553	$2,205,170	$2,512,590	$(4,777,576)	$(4,422,009)	$761,906	$1,698,224	$2,231,839

Inflows & Outflows:	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total 2000-2020
From Development Program:											
Investor Equity Invest - Stages I, II, III & IV (Bamako)	$-	$-	$-	$-	$-	$(4,417,725)	$(4,417,725)	$-	$-	$-	$(17,912,745)
Dev. Bank Debt Service - Stage I (Bamako)	$(257,314)	$(257,314)	$(257,314)	$(257,314)	$-	$-	$-	$-	$-	$-	$(3,470,304)
Supp. Credit Repayment - Stage I (Bamako)	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	$(691,917)
Dev. Bank Debt Service - Stage II (Bamako)	$(2,323,234)	$(2,323,234)	$(2,323,234)	$(2,323,234)	$(2,323,234)	$(2,323,234)	$(2,323,234)	$(2,323,234)	$(2,323,235)	$-	$(31,332,645)
Supp. Credit Repayment - Stage II (Bamako)	$(1,397,286)	$(1,397,285)	$-	$-	$-	$-	$-	$-	$-	$-	$(8,329,585)
Investor Equity Invest - Stages I, II, III & IV (Domestic)	$(313,059)	$(313,059)	$-	$-	$-	$(1,093,226)	$(1,093,226)	$-	$-	$-	$(3,877,059)
Dev. Bank Debt Service - Stage I (Domestic)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$-	$-	$-	$-	$-	$-	$(19,751,956)
Supp. Credit Repayment - Stage I (Domestic)	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	$(4,454,856)
Dev. Bank Debt Service - Stage II (domestic)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,371)	$-	$(8,293,207)
Supp. Credit Repayment - Stage II (Domestic)	$(356,276)	$(356,275)	$-	$-	$-	$-	$-	$-	$-	$-	$(2,493,931)
From Operations:											
Revenues (Bamako)	$15,515,041	$16,349,593	$17,690,273	$18,663,167	$19,584,952	$20,546,380	$21,486,461	$23,603,672	$25,183,209	$26,152,350	$303,121,800
Expenses (Bamako)	$(3,350,201)	$(3,358,716)	$(3,377,827)	$(3,386,932)	$(3,394,936)	$(3,403,780)	$(3,411,662)	$(3,914,634)	$(3,922,229)	$(3,930,316)	$(62,929,595)
Profit Taxes (Bamako)	$(3,649,452)	$(3,897,263)	$(4,293,734)	$(4,582,871)	$(4,857,005)	$(5,142,780)	$(5,422,440)	$(5,906,711)	$(6,378,294)	$(6,666,610)	$(72,057,661)
Revenues (Domestic)	$938,968	$983,757	$1,141,962	$1,196,815	$1,290,425	$1,314,996	$1,378,612	$1,445,390	$1,515,521	$1,589,157	$18,650,780
Expenses (Domestic)	$(70,068)	$(70,227)	$(71,204)	$(71,378)	$(71,559)	$(71,756)	$(71,964)	$(80,469)	$(80,691)	$(80,920)	$(1,355,151)
Profit Taxes (Domestic)	$(260,670)	$(274,059)	$(321,228)	$(337,631)	$(365,660)	$(372,972)	$(391,994)	$(409,476)	$(430,449)	$(452,471)	$(5,188,689)
Annual Gross Cash Flow	$2,473,223	$3,082,692	$6,184,469	$6,897,397	$9,270,611	$4,443,531	$5,140,456	$11,822,165	$12,971,461	$16,611,190	$79,633,278
Weighted Average Cost of Capital (WACC)											13.74%
Net Present Value (NPV)											$8,676,763
Internal Rate of Return (IRR)											44.54%

Table V-28. Alternative A Cash Flow – Lower Activity Scenario, Alternative 2

Inflows & Outflows:	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
From Development Program:											
Investor Equity Invest - Stages I, II, III & IV (Bamako)	$-	$(559,774)	$(559,774)	$-	$-	$-	$(5,391,022)	$(5,391,022)	$-	$-	$-
Dev. Bank Debt Service - Stage I (Bamako)	$-	$(250,779)	$(250,779)	$(337,374)	$(337,374)	$(337,374)	$(337,374)	$(337,374)	$(337,374)	$(337,374)	$(337,374)
Supp. Credit Repayment - Stage I (Bamako)	$-	$(73,143)	$(73,143)	$(152,183)	$(152,183)	$(152,183)	$(152,183)	$(152,183)	$-	$-	$-
Dev. Bank Debt Service - Stage II (Bamako)	$-	$-	$-	$-	$-	$-	$(2,264,229)	$(2,264,229)	$(3,046,082)	$(3,046,082)	$(3,046,082)
Supp. Credit Repayment - Stage II (Bamako)	$-	$-	$-	$-	$-	$-	$(880,533)	$(880,533)	$(1,832,034)	$(1,832,034)	$(1,832,036)
Investor Equity Invest - Stages I, II, III & IV (Domestic)	$-	$(349,396)	$(349,396)	$-	$-	$-	$(182,850)	$(182,850)	$-	$-	$-
Dev. Bank Debt Service - Stage I (Domestic)	$-	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)
Supp. Credit Repayment - Stage I (Domestic)	$-	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$-	$-	$-
Dev. Bank Debt Service - Stage II (domestic)	$-	$-	$-	$-	$-	$-	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)
Supp. Credit Repayment - Stage II (Domestic)	$-	$-	$-	$-	$-	$-	$(356,276)	$(356,276)	$(356,276)	$(356,276)	$(356,276)
From Operations:											
Revenues (Bamako)	$2,899,343	$4,592,875	$4,929,866	$8,002,446	$8,439,986	$8,860,183	$9,342,831	$9,829,678	$12,662,625	$14,028,658	$14,758,211
Expenses (Bamako)	$(2,271,929)	$(1,887,808)	$(1,898,538)	$(2,211,023)	$(2,306,825)	$(2,312,470)	$(2,318,796)	$(2,324,908)	$(3,267,940)	$(3,335,210)	$(3,342,915)
Profit Taxes (Bamako)	$(188,224)	$(811,520)	$(909,398)	$(1,737,427)	$(1,839,948)	$(1,964,314)	$(2,107,211)	$(2,251,431)	$(2,818,405)	$(3,208,034)	$(3,424,589)
Revenues (Domestic)	$52,033	$218,005	$227,623	$508,254	$531,772	$556,487	$582,470	$609,808	$816,730	$855,697	$896,297
Expenses (Domestic)	$(51,412)	$(35,221)	$(35,288)	$(56,537)	$(56,626)	$(56,722)	$(56,829)	$(56,947)	$(69,642)	$(69,775)	$(69,915)
Profit Taxes (Domestic)	$(186)	$(54,835)	$(57,701)	$(135,515)	$(142,544)	$(149,930)	$(157,692)	$(165,858)	$(224,126)	$(235,777)	$(247,914)
Annual Gross Cash Flow	$439,625	$(1,258,859)	$(1,023,790)	$1,833,379	$2,088,996	$2,396,416	$(6,919,327)	$(6,563,760)	$(475,752)	$460,566	$994,180

Inflows & Outflows:	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total 2000-2020
From Development Program:											
Investor Equity Invest - Stages I, II, III & IV (Bamako)	$-	$-	$-	$-	$-	$(5,792,250)	$(5,792,250)	$-	$-	$-	$(23,486,094)
Dev. Bank Debt Service - Stage I (Bamako)	$(337,374)	$(337,374)	$(337,374)	$(337,374)	$-	$-	$-	$-	$-	$-	$(4,550,050)
Supp. Credit Repayment - Stage I (Bamako)	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	$(907,199)
Dev. Bank Debt Service - Stage II (Bamako)	$(3,046,082)	$(3,046,082)	$(3,046,082)	$(3,046,082)	$(3,046,082)	$(3,046,082)	$(3,046,082)	$(3,046,082)	$(3,046,083)	$-	$(41,081,445)
Supp. Credit Repayment - Stage II (Bamako)	$(1,832,036)	$(1,832,034)	$-	$-	$-	$-	$-	$-	$-	$-	$(10,921,242)
Investor Equity Invest - Stages I, II, III & IV (Domestic)	$(313,059)	$(313,059)	$-	$-	$-	$(1,093,226)	$(1,093,226)	$-	$-	$-	$(3,877,059)
Dev. Bank Debt Service - Stage I (Domestic)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$-	$-	$-	$-	$-	$-	$(19,751,956)
Supp. Credit Repayment - Stage I (Domestic)	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	$(4,454,856)
Dev. Bank Debt Service - Stage II (domestic)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,371)	$-	$(8,293,207)
Supp. Credit Repayment - Stage II (Domestic)	$(356,276)	$(356,275)	$-	$-	$-	$-	$-	$-	$-	$-	$(2,493,931)
From Operations:											
Revenues (Bamako)	$15,515,041	$16,349,593	$17,690,273	$18,663,167	$19,584,952	$20,546,380	$21,486,461	$23,603,672	$25,183,209	$26,152,350	$303,121,800
Expenses (Bamako)	$(3,350,201)	$(3,358,716)	$(3,377,827)	$(3,386,932)	$(3,394,936)	$(3,403,780)	$(3,411,662)	$(3,914,634)	$(3,922,229)	$(3,930,316)	$(62,929,595)
Profit Taxes (Bamako)	$(3,649,452)	$(3,897,263)	$(4,293,734)	$(4,582,871)	$(4,857,005)	$(5,142,780)	$(5,422,440)	$(5,906,711)	$(6,378,294)	$(6,666,610)	$(72,057,661)
Revenues (Domestic)	$938,968	$983,757	$1,141,962	$1,196,815	$1,290,425	$1,314,996	$1,378,612	$1,445,390	$1,515,521	$1,589,157	$18,650,780
Expenses (Domestic)	$(70,068)	$(70,227)	$(71,204)	$(71,378)	$(71,559)	$(71,756)	$(71,964)	$(80,469)	$(80,691)	$(80,920)	$(1,355,151)
Profit Taxes (Domestic)	$(260,670)	$(274,059)	$(321,228)	$(337,631)	$(365,660)	$(372,972)	$(391,994)	$(409,476)	$(430,449)	$(452,471)	$(5,188,689)
Annual Gross Cash Flow	$1,235,564	$1,845,034	$5,381,560	$6,094,488	$8,547,763	$2,346,158	$3,043,082	$11,099,317	$12,248,613	$16,611,190	$60,424,445
Weighted Average Cost of Capital (WACC)											13.74%
Net Present Value (NPV)											$4,125,561
Internal Rate of Return (IRR)											25.45%

Table V-29. Alternative A Cash Flow – Lower Activity Scenario, Alternative 3

Inflows & Outflows:	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
From Development Program:											
Investor Equity Invest - Stages I, II, III & IV (Bamako)	$-	$(680,732)	$(680,732)	$-	$-	$-	$(6,555,930)	$(6,555,930)	$-	$-	$-
Dev. Bank Debt Service - Stage I (Bamako)	$-	$(304,968)	$(304,968)	$(410,275)	$(410,275)	$(410,275)	$(410,275)	$(410,275)	$(410,275)	$(410,275)	$(410,275)
Supp. Credit Repayment - Stage I (Bamako)	$-	$(88,948)	$(88,948)	$(185,067)	$(185,067)	$(185,067)	$(185,067)	$(185,067)	$-	$-	$-
Dev. Bank Debt Service - Stage II (Bamako)	$-	$-	$-	$-	$-	$-	$(2,753,490)	$(2,753,490)	$(3,704,288)	$(3,704,288)	$(3,704,288)
Supp. Credit Repayment - Stage II (Bamako)	$-	$-	$-	$-	$-	$-	$(1,070,801)	$(1,070,801)	$(2,227,906)	$(2,227,906)	$(2,227,907)
Investor Equity Invest - Stages I, II, III & IV (Domestic)	$-	$(349,396)	$(349,396)	$-	$-	$-	$(182,850)	$(182,850)	$-	$-	$-
Dev. Bank Debt Service - Stage I (Domestic)	$-	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)
Supp. Credit Repayment - Stage I (Domestic)	$-	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$-	$-	$-
Dev. Bank Debt Service - Stage II (domestic)	$-	$-	$-	$-	$-	$-	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)
Supp. Credit Repayment - Stage II (Domestic)	$-	$-	$-	$-	$-	$-	$(356,276)	$(356,276)	$(356,276)	$(356,276)	$(356,276)
From Operations:											
Revenues (Bamako)	$2,899,343	$4,592,875	$4,929,866	$8,002,446	$8,439,986	$8,860,183	$9,342,831	$9,829,678	$12,662,625	$14,028,658	$14,758,211
Expenses (Bamako)	$(2,271,929)	$(1,887,808)	$(1,898,538)	$(2,211,023)	$(2,306,825)	$(2,312,470)	$(2,318,796)	$(2,324,908)	$(3,267,940)	$(3,335,210)	$(3,342,915)
Profit Taxes (Bamako)	$(188,224)	$(811,520)	$(909,398)	$(1,737,427)	$(1,839,948)	$(1,964,314)	$(2,107,211)	$(2,251,431)	$(2,818,405)	$(3,208,034)	$(3,424,589)
Revenues (Domestic)	$52,033	$218,005	$227,623	$508,254	$531,772	$556,487	$582,470	$609,808	$816,730	$855,697	$896,297
Expenses (Domestic)	$(51,412)	$(35,221)	$(35,288)	$(56,537)	$(56,626)	$(56,722)	$(56,829)	$(56,947)	$(69,642)	$(69,775)	$(69,915)
Profit Taxes (Domestic)	$(186)	$(54,835)	$(57,701)	$(135,515)	$(142,544)	$(149,930)	$(157,692)	$(165,858)	$(224,126)	$(235,777)	$(247,914)
Annual Gross Cash Flow	$439,625	$(1,449,810)	$(1,214,742)	$1,727,594	$1,983,211	$2,290,631	$(8,869,549)	$(8,513,982)	$(1,602,730)	$(666,413)	$(132,798)

Inflows & Outflows:	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total 2000-2020
From Development Program:											
Investor Equity Invest - Stages I, II, III & IV (Bamako)	$-	$-	$-	$-	$-	$(7,043,857)	$(7,043,857)	$-	$-	$-	$(28,561,038)
Dev. Bank Debt Service - Stage I (Bamako)	$(410,275)	$(410,275)	$(410,275)	$(410,275)	$-	$-	$-	$-	$-	$-	$(5,533,238)
Supp. Credit Repayment - Stage I (Bamako)	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	$(1,103,229)
Dev. Bank Debt Service - Stage II (Bamako)	$(3,704,288)	$(3,704,288)	$(3,704,288)	$(3,704,288)	$(3,704,288)	$(3,704,288)	$(3,704,288)	$(3,704,288)	$(3,704,290)	$-	$(49,958,444)
Supp. Credit Repayment - Stage II (Bamako)	$(2,227,907)	$(2,227,906)	$-	$-	$-	$-	$-	$-	$-	$-	$(13,281,136)
Investor Equity Invest - Stages I, II, III & IV (Domestic)	$(313,059)	$(313,059)	$-	$-	$-	$(1,093,226)	$(1,093,226)	$-	$-	$-	$(3,877,059)
Dev. Bank Debt Service - Stage I (Domestic)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$-	$-	$-	$-	$-	$-	$(19,751,956)
Supp. Credit Repayment - Stage I (Domestic)	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	$(4,454,856)
Dev. Bank Debt Service - Stage II (domestic)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,371)	$-	$(8,293,207)
Supp. Credit Repayment - Stage II (Domestic)	$(356,276)	$(356,275)	$-	$-	$-	$-	$-	$-	$-	$-	$(2,493,931)
From Operations:											
Revenues (Bamako)	$15,515,041	$16,349,593	$17,690,273	$18,663,167	$19,584,952	$20,546,380	$21,486,461	$23,603,672	$25,183,209	$26,152,350	$303,121,800
Expenses (Bamako)	$(3,350,201)	$(3,358,716)	$(3,377,827)	$(3,386,932)	$(3,394,936)	$(3,403,780)	$(3,411,662)	$(3,914,634)	$(3,922,229)	$(3,930,316)	$(62,929,595)
Profit Taxes (Bamako)	$(3,649,452)	$(3,897,263)	$(4,293,734)	$(4,582,871)	$(4,857,005)	$(5,142,780)	$(5,422,440)	$(5,906,711)	$(6,378,294)	$(6,666,610)	$(72,057,661)
Revenues (Domestic)	$938,968	$983,757	$1,141,962	$1,196,815	$1,290,425	$1,314,996	$1,378,612	$1,445,390	$1,515,521	$1,589,157	$18,650,780
Expenses (Domestic)	$(70,068)	$(70,227)	$(71,204)	$(71,378)	$(71,559)	$(71,756)	$(71,964)	$(80,469)	$(80,691)	$(80,920)	$(1,355,151)
Profit Taxes (Domestic)	$(260,670)	$(274,059)	$(321,228)	$(337,631)	$(365,660)	$(372,972)	$(391,994)	$(409,476)	$(430,449)	$(452,471)	$(5,188,689)
Annual Gross Cash Flow	$108,586	$718,056	$4,650,453	$5,363,381	$7,889,557	$436,345	$1,133,270	$10,441,111	$11,590,406	$16,611,190	$42,933,390
Weighted Average Cost of Capital (WACC)											13.74%
Net Present Value (NPV)											$(18,642)
Internal Rate of Return (IRR)											13.70%

Table V-30. Alternative A Cash Flow – Higher Expense Scenario, Alternative 1

Inflows & Outflows:	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
From Development Program:											
Investor Equity Invest - Stages I, II, III & IV (Bamako)	$-	$(426,938)	$(426,938)	$-	$-	$-	$(4,111,710)	$(4,111,710)	$-	$-	$-
Dev. Bank Debt Service - Stage I (Bamako)	$-	$(191,268)	$(191,268)	$(257,314)	$(257,314)	$(257,314)	$(257,314)	$(257,314)	$(257,314)	$(257,314)	$(257,314)
Supp. Credit Repayment - Stage I (Bamako)	$-	$(55,786)	$(55,786)	$(116,069)	$(116,069)	$(116,069)	$(116,069)	$(116,069)	$-	$-	$-
Dev. Bank Debt Service - Stage II (Bamako)	$-	$-	$-	$-	$-	$-	$(1,726,918)	$(1,726,918)	$(2,323,234)	$(2,323,234)	$(2,323,234)
Supp. Credit Repayment - Stage II (Bamako)	$-	$-	$-	$-	$-	$-	$(671,579)	$(671,579)	$(1,397,285)	$(1,397,285)	$(1,397,286)
Investor Equity Invest - Stages I, II, III & IV (Domestic)	$-	$(349,396)	$(349,396)	$-	$-	$-	$(182,850)	$(182,850)	$-	$-	$-
Dev. Bank Debt Service - Stage I (Domestic)	$-	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)
Supp. Credit Repayment - Stage I (Domestic)	$-	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$-	$-	$-
Dev. Bank Debt Service - Stage II (domestic)	$-	$-	$-	$-	$-	$-	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)
Supp. Credit Repayment - Stage II (Domestic)	$-	$-	$-	$-	$-	$-	$(356,276)	$(356,276)	$(356,276)	$(356,276)	$(356,276)
From Operations:											
Revenues (Bamako)	$2,837,794	$4,374,870	$5,013,772	$8,218,539	$8,638,310	$9,085,094	$9,560,191	$10,062,054	$13,656,832	$14,358,129	$15,104,536
Expenses (Bamako)	$(2,345,692)	$(2,077,396)	$(2,088,949)	$(2,532,915)	$(2,538,981)	$(2,545,425)	$(2,552,219)	$(2,558,981)	$(3,662,379)	$(3,670,435)	$(3,678,976)
Profit Taxes (Bamako)	$(147,631)	$(689,242)	$(877,447)	$(1,705,687)	$(1,829,799)	$(1,961,901)	$(2,102,392)	$(2,250,922)	$(2,998,336)	$(3,206,308)	$(3,427,668)
Revenues (Domestic)	$52,033	$218,005	$227,623	$508,254	$531,772	$556,487	$582,470	$609,808	$816,730	$855,697	$896,297
Expenses (Domestic)	$(56,553)	$(38,743)	$(38,816)	$(62,191)	$(62,289)	$(62,394)	$(62,512)	$(62,642)	$(76,606)	$(76,752)	$(76,907)
Profit Taxes (Domestic)	$1,356	$(53,779)	$(56,642)	$(133,819)	$(140,845)	$(148,228)	$(155,988)	$(164,150)	$(222,037)	$(233,683)	$(245,817)
Annual Gross Cash Flow	$341,307	$(1,336,934)	$(891,109)	$1,871,536	$2,177,524	$2,502,988	$(4,792,798)	$(4,427,182)	$1,176,869	$1,689,312	$2,234,129

Inflows & Outflows:	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total 2000-2020
From Development Program:											
Investor Equity Invest - Stages I, II, III & IV (Bamako)	$-	$-	$-	$-	$-	$(4,417,725)	$(4,417,725)	$-	$-	$-	$(17,912,745)
Dev. Bank Debt Service - Stage I (Bamako)	$(257,314)	$(257,314)	$(257,314)	$(257,314)	$-	$-	$-	$-	$-	$-	$(3,470,304)
Supp. Credit Repayment - Stage I (Bamako)	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	$(691,917)
Dev. Bank Debt Service - Stage II (Bamako)	$(2,323,234)	$(2,323,234)	$(2,323,234)	$(2,323,234)	$(2,323,234)	$(2,323,234)	$(2,323,234)	$(2,323,234)	$(2,323,235)	$-	$(31,332,645)
Supp. Credit Repayment - Stage II (Bamako)	$(1,397,286)	$(1,397,285)	$-	$-	$-	$-	$-	$-	$-	$-	$(8,329,585)
Investor Equity Invest - Stages I, II, III & IV (Domestic)	$(313,059)	$(313,059)	$-	$-	$-	$(1,093,226)	$(1,093,226)	$-	$-	$-	$(3,877,059)
Dev. Bank Debt Service - Stage I (Domestic)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$-	$-	$-	$-	$-	$-	$(19,751,956)
Supp. Credit Repayment - Stage I (Domestic)	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	$(4,454,856)
Dev. Bank Debt Service - Stage II (domestic)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,371)	$-	$(8,293,207)
Supp. Credit Repayment - Stage II (Domestic)	$(356,276)	$(356,275)	$-	$-	$-	$-	$-	$-	$-	$-	$(2,493,931)
From Operations:											
Revenues (Bamako)	$15,887,504	$16,732,199	$18,113,226	$19,025,468	$19,928,920	$20,861,693	$21,775,415	$24,490,452	$25,399,602	$26,324,368	$309,448,970
Expenses (Bamako)	$(3,686,927)	$(3,696,451)	$(3,717,383)	$(3,727,113)	$(3,735,474)	$(3,745,222)	$(3,753,378)	$(4,306,669)	$(4,314,451)	$(4,323,323)	$(69,258,739)
Profit Taxes (Bamako)	$(3,660,173)	$(3,910,725)	$(4,318,753)	$(4,589,507)	$(4,858,034)	$(5,134,941)	$(5,406,611)	$(6,055,135)	$(6,325,545)	$(6,600,314)	$(72,057,069)
Revenues (Domestic)	$938,968	$983,757	$1,141,962	$1,196,815	$1,290,425	$1,314,996	$1,378,612	$1,445,390	$1,515,521	$1,589,157	$18,650,780
Expenses (Domestic)	$(77,075)	$(77,250)	$(78,324)	$(78,515)	$(78,715)	$(78,932)	$(79,160)	$(88,516)	$(88,760)	$(89,012)	$(1,490,666)
Profit Taxes (Domestic)	$(258,568)	$(271,952)	$(319,091)	$(335,490)	$(363,513)	$(370,819)	$(389,835)	$(407,062)	$(428,028)	$(450,044)	$(5,148,034)
Annual Gross Cash Flow	$2,493,335	$3,109,187	$6,237,863	$6,907,884	$9,268,003	$4,420,218	$5,098,485	$12,162,854	$12,842,732	$16,450,833	$79,537,036
Weighted Average Cost of Capital (WACC)											13.74%
Net Present Value (NPV)											$8,391,759
Internal Rate of Return (IRR)											48.67%

Table V-31. Alternative A Cash Flow – Higher Expense Scenario, Alternative 2

Inflows & Outflows:	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
From Development Program:											
Investor Equity Invest - Stages I, II, III & IV (Bamako)	$-	$(559,774)	$(559,774)	$-	$-	$-	$(5,391,022)	$(5,391,022)	$-	$-	$-
Dev. Bank Debt Service - Stage I (Bamako)	$-	$(250,779)	$(250,779)	$(337,374)	$(337,374)	$(337,374)	$(337,374)	$(337,374)	$(337,374)	$(337,374)	$(337,374)
Supp. Credit Repayment - Stage I (Bamako)	$-	$(73,143)	$(73,143)	$(152,183)	$(152,183)	$(152,183)	$(152,183)	$(152,183)	$-	$-	$-
Dev. Bank Debt Service - Stage II (Bamako)	$-	$-	$-	$-	$-	$-	$(2,264,229)	$(2,264,229)	$(3,046,082)	$(3,046,082)	$(3,046,082)
Supp. Credit Repayment - Stage II (Bamako)	$-	$-	$-	$-	$-	$-	$(880,533)	$(880,533)	$(1,832,034)	$(1,832,034)	$(1,832,036)
Investor Equity Invest - Stages I, II, III & IV (Domestic)	$-	$(349,396)	$(349,396)	$-	$-	$-	$(182,850)	$(182,850)	$-	$-	$-
Dev. Bank Debt Service - Stage I (Domestic)	$-	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)
Supp. Credit Repayment - Stage I (Domestic)	$-	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$-	$-	$-
Dev. Bank Debt Service - Stage II (domestic)	$-	$-	$-	$-	$-	$-	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)
Supp. Credit Repayment - Stage II (Domestic)	$-	$-	$-	$-	$-	$-	$(356,276)	$(356,276)	$(356,276)	$(356,276)	$(356,276)
From Operations:											
Revenues (Bamako)	$2,837,794	$4,374,870	$5,013,772	$8,218,539	$8,638,310	$9,085,094	$9,560,191	$10,062,054	$13,656,832	$14,358,129	$15,104,536
Expenses (Bamako)	$(2,345,692)	$(2,077,396)	$(2,088,949)	$(2,532,915)	$(2,538,981)	$(2,545,425)	$(2,552,219)	$(2,558,981)	$(3,662,379)	$(3,670,435)	$(3,678,976)
Profit Taxes (Bamako)	$(147,631)	$(689,242)	$(877,447)	$(1,705,687)	$(1,829,799)	$(1,961,901)	$(2,102,392)	$(2,250,922)	$(2,998,336)	$(3,206,308)	$(3,427,668)
Revenues (Domestic)	$52,033	$218,005	$227,623	$508,254	$531,772	$556,487	$582,470	$609,808	$816,730	$855,697	$896,297
Expenses (Domestic)	$(56,553)	$(38,743)	$(38,816)	$(62,191)	$(62,289)	$(62,394)	$(62,512)	$(62,642)	$(76,606)	$(76,752)	$(76,907)
Profit Taxes (Domestic)	$1,356	$(53,779)	$(56,642)	$(133,819)	$(140,845)	$(148,228)	$(155,988)	$(164,150)	$(222,037)	$(233,683)	$(245,817)
Annual Gross Cash Flow	$341,307	$(1,546,639)	$(1,100,814)	$1,755,362	$2,061,350	$2,386,814	$(6,934,549)	$(6,568,934)	$(60,789)	$451,654	$996,471

Inflows & Outflows:	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total 2000-2020
From Development Program:											
Investor Equity Invest - Stages I, II, III & IV (Bamako)	$-	$-	$-	$-	$-	$(5,792,250)	$(5,792,250)	$-	$-	$-	$(23,486,094)
Dev. Bank Debt Service - Stage I (Bamako)	$(337,374)	$(337,374)	$(337,374)	$(337,374)	$-	$-	$-	$-	$-	$-	$(4,550,050)
Supp. Credit Repayment - Stage I (Bamako)	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	$(907,199)
Dev. Bank Debt Service - Stage II (Bamako)	$(3,046,082)	$(3,046,082)	$(3,046,082)	$(3,046,082)	$(3,046,082)	$(3,046,082)	$(3,046,082)	$(3,046,082)	$(3,046,083)	$-	$(41,081,445)
Supp. Credit Repayment - Stage II (Bamako)	$(1,832,036)	$(1,832,034)	$-	$-	$-	$-	$-	$-	$-	$-	$(10,921,242)
Investor Equity Invest - Stages I, II, III & IV (Domestic)	$(313,059)	$(313,059)	$-	$-	$-	$(1,093,226)	$(1,093,226)	$-	$-	$-	$(3,877,059)
Dev. Bank Debt Service - Stage I (Domestic)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$-	$-	$-	$-	$-	$-	$(19,751,956)
Supp. Credit Repayment - Stage I (Domestic)	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	$(4,454,856)
Dev. Bank Debt Service - Stage II (domestic)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,371)	$-	$(8,293,207)
Supp. Credit Repayment - Stage II (Domestic)	$(356,276)	$(356,275)	$-	$-	$-	$-	$-	$-	$-	$-	$(2,493,931)
From Operations:											
Revenues (Bamako)	$15,887,504	$16,732,199	$18,113,226	$19,025,468	$19,928,920	$20,861,693	$21,775,415	$24,490,452	$25,399,602	$26,324,368	$309,448,970
Expenses (Bamako)	$(3,686,927)	$(3,696,451)	$(3,717,383)	$(3,727,113)	$(3,735,474)	$(3,745,222)	$(3,753,378)	$(4,306,669)	$(4,314,451)	$(4,323,323)	$(69,258,739)
Profit Taxes (Bamako)	$(3,660,173)	$(3,910,725)	$(4,318,753)	$(4,589,507)	$(4,858,034)	$(5,134,941)	$(5,406,611)	$(6,055,135)	$(6,325,545)	$(6,600,314)	$(72,057,069)
Revenues (Domestic)	$938,968	$983,757	$1,141,962	$1,196,815	$1,290,425	$1,314,996	$1,378,612	$1,445,390	$1,515,521	$1,589,157	$18,650,780
Expenses (Domestic)	$(77,075)	$(77,250)	$(78,324)	$(78,515)	$(78,715)	$(78,932)	$(79,160)	$(88,516)	$(88,760)	$(89,012)	$(1,490,666)
Profit Taxes (Domestic)	$(258,568)	$(271,952)	$(319,091)	$(335,490)	$(363,513)	$(370,819)	$(389,835)	$(407,062)	$(428,028)	$(450,044)	$(5,148,034)
Annual Gross Cash Flow	$1,255,676	$1,871,529	$5,434,954	$6,104,976	$8,545,155	$2,322,844	$3,001,112	$11,440,006	$12,119,884	$16,450,833	$60,328,203
Weighted Average Cost of Capital (WACC)											13.74%
Net Present Value (NPV)											$3,840,557
Internal Rate of Return (IRR)											23.04%

Table V-32. Alternative A Cash Flow – Higher Expense Scenario, Alternative 3

Inflows & Outflows:	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
From Development Program:											
Investor Equity Invest - Stages I, II, III & IV (Bamako)	$-	$(680,732)	$(680,732)	$-	$-	$-	$(6,555,930)	$(6,555,930)	$-	$-	$-
Dev. Bank Debt Service - Stage I (Bamako)	$-	$(304,968)	$(304,968)	$(410,275)	$(410,275)	$(410,275)	$(410,275)	$(410,275)	$(410,275)	$(410,275)	$(410,275)
Supp. Credit Repayment - Stage I (Bamako)	$-	$(88,948)	$(88,948)	$(185,067)	$(185,067)	$(185,067)	$(185,067)	$(185,067)	$-	$-	$-
Dev. Bank Debt Service - Stage II (Bamako)	$-	$-	$-	$-	$-	$-	$(2,753,490)	$(2,753,490)	$(3,704,288)	$(3,704,288)	$(3,704,288)
Supp. Credit Repayment - Stage II (Bamako)	$-	$-	$-	$-	$-	$-	$(1,070,801)	$(1,070,801)	$(2,227,906)	$(2,227,906)	$(2,227,907)
Investor Equity Invest - Stages I, II, III & IV (Domestic)	$-	$(349,396)	$(349,396)	$-	$-	$-	$(182,850)	$(182,850)	$-	$-	$-
Dev. Bank Debt Service - Stage I (Domestic)	$-	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)
Supp. Credit Repayment - Stage I (Domestic)	$-	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$-	$-	$-
Dev. Bank Debt Service - Stage II (domestic)	$-	$-	$-	$-	$-	$-	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)
Supp. Credit Repayment - Stage II (Domestic)	$-	$-	$-	$-	$-	$-	$(356,276)	$(356,276)	$(356,276)	$(356,276)	$(356,276)
From Operations:											
Revenues (Bamako)	$2,837,794	$4,374,870	$5,013,772	$8,218,539	$8,638,310	$9,085,094	$9,560,191	$10,062,054	$13,656,832	$14,358,129	$15,104,536
Expenses (Bamako)	$(2,345,692)	$(2,077,396)	$(2,088,949)	$(2,532,915)	$(2,538,981)	$(2,545,425)	$(2,552,219)	$(2,558,981)	$(3,662,379)	$(3,670,435)	$(3,678,976)
Profit Taxes (Bamako)	$(147,631)	$(689,242)	$(877,447)	$(1,705,687)	$(1,829,799)	$(1,961,901)	$(2,102,392)	$(2,250,922)	$(2,998,336)	$(3,206,308)	$(3,427,668)
Revenues (Domestic)	$52,033	$218,005	$227,623	$508,254	$531,772	$556,487	$582,470	$609,808	$816,730	$855,697	$896,297
Expenses (Domestic)	$(56,553)	$(38,743)	$(38,816)	$(62,191)	$(62,289)	$(62,394)	$(62,512)	$(62,642)	$(76,606)	$(76,752)	$(76,907)
Profit Taxes (Domestic)	$1,356	$(53,779)	$(56,642)	$(133,819)	$(140,845)	$(148,228)	$(155,988)	$(164,150)	$(222,037)	$(233,683)	$(245,817)
Annual Gross Cash Flow	$341,307	$(1,737,591)	$(1,291,765)	$1,649,577	$1,955,565	$2,281,029	$(8,884,772)	$(8,519,156)	$(1,187,768)	$(675,325)	$(130,508)

Inflows & Outflows:	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total 2000-2020
From Development Program:											
Investor Equity Invest - Stages I, II, III & IV (Bamako)	$-	$-	$-	$-	$-	$(7,043,857)	$(7,043,857)	$-	$-	$-	$(28,561,038)
Dev. Bank Debt Service - Stage I (Bamako)	$(410,275)	$(410,275)	$(410,275)	$(410,275)	$-	$-	$-	$-	$-	$-	$(5,533,238)
Supp. Credit Repayment - Stage I (Bamako)	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	$(1,103,229)
Dev. Bank Debt Service - Stage II (Bamako)	$(3,704,288)	$(3,704,288)	$(3,704,288)	$(3,704,288)	$(3,704,288)	$(3,704,288)	$(3,704,288)	$(3,704,288)	$(3,704,290)	$-	$(49,958,444)
Supp. Credit Repayment - Stage II (Bamako)	$(2,227,907)	$(2,227,906)	$-	$-	$-	$-	$-	$-	$-	$-	$(13,281,136)
Investor Equity Invest - Stages I, II, III & IV (Domestic)	$(313,059)	$(313,059)	$-	$-	$-	$(1,093,226)	$(1,093,226)	$-	$-	$-	$(3,877,059)
Dev. Bank Debt Service - Stage I (Domestic)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$-	$-	$-	$-	$-	$-	$(19,751,956)
Supp. Credit Repayment - Stage I (Domestic)	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	$(4,454,856)
Dev. Bank Debt Service - Stage II (domestic)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,371)	$-	$(8,293,207)
Supp. Credit Repayment - Stage II (Domestic)	$(356,276)	$(356,275)	$-	$-	$-	$-	$-	$-	$-	$-	$(2,493,931)
From Operations:											
Revenues (Bamako)	$15,887,504	$16,732,199	$18,113,226	$19,025,468	$19,928,920	$20,861,693	$21,775,415	$24,490,452	$25,399,602	$26,324,368	$309,448,970
Expenses (Bamako)	$(3,686,927)	$(3,696,451)	$(3,717,383)	$(3,727,113)	$(3,735,474)	$(3,745,222)	$(3,753,378)	$(4,306,669)	$(4,314,451)	$(4,323,323)	$(69,258,739)
Profit Taxes (Bamako)	$(3,660,173)	$(3,910,725)	$(4,318,753)	$(4,589,507)	$(4,858,034)	$(5,134,941)	$(5,406,611)	$(6,055,135)	$(6,325,545)	$(6,600,314)	$(72,057,069)
Revenues (Domestic)	$938,968	$983,757	$1,141,962	$1,196,815	$1,290,425	$1,314,996	$1,378,612	$1,445,390	$1,515,521	$1,589,157	$18,650,780
Expenses (Domestic)	$(77,075)	$(77,250)	$(78,324)	$(78,515)	$(78,715)	$(78,932)	$(79,160)	$(88,516)	$(88,760)	$(89,012)	$(1,490,666)
Profit Taxes (Domestic)	$(258,568)	$(271,952)	$(319,091)	$(335,490)	$(363,513)	$(370,819)	$(389,835)	$(407,062)	$(428,028)	$(450,044)	$(5,148,034)
Annual Gross Cash Flow	$128,697	$744,550	$4,703,847	$5,373,868	$7,886,949	$413,032	$1,091,299	$10,781,799	$11,461,677	$16,450,833	$42,837,148
Weighted Average Cost of Capital (WACC)											13.74%
Net Present Value (NPV)											$(303,646)
Internal Rate of Return (IRR)											13.17%

Table V-33. Alternative A Cash Flow – Lower Revenue Scenario, Alternative 1

Inflows & Outflows:	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
From Development Program:											
Investor Equity Invest - Stages I, II, III & IV (Bamako)	$-	$(426,938)	$(426,938)	$-	$-	$-	$(4,111,710)	$(4,111,710)	$-	$-	$-
Dev. Bank Debt Service - Stage I (Bamako)	$-	$(191,268)	$(191,268)	$(257,314)	$(257,314)	$(257,314)	$(257,314)	$(257,314)	$(257,314)	$(257,314)	$(257,314)
Supp. Credit Repayment - Stage I (Bamako)	$-	$(55,786)	$(55,786)	$(116,069)	$(116,069)	$(116,069)	$(116,069)	$(116,069)	$-	$-	$-
Dev. Bank Debt Service - Stage II (Bamako)	$-	$-	$-	$-	$-	$-	$(1,726,918)	$(1,726,918)	$(2,323,234)	$(2,323,234)	$(2,323,234)
Supp. Credit Repayment - Stage II (Bamako)	$-	$-	$-	$-	$-	$-	$(671,579)	$(671,579)	$(1,397,285)	$(1,397,285)	$(1,397,286)
Investor Equity Invest - Stages I, II, III & IV (Domestic)	$-	$(349,396)	$(349,396)	$-	$-	$-	$(182,850)	$(182,850)	$-	$-	$-
Dev. Bank Debt Service - Stage I (Domestic)	$-	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)
Supp. Credit Repayment - Stage I (Domestic)	$-	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$-	$-	$-
Dev. Bank Debt Service - Stage II (domestic)	$-	$-	$-	$-	$-	$-	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)
Supp. Credit Repayment - Stage II (Domestic)	$-	$-	$-	$-	$-	$-	$(356,276)	$(356,276)	$(356,276)	$(356,276)	$(356,276)
From Operations:											
Revenues (Bamako)	$2,554,015	$3,937,383	$4,512,395	$7,396,685	$7,774,479	$8,176,584	$8,604,172	$9,055,849	$12,291,148	$12,922,316	$13,594,083
Expenses (Bamako)	$(2,132,448)	$(1,888,542)	$(1,899,044)	$(2,302,650)	$(2,308,164)	$(2,314,023)	$(2,320,199)	$(2,326,346)	$(3,329,435)	$(3,336,759)	$(3,344,524)
Profit Taxes (Bamako)	$(126,470)	$(614,652)	$(784,005)	$(1,528,211)	$(1,639,895)	$(1,758,768)	$(1,885,192)	$(2,018,851)	$(2,688,514)	$(2,875,667)	$(3,074,868)
Revenues (Domestic)	$46,830	$196,204	$204,860	$457,429	$478,595	$500,838	$524,223	$548,827	$735,057	$770,127	$806,667
Expenses (Domestic)	$(51,412)	$(35,221)	$(35,288)	$(56,537)	$(56,626)	$(56,722)	$(56,829)	$(56,947)	$(69,642)	$(69,775)	$(69,915)
Profit Taxes (Domestic)	$1,375	$(48,295)	$(50,872)	$(120,267)	$(126,591)	$(133,235)	$(140,218)	$(147,564)	$(199,625)	$(210,106)	$(221,026)
Annual Gross Cash Flow	$291,890	$(1,523,772)	$(1,122,603)	$1,425,804	$1,701,153	$1,994,030	$(5,336,392)	$(5,007,382)	$401,655	$862,801	$1,353,082

Inflows & Outflows:	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total 2000-2020
From Development Program:											
Investor Equity Invest - Stages I, II, III & IV (Bamako)	$-	$-	$-	$-	$-	$(4,417,725)	$(4,417,725)	$-	$-	$-	$(17,912,745)
Dev. Bank Debt Service - Stage I (Bamako)	$(257,314)	$(257,314)	$(257,314)	$(257,314)	$-	$-	$-	$-	$-	$-	$(3,470,304)
Supp. Credit Repayment - Stage I (Bamako)	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	$(691,917)
Dev. Bank Debt Service - Stage II (Bamako)	$(2,323,234)	$(2,323,234)	$(2,323,234)	$(2,323,234)	$(2,323,234)	$(2,323,234)	$(2,323,234)	$(2,323,234)	$(2,323,235)	$-	$(31,332,645)
Supp. Credit Repayment - Stage II (Bamako)	$(1,397,286)	$(1,397,285)	$-	$-	$-	$-	$-	$-	$-	$-	$(8,329,585)
Investor Equity Invest - Stages I, II, III & IV (Domestic)	$(313,059)	$(313,059)	$-	$-	$-	$(1,093,226)	$(1,093,226)	$-	$-	$-	$(3,877,059)
Dev. Bank Debt Service - Stage I (Domestic)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$-	$-	$-	$-	$-	$-	$(19,751,956)
Supp. Credit Repayment - Stage I (Domestic)	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	$(4,454,856)
Dev. Bank Debt Service - Stage II (domestic)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,371)	$-	$(8,293,207)
Supp. Credit Repayment - Stage II (Domestic)	$(356,276)	$(356,275)	$-	$-	$-	$-	$-	$-	$-	$-	$(2,493,931)
From Operations:											
Revenues (Bamako)	$14,298,754	$15,058,980	$16,301,904	$17,122,921	$17,936,028	$18,775,524	$19,597,873	$22,041,407	$22,859,642	$23,691,931	$278,504,073
Expenses (Bamako)	$(3,351,752)	$(3,360,410)	$(3,379,439)	$(3,388,284)	$(3,395,885)	$(3,404,747)	$(3,412,161)	$(3,915,154)	$(3,922,229)	$(3,930,293)	$(62,962,490)
Profit Taxes (Bamako)	$(3,284,101)	$(3,509,571)	$(3,876,739)	$(4,120,391)	$(4,362,043)	$(4,611,233)	$(4,855,714)	$(5,437,876)	$(5,681,224)	$(5,928,491)	$(64,662,475)
Revenues (Domestic)	$845,071	$885,381	$1,027,766	$1,077,133	$1,161,383	$1,183,497	$1,240,751	$1,300,851	$1,363,969	$1,430,242	$16,785,702
Expenses (Domestic)	$(70,068)	$(70,227)	$(71,204)	$(71,378)	$(71,559)	$(71,756)	$(71,964)	$(80,469)	$(80,691)	$(80,920)	$(1,355,151)
Profit Taxes (Domestic)	$(232,501)	$(244,546)	$(286,969)	$(301,727)	$(326,947)	$(333,522)	$(350,636)	$(366,115)	$(384,984)	$(404,796)	$(4,629,165)
Annual Gross Cash Flow	$1,555,009	$2,109,214	$5,131,545	$5,734,501	$8,025,370	$3,111,205	$3,721,592	$10,627,038	$11,238,878	$14,777,672	$61,072,289
Weighted Average Cost of Capital (WACC)											13.74%
Net Present Value (NPV)											$4,632,443
Internal Rate of Return (IRR)											25.68%

Table V-34. Alternative A Cash Flow – Lower Revenue Scenario, Alternative 2

Inflows & Outflows:	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
From Development Program:											
Investor Equity Invest - Stages I, II, III & IV (Bamako)	$-	$(559,774)	$(559,774)	$-	$-	$-	$(5,391,022)	$(5,391,022)	$-	$-	$-
Dev. Bank Debt Service - Stage I (Bamako)	$-	$(250,779)	$(250,779)	$(337,374)	$(337,374)	$(337,374)	$(337,374)	$(337,374)	$(337,374)	$(337,374)	$(337,374)
Supp. Credit Repayment - Stage I (Bamako)	$-	$(73,143)	$(73,143)	$(152,183)	$(152,183)	$(152,183)	$(152,183)	$(152,183)	$-	$-	$-
Dev. Bank Debt Service - Stage II (Bamako)	$-	$-	$-	$-	$-	$-	$(2,264,229)	$(2,264,229)	$(3,046,082)	$(3,046,082)	$(3,046,082)
Supp. Credit Repayment - Stage II (Bamako)	$-	$-	$-	$-	$-	$-	$(880,533)	$(880,533)	$(1,832,034)	$(1,832,034)	$(1,832,036)
Investor Equity Invest - Stages I, II, III & IV (Domestic)	$-	$(349,396)	$(349,396)	$-	$-	$-	$(182,850)	$(182,850)	$-	$-	$-
Dev. Bank Debt Service - Stage I (Domestic)	$-	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)
Supp. Credit Repayment - Stage I (Domestic)	$-	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$-	$-	$-
Dev. Bank Debt Service - Stage II (domestic)	$-	$-	$-	$-	$-	$-	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)
Supp. Credit Repayment - Stage II (Domestic)	$-	$-	$-	$-	$-	$-	$(356,276)	$(356,276)	$(356,276)	$(356,276)	$(356,276)
From Operations:											
Revenues (Bamako)	$2,554,015	$3,937,383	$4,512,395	$7,396,685	$7,774,479	$8,176,584	$8,604,172	$9,055,849	$12,291,148	$12,922,316	$13,594,083
Expenses (Bamako)	$(2,132,448)	$(1,923,763)	$(1,934,332)	$(2,359,188)	$(2,364,791)	$(2,370,745)	$(2,377,027)	$(2,383,293)	$(3,399,077)	$(3,406,534)	$(3,414,439)
Profit Taxes (Bamako)	$(126,470)	$(604,086)	$(773,419)	$(1,511,249)	$(1,622,907)	$(1,741,752)	$(1,868,143)	$(2,001,767)	$(2,667,621)	$(2,854,735)	$(3,053,893)
Revenues (Domestic)	$46,830	$196,204	$204,860	$457,429	$478,595	$500,838	$524,223	$548,827	$735,057	$770,127	$806,667
Expenses (Domestic)	$(51,412)	$(35,221)	$(35,288)	$(56,537)	$(56,626)	$(56,722)	$(56,829)	$(56,947)	$(69,642)	$(69,775)	$(69,915)
Profit Taxes (Domestic)	$1,375	$(48,295)	$(50,872)	$(120,267)	$(126,591)	$(133,235)	$(140,218)	$(147,564)	$(199,625)	$(210,106)	$(221,026)
Annual Gross Cash Flow	$291,890	$(1,758,131)	$(1,357,009)	$1,270,053	$1,545,341	$1,838,151	$(7,517,924)	$(7,188,996)	$(884,753)	$(423,699)	$66,483

Inflows & Outflows:	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total 2000-2020
From Development Program:											
Investor Equity Invest - Stages I, II, III & IV (Bamako)	$-	$-	$-	$-	$-	$(5,792,250)	$(5,792,250)	$-	$-	$-	$(23,486,094)
Dev. Bank Debt Service - Stage I (Bamako)	$(337,374)	$(337,374)	$(337,374)	$(337,374)	$-	$-	$-	$-	$-	$-	$(4,550,050)
Supp. Credit Repayment - Stage I (Bamako)	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	$(907,199)
Dev. Bank Debt Service - Stage II (Bamako)	$(3,046,082)	$(3,046,082)	$(3,046,082)	$(3,046,082)	$(3,046,082)	$(3,046,082)	$(3,046,082)	$(3,046,082)	$(3,046,083)	$-	$(41,081,445)
Supp. Credit Repayment - Stage II (Bamako)	$(1,832,036)	$(1,832,034)	$-	$-	$-	$-	$-	$-	$-	$-	$(10,921,242)
Investor Equity Invest - Stages I, II, III & IV (Domestic)	$(313,059)	$(313,059)	$-	$-	$-	$(1,093,226)	$(1,093,226)	$-	$-	$-	$(3,877,059)
Dev. Bank Debt Service - Stage I (Domestic)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$-	$-	$-	$-	$-	$-	$(19,751,956)
Supp. Credit Repayment - Stage I (Domestic)	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	$(4,454,856)
Dev. Bank Debt Service - Stage II (domestic)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,371)	$-	$(8,293,207)
Supp. Credit Repayment - Stage II (Domestic)	$(356,276)	$(356,275)	$-	$-	$-	$-	$-	$-	$-	$-	$(2,493,931)
From Operations:											
Revenues (Bamako)	$14,298,754	$15,058,980	$16,301,904	$17,122,921	$17,936,028	$18,775,524	$19,597,873	$22,041,407	$22,859,642	$23,691,931	$278,504,073
Expenses (Bamako)	$(3,421,820)	$(3,430,637)	$(3,450,643)	$(3,459,662)	$(3,467,445)	$(3,476,504)	$(3,484,125)	$(3,995,623)	$(4,002,920)	$(4,011,214)	$(64,266,229)
Profit Taxes (Bamako)	$(3,263,080)	$(3,488,503)	$(3,855,378)	$(4,098,978)	$(4,340,575)	$(4,589,706)	$(4,834,124)	$(5,413,735)	$(5,657,017)	$(5,904,215)	$(64,271,353)
Revenues (Domestic)	$845,071	$885,381	$1,027,766	$1,077,133	$1,161,383	$1,183,497	$1,240,751	$1,300,851	$1,363,969	$1,430,242	$16,785,702
Expenses (Domestic)	$(70,068)	$(70,227)	$(71,204)	$(71,378)	$(71,559)	$(71,756)	$(71,964)	$(80,469)	$(80,691)	$(80,920)	$(1,355,151)
Profit Taxes (Domestic)	$(232,501)	$(244,546)	$(286,969)	$(301,727)	$(326,947)	$(333,522)	$(350,636)	$(366,115)	$(384,984)	$(404,796)	$(4,629,165)
Annual Gross Cash Flow	$268,303	$822,397	$4,278,794	$4,881,628	$7,252,430	$963,602	$1,573,844	$9,847,862	$10,459,546	$14,721,027	$40,950,838
Weighted Average Cost of Capital (WACC)											13.74%
Net Present Value (NPV)											$(153,611)
Internal Rate of Return (IRR)											13.44%

Table V-35. Alternative A Cash Flow – Lower Revenue Scenario, Alternative 3

Inflows & Outflows:	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
From Development Program:											
Investor Equity Invest - Stages I, II, III & IV (Bamako)	$-	$(680,732)	$(680,732)	$-	$-	$-	$(6,555,930)	$(6,555,930)	$-	$-	$-
Dev. Bank Debt Service - Stage I (Bamako)	$-	$(304,968)	$(304,968)	$(410,275)	$(410,275)	$(410,275)	$(410,275)	$(410,275)	$(410,275)	**$(410,275)**	$(410,275)
Supp. Credit Repayment - Stage I (Bamako)	$-	$(88,948)	$(88,948)	$(185,067)	$(185,067)	$(185,067)	$(185,067)	$(185,067)	$-	$-	$-
Dev. Bank Debt Service - Stage II (Bamako)	$-	$-	$-	$-	$-	$-	$(2,753,490)	$(2,753,490)	$(3,704,288)	$(3,704,288)	$(3,704,288)
Supp. Credit Repayment - Stage II (Bamako)	$-	$-	$-	$-	$-	$-	$(1,070,801)	$(1,070,801)	$(2,227,906)	$(2,227,906)	$(2,227,907)
Investor Equity Invest - Stages I, II, III & IV (Domestic)	$-	$(349,396)	$(349,396)	$-	$-	$-	$(182,850)	$(182,850)	$-	$-	$-
Dev. Bank Debt Service - Stage I (Domestic)	$-	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)
Supp. Credit Repayment - Stage I (Domestic)	$-	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$-	$-	$-
Dev. Bank Debt Service - Stage II (domestic)	$-	$-	$-	$-	$-	$-	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)
Supp. Credit Repayment - Stage II (Domestic)	$-	$-	$-	$-	$-	$-	$(356,276)	$(356,276)	$(356,276)	$(356,276)	$(356,276)
From Operations:											
Revenues (Bamako)	$2,554,015	$3,937,383	$4,512,395	$7,396,685	$7,774,479	$8,176,584	$8,604,172	$9,055,849	$12,291,148	$12,922,316	$13,594,083
Expenses (Bamako)	$(2,132,448)	$(1,888,542)	$(1,899,044)	$(2,302,650)	$(2,308,164)	$(2,314,023)	$(2,320,199)	$(2,326,346)	$(3,329,435)	$(3,336,759)	$(3,344,524)
Profit Taxes (Bamako)	$(126,470)	$(614,652)	$(784,005)	$(1,528,211)	$(1,639,895)	$(1,758,768)	$(1,885,192)	$(2,018,851)	$(2,688,514)	$(2,875,667)	$(3,074,868)
Revenues (Domestic)	$46,830	$196,204	$204,860	$457,429	$478,595	$500,838	$524,223	$548,827	$735,057	$770,127	$806,667
Expenses (Domestic)	$(51,412)	$(35,221)	$(35,288)	$(56,537)	$(56,626)	$(56,722)	$(56,829)	$(56,947)	$(69,642)	$(69,775)	$(69,915)
Profit Taxes (Domestic)	$1,375	$(48,295)	$(50,872)	$(120,267)	$(126,591)	$(133,235)	$(140,218)	$(147,564)	$(199,625)	$(210,106)	$(221,026)
Annual Gross Cash Flow	$291,890	$(1,924,429)	$(1,523,260)	$1,203,845	$1,479,195	$1,772,071	$(9,428,366)	$(9,099,356)	$(1,962,982)	$(1,501,835)	$(1,011,556)

Inflows & Outflows:	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total 2000-2020
From Development Program:											
Investor Equity Invest - Stages I, II, III & IV (Bamako)	$-	$-	$-	$-	$-	$(7,043,857)	$(7,043,857)	$-	$-	$-	$(28,561,038)
Dev. Bank Debt Service - Stage I (Bamako)	$(410,275)	$(410,275)	$(410,275)	$(410,275)	$-	$-	$-	$-	$-	$-	$(5,533,238)
Supp. Credit Repayment - Stage I (Bamako)	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	$(1,103,229)
Dev. Bank Debt Service - Stage II (Bamako)	$(3,704,288)	$(3,704,288)	$(3,704,288)	$(3,704,288)	$(3,704,288)	$(3,704,288)	$(3,704,288)	$(3,704,288)	$(3,704,290)	$-	$(49,958,444)
Supp. Credit Repayment - Stage II (Bamako)	$(2,227,907)	$(2,227,906)	$-	$-	$-	$-	$-	$-	$-	$-	$(13,281,136)
Investor Equity Invest - Stages I, II, III & IV (Domestic)	$(313,059)	$(313,059)	$-	$-	$-	$(1,093,226)	$(1,093,226)	$-	$-	$-	$(3,877,059)
Dev. Bank Debt Service - Stage I (Domestic)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$-	$-	$-	$-	$-	$-	$(19,751,956)
Supp. Credit Repayment - Stage I (Domestic)	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	$(4,454,856)
Dev. Bank Debt Service - Stage II (domestic)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,371)	$-	$(8,293,207)
Supp. Credit Repayment - Stage II (Domestic)	$(356,276)	$(356,275)	$-	$-	$-	$-	$-	$-	$-	$-	$(2,493,931)
From Operations:											
Revenues (Bamako)	$14,298,754	$15,058,980	$16,301,904	$17,122,921	$17,936,028	$18,775,524	$19,597,873	$22,041,407	$22,859,642	$23,691,931	$278,504,073
Expenses (Bamako)	$(3,351,752)	$(3,360,410)	$(3,379,439)	$(3,388,284)	$(3,395,885)	$(3,404,747)	$(3,412,161)	$(3,915,154)	$(3,922,229)	$(3,930,293)	$(62,962,490)
Profit Taxes (Bamako)	$(3,284,101)	$(3,509,571)	$(3,876,739)	$(4,120,391)	$(4,362,043)	$(4,611,233)	$(4,855,714)	$(5,437,876)	$(5,681,224)	$(5,928,491)	$(64,662,475)
Revenues (Domestic)	$845,071	$885,381	$1,027,766	$1,077,133	$1,161,383	$1,183,497	$1,240,751	$1,300,851	$1,363,969	$1,430,242	$16,785,702
Expenses (Domestic)	$(70,068)	$(70,227)	$(71,204)	$(71,378)	$(71,559)	$(71,756)	$(71,964)	$(80,469)	$(80,691)	$(80,920)	$(1,355,151)
Profit Taxes (Domestic)	$(232,501)	$(244,546)	$(286,969)	$(301,727)	$(326,947)	$(333,522)	$(350,636)	$(366,115)	$(384,984)	$(404,796)	$(4,629,165)
Annual Gross Cash Flow	$(809,628)	$(255,422)	$3,597,529	$4,200,485	$6,644,316	$(895,981)	$(285,594)	$9,245,984	$9,857,823	$14,777,672	$24,372,400
Weighted Average Cost of Capital (WACC)											13.74%
Net Present Value (NPV)											$(4,062,962)
Internal Rate of Return (IRR)											7.02%

5.6.3 Alternative B Case Cash Flows

The cash flows for the Alternative B Case are summarized in Table V-36, which is presented below and represents a matrix showing the gross cash flow, the NPV and the IRR for the 12 variations of the Alternative B Case. Based on the same criteria as noted above, the Alternative B Case would be considered to be feasible from the concessionaire's standpoint for Terminal Alternative 1, Terminal Alternative 2 and Terminal Alternative 3, because the IRRs exceed 20 percent in each case, with 51.69, 35.07 and 25.08, respectively. Essentially, this demonstrates that the revised financial structure whereby the concessionaire would become responsible for both airside and landside capital development requirements and ASECNA would concede 100 percent of airside revenues (landing fee, aircraft parking fees and airfield lighting fees) would represent an acceptable basis for the concession of Bamako-Sénou and the nine domestic airports.

The details for each of these various cash flows are presented in Tables V-37 through V-48, with baseline activity, expense and revenue scenarios reflected in Tables V-37 through V-39, with lower activity sensitivity scenarios reflected in Tables V-40 through V-42, with higher expense sensitivity scenarios reflected in Tables V-43 through V-45, and with lower revenue sensitivity scenarios reflected in Tables V-46 through V-48.

It should be noted that the IRRs exceed the feasibility threshold of 20 percent by substantial amounts for the Terminal 1 Alternative (51.69 percent) and Terminal 2 Alternative (35.07 percent) based on the transfer of 100 percent of the landing fee and airfield parking fee revenues from ASECNA to the concessionaire as presented above. For this reason, the consultant recalculated the shares of these airfield revenues that the concessionaire would require in order to achieve a minimum of 20 percent IRR for these terminal development alternatives. The consultant has determined that transfers of 60 percent would produce an IRR of 22.29 percent for Terminal Alternative 1 and 80 percent would produce an IRR of 23.64 percent for Alternative 2. These transfer levels might be more acceptable to ASECNA when ADM and ASECNA address the airside development- and revenue sharing-issues prior to proceeding with the concession of the airports as mentioned above, because ASECNA would retain 40 percent or 20 percent to support its continuing activity in operating and maintaining, as well as developing airside communication and navigational equipment at these airports.

Table V-36. Alternative B Case Cash Flow

Concession Responsible for all Airside & Landside Development and Receives 100% of Landing Fee Revenue	Alternative 1 Single-Level Terminal (Bamako) Cost (Bamako) $65,679,454 Cost (Domestic) $29,967,761	Alternative 2 Split-Level Terminal (Bamako) Cost (Bamako) $76,762,003 Cost (Domestic) $29,967,761	Alternative 3 Two- Level Terminal (Bamako) Cost (Bamako) $87,837,653 Cost (Domestic) $29,967,761
Baseline Scenario			
Gross Cash Flow	$146,634,641	$129,603,796	$112,583,553
Net Present Value (NPV)	18,883,730	14,108,319	9,335,881
Internal Rate of Return (IRR)	51.69%	35.07%	25.08%
Lower Activity Scenario			
Gross Cash Flow	$123,345,108	$106,314,263	$89,294,020
Net Present Value (NPV)	14,525,480	9,750,069	4,977,631
Internal Rate of Return (IRR)	41.86%	28.00%	19.66%
Higher Expense Scenario			
Gross Cash Flow	$142,132,407	$125,101,562	$108,081,319
Net Present Value (NPV)	17,647,339	12,871,929	8,099,491
Internal Rate of Return (IRR)	45.15%	31.63%	23.01%
Lower Revenue Scenario			
Gross Cash Flow	$123,667,659	$106,636,814	$89,616,571
Net Present Value (NPV)	13,888,023	9,112,613	4,340,175
Internal Rate of Return (IRR)	36.17%	25.52%	18.46%

Table V-37. Alternative B Cash Flow – Baseline Activity Scenario, Alternative 1

Inflows & Outflows:	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
From Development Program:											
Investor Equity Invest - Stages I, II, III & IV (Bamako)	$-	$(2,554,550)	$(2,554,550)	$-	$-	$-	$(4,455,087)	$(4,455,087)	$-	$-	$-
Dev. Bank Debt Service - Stage I (Bamako)	$-	$(1,144,438)	$(1,144,438)	$(1,539,621)	$(1,539,621)	$(1,539,621)	$(1,539,621)	$(1,539,621)	$(1,539,621)	$(1,539,621)	$(1,539,621)
Supp. Credit Repayment - Stage I (Bamako)	$-	$(333,795)	$(333,795)	$(694,492)	$(694,492)	$(694,492)	$(694,492)	$(694,492)	$-	$-	$-
Dev. Bank Debt Service - Stage II (Bamako)	$-	$-	$-	$-	$-	$-	$(1,871,137)	$(1,871,137)	$(2,517,253)	$(2,517,253)	$(2,517,253)
Supp. Credit Repayment - Stage II (Bamako)	$-	$-	$-	$-	$-	$-	$(769,986)	$(769,986)	$(1,513,976)	$(1,513,976)	$(1,513,976)
Investor Equity Invest - Stages I, II, III & IV (Domestic)	$-	$(2,340,900)	$(2,340,900)	$-	$-	$-	$(1,048,392)	$(1,048,392)	$-	$-	$-
Dev. Bank Debt Service - Stage I (Domestic)	$-	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)
Supp. Credit Repayment - Stage I (Domestic)	$-	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$-	$-	$-
Dev. Bank Debt Service - Stage II (domestic)	$-	$-	$-	$-	$-	$-	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)
Supp. Credit Repayment - Stage II (Domestic)	$-	$-	$-	$-	$-	$-	$(356,276)	$(356,276)	$(356,276)	$(356,276)	$(356,276)
From Operations:											
Revenues (Bamako)	$2,837,794	$4,374,870	$5,013,772	$8,218,539	$8,638,310	$9,085,094	$9,560,191	$10,062,054	$13,656,832	$14,358,129	$15,104,536
Expenses (Bamako)	$-	$4,557,809	$5,079,821	$5,089,516	$5,378,323	$5,684,114	$6,007,093	$6,322,646	$6,682,820	$7,063,793	$7,466,949
Profit Taxes (Bamako)	$(2,132,448)	$(1,888,542)	$(1,899,044)	$(2,302,650)	$(2,308,164)	$(2,314,023)	$(2,320,199)	$(2,326,346)	$(3,329,435)	$(3,336,759)	$(3,344,524)
Revenues (Domestic)	$(211,604)	$(2,113,241)	$(2,458,365)	$(3,301,622)	$(3,512,541)	$(3,736,555)	$(3,974,126)	$(4,217,506)	$(5,103,065)	$(5,425,549)	$(5,768,089)
Expenses (Domestic)	$52,033	$218,005	$227,623	$508,254	$531,772	$556,487	$582,470	$609,808	$816,730	$855,697	$896,297
Profit Taxes (Domestic)	$-	$524,438	$533,775	$544,895	$542,035	$570,538	$585,314	$601,690	$619,146	$637,469	$656,871
	$(51,412)	$(35,221)	$(35,288)	$(56,537)	$(56,626)	$(56,722)	$(56,829)	$(56,947)	$(69,642)	$(69,775)	$(69,915)
Annual Gross Cash Flow	$-	$(336,197)	$(349,645)	$(363,631)	$(378,176)	$(393,303)	$(409,035)	$(425,397)	$(442,413)	$(460,109)	$(478,514)

Inflows & Outflows:	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total 2000-2020
From Development Program:											
Investor Equity Invest - Stages I, II, III & IV (Bamako)	$(2,057,962)	$(2,057,962)	$-	$-	$-	$(7,416,307)	$(7,416,307)	$-	$-	$-	$(32,967,813)
Dev. Bank Debt Service - Stage I (Bamako)	$(1,539,621)	$(1,539,621)	$(1,539,621)	$(1,539,621)	$-	$-	$-	$-	$-	$-	$(20,764,325)
Supp. Credit Repayment - Stage I (Bamako)	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	$(4,140,050)
Dev. Bank Debt Service - Stage II (Bamako)	$(2,517,253)	$(2,517,253)	$(2,517,253)	$(2,517,253)	$(2,517,253)	$(2,517,253)	$(2,517,253)	$(2,517,253)	$(2,517,253)	$-	$(33,949,308)
Supp. Credit Repayment - Stage II (Bamako)	$(1,513,976)	$(1,513,976)	$-	$-	$-	$-	$-	$-	$-	$-	$(9,109,852)
Investor Equity Invest - Stages I, II, III & IV (Domestic)	$(1,985,041)	$(1,985,041)	$-	$-	$-	$(1,701,200)	$(1,701,200)	$-	$-	$-	$(14,151,065)
Dev. Bank Debt Service - Stage I (Domestic)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$-	$-	$-	$-	$-	$-	$(19,751,956)
Supp. Credit Repayment - Stage I (Domestic)	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	$(4,454,856)
Dev. Bank Debt Service - Stage II (domestic)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,371)	$-	$(8,293,207)
Supp. Credit Repayment - Stage II (Domestic)	$(356,276)	$(356,275)	$-	$-	$-	$-	$-	$-	$-	$-	$(2,493,931)
From Operations:											
Revenues (Bamako)	$15,887,504	$16,732,199	$18,113,226	$19,025,468	$19,928,920	$20,861,693	$21,775,415	$24,490,452	$25,399,602	$26,324,368	$309,448,970
Expenses (Bamako)	$7,828,921	$8,276,766	$8,679,225	$9,133,353	$9,506,048	$9,957,425	$10,315,975	$10,756,056	$11,092,002	$11,491,715	$156,370,371
Profit Taxes (Bamako)	$(3,351,752)	$(3,360,410)	$(3,379,439)	$(3,388,284)	$(3,395,885)	$(3,404,747)	$(3,412,161)	$(3,915,154)	$(3,922,229)	$(3,930,293)	$(62,962,490)
Revenues (Domestic)	$(6,109,402)	$(6,494,567)	$(7,023,904)	$(7,431,161)	$(7,811,725)	$(8,224,311)	$(8,603,768)	$(9,399,406)	$(9,770,813)	$(10,165,737)	$(120,857,055)
Expenses (Domestic)	$938,968	$983,757	$1,141,962	$1,196,815	$1,290,425	$1,314,996	$1,378,612	$1,445,390	$1,515,521	$1,589,157	$18,650,780
Profit Taxes (Domestic)	$678,051	$699,938	$723,252	$747,279	$772,371	$799,599	$828,247	$857,965	$888,572	$920,248	$13,731,692
	$(70,068)	$(70,227)	$(71,204)	$(71,378)	$(71,559)	$(71,756)	$(71,964)	$(80,469)	$(80,691)	$(80,920)	$(1,355,151)
Annual Gross Cash Flow	$(497,654)	$(517,560)	$(538,263)	$(559,793)	$(582,185)	$(605,472)	$(629,691)	$(654,879)	$(681,074)	$(708,317)	$(10,011,311)
Weighted Average Cost of Capital (WACC)											13.74%
Net Present Value (NPV)											$18,883,730
Internal Rate of Return (IRR)											51.69%

Table V-38. Alternative B Cash Flow Scenario – Baseline Activity Scenario, Alternative 2

Inflows & Outflows:	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
From Development Program:											
Investor Equity Invest - Stages I, II, III & IV (Bamako)	$-	$(2,985,597)	$(2,985,597)	$-	$-	$-	$(5,206,825)	$(5,206,825)	$-	$-	$-
Dev. Bank Debt Service - Stage I (Bamako)	$-	$(1,337,547)	$(1,337,547)	$(1,799,412)	$(1,799,412)	$(1,799,412)	$(1,799,412)	$(1,799,412)	$(1,799,412)	$(1,799,412)	$(1,799,412)
Supp. Credit Repayment - Stage I (Bamako)	$-	$(390,119)	$(390,119)	$(811,678)	$(811,678)	$(811,678)	$(811,678)	$(811,678)	$-	$-	$-
Dev. Bank Debt Service - Stage II (Bamako)	$-	$-	$-	$-	$-	$-	$(2,186,867)	$(2,186,867)	$(2,942,006)	$(2,942,006)	$(2,942,006)
Supp. Credit Repayment - Stage II (Bamako)	$-	$-	$-	$-	$-	$-	$(899,911)	$(899,911)	$(1,769,440)	$(1,769,440)	$(1,769,440)
Investor Equity Invest - Stages I, II, III & IV (Domestic)	$-	$(2,340,900)	$(2,340,900)	$-	$-	$-	$(1,048,392)	$(1,048,392)	$-	$-	$-
Dev. Bank Debt Service - Stage I (Domestic)	$-	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)
Supp. Credit Repayment - Stage I (Domestic)	$-	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$-	$-	$-
Dev. Bank Debt Service - Stage II (domestic)	$-	$-	$-	$-	$-	$-	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)
Supp. Credit Repayment - Stage II (Domestic)	$-	$-	$-	$-	$-	$-	$(356,276)	$(356,276)	$(356,276)	$(356,276)	$(356,276)
From Operations:											
Revenues (Bamako)	$2,837,794	$4,374,870	$5,013,772	$8,218,539	$8,638,310	$9,085,094	$9,560,191	$10,062,054	$13,656,832	$14,358,129	$15,104,536
Expenses (Bamako)	$-	$4,557,809	$5,079,821	$5,089,516	$5,378,323	$5,684,114	$6,007,093	$6,322,646	$6,682,820	$7,063,793	$7,466,949
Profit Taxes (Bamako)	$(2,132,448)	$(1,888,542)	$(1,899,044)	$(2,302,650)	$(2,308,164)	$(2,314,023)	$(2,320,199)	$(2,326,346)	$(3,329,435)	$(3,336,759)	$(3,344,524)
Revenues (Domestic)	$(211,604)	$(2,113,241)	$(2,458,365)	$(3,301,622)	$(3,512,541)	$(3,736,555)	$(3,974,126)	$(4,217,506)	$(5,103,065)	$(5,425,549)	$(5,768,089)
Expenses (Domestic)	$52,033	$218,005	$227,623	$508,254	$531,772	$556,487	$582,470	$609,808	$816,730	$855,697	$896,297
Profit Taxes (Domestic)	$-	$524,438	$533,775	$544,895	$542,035	$570,538	$585,314	$601,690	$619,146	$637,469	$656,871
	$(51,412)	$(35,221)	$(35,288)	$(56,537)	$(56,626)	$(56,722)	$(56,829)	$(56,947)	$(69,642)	$(69,775)	$(69,915)
Annual Gross Cash Flow	$-	$(336,197)	$(349,645)	$(363,631)	$(378,176)	$(393,303)	$(409,035)	$(425,397)	$(442,413)	$(460,109)	$(478,514)

Inflows & Outflows:	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total 2000-2020
From Development Program:											
Investor Equity Invest - Stages I, II, III & IV (Bamako)	$(2,405,216)	$(2,405,216)	$-	$-	$-	$(8,667,712)	$(8,667,712)	$-	$-	$-	$(38,530,700)
Dev. Bank Debt Service - Stage I (Bamako)	$(1,799,412)	$(1,799,412)	$(1,799,412)	$(1,799,412)	$-	$-	$-	$-	$-	$-	$(24,268,033)
Supp. Credit Repayment - Stage I (Bamako)	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	$(4,838,629)
Dev. Bank Debt Service - Stage II (Bamako)	$(2,942,006)	$(2,942,006)	$(2,942,006)	$(2,942,006)	$(2,942,006)	$(2,942,006)	$(2,942,006)	$(2,942,006)	$(2,942,006)	$-	$(39,677,810)
Supp. Credit Repayment - Stage II (Bamako)	$(1,769,440)	$(1,769,440)	$-	$-	$-	$-	$-	$-	$-	$-	$(10,647,020)
Investor Equity Invest - Stages I, II, III & IV (Domestic)	$(1,985,041)	$(1,985,041)	$-	$-	$-	$(1,701,200)	$(1,701,200)	$-	$-	$-	$(14,151,065)
Dev. Bank Debt Service - Stage I (Domestic)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$-	$-	$-	$-	$-	$-	$(19,751,956)
Supp. Credit Repayment - Stage I (Domestic)	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	$(4,454,856)
Dev. Bank Debt Service - Stage II (domestic)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,371)	$-	$(8,293,207)
Supp. Credit Repayment - Stage II (Domestic)	$(356,276)	$(356,275)	$-	$-	$-	$-	$-	$-	$-	$-	$(2,493,931)
From Operations:											
Revenues (Bamako)	$15,887,504	$16,732,199	$18,113,226	$19,025,468	$19,928,920	$20,861,693	$21,775,415	$24,490,452	$25,399,602	$26,324,368	$309,448,970
Expenses (Bamako)	$7,828,921	$8,276,766	$8,679,225	$9,133,353	$9,506,048	$9,957,425	$10,315,975	$10,756,056	$11,092,002	$11,491,715	$156,370,371
Profit Taxes (Bamako)	$(3,351,752)	$(3,360,410)	$(3,379,439)	$(3,388,284)	$(3,395,885)	$(3,404,747)	$(3,412,161)	$(3,915,154)	$(3,922,229)	$(3,930,293)	$(62,962,490)
Revenues (Domestic)	$(6,109,402)	$(6,494,567)	$(7,023,904)	$(7,431,161)	$(7,811,725)	$(8,224,311)	$(8,603,768)	$(9,399,406)	$(9,770,813)	$(10,165,737)	$(120,857,055)
Expenses (Domestic)	$938,968	$983,757	$1,141,962	$1,196,815	$1,290,425	$1,314,996	$1,378,612	$1,445,390	$1,515,521	$1,589,157	$18,650,780
Profit Taxes (Domestic)	$678,051	$699,938	$723,252	$747,279	$772,371	$799,599	$828,247	$857,965	$888,572	$920,248	$13,731,692
	$(70,068)	$(70,227)	$(71,204)	$(71,378)	$(71,559)	$(71,756)	$(71,964)	$(80,469)	$(80,691)	$(80,920)	$(1,355,151)
Annual Gross Cash Flow	$(497,654)	$(517,560)	$(538,263)	$(559,793)	$(582,185)	$(605,472)	$(629,691)	$(654,879)	$(681,074)	$(708,317)	$(10,011,311)
Weighted Average Cost of Capital (WACC)											13.74%
Net Present Value (NPV)											$14,108,319
Internal Rate of Return (IRR)											35.07%

Table V-39. Alternative B Cash Flow – Baseline Activity Scenario, Alternative 3

Inflows & Outflows:	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
From Development Program:											
Investor Equity Invest - Stages I, II, III & IV (Bamako)	$-	$(3,416,376)	$(3,416,376)	$-	$-	$-	$(5,958,095)	$(5,958,095)	$-	$-	$-
Dev. Bank Debt Service - Stage I (Bamako)	$-	$(1,530,536)	$(1,530,536)	$(2,059,041)	$(2,059,041)	$(2,059,041)	$(2,059,041)	$(2,059,041)	$(2,059,041)	$(2,059,041)	$(2,059,041)
Supp. Credit Repayment - Stage I (Bamako)	$-	$(446,407)	$(446,407)	$(928,792)	$(928,792)	$(928,792)	$(928,792)	$(928,792)	$-	$-	$-
Dev. Bank Debt Service - Stage II (Bamako)	$-	$-	$-	$-	$-	$-	$(2,502,400)	$(2,502,400)	$(3,366,495)	$(3,366,495)	$(3,366,495)
Supp. Credit Repayment - Stage II (Bamako)	$-	$-	$-	$-	$-	$-	$(1,029,755)	$(1,029,755)	$(2,024,744)	$(2,024,744)	$(2,024,744)
Investor Equity Invest - Stages I, II, III & IV (Domestic)	$-	$(2,340,900)	$(2,340,900)	$-	$-	$-	$(1,048,392)	$(1,048,392)	$-	$-	$-
Dev. Bank Debt Service - Stage I (Domestic)	$-	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)
Supp. Credit Repayment - Stage I (Domestic)	$-	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$-	$-	$-
Dev. Bank Debt Service - Stage II (domestic)	$-	$-	$-	$-	$-	$-	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)
Supp. Credit Repayment - Stage II (Domestic)	$-	$-	$-	$-	$-	$-	$(356,276)	$(356,276)	$(356,276)	$(356,276)	$(356,276)
From Operations:											
Revenues (Bamako)	$2,837,794	$4,374,870	$5,013,772	$8,218,539	$8,638,310	$9,085,094	$9,560,191	$10,062,054	$13,656,832	$14,358,129	$15,104,536
Expenses (Bamako)	$-	$4,557,809	$5,079,821	$5,089,516	$5,378,323	$5,684,114	$6,007,093	$6,322,646	$6,682,820	$7,063,793	$7,466,949
Profit Taxes (Bamako)	$(2,132,448)	$(1,888,542)	$(1,899,044)	$(2,302,650)	$(2,308,164)	$(2,314,023)	$(2,320,199)	$(2,326,346)	$(3,329,435)	$(3,336,759)	$(3,344,524)
Revenues (Domestic)	$(211,604)	$(2,113,241)	$(2,458,365)	$(3,301,622)	$(3,512,541)	$(3,736,555)	$(3,974,126)	$(4,217,506)	$(5,103,065)	$(5,425,549)	$(5,768,089)
Expenses (Domestic)	$52,033	$218,005	$227,623	$508,254	$531,772	$556,487	$582,470	$609,808	$816,730	$855,697	$896,297
Profit Taxes (Domestic)	$-	$524,438	$533,775	$544,895	$542,035	$570,538	$585,314	$601,690	$619,146	$637,469	$656,871
	$(51,412)	$(35,221)	$(35,288)	$(56,537)	$(56,626)	$(56,722)	$(56,829)	$(56,947)	$(69,642)	$(69,775)	$(69,915)
Annual Gross Cash Flow	$-	$(336,197)	$(349,645)	$(363,631)	$(378,176)	$(393,303)	$(409,035)	$(425,397)	$(442,413)	$(460,109)	$(478,514)

Inflows & Outflows:	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total 2000-2020
From Development Program:											
Investor Equity Invest - Stages I, II, III & IV (Bamako)	$(2,752,254)	$(2,752,254)	$-	$-	$-	$(9,918,338)	$(9,918,338)	$-	$-	$-	$(44,090,124)
Dev. Bank Debt Service - Stage I (Bamako)	$(2,059,041)	$(2,059,041)	$(2,059,041)	$(2,059,041)	$-	$-	$-	$-	$-	$-	$(27,769,560)
Supp. Credit Repayment - Stage I (Bamako)	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	$(5,536,773)
Dev. Bank Debt Service - Stage II (Bamako)	$(3,366,495)	$(3,366,495)	$(3,366,495)	$(3,366,495)	$(3,366,495)	$(3,366,495)	$(3,366,495)	$(3,366,495)	$(3,366,495)	$-	$(45,402,745)
Supp. Credit Repayment - Stage II (Bamako)	$(2,024,744)	$(2,024,744)	$-	$-	$-	$-	$-	$-	$-	$-	$(12,183,231)
Investor Equity Invest - Stages I, II, III & IV (Domestic)	$(1,985,041)	$(1,985,041)	$-	$-	$-	$(1,701,200)	$(1,701,200)	$-	$-	$-	$(14,151,065)
Dev. Bank Debt Service - Stage I (Domestic)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$-	$-	$-	$-	$-	$-	$(19,751,956)
Supp. Credit Repayment - Stage I (Domestic)	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	$(4,454,856)
Dev. Bank Debt Service - Stage II (domestic)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,371)	$-	$(8,293,207)
Supp. Credit Repayment - Stage II (Domestic)	$(356,276)	$(356,275)	$-	$-	$-	$-	$-	$-	$-	$-	$(2,493,931)
From Operations:											
Revenues (Bamako)	$15,887,504	$16,732,199	$18,113,226	$19,025,468	$19,928,920	$20,861,693	$21,775,415	$24,490,452	$25,399,602	$26,324,368	$309,448,970
Expenses (Bamako)	$7,828,921	$8,276,766	$8,679,225	$9,133,353	$9,506,048	$9,957,425	$10,315,975	$10,756,056	$11,092,002	$11,491,715	$156,370,371
Profit Taxes (Bamako)	$(3,351,752)	$(3,360,410)	$(3,379,439)	$(3,388,284)	$(3,395,885)	$(3,404,747)	$(3,412,161)	$(3,915,154)	$(3,922,229)	$(3,930,293)	$(62,962,490)
Revenues (Domestic)	$(6,109,402)	$(6,494,567)	$(7,023,904)	$(7,431,161)	$(7,811,725)	$(8,224,311)	$(8,603,768)	$(9,399,406)	$(9,770,813)	$(10,165,737)	$(120,857,055)
Expenses (Domestic)	$938,968	$983,757	$1,141,962	$1,196,815	$1,290,425	$1,314,996	$1,378,612	$1,445,390	$1,515,521	$1,589,157	$18,650,780
Profit Taxes (Domestic)	$678,051	$699,938	$723,252	$747,279	$772,371	$799,599	$828,247	$857,965	$888,572	$920,248	$13,731,692
	$(70,068)	$(70,227)	$(71,204)	$(71,378)	$(71,559)	$(71,756)	$(71,964)	$(80,469)	$(80,691)	$(80,920)	$(1,355,151)
Annual Gross Cash Flow	$(497,654)	$(517,560)	$(538,263)	$(559,793)	$(582,185)	$(605,472)	$(629,691)	$(654,879)	$(681,074)	$(708,317)	$(10,011,311)
Weighted Average Cost of Capital (WACC)											13.74%
Net Present Value (NPV)											$9,335,881
Internal Rate of Return (IRR)											25.08%

Table V-40. Alternative B Cash Flow – Lower Activity Scenario, Alternative 1

Inflows & Outflows:	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
From Development Program:											
Investor Equity Invest - Stages I, II, III & IV (Bamako)	$-	$(2,554,550)	$(2,554,550)	$-	$-	$-	$(4,455,087)	$(4,455,087)	$-	$-	$-
Dev. Bank Debt Service - Stage I (Bamako)	$-	$(1,144,438)	$(1,144,438)	$(1,539,621)	$(1,539,621)	$(1,539,621)	$(1,539,621)	$(1,539,621)	$(1,539,621)	$(1,539,621)	$(1,539,621)
Supp. Credit Repayment - Stage I (Bamako)	$-	$(333,795)	$(333,795)	$(694,492)	$(694,492)	$(694,492)	$(694,492)	$(694,492)	$-	$-	$-
Dev. Bank Debt Service - Stage II (Bamako)	$-	$-	$-	$-	$-	$-	$(1,871,137)	$(1,871,137)	$(2,517,253)	$(2,517,253)	$(2,517,253)
Supp. Credit Repayment - Stage II (Bamako)	$-	$-	$-	$-	$-	$-	$(769,986)	$(769,986)	$(1,513,976)	$(1,513,976)	$(1,513,976)
Investor Equity Invest - Stages I, II, III & IV (Domestic)	$-	$(2,340,900)	$(2,340,900)	$-	$-	$-	$(1,048,392)	$(1,048,392)	$-	$-	$-
Dev. Bank Debt Service - Stage I (Domestic)	$-	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)
Supp. Credit Repayment - Stage I (Domestic)	$-	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$-	$-	$-
Dev. Bank Debt Service - Stage II (domestic)	$-	$-	$-	$-	$-	$-	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)
Supp. Credit Repayment - Stage II (Domestic)	$-	$-	$-	$-	$-	$-	$(356,276)	$(356,276)	$(356,276)	$(356,276)	$(356,276)
From Operations:											
Revenues (Bamako)	$2,899,343	$4,592,875	$4,929,866	$8,002,446	$8,439,986	$8,860,183	$9,342,831	$9,829,678	$12,662,625	$14,028,658	$14,758,211
Expenses (Bamako)	$-	$4,379,089	$4,846,395	$4,755,937	$4,942,894	$5,129,410	$5,335,636	$5,529,530	$5,755,548	$5,992,519	$6,240,953
Profit Taxes (Bamako)	$(2,271,929)	$(1,887,808)	$(1,898,538)	$(2,211,023)	$(2,306,825)	$(2,312,470)	$(2,318,796)	$(2,324,908)	$(3,267,940)	$(3,335,210)	$(3,342,915)
Revenues (Domestic)	$(188,224)	$(2,125,247)	$(2,363,317)	$(3,164,208)	$(3,322,817)	$(3,503,137)	$(3,707,902)	$(3,910,290)	$(4,545,070)	$(5,005,790)	$(5,296,875)
Expenses (Domestic)	$52,033	$218,005	$227,623	$508,254	$531,772	$556,487	$582,470	$609,808	$816,730	$855,697	$896,297
Profit Taxes (Domestic)	$-	$524,438	$533,775	$544,895	$542,035	$570,538	$585,314	$601,690	$619,146	$637,469	$656,871
	$(51,412)	$(35,221)	$(35,288)	$(56,537)	$(56,626)	$(56,722)	$(56,829)	$(56,947)	$(69,642)	$(69,775)	$(69,915)
Annual Gross Cash Flow	$-	$(336,197)	$(349,645)	$(363,631)	$(378,176)	$(393,303)	$(409,035)	$(425,397)	$(442,413)	$(460,109)	$(478,514)

Inflows & Outflows:	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total 2000-2020
From Development Program:											
Investor Equity Invest - Stages I, II, III & IV (Bamako)	$(2,057,962)	$(2,057,962)	$-	$-	$-	$(7,416,307)	$(7,416,307)	$-	$-	$-	$(32,967,813)
Dev. Bank Debt Service - Stage I (Bamako)	$(1,539,621)	$(1,539,621)	$(1,539,621)	$(1,539,621)	$-	$-	$-	$-	$-	$-	$(20,764,325)
Supp. Credit Repayment - Stage I (Bamako)	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	$(4,140,050)
Dev. Bank Debt Service - Stage II (Bamako)	$(2,517,253)	$(2,517,253)	$(2,517,253)	$(2,517,253)	$(2,517,253)	$(2,517,253)	$(2,517,253)	$(2,517,253)	$(2,517,253)	$-	$(33,949,308)
Supp. Credit Repayment - Stage II (Bamako)	$(1,513,976)	$(1,513,976)	$-	$-	$-	$-	$-	$-	$-	$-	$(9,109,852)
Investor Equity Invest - Stages I, II, III & IV (Domestic)	$(1,985,041)	$(1,985,041)	$-	$-	$-	$(1,701,200)	$(1,701,200)	$-	$-	$-	$(14,151,065)
Dev. Bank Debt Service - Stage I (Domestic)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$-	$-	$-	$-	$-	$-	$(19,751,956)
Supp. Credit Repayment - Stage I (Domestic)	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	$(4,454,856)
Dev. Bank Debt Service - Stage II (domestic)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,371)	$-	$(8,293,207)
Supp. Credit Repayment - Stage II (Domestic)	$(356,276)	$(356,275)	$-	$-	$-	$-	$-	$-	$-	$-	$(2,493,931)
From Operations:											
Revenues (Bamako)	$15,515,041	$16,349,593	$17,690,273	$18,663,167	$19,584,952	$20,546,380	$21,486,461	$23,603,672	$25,183,209	$26,152,350	$303,121,800
Expenses (Bamako)	$6,453,688	$6,724,205	$6,957,229	$7,244,033	$7,481,435	$7,780,791	$8,026,408	$8,336,677	$8,588,240	$8,893,265	$129,393,884
Profit Taxes (Bamako)	$(3,350,201)	$(3,358,716)	$(3,377,827)	$(3,386,932)	$(3,394,936)	$(3,403,780)	$(3,411,662)	$(3,914,634)	$(3,922,229)	$(3,930,316)	$(62,929,595)
Revenues (Domestic)	$(5,585,558)	$(5,914,525)	$(6,380,903)	$(6,756,081)	$(7,101,435)	$(7,477,017)	$(7,830,362)	$(8,407,714)	$(8,954,766)	$(9,334,590)	$(110,875,827)
Expenses (Domestic)	$938,968	$983,757	$1,141,962	$1,196,815	$1,290,425	$1,314,996	$1,378,612	$1,445,390	$1,515,521	$1,589,157	$18,650,780
Profit Taxes (Domestic)	$678,051	$699,938	$723,252	$747,279	$772,371	$799,599	$828,247	$857,965	$888,572	$920,248	$13,731,692
	$(70,068)	$(70,227)	$(71,204)	$(71,378)	$(71,559)	$(71,756)	$(71,964)	$(80,469)	$(80,691)	$(80,920)	$(1,355,151)
Annual Gross Cash Flow	$(497,654)	$(517,560)	$(538,263)	$(559,793)	$(582,185)	$(605,472)	$(629,691)	$(654,879)	$(681,074)	$(708,317)	$(10,011,311)
Weighted Average Cost of Capital (WACC)											13.74%
Net Present Value (NPV)											$14,525,480
Internal Rate of Return (IRR)											41.86%

Table V-41. Alternative B Cash Flow – Lower Activity Scenario, Alternative 2

Inflows & Outflows:	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
From Development Program:											
Investor Equity Invest - Stages I, II, III & IV (Bamako)	$-	$(2,985,597)	$(2,985,597)	$-	$-	$-	$(5,206,825)	$(5,206,825)	$-	$-	$-
Dev. Bank Debt Service - Stage I (Bamako)	$-	$(1,337,547)	$(1,337,547)	$(1,799,412)	$(1,799,412)	$(1,799,412)	$(1,799,412)	$(1,799,412)	$(1,799,412)	$(1,799,412)	$(1,799,412)
Supp. Credit Repayment - Stage I (Bamako)	$-	$(390,119)	$(390,119)	$(811,678)	$(811,678)	$(811,678)	$(811,678)	$(811,678)	$-	$-	$-
Dev. Bank Debt Service - Stage II (Bamako)	$-	$-	$-	$-	$-	$-	$(2,186,867)	$(2,186,867)	$(2,942,006)	$(2,942,006)	$(2,942,006)
Supp. Credit Repayment - Stage II (Bamako)	$-	$-	$-	$-	$-	$-	$(899,911)	$(899,911)	$(1,769,440)	$(1,769,440)	$(1,769,440)
Investor Equity Invest - Stages I, II, III & IV (Domestic)	$-	$(2,340,900)	$(2,340,900)	$-	$-	$-	$(1,048,392)	$(1,048,392)	$-	$-	$-
Dev. Bank Debt Service - Stage I (Domestic)	$-	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)
Supp. Credit Repayment - Stage I (Domestic)	$-	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$-	$-	$-
Dev. Bank Debt Service - Stage II (domestic)	$-	$-	$-	$-	$-	$-	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)
Supp. Credit Repayment - Stage II (Domestic)	$-	$-	$-	$-	$-	$-	$(356,276)	$(356,276)	$(356,276)	$(356,276)	$(356,276)
From Operations:											
Revenues (Bamako)	$2,899,343	$4,592,875	$4,929,866	$8,002,446	$8,439,986	$8,860,183	$9,342,831	$9,829,678	$12,662,625	$14,028,658	$14,758,211
Expenses (Bamako)	$-	$4,379,089	$4,846,395	$4,755,937	$4,942,894	$5,129,410	$5,335,636	$5,529,530	$5,755,548	$5,992,519	$6,240,953
Profit Taxes (Bamako)	$(2,271,929)	$(1,887,808)	$(1,898,538)	$(2,211,023)	$(2,306,825)	$(2,312,470)	$(2,318,796)	$(2,324,908)	$(3,267,940)	$(3,335,210)	$(3,342,915)
Revenues (Domestic)	$(188,224)	$(2,125,247)	$(2,363,317)	$(3,164,208)	$(3,322,817)	$(3,503,137)	$(3,707,902)	$(3,910,290)	$(4,545,070)	$(5,005,790)	$(5,296,875)
Expenses (Domestic)	$52,033	$218,005	$227,623	$508,254	$531,772	$556,487	$582,470	$609,808	$816,730	$855,697	$896,297
Profit Taxes (Domestic)	$-	$524,438	$533,775	$544,895	$542,035	$570,538	$585,314	$601,690	$619,146	$637,469	$656,871
	$(51,412)	$(35,221)	$(35,288)	$(56,537)	$(56,626)	$(56,722)	$(56,829)	$(56,947)	$(69,642)	$(69,775)	$(69,915)
Annual Gross Cash Flow	$-	$(336,197)	$(349,645)	$(363,631)	$(378,176)	$(393,303)	$(409,035)	$(425,397)	$(442,413)	$(460,109)	$(478,514)

Inflows & Outflows:	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total 2000-2020
From Development Program:											
Investor Equity Invest - Stages I, II, III & IV (Bamako)	$(2,405,216)	$(2,405,216)	$-	$-	$-	$(8,667,712)	$(8,667,712)	$-	$-	$-	$(38,530,700)
Dev. Bank Debt Service - Stage I (Bamako)	$(1,799,412)	$(1,799,412)	$(1,799,412)	$(1,799,412)	$-	$-	$-	$-	$-	$-	$(24,268,033)
Supp. Credit Repayment - Stage I (Bamako)	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	$(4,838,629)
Dev. Bank Debt Service - Stage II (Bamako)	$(2,942,006)	$(2,942,006)	$(2,942,006)	$(2,942,006)	$(2,942,006)	$(2,942,006)	$(2,942,006)	$(2,942,006)	$(2,942,006)	$-	$(39,677,810)
Supp. Credit Repayment - Stage II (Bamako)	$(1,769,440)	$(1,769,440)	$-	$-	$-	$-	$-	$-	$-	$-	$(10,647,020)
Investor Equity Invest - Stages I, II, III & IV (Domestic)	$(1,985,041)	$(1,985,041)	$-	$-	$-	$(1,701,200)	$(1,701,200)	$-	$-	$-	$(14,151,065)
Dev. Bank Debt Service - Stage I (Domestic)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$-	$-	$-	$-	$-	$-	$(19,751,956)
Supp. Credit Repayment - Stage I (Domestic)	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	$(4,454,856)
Dev. Bank Debt Service - Stage II (domestic)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,371)	$-	$(8,293,207)
Supp. Credit Repayment - Stage II (Domestic)	$(356,276)	$(356,275)	$-	$-	$-	$-	$-	$-	$-	$-	$(2,493,931)
From Operations:											
Revenues (Bamako)	$15,515,041	$16,349,593	$17,690,273	$18,663,167	$19,584,952	$20,546,380	$21,486,461	$23,603,672	$25,183,209	$26,152,350	$303,121,800
Expenses (Bamako)	$6,453,688	$6,724,205	$6,957,229	$7,244,033	$7,481,435	$7,780,791	$8,026,408	$8,336,677	$8,588,240	$8,893,265	$129,393,884
Profit Taxes (Bamako)	$(3,350,201)	$(3,358,716)	$(3,377,827)	$(3,386,932)	$(3,394,936)	$(3,403,780)	$(3,411,662)	$(3,914,634)	$(3,922,229)	$(3,930,316)	$(62,929,595)
Revenues (Domestic)	$(5,585,558)	$(5,914,525)	$(6,380,903)	$(6,756,081)	$(7,101,435)	$(7,477,017)	$(7,830,362)	$(8,407,714)	$(8,954,766)	$(9,334,590)	$(110,875,827)
Expenses (Domestic)	$938,968	$983,757	$1,141,962	$1,196,815	$1,290,425	$1,314,996	$1,378,612	$1,445,390	$1,515,521	$1,589,157	$18,650,780
Profit Taxes (Domestic)	$678,051	$699,938	$723,252	$747,279	$772,371	$799,599	$828,247	$857,965	$888,572	$920,248	$13,731,692
	$(70,068)	$(70,227)	$(71,204)	$(71,378)	$(71,559)	$(71,756)	$(71,964)	$(80,469)	$(80,691)	$(80,920)	$(1,355,151)
Annual Gross Cash Flow	$(497,654)	$(517,560)	$(538,263)	$(559,793)	$(582,185)	$(605,472)	$(629,691)	$(654,879)	$(681,074)	$(708,317)	$(10,011,311)
Weighted Average Cost of Capital (WACC)											13.74%
Net Present Value (NPV)											$9,750,069
Internal Rate of Return (IRR)											28.00%

Table V-42. Alternative B Cash Flow – Lower Activity Scenario, Alternative 3

Inflows & Outflows:	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
From Development Program:											
Investor Equity Invest - Stages I, II, III & IV (Bamako)	$-	$(3,416,376)	$(3,416,376)	$-	$-	$-	$(5,958,095)	$(5,958,095)	$-	$-	$-
Dev. Bank Debt Service - Stage I (Bamako)	$-	$(1,530,536)	$(1,530,536)	$(2,059,041)	$(2,059,041)	$(2,059,041)	$(2,059,041)	$(2,059,041)	$(2,059,041)	$(2,059,041)	$(2,059,041)
Supp.Credit Repayment - Stage I (Bamako)	$-	$(446,407)	$(446,407)	$(928,792)	$(928,792)	$(928,792)	$(928,792)	$(928,792)	$-	$-	$-
Dev. Bank Debt Service - Stage II (Bamako)	$-	$-	$-	$-	$-	$-	$(2,502,400)	$(2,502,400)	$(3,366,495)	$(3,366,495)	$(3,366,495)
Supp.Credit Repayment - Stage II (Bamako)	$-	$-	$-	$-	$-	$-	$(1,029,755)	$(1,029,755)	$(2,024,744)	$(2,024,744)	$(2,024,744)
Investor Equity Invest - Stages I, II, III & IV (Domestic)	$-	$(2,340,900)	$(2,340,900)	$-	$-	$-	$(1,048,392)	$(1,048,392)	$-	$-	$-
Dev. Bank Debt Service - Stage I (Domestic)	$-	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)
Supp.Credit Repayment - Stage I (Domestic)	$-	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$-	$-	$-
Dev. Bank Debt Service - Stage II (domestic)	$-	$-	$-	$-	$-	$-	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)
Supp.Credit Repayment - Stage II (Domestic)	$-	$-	$-	$-	$-	$-	$(356,276)	$(356,276)	$(356,276)	$(356,276)	$(356,276)
From Operations:											
Revenues (Bamako)	$2,899,343	$4,592,875	$4,929,866	$8,002,446	$8,439,986	$8,860,183	$9,342,831	$9,829,678	$12,662,625	$14,028,658	$14,758,211
Expenses (Bamako)	$-	$4,379,089	$4,846,395	$4,755,937	$4,942,894	$5,129,410	$5,335,636	$5,529,530	$5,755,548	$5,992,519	$6,240,953
Profit Taxes (Bamako)	$(2,271,929)	$(1,887,808)	$(1,898,538)	$(2,211,023)	$(2,306,825)	$(2,312,470)	$(2,318,796)	$(2,324,908)	$(3,267,940)	$(3,335,210)	$(3,342,915)
Revenues (Domestic)	$(188,224)	$(2,125,247)	$(2,363,317)	$(3,164,208)	$(3,322,817)	$(3,503,137)	$(3,707,902)	$(3,910,290)	$(4,545,070)	$(5,005,790)	$(5,296,875)
Expenses (Domestic)	$52,033	$218,005	$227,623	$508,254	$531,772	$556,487	$582,470	$609,808	$816,730	$855,697	$896,297
Profit Taxes (Domestic)	$-	$524,438	$533,775	$544,895	$542,035	$570,538	$585,314	$601,690	$619,146	$637,469	$656,871
	$(51,412)	$(35,221)	$(35,288)	$(56,537)	$(56,626)	$(56,722)	$(56,829)	$(56,947)	$(69,642)	$(69,775)	$(69,915)
Annual Gross Cash Flow	$-	$(336,197)	$(349,645)	$(363,631)	$(378,176)	$(393,303)	$(409,035)	$(425,397)	$(442,413)	$(460,109)	$(478,514)

Inflows & Outflows:	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total 2000-2020
From Development Program:											
Investor Equity Invest - Stages I, II, III & IV (Bamako)	$(2,752,254)	$(2,752,254)	$-	$-	$-	$(9,918,338)	$(9,918,338)	$-	$-	$-	$(44,090,124)
Dev. Bank Debt Service - Stage I (Bamako)	$(2,059,041)	$(2,059,041)	$(2,059,041)	$(2,059,041)	$-	$-	$-	$-	$-	$-	$(27,769,560)
Supp.Credit Repayment - Stage I (Bamako)	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	$(5,536,773)
Dev. Bank Debt Service - Stage II (Bamako)	$(3,366,495)	$(3,366,495)	$(3,366,495)	$(3,366,495)	$(3,366,495)	$(3,366,495)	$(3,366,495)	$(3,366,495)	$(3,366,495)	$-	$(45,402,745)
Supp.Credit Repayment - Stage II (Bamako)	$(2,024,744)	$(2,024,744)	$-	$-	$-	$-	$-	$-	$-	$-	$(12,183,231)
Investor Equity Invest - Stages I, II, III & IV (Domestic)	$(1,985,041)	$(1,985,041)	$-	$-	$-	$(1,701,200)	$(1,701,200)	$-	$-	$-	$(14,151,065)
Dev. Bank Debt Service - Stage I (Domestic)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$-	$-	$-	$-	$-	$-	$(19,751,956)
Supp.Credit Repayment - Stage I (Domestic)	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	$(4,454,856)
Dev. Bank Debt Service - Stage II (domestic)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,371)	$-	$(8,293,207)
Supp.Credit Repayment - Stage II (Domestic)	$(356,276)	$(356,275)	$-	$-	$-	$-	$-	$-	$-	$-	$(2,493,931)
From Operations:											
Revenues (Bamako)	$15,515,041	$16,349,593	$17,690,273	$18,663,167	$19,584,952	$20,546,380	$21,486,461	$23,603,672	$25,183,209	$26,152,350	$303,121,800
Expenses (Bamako)	$6,453,688	$6,724,205	$6,957,229	$7,244,033	$7,481,435	$7,780,791	$8,026,408	$8,336,677	$8,588,240	$8,893,265	$129,393,884
Profit Taxes (Bamako)	$(3,350,201)	$(3,358,716)	$(3,377,827)	$(3,386,932)	$(3,394,936)	$(3,403,780)	$(3,411,662)	$(3,914,634)	$(3,922,229)	$(3,930,316)	$(62,929,595)
Revenues (Domestic)	$(5,585,558)	$(5,914,525)	$(6,380,903)	$(6,756,081)	$(7,101,435)	$(7,477,017)	$(7,830,362)	$(8,407,714)	$(8,954,766)	$(9,334,590)	$(110,875,827)
Expenses (Domestic)	$938,968	$983,757	$1,141,962	$1,196,815	$1,290,425	$1,314,996	$1,378,612	$1,445,390	$1,515,521	$1,589,157	$18,650,780
Profit Taxes (Domestic)	$678,051	$699,938	$723,252	$747,279	$772,371	$799,599	$828,247	$857,965	$888,572	$920,248	$13,731,692
	$(70,068)	$(70,227)	$(71,204)	$(71,378)	$(71,559)	$(71,756)	$(71,964)	$(80,469)	$(80,691)	$(80,920)	$(1,355,151)
Annual Gross Cash Flow	$(497,654)	$(517,560)	$(538,263)	$(559,793)	$(582,185)	$(605,472)	$(629,691)	$(654,879)	$(681,074)	$(708,317)	$(10,011,311)
Weighted Average Cost of Capital (WACC)											13.74%
Net Present Value (NPV)											$4,977,631
Internal Rate of Return (IRR)											19.66%

Table V-43. Alternative B Cash Flow – Higher Expense Scenario, Alternative 1

Inflows & Outflows:	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
From Development Program:											
Investor Equity Invest - Stages I, II, III & IV (Bamako)	$-	$(2,554,550)	$(2,554,550)	$-	$-	$-	$(4,455,087)	$(4,455,087)	$-	$-	$-
Dev. Bank Debt Service - Stage I (Bamako)	$-	$(1,144,438)	$(1,144,438)	$(1,539,621)	$(1,539,621)	$(1,539,621)	$(1,539,621)	$(1,539,621)	$(1,539,621)	$(1,539,621)	$(1,539,621)
Supp. Credit Repayment - Stage I (Bamako)	$-	$(333,795)	$(333,795)	$(694,492)	$(694,492)	$(694,492)	$(694,492)	$(694,492)	$-	$-	$-
Dev. Bank Debt Service - Stage II (Bamako)	$-	$-	$-	$-	$-	$-	$(1,871,137)	$(1,871,137)	$(2,517,253)	$(2,517,253)	$(2,517,253)
Supp. Credit Repayment - Stage II (Bamako)	$-	$-	$-	$-	$-	$-	$(769,986)	$(769,986)	$(1,513,976)	$(1,513,976)	$(1,513,976)
Investor Equity Invest - Stages I, II, III & IV (Domestic)	$-	$(2,340,900)	$(2,340,900)	$-	$-	$-	$(1,048,392)	$(1,048,392)	$-	$-	$-
Dev. Bank Debt Service - Stage I (Domestic)	$-	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)
Supp. Credit Repayment - Stage I (Domestic)	$-	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$-	$-	$-
Dev. Bank Debt Service - Stage II (domestic)	$-	$-	$-	$-	$-	$-	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)
Supp. Credit Repayment - Stage II (Domestic)	$-	$-	$-	$-	$-	$-	$(356,276)	$(356,276)	$(356,276)	$(356,276)	$(356,276)
From Operations:											
Revenues (Bamako)	$2,837,794	$4,374,870	$5,013,772	$8,218,539	$8,638,310	$9,085,094	$9,560,191	$10,062,054	$13,656,832	$14,358,129	$15,104,536
Expenses (Bamako)	$-	$4,557,809	$5,079,821	$5,089,516	$5,378,323	$5,684,114	$6,007,093	$6,322,646	$6,682,820	$7,063,793	$7,466,949
Profit Taxes (Bamako)	$(2,345,692)	$(2,077,396)	$(2,088,949)	$(2,532,915)	$(2,538,981)	$(2,545,425)	$(2,552,219)	$(2,558,981)	$(3,662,379)	$(3,670,435)	$(3,678,976)
Revenues (Domestic)	$(147,631)	$(2,056,585)	$(2,401,393)	$(3,232,542)	$(3,443,296)	$(3,667,135)	$(3,904,520)	$(4,147,716)	$(5,003,182)	$(5,325,446)	$(5,667,753)
Expenses (Domestic)	$52,033	$218,005	$227,623	$508,254	$531,772	$556,487	$582,470	$609,808	$816,730	$855,697	$896,297
Profit Taxes (Domestic)	$-	$524,438	$533,775	$544,895	$542,035	$570,538	$585,314	$601,690	$619,146	$637,469	$656,871
	$(56,553)	$(38,743)	$(38,816)	$(62,191)	$(62,289)	$(62,394)	$(62,512)	$(62,642)	$(76,606)	$(76,752)	$(76,907)
Annual Gross Cash Flow	$-	$(336,197)	$(349,645)	$(363,631)	$(378,176)	$(393,303)	$(409,035)	$(425,397)	$(442,413)	$(460,109)	$(478,514)

Inflows & Outflows:	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total 2000-2020
From Development Program:											
Investor Equity Invest - Stages I, II, III & IV (Bamako)	$(2,057,962)	$(2,057,962)	$-	$-	$-	$(7,416,307)	$(7,416,307)	$-	$-	$-	$(32,967,813)
Dev. Bank Debt Service - Stage I (Bamako)	$(1,539,621)	$(1,539,621)	$(1,539,621)	$(1,539,621)	$-	$-	$-	$-	$-	$-	$(20,764,325)
Supp. Credit Repayment - Stage I (Bamako)	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	$(4,140,050)
Dev. Bank Debt Service - Stage II (Bamako)	$(2,517,253)	$(2,517,253)	$(2,517,253)	$(2,517,253)	$(2,517,253)	$(2,517,253)	$(2,517,253)	$(2,517,253)	$(2,517,253)	$-	$(33,949,308)
Supp. Credit Repayment - Stage II (Bamako)	$(1,513,976)	$(1,513,976)	$-	$-	$-	$-	$-	$-	$-	$-	$(9,109,852)
Investor Equity Invest - Stages I, II, III & IV (Domestic)	$(1,985,041)	$(1,985,041)	$-	$-	$-	$(1,701,200)	$(1,701,200)	$-	$-	$-	$(14,151,065)
Dev. Bank Debt Service - Stage I (Domestic)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$-	$-	$-	$-	$-	$-	$(19,751,956)
Supp. Credit Repayment - Stage I (Domestic)	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	$(4,454,856)
Dev. Bank Debt Service - Stage II (domestic)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,371)	$-	$(8,293,207)
Supp. Credit Repayment - Stage II (Domestic)	$(356,276)	$(356,275)	$-	$-	$-	$-	$-	$-	$-	$-	$(2,493,931)
From Operations:											
Revenues (Bamako)	$15,887,504	$16,732,199	$18,113,226	$19,025,468	$19,928,920	$20,861,693	$21,775,415	$24,490,452	$25,399,602	$26,324,368	$309,448,970
Expenses (Bamako)	$7,828,921	$8,276,766	$8,679,225	$9,133,353	$9,506,048	$9,957,425	$10,315,975	$10,756,056	$11,092,002	$11,491,715	$156,370,371
Profit Taxes (Bamako)	$(3,686,927)	$(3,696,451)	$(3,717,383)	$(3,727,113)	$(3,735,474)	$(3,745,222)	$(3,753,378)	$(4,306,669)	$(4,314,451)	$(4,323,323)	$(69,258,739)
Revenues (Domestic)	$(6,008,850)	$(6,393,755)	$(6,922,520)	$(7,329,512)	$(7,709,848)	$(8,122,169)	$(8,501,404)	$(9,281,952)	$(9,653,146)	$(10,047,828)	$(118,968,181)
Expenses (Domestic)	$938,968	$983,757	$1,141,962	$1,196,815	$1,290,425	$1,314,996	$1,378,612	$1,445,390	$1,515,521	$1,589,157	$18,650,780
Profit Taxes (Domestic)	$678,051	$699,938	$723,252	$747,279	$772,371	$799,599	$828,247	$857,965	$888,572	$920,248	$13,731,692
	$(77,075)	$(77,250)	$(78,324)	$(78,515)	$(78,715)	$(78,932)	$(79,160)	$(88,516)	$(88,760)	$(89,012)	$(1,490,666)
Annual Gross Cash Flow	$(497,654)	$(517,560)	$(538,263)	$(559,793)	$(582,185)	$(605,472)	$(629,691)	$(654,879)	$(681,074)	$(708,317)	$(10,011,311)
Weighted Average Cost of Capital (WACC)											13.74%
Net Present Value (NPV)											$17,647,339
Internal Rate of Return (IRR)											45.15%

Table V-44. Alternative B Cash Flow – Higher Expense Scenario, Alternative 2

Inflows & Outflows:	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
From Development Program:											
Investor Equity Invest - Stages I, II, III & IV (Bamako)	$-	$(2,985,597)	$(2,985,597)	$-	$-	$-	$(5,206,825)	$(5,206,825)	$-	$-	$-
Dev. Bank Debt Service - Stage I (Bamako)	$-	$(1,337,547)	$(1,337,547)	$(1,799,412)	$(1,799,412)	$(1,799,412)	$(1,799,412)	$(1,799,412)	$(1,799,412)	$(1,799,412)	$(1,799,412)
Supp. Credit Repayment - Stage I (Bamako)	$-	$(390,119)	$(390,119)	$(811,678)	$(811,678)	$(811,678)	$(811,678)	$(811,678)	$-	$-	$-
Dev. Bank Debt Service - Stage II (Bamako)	$-	$-	$-	$-	$-	$-	$(2,186,867)	$(2,186,867)	$(2,942,006)	$(2,942,006)	$(2,942,006)
Supp. Credit Repayment - Stage II (Bamako)	$-	$-	$-	$-	$-	$-	$(899,911)	$(899,911)	$(1,769,440)	$(1,769,440)	$(1,769,440)
Investor Equity Invest - Stages I, II, III & IV (Domestic)	$-	$(2,340,900)	$(2,340,900)	$-	$-	$-	$(1,048,392)	$(1,048,392)	$-	$-	$-
Dev. Bank Debt Service - Stage I (Domestic)	$-	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)
Supp. Credit Repayment - Stage I (Domestic)	$-	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$-	$-	$-
Dev. Bank Debt Service - Stage II (domestic)	$-	$-	$-	$-	$-	$-	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)
Supp. Credit Repayment - Stage II (Domestic)	$-	$-	$-	$-	$-	$-	$(356,276)	$(356,276)	$(356,276)	$(356,276)	$(356,276)
From Operations:											
Revenues (Bamako)	$2,837,794	$4,374,870	$5,013,772	$8,218,539	$8,638,310	$9,085,094	$9,560,191	$10,062,054	$13,656,832	$14,358,129	$15,104,536
Expenses (Bamako)	$-	$4,557,809	$5,079,821	$5,089,516	$5,378,323	$5,684,114	$6,007,093	$6,322,646	$6,682,820	$7,063,793	$7,466,949
Profit Taxes (Bamako)	$(2,345,692)	$(2,077,396)	$(2,088,949)	$(2,532,915)	$(2,538,981)	$(2,545,425)	$(2,552,219)	$(2,558,981)	$(3,662,379)	$(3,670,435)	$(3,678,976)
Revenues (Domestic)	$(147,631)	$(2,056,585)	$(2,401,393)	$(3,232,542)	$(3,443,296)	$(3,667,135)	$(3,904,520)	$(4,147,716)	$(5,003,182)	$(5,325,446)	$(5,667,753)
Expenses (Domestic)	$52,033	$218,005	$227,623	$508,254	$531,772	$556,487	$582,470	$609,808	$816,730	$855,697	$896,297
Profit Taxes (Domestic)	$-	$524,438	$533,775	$544,895	$542,035	$570,538	$585,314	$601,690	$619,146	$637,469	$656,871
	$(56,553)	$(38,743)	$(38,816)	$(62,191)	$(62,289)	$(62,394)	$(62,512)	$(62,642)	$(76,606)	$(76,752)	$(76,907)
Annual Gross Cash Flow	$-	$(336,197)	$(349,645)	$(363,631)	$(378,176)	$(393,303)	$(409,035)	$(425,397)	$(442,413)	$(460,109)	$(478,514)

Inflows & Outflows:	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total 2000-2020
From Development Program:											
Investor Equity Invest - Stages I, II, III & IV (Bamako)	$(2,405,216)	$(2,405,216)	$-	$-	$-	$(8,667,712)	$(8,667,712)	$-	$-	$-	$(38,530,700)
Dev. Bank Debt Service - Stage I (Bamako)	$(1,799,412)	$(1,799,412)	$(1,799,412)	$(1,799,412)	$-	$-	$-	$-	$-	$-	$(24,268,033)
Supp. Credit Repayment - Stage I (Bamako)	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	$(4,838,629)
Dev. Bank Debt Service - Stage II (Bamako)	$(2,942,006)	$(2,942,006)	$(2,942,006)	$(2,942,006)	$(2,942,006)	$(2,942,006)	$(2,942,006)	$(2,942,006)	$(2,942,006)	$-	$(39,677,810)
Supp. Credit Repayment - Stage II (Bamako)	$(1,769,440)	$(1,769,440)	$-	$-	$-	$-	$-	$-	$-	$-	$(10,647,020)
Investor Equity Invest - Stages I, II, III & IV (Domestic)	$(1,985,041)	$(1,985,041)	$-	$-	$-	$(1,701,200)	$(1,701,200)	$-	$-	$-	$(14,151,065)
Dev. Bank Debt Service - Stage I (Domestic)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$-	$-	$-	$-	$-	$-	$(19,751,956)
Supp. Credit Repayment - Stage I (Domestic)	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	$(4,454,856)
Dev. Bank Debt Service - Stage II (domestic)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,371)	$-	$(8,293,207)
Supp. Credit Repayment - Stage II (Domestic)	$(356,276)	$(356,275)	$-	$-	$-	$-	$-	$-	$-	$-	$(2,493,931)
From Operations:											
Revenues (Bamako)	$15,887,504	$16,732,199	$18,113,226	$19,025,468	$19,928,920	$20,861,693	$21,775,415	$24,490,452	$25,399,602	$26,324,368	$309,448,970
Expenses (Bamako)	$7,828,921	$8,276,766	$8,679,225	$9,133,353	$9,506,048	$9,957,425	$10,315,975	$10,756,056	$11,092,002	$11,491,715	$156,370,371
Profit Taxes (Bamako)	$(3,686,927)	$(3,696,451)	$(3,717,383)	$(3,727,113)	$(3,735,474)	$(3,745,222)	$(3,753,378)	$(4,306,669)	$(4,314,451)	$(4,323,323)	$(69,258,739)
Revenues (Domestic)	$(6,008,850)	$(6,393,755)	$(6,922,520)	$(7,329,512)	$(7,709,848)	$(8,122,169)	$(8,501,404)	$(9,281,952)	$(9,653,146)	$(10,047,828)	$(118,968,181)
Expenses (Domestic)	$938,968	$983,757	$1,141,962	$1,196,815	$1,290,425	$1,314,996	$1,378,612	$1,445,390	$1,515,521	$1,589,157	$18,650,780
Profit Taxes (Domestic)	$678,051	$699,938	$723,252	$747,279	$772,371	$799,599	$828,247	$857,965	$888,572	$920,248	$13,731,692
	$(77,075)	$(77,250)	$(78,324)	$(78,515)	$(78,715)	$(78,932)	$(79,160)	$(88,516)	$(88,760)	$(89,012)	$(1,490,666)
Annual Gross Cash Flow	$(497,654)	$(517,560)	$(538,263)	$(559,793)	$(582,185)	$(605,472)	$(629,691)	$(654,879)	$(681,074)	$(708,317)	$(10,011,311)
Weighted Average Cost of Capital (WACC)											13.74%
Net Present Value (NPV)											$12,871,929
Internal Rate of Return (IRR)											31.63%

Table V-45. Alternative B Cash Flow – Higher Expense Scenario, Alternative 3

Inflows & Outflows:	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
From Development Program:											
Investor Equity Invest - Stages I, II, III & IV (Bamako)	$-	$(3,416,376)	$(3,416,376)	$-	$-	$-	$(5,958,095)	$(5,958,095)	$-	$-	$-
Dev. Bank Debt Service - Stage I (Bamako)	$-	$(1,530,536)	$(1,530,536)	$(2,059,041)	$(2,059,041)	$(2,059,041)	$(2,059,041)	$(2,059,041)	$(2,059,041)	$(2,059,041)	$(2,059,041)
Supp. Credit Repayment - Stage I (Bamako)	$-	$(446,407)	$(446,407)	$(928,792)	$(928,792)	$(928,792)	$(928,792)	$(928,792)	$-	$-	$-
Dev. Bank Debt Service - Stage II (Bamako)	$-	$-	$-	$-	$-	$-	$(2,502,400)	$(2,502,400)	$(3,366,495)	$(3,366,495)	$(3,366,495)
Supp. Credit Repayment - Stage II (Bamako)	$-	$-	$-	$-	$-	$-	$(1,029,755)	$(1,029,755)	$(2,024,744)	$(2,024,744)	$(2,024,744)
Investor Equity Invest - Stages I, II, III & IV (Domestic)	$-	$(2,340,900)	$(2,340,900)	$-	$-	$-	$(1,048,392)	$(1,048,392)	$-	$-	$-
Dev. Bank Debt Service - Stage I (Domestic)	$-	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)
Supp. Credit Repayment - Stage I (Domestic)	$-	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$-	$-	$-
Dev. Bank Debt Service - Stage II (domestic)	$-	$-	$-	$-	$-	$-	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)
Supp. Credit Repayment - Stage II (Domestic)	$-	$-	$-	$-	$-	$-	$(356,276)	$(356,276)	$(356,276)	$(356,276)	$(356,276)
From Operations:											
Revenues (Bamako)	$2,837,794	$4,374,870	$5,013,772	$8,218,539	$8,638,310	$9,085,094	$9,560,191	$10,062,054	$13,656,832	$14,358,129	$15,104,536
Expenses (Bamako)	$-	$4,557,809	$5,079,821	$5,089,516	$5,378,323	$5,684,114	$6,007,093	$6,322,646	$6,682,820	$7,063,793	$7,466,949
Profit Taxes (Bamako)	$(2,345,692)	$(2,077,396)	$(2,088,949)	$(2,532,915)	$(2,538,981)	$(2,545,425)	$(2,552,219)	$(2,558,981)	$(3,662,379)	$(3,670,435)	$(3,678,976)
Revenues (Domestic)	$(147,631)	$(2,056,585)	$(2,401,393)	$(3,232,542)	$(3,443,296)	$(3,667,135)	$(3,904,520)	$(4,147,716)	$(5,003,182)	$(5,325,446)	$(5,667,753)
Expenses (Domestic)	$52,033	$218,005	$227,623	$508,254	$531,772	$556,487	$582,470	$609,808	$816,730	$855,697	$896,297
Profit Taxes (Domestic)	$-	$524,438	$533,775	$544,895	$542,035	$570,538	$585,314	$601,690	$619,146	$637,469	$656,871
	$(56,553)	$(38,743)	$(38,816)	$(62,191)	$(62,289)	$(62,394)	$(62,512)	$(62,642)	$(76,606)	$(76,752)	$(76,907)
Annual Gross Cash Flow	$-	$(336,197)	$(349,645)	$(363,631)	$(378,176)	$(393,303)	$(409,035)	$(425,397)	$(442,413)	$(460,109)	$(478,514)

Inflows & Outflows:	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total 2000-2020
From Development Program:											
Investor Equity Invest - Stages I, II, III & IV (Bamako)	$(2,752,254)	$(2,752,254)	$-	$-	$-	$(9,918,338)	$(9,918,338)	$-	$-	$-	$(44,090,124)
Dev. Bank Debt Service - Stage I (Bamako)	$(2,059,041)	$(2,059,041)	$(2,059,041)	$(2,059,041)	$-	$-	$-	$-	$-	$-	$(27,769,560)
Supp. Credit Repayment - Stage I (Bamako)	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	$(5,536,773)
Dev. Bank Debt Service - Stage II (Bamako)	$(3,366,495)	$(3,366,495)	$(3,366,495)	$(3,366,495)	$(3,366,495)	$(3,366,495)	$(3,366,495)	$(3,366,495)	$(3,366,495)	$-	$(45,402,745)
Supp. Credit Repayment - Stage II (Bamako)	$(2,024,744)	$(2,024,744)	$-	$-	$-	$-	$-	$-	$-	$-	$(12,183,231)
Investor Equity Invest - Stages I, II, III & IV (Domestic)	$(1,985,041)	$(1,985,041)	$-	$-	$-	$(1,701,200)	$(1,701,200)	$-	$-	$-	$(14,151,065)
Dev. Bank Debt Service - Stage I (Domestic)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$-	$-	$-	$-	$-	$-	$(19,751,956)
Supp. Credit Repayment - Stage I (Domestic)	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	$(4,454,856)
Dev. Bank Debt Service - Stage II (domestic)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,371)	$-	$(8,293,207)
Supp. Credit Repayment - Stage II (Domestic)	$(356,276)	$(356,275)	$-	$-	$-	$-	$-	$-	$-	$-	$(2,493,931)
From Operations:											
Revenues (Bamako)	$15,887,504	$16,732,199	$18,113,226	$19,025,468	$19,928,920	$20,861,693	$21,775,415	$24,490,452	$25,399,602	$26,324,368	$309,448,970
Expenses (Bamako)	$7,828,921	$8,276,766	$8,679,225	$9,133,353	$9,506,048	$9,957,425	$10,315,975	$10,756,056	$11,092,002	$11,491,715	$156,370,371
Profit Taxes (Bamako)	$(3,686,927)	$(3,696,451)	$(3,717,383)	$(3,727,113)	$(3,735,474)	$(3,745,222)	$(3,753,378)	$(4,306,669)	$(4,314,451)	$(4,323,323)	$(69,258,739)
Revenues (Domestic)	$(6,008,850)	$(6,393,755)	$(6,922,520)	$(7,329,512)	$(7,709,848)	$(8,122,169)	$(8,501,404)	$(9,281,952)	$(9,653,146)	$(10,047,828)	$(118,968,181)
Expenses (Domestic)	$938,968	$983,757	$1,141,962	$1,196,815	$1,290,425	$1,314,996	$1,378,612	$1,445,390	$1,515,521	$1,589,157	$18,650,780
Profit Taxes (Domestic)	$678,051	$699,938	$723,252	$747,279	$772,371	$799,599	$828,247	$857,965	$888,572	$920,248	$13,731,692
	$(77,075)	$(77,250)	$(78,324)	$(78,515)	$(78,715)	$(78,932)	$(79,160)	$(88,516)	$(88,760)	$(89,012)	$(1,490,666)
Annual Gross Cash Flow	$(497,654)	$(517,560)	$(538,263)	$(559,793)	$(582,185)	$(605,472)	$(629,691)	$(654,879)	$(681,074)	$(708,317)	$(10,011,311)
Weighted Average Cost of Capital (WACC)											13.74%
Net Present Value (NPV)											$8,099,491
Internal Rate of Return (IRR)											23.01%

Table V-46. Alternative B Cash Flow – Lower Revenue Scenario, Alternative 1

Inflows & Outflows:	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
From Development Program:											
Investor Equity Invest - Stages I, II, III & IV (Bamako)	$-	$(2,554,550)	$(2,554,550)	$-	$-	$-	$(4,455,087)	$(4,455,087)	$-	$-	$-
Dev. Bank Debt Service - Stage I (Bamako)	$-	$(1,144,438)	$(1,144,438)	$(1,539,621)	$(1,539,621)	$(1,539,621)	$(1,539,621)	$(1,539,621)	$(1,539,621)	$(1,539,621)	$(1,539,621)
Supp. Credit Repayment - Stage I (Bamako)	$-	$(333,795)	$(333,795)	$(694,492)	$(694,492)	$(694,492)	$(694,492)	$(694,492)	$-	$-	$-
Dev. Bank Debt Service - Stage II (Bamako)	$-	$-	$-	$-	$-	$-	$(1,871,137)	$(1,871,137)	$(2,517,253)	$(2,517,253)	$(2,517,253)
Supp. Credit Repayment - Stage II (Bamako)	$-	$-	$-	$-	$-	$-	$(769,986)	$(769,986)	$(1,513,976)	$(1,513,976)	$(1,513,976)
Investor Equity Invest - Stages I, II, III & IV (Domestic)	$-	$(2,340,900)	$(2,340,900)	$-	$-	$-	$(1,048,392)	$(1,048,392)	$-	$-	$-
Dev. Bank Debt Service - Stage I (Domestic)	$-	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)
Supp. Credit Repayment - Stage I (Domestic)	$-	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$-	$-	$-
Dev. Bank Debt Service - Stage II (domestic)	$-	$-	$-	$-	$-	$-	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)
Supp. Credit Repayment - Stage II (Domestic)	$-	$-	$-	$-	$-	$-	$(356,276)	$(356,276)	$(356,276)	$(356,276)	$(356,276)
From Operations:											
Revenues (Bamako)	$2,554,015	$3,937,383	$4,512,395	$7,396,685	$7,774,479	$8,176,584	$8,604,172	$9,055,849	$12,291,148	$12,922,316	$13,594,083
Expenses (Bamako)	$-	$4,557,809	$5,079,821	$5,089,516	$5,378,323	$5,684,114	$6,007,093	$6,322,646	$6,682,820	$7,063,793	$7,466,949
Profit Taxes (Bamako)	$(2,132,448)	$(1,888,542)	$(1,899,044)	$(2,302,650)	$(2,308,164)	$(2,314,023)	$(2,320,199)	$(2,326,346)	$(3,329,435)	$(3,336,759)	$(3,344,524)
Revenues (Domestic)	$(126,470)	$(1,981,995)	$(2,307,951)	$(3,055,065)	$(3,253,391)	$(3,464,003)	$(3,687,320)	$(3,915,645)	$(4,693,360)	$(4,994,805)	$(5,314,952)
Expenses (Domestic)	$46,830	$196,204	$204,860	$457,429	$478,595	$500,838	$524,223	$548,827	$735,057	$770,127	$806,667
Profit Taxes (Domestic)	$-	$524,438	$533,775	$544,895	$542,035	$570,538	$585,314	$601,690	$619,146	$637,469	$656,871
	$(51,412)	$(35,221)	$(35,288)	$(56,537)	$(56,626)	$(56,722)	$(56,829)	$(56,947)	$(69,642)	$(69,775)	$(69,915)
Annual Gross Cash Flow	$-	$(336,197)	$(349,645)	$(363,631)	$(378,176)	$(393,303)	$(409,035)	$(425,397)	$(442,413)	$(460,109)	$(478,514)

Inflows & Outflows:	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total 2000-2020
From Development Program:											
Investor Equity Invest - Stages I, II, III & IV (Bamako)	$(2,057,962)	$(2,057,962)	$-	$-	$-	$(7,416,307)	$(7,416,307)	$-	$-	$-	$(32,967,813)
Dev. Bank Debt Service - Stage I (Bamako)	$(1,539,621)	$(1,539,621)	$(1,539,621)	$(1,539,621)	$-	$-	$-	$-	$-	$-	$(20,764,325)
Supp. Credit Repayment - Stage I (Bamako)	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	$(4,140,050)
Dev. Bank Debt Service - Stage II (Bamako)	$(2,517,253)	$(2,517,253)	$(2,517,253)	$(2,517,253)	$(2,517,253)	$(2,517,253)	$(2,517,253)	$(2,517,253)	$(2,517,253)	$-	$(33,949,308)
Supp. Credit Repayment - Stage II (Bamako)	$(1,513,976)	$(1,513,976)	$-	$-	$-	$-	$-	$-	$-	$-	$(9,109,852)
Investor Equity Invest - Stages I, II, III & IV (Domestic)	$(1,985,041)	$(1,985,041)	$-	$-	$-	$(1,701,200)	$(1,701,200)	$-	$-	$-	$(14,151,065)
Dev. Bank Debt Service - Stage I (Domestic)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$-	$-	$-	$-	$-	$-	$(19,751,956)
Supp. Credit Repayment - Stage I (Domestic)	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	$(4,454,856)
Dev. Bank Debt Service - Stage II (domestic)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,371)	$-	$(8,293,207)
Supp. Credit Repayment - Stage II (Domestic)	$(356,276)	$(356,275)	$-	$-	$-	$-	$-	$-	$-	$-	$(2,493,931)
From Operations:											
Revenues (Bamako)	$14,298,754	$15,058,980	$16,301,904	$17,122,921	$17,936,028	$18,775,524	$19,597,873	$22,041,407	$22,859,642	$23,691,931	$278,504,073
Expenses (Bamako)	$7,828,921	$8,276,766	$8,679,225	$9,133,353	$9,506,048	$9,957,425	$10,315,975	$10,756,056	$11,092,002	$11,491,715	$156,370,371
Profit Taxes (Bamako)	$(3,351,752)	$(3,360,410)	$(3,379,439)	$(3,388,284)	$(3,395,885)	$(3,404,747)	$(3,412,161)	$(3,915,154)	$(3,922,229)	$(3,930,293)	$(62,962,490)
Revenues (Domestic)	$(5,632,777)	$(5,992,601)	$(6,480,507)	$(6,860,397)	$(7,213,857)	$(7,598,460)	$(7,950,506)	$(8,664,693)	$(9,008,825)	$(9,376,006)	$(111,573,586)
Expenses (Domestic)	$845,071	$885,381	$1,027,766	$1,077,133	$1,161,383	$1,183,497	$1,240,751	$1,300,851	$1,363,969	$1,430,242	$16,785,702
Profit Taxes (Domestic)	$678,051	$699,938	$723,252	$747,279	$772,371	$799,599	$828,247	$857,965	$888,572	$920,248	$13,731,692
	$(70,068)	$(70,227)	$(71,204)	$(71,378)	$(71,559)	$(71,756)	$(71,964)	$(80,469)	$(80,691)	$(80,920)	$(1,355,151)
Annual Gross Cash Flow	$(497,654)	$(517,560)	$(538,263)	$(559,793)	$(582,185)	$(605,472)	$(629,691)	$(654,879)	$(681,074)	$(708,317)	$(10,011,311)
Weighted Average Cost of Capital (WACC)											13.74%
Net Present Value (NPV)											$13,888,023
Internal Rate of Return (IRR)											36.17%

Table V-47. Alternative B Cash Flow – Lower Revenue Scenario, Alternative 2

Inflows & Outflows:	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
From Development Program:											
Investor Equity Invest - Stages I, II, III & IV (Bamako)	$-	$(2,985,597)	$(2,985,597)	$-	$-	$-	$(5,206,825)	$(5,206,825)	$-	$-	$-
Dev. Bank Debt Service - Stage I (Bamako)	$-	$(1,337,547)	$(1,337,547)	$(1,799,412)	$(1,799,412)	$(1,799,412)	$(1,799,412)	$(1,799,412)	$(1,799,412)	$(1,799,412)	$(1,799,412)
Supp. Credit Repayment - Stage I (Bamako)	$-	$(390,119)	$(390,119)	$(811,678)	$(811,678)	$(811,678)	$(811,678)	$(811,678)	$-	$-	$-
Dev. Bank Debt Service - Stage II (Bamako)	$-	$-	$-	$-	$-	$-	$(2,186,867)	$(2,186,867)	$(2,942,006)	$(2,942,006)	$(2,942,006)
Supp. Credit Repayment - Stage II (Bamako)	$-	$-	$-	$-	$-	$-	$(899,911)	$(899,911)	$(1,769,440)	$(1,769,440)	$(1,769,440)
Investor Equity Invest - Stages I, II, III & IV (Domestic)	$-	$(2,340,900)	$(2,340,900)	$-	$-	$-	$(1,048,392)	$(1,048,392)	$-	$-	$-
Dev. Bank Debt Service - Stage I (Domestic)	$-	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)
Supp. Credit Repayment - Stage I (Domestic)	$-	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$-	$-	$-
Dev. Bank Debt Service - Stage II (domestic)	$-	$-	$-	$-	$-	$-	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)
Supp. Credit Repayment - Stage II (Domestic)	$-	$-	$-	$-	$-	$-	$(356,276)	$(356,276)	$(356,276)	$(356,276)	$(356,276)
From Operations:											
Revenues (Bamako)	$2,554,015	$3,937,383	$4,512,395	$7,396,685	$7,774,479	$8,176,584	$8,604,172	$9,055,849	$12,291,148	$12,922,316	$13,594,083
Expenses (Bamako)	$-	$4,557,809	$5,079,821	$5,089,516	$5,378,323	$5,684,114	$6,007,093	$6,322,646	$6,682,820	$7,063,793	$7,466,949
Profit Taxes (Bamako)	$(2,132,448)	$(1,888,542)	$(1,899,044)	$(2,302,650)	$(2,308,164)	$(2,314,023)	$(2,320,199)	$(2,326,346)	$(3,329,435)	$(3,336,759)	$(3,344,524)
Revenues (Domestic)	$(126,470)	$(1,981,995)	$(2,307,951)	$(3,055,065)	$(3,253,391)	$(3,464,003)	$(3,687,320)	$(3,915,645)	$(4,693,360)	$(4,994,805)	$(5,314,952)
Expenses (Domestic)	$46,830	$196,204	$204,860	$457,429	$478,595	$500,838	$524,223	$548,827	$735,057	$770,127	$806,667
Profit Taxes (Domestic)	$-	$524,438	$533,775	$544,895	$542,035	$570,538	$585,314	$601,690	$619,146	$637,469	$656,871
	$(51,412)	$(35,221)	$(35,288)	$(56,537)	$(56,626)	$(56,722)	$(56,829)	$(56,947)	$(69,642)	$(69,775)	$(69,915)
Annual Gross Cash Flow	$-	$(336,197)	$(349,645)	$(363,631)	$(378,176)	$(393,303)	$(409,035)	$(425,397)	$(442,413)	$(460,109)	$(478,514)

Inflows & Outflows:	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total 2000-2020
From Development Program:											
Investor Equity Invest - Stages I, II, III & IV (Bamako)	$(2,405,216)	$(2,405,216)	$-	$-	$-	$(8,667,712)	$(8,667,712)	$-	$-	$-	$(38,530,700)
Dev. Bank Debt Service - Stage I (Bamako)	$(1,799,412)	$(1,799,412)	$(1,799,412)	$(1,799,412)	$-	$-	$-	$-	$-	$-	$(24,268,033)
Supp. Credit Repayment - Stage I (Bamako)	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	$(4,838,629)
Dev. Bank Debt Service - Stage II (Bamako)	$(2,942,006)	$(2,942,006)	$(2,942,006)	$(2,942,006)	$(2,942,006)	$(2,942,006)	$(2,942,006)	$(2,942,006)	$(2,942,006)	$-	$(39,677,810)
Supp. Credit Repayment - Stage II (Bamako)	$(1,769,440)	$(1,769,440)	$-	$-	$-	$-	$-	$-	$-	$-	$(10,647,020)
Investor Equity Invest - Stages I, II, III & IV (Domestic)	$(1,985,041)	$(1,985,041)	$-	$-	$-	$(1,701,200)	$(1,701,200)	$-	$-	$-	$(14,151,065)
Dev. Bank Debt Service - Stage I (Domestic)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$-	$-	$-	$-	$-	$-	$(19,751,956)
Supp. Credit Repayment - Stage I (Domestic)	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	$(4,454,856)
Dev. Bank Debt Service - Stage II (domestic)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,371)	$-	$(8,293,207)
Supp. Credit Repayment - Stage II (Domestic)	$(356,276)	$(356,275)	$-	$-	$-	$-	$-	$-	$-	$-	$(2,493,931)
From Operations:											
Revenues (Bamako)	$14,298,754	$15,058,980	$16,301,904	$17,122,921	$17,936,028	$18,775,524	$19,597,873	$22,041,407	$22,859,642	$23,691,931	$278,504,073
Expenses (Bamako)	$7,828,921	$8,276,766	$8,679,225	$9,133,353	$9,506,048	$9,957,425	$10,315,975	$10,756,056	$11,092,002	$11,491,715	$156,370,371
Profit Taxes (Bamako)	$(3,351,752)	$(3,360,410)	$(3,379,439)	$(3,388,284)	$(3,395,885)	$(3,404,747)	$(3,412,161)	$(3,915,154)	$(3,922,229)	$(3,930,293)	$(62,962,490)
Revenues (Domestic)	$(5,632,777)	$(5,992,601)	$(6,480,507)	$(6,860,397)	$(7,213,857)	$(7,598,460)	$(7,950,506)	$(8,664,693)	$(9,008,825)	$(9,376,006)	$(111,573,586)
Expenses (Domestic)	$845,071	$885,381	$1,027,766	$1,077,133	$1,161,383	$1,183,497	$1,240,751	$1,300,851	$1,363,969	$1,430,242	$16,785,702
Profit Taxes (Domestic)	$678,051	$699,938	$723,252	$747,279	$772,371	$799,599	$828,247	$857,965	$888,572	$920,248	$13,731,692
	$(70,068)	$(70,227)	$(71,204)	$(71,378)	$(71,559)	$(71,756)	$(71,964)	$(80,469)	$(80,691)	$(80,920)	$(1,355,151)
Annual Gross Cash Flow	$(497,654)	$(517,560)	$(538,263)	$(559,793)	$(582,185)	$(605,472)	$(629,691)	$(654,879)	$(681,074)	$(708,317)	$(10,011,311)
Weighted Average Cost of Capital (WACC)											13.74%
Net Present Value (NPV)											$9,112,613
Internal Rate of Return (IRR)											25.52%

Table V-48. Alternative B Cash Flow – Lower Revenue Scenario, Alternative 3

Inflows & Outflows:	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
From Development Program:											
Investor Equity Invest - Stages I, II, III & IV (Bamako)	$-	$(3,416,376)	$(3,416,376)	$-	$-	$-	$(5,958,095)	$(5,958,095)	$-	$-	$-
Dev. Bank Debt Service - Stage I (Bamako)	$-	$(1,530,536)	$(1,530,536)	$(2,059,041)	$(2,059,041)	$(2,059,041)	$(2,059,041)	$(2,059,041)	$(2,059,041)	$(2,059,041)	$(2,059,041)
Supp. Credit Repayment - Stage I (Bamako)	$-	$(446,407)	$(446,407)	$(928,792)	$(928,792)	$(928,792)	$(928,792)	$(928,792)	$-	$-	$-
Dev. Bank Debt Service - Stage II (Bamako)	$-	$-	$-	$-	$-	$-	$(2,502,400)	$(2,502,400)	$(3,366,495)	$(3,366,495)	$(3,366,495)
Supp. Credit Repayment - Stage II (Bamako)	$-	$-	$-	$-	$-	$-	$(1,029,755)	$(1,029,755)	$(2,024,744)	$(2,024,744)	$(2,024,744)
Investor Equity Invest - Stages I, II, III & IV (Domestic)	$-	$(2,340,900)	$(2,340,900)	$-	$-	$-	$(1,048,392)	$(1,048,392)	$-	$-	$-
Dev. Bank Debt Service - Stage I (Domestic)	$-	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)
Supp. Credit Repayment - Stage I (Domestic)	$-	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$(636,408)	$-	$-	$-
Dev. Bank Debt Service - Stage II (domestic)	$-	$-	$-	$-	$-	$-	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)
Supp. Credit Repayment - Stage II (Domestic)	$-	$-	$-	$-	$-	$-	$(356,276)	$(356,276)	$(356,276)	$(356,276)	$(356,276)
From Operations:											
Revenues (Bamako)	$2,554,015	$3,937,383	$4,512,395	$7,396,685	$7,774,479	$8,176,584	$8,604,172	$9,055,849	$12,291,148	$12,922,316	$13,594,083
Expenses (Bamako)	$-	$4,557,809	$5,079,821	$5,089,516	$5,378,323	$5,684,114	$6,007,093	$6,322,646	$6,682,820	$7,063,793	$7,466,949
Profit Taxes (Bamako)	$(2,132,448)	$(1,888,542)	$(1,899,044)	$(2,302,650)	$(2,308,164)	$(2,314,023)	$(2,320,199)	$(2,326,346)	$(3,329,435)	$(3,336,759)	$(3,344,524)
Revenues (Domestic)	$(126,470)	$(1,981,995)	$(2,307,951)	$(3,055,065)	$(3,253,391)	$(3,464,003)	$(3,687,320)	$(3,915,645)	$(4,693,360)	$(4,994,805)	$(5,314,952)
Expenses (Domestic)	$46,830	$196,204	$204,860	$457,429	$478,595	$500,838	$524,223	$548,827	$735,057	$770,127	$806,667
Profit Taxes (Domestic)	$-	$524,438	$533,775	$544,895	$542,035	$570,538	$585,314	$601,690	$619,146	$637,469	$656,871
	$(51,412)	$(35,221)	$(35,288)	$(56,537)	$(56,626)	$(56,722)	$(56,829)	$(56,947)	$(69,642)	$(69,775)	$(69,915)
Annual Gross Cash Flow	$-	$(336,197)	$(349,645)	$(363,631)	$(378,176)	$(393,303)	$(409,035)	$(425,397)	$(442,413)	$(460,109)	$(478,514)

Inflows & Outflows:	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total 2000-2020
From Development Program:											
Investor Equity Invest - Stages I, II, III & IV (Bamako)	$(2,752,254)	$(2,752,254)	$-	$-	$-	$(9,918,338)	$(9,918,338)	$-	$-	$-	$(44,090,124)
Dev. Bank Debt Service - Stage I (Bamako)	$(2,059,041)	$(2,059,041)	$(2,059,041)	$(2,059,041)	$-	$-	$-	$-	$-	$-	$(27,769,560)
Supp. Credit Repayment - Stage I (Bamako)	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	$(5,536,773)
Dev. Bank Debt Service - Stage II (Bamako)	$(3,366,495)	$(3,366,495)	$(3,366,495)	$(3,366,495)	$(3,366,495)	$(3,366,495)	$(3,366,495)	$(3,366,495)	$(3,366,495)	$-	$(45,402,745)
Supp. Credit Repayment - Stage II (Bamako)	$(2,024,744)	$(2,024,744)	$-	$-	$-	$-	$-	$-	$-	$-	$(12,183,231)
Investor Equity Invest - Stages I, II, III & IV (Domestic)	$(1,985,041)	$(1,985,041)	$-	$-	$-	$(1,701,200)	$(1,701,200)	$-	$-	$-	$(14,151,065)
Dev. Bank Debt Service - Stage I (Domestic)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$(1,410,854)	$-	$-	$-	$-	$-	$-	$(19,751,956)
Supp. Credit Repayment - Stage I (Domestic)	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	$(4,454,856)
Dev. Bank Debt Service - Stage II (domestic)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,372)	$(592,371)	$-	$(8,293,207)
Supp. Credit Repayment - Stage II (Domestic)	$(356,276)	$(356,275)	$-	$-	$-	$-	$-	$-	$-	$-	$(2,493,931)
From Operations:											
Revenues (Bamako)	$14,298,754	$15,058,980	$16,301,904	$17,122,921	$17,936,028	$18,775,524	$19,597,873	$22,041,407	$22,859,642	$23,691,931	$278,504,073
Expenses (Bamako)	$7,828,921	$8,276,766	$8,679,225	$9,133,353	$9,506,048	$9,957,425	$10,315,975	$10,756,056	$11,092,002	$11,491,715	$156,370,371
Profit Taxes (Bamako)	$(3,351,752)	$(3,360,410)	$(3,379,439)	$(3,388,284)	$(3,395,885)	$(3,404,747)	$(3,412,161)	$(3,915,154)	$(3,922,229)	$(3,930,293)	$(62,962,490)
Revenues (Domestic)	$(5,632,777)	$(5,992,601)	$(6,480,507)	$(6,860,397)	$(7,213,857)	$(7,598,460)	$(7,950,506)	$(8,664,693)	$(9,008,825)	$(9,376,006)	$(111,573,586)
Expenses (Domestic)	$845,071	$885,381	$1,027,766	$1,077,133	$1,161,383	$1,183,497	$1,240,751	$1,300,851	$1,363,969	$1,430,242	$16,785,702
Profit Taxes (Domestic)	$678,051	$699,938	$723,252	$747,279	$772,371	$799,599	$828,247	$857,965	$888,572	$920,248	$13,731,692
	$(70,068)	$(70,227)	$(71,204)	$(71,378)	$(71,559)	$(71,756)	$(71,964)	$(80,469)	$(80,691)	$(80,920)	$(1,355,151)
Annual Gross Cash Flow	$(497,654)	$(517,560)	$(538,263)	$(559,793)	$(582,185)	$(605,472)	$(629,691)	$(654,879)	$(681,074)	$(708,317)	$(10,011,311)
Weighted Average Cost of Capital (WACC)											13.74%
Net Present Value (NPV)											$4,340,175
Internal Rate of Return (IRR)											18.46%

5.7 *Possible Revenue Enhancements*

5.7.1 Revenue Enhancements

As already discussed, one possibility for enhancing revenues would be to provide the proposed concessionaire with the right to receive a portion of the aircraft landing and fee revenue, which currently is split between ASECNA and the Government. This solution would appear to be an equitable arrangement among the parties, since it is expected that the proposed concessionaire would assume responsibility for development and maintenance of the airfield, except for aeronautical communication and facilities and services, which are the responsibility of ASECNA. This solution would be consistent with ICAO recommended policies and with normal revenue distribution practices in the airport industry, with aeronautical revenues (including landing fees) associated with airside commitments, non-aeronautical revenues associated with landside commitments, and navigation fees associated with air traffic management commitments. To support this possibility, the Consultants have prepared landing fee revenue projections and cash flow projections as discussed in Section 5.6, assuming the current fee structure, for the proposed 20-year concession period. The projections of aircraft landings and aircraft gross weights are included in the appendix to this Chapter of the report (Table V-36 and Table V-37).

Another possibility for enhancing revenues would be for the proposed concessionaire to implement increases in the passenger service charge more rapidly, rather than tying most of the proposed increases to the completion of facility improvements. Obviously, the financial performance of the project would be enhanced if the analysis assumed implementation of these tariff revisions when the proposed concessionaire assumes control in 2001 rather than doing so progressively. This consists essentially of an attempt to "pre-fund'' the investment requirements, and would almost certainly be vigorously opposed by the airlines operating at the airport, as well as passengers. The Consultants, therefore have not performed any additional analysis to evaluate the effect of this approach on the financial outcome.

5.7.2 Other New Revenue Sources

Finally, the Consultants did consider that it might be possible for the proposed concessionaire to develop other new sources of revenue. Some possibilities are as follows:

- Parcel Wrapping Fee
- Telecommunication Fee (a fee on telephone service)
- Audio-Visual Device Fee

- Sewage Treatment Fee for airport tenants
- Peak Hour and Night Operations Fee
- Airport Hotel Fees
- Ground Transport Permit Fee
- New types of terminal concessions such as Internet Access, Video Game Room for greeters, etc.
- Development of airport real estate.

The consultant does not believe that the viability of these revenue sources or their potential to contribute to the airport cash flow projections can be evaluated at this time. Moreover, it is not likely that the additional revenues would be sufficient to have a material effect on the outcome of the various cash flow alternatives, which have been evaluated. This type of analysis would be considered by potential concessionaires when preparing bids for the concession of the airports, particularly when estimating payments to the Government from profits of these airports. For these reasons, the Consultants have not performed any additional analysis of these possibilities.

5.8 Conclusions

The conclusion of the Financial Analysis is that a private concession to develop and operate the Bamako-Sénou and the nine domestic airports for a twenty-year period is feasible under an arrangement, whereby the responsibility for meeting airside development requirements is reflected by concomitant access to airside operating revenues.

Specifically, the concessionaire could not expect to realize an IRR approaching 20 percent under an arrangement (referred to herein as "Baseline Case") whereby the concessionaire assumes responsibility for both airside and landside development while ASECNA receives 100 percent of the airside revenue sources.

However, the concessionaire could expect to realize an IRR exceeding 20 percent under two revised alternative arrangements. The first alternative (referred to herein as "Alternative A Case") would represent an arrangement whereby the concessionaire assumes responsibility for the landside development requirements only, with ASECNA assuming responsibility for the airside development requirements and retaining access to the airside revenue sources (Alternative A). Under this arrangement, the concessionaire could expect to realize IRRs exceeding 20 percent for Terminal Alternatives 1 and 2, but not for Terminal Alternative 3. The

APPENDIX A
PHOTOGRAPHS

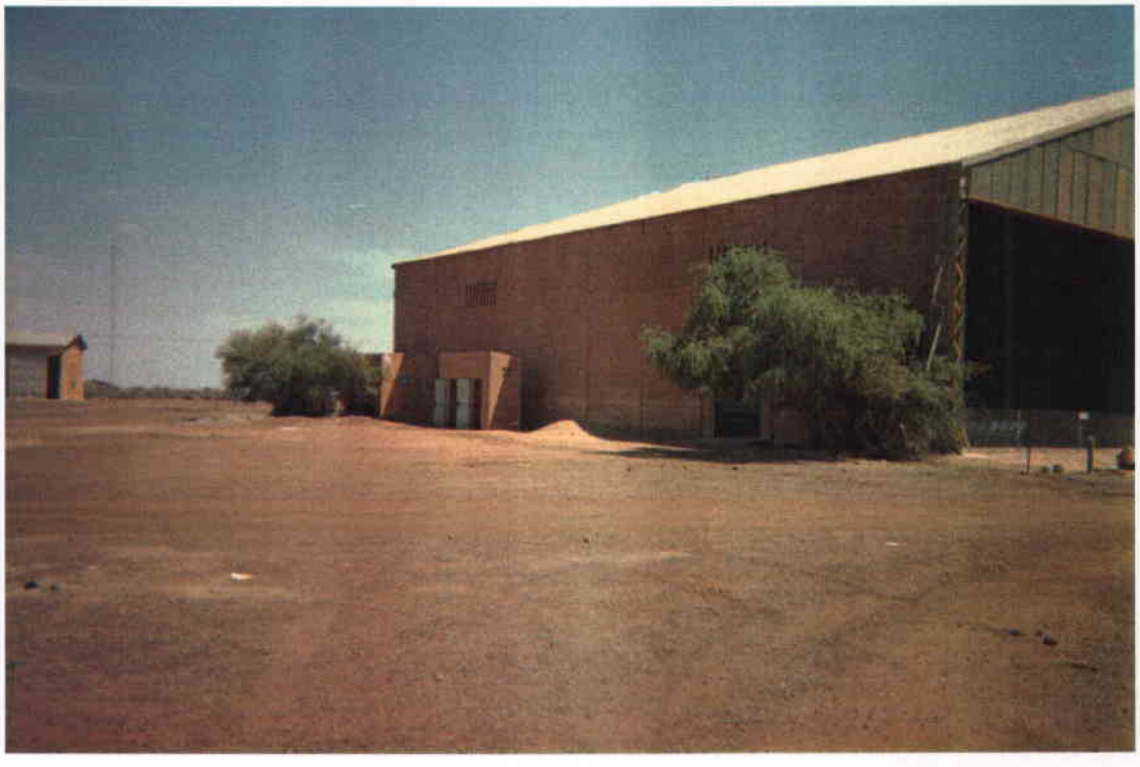
Photograph A-1. Runway at Mopti Airport

Photograph A-2. Runway End at Mopti Airport

Photograph A-3. Terminal Building at Mopti Airport

Photograph A-4. Water Tank at Mopti Airport

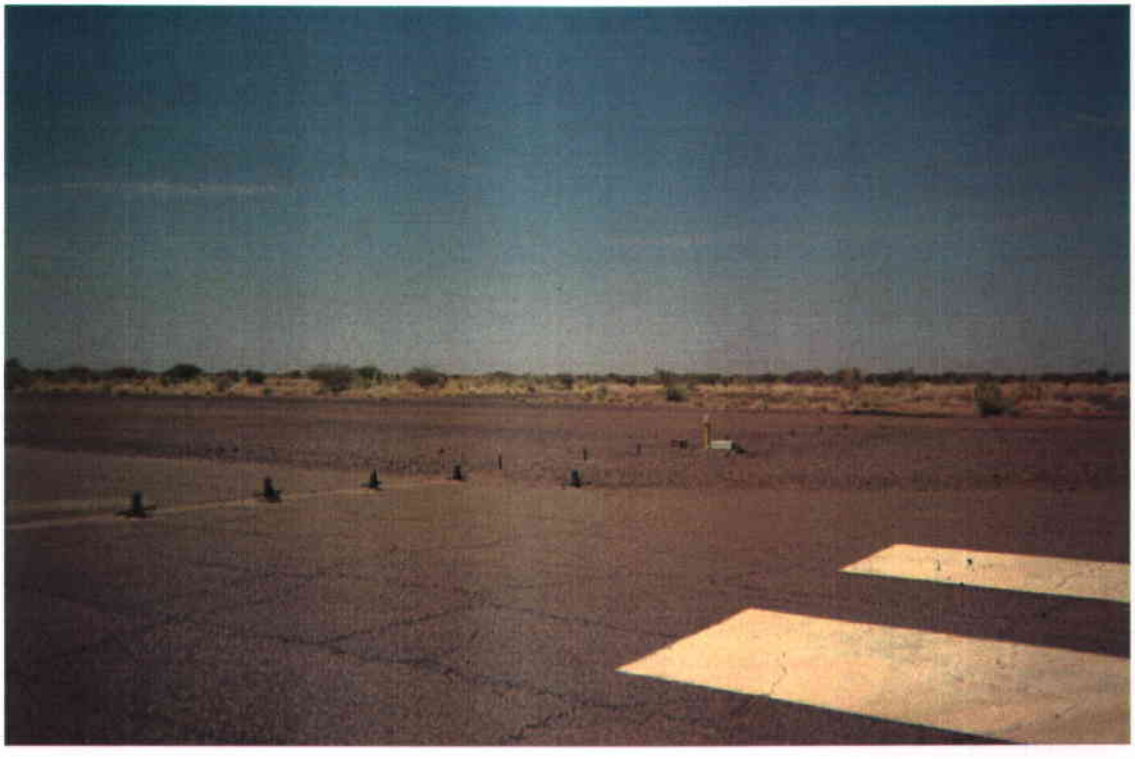
Photograph A-5. Apron and ARFF Building at Mopti Airport



Photograph A-6. Drainage at Mopti Airport

Photograph A-7. Runway and Drainage at Mopti Airport

Photograph A-8. Runway Lighting at Mopti Airport



Photograph A-9. Runway End at Mopti Airport

Photograph A-10. Pavement Conditions at Mopti Airport

Photograph A-11. Runway Lighting at Mopti Airport

Photograph A-12. Runway End at Mopti Airport

Photograph A-13. Runway End at Mopti Airport

Photograph A-14. Runway Lighting at Mopti Airport

Photograph A-15. Mopti Airport Apron

Photograph A-16. Mopti Airport Terminal and ARFF Building

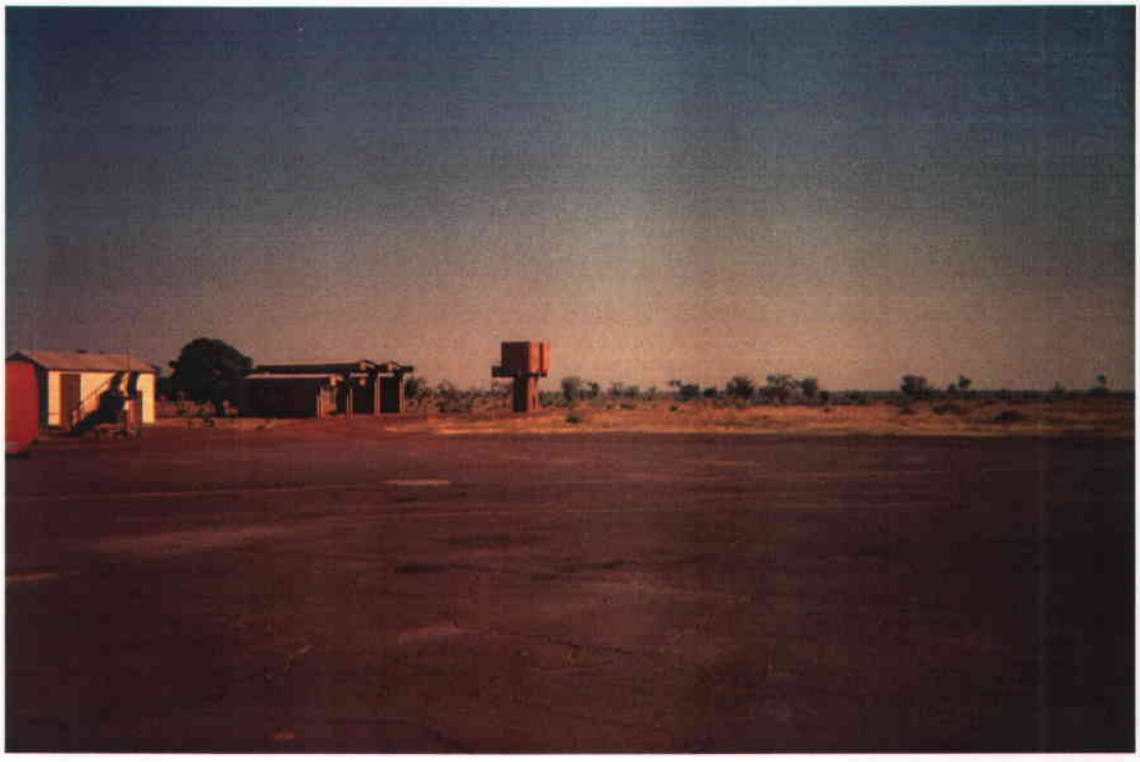
Photograph A-17. Mopti Airport ARFF Building

Photograph A-18. Apron View at Mopti Airport

Photograph A-19. Building at Mopti Airport

Photograph A-20. Apron View at Mopti Airport

Photograph A-21. Apron and Building at Mopti Airport



Photograph A-22. Apron View at Mopti Airport

Photograph A-23. Terminal Building and Air Control Room– Mopti Airport

Photograph A-24. Water Building at Mopti Airport

Photograph A-25. Aerial View of Mopti Airport

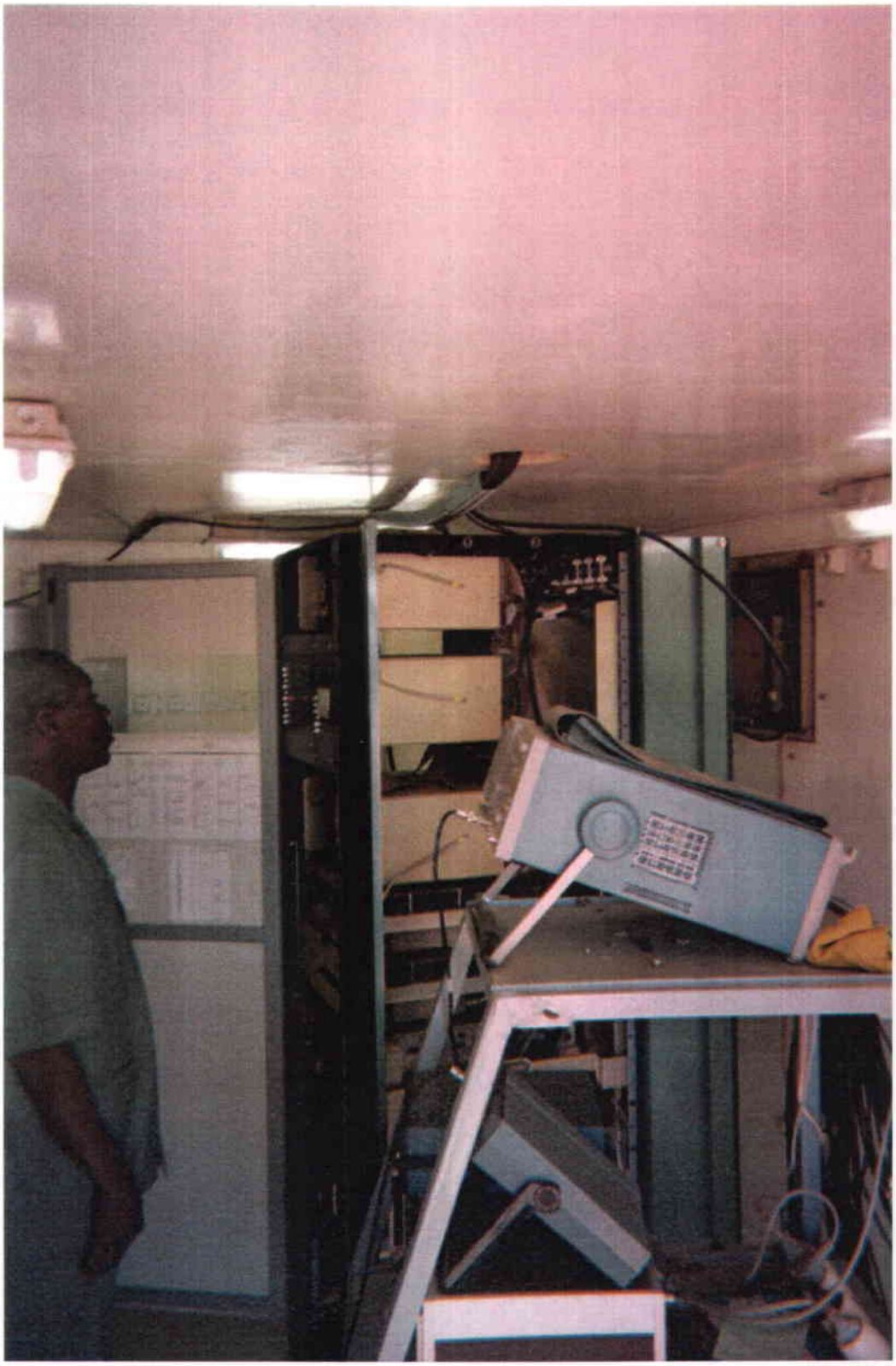
Photograph A-26. Apron and Wind Cone – Mopti Airport

Photograph A-27. Generators – Mopti Airport

Photograph A-28. VOR – Mopti Airport

Photograph A-29. Equipment – Mopti Airport

Photograph A-30. VOR Equipment – Mopti Airport

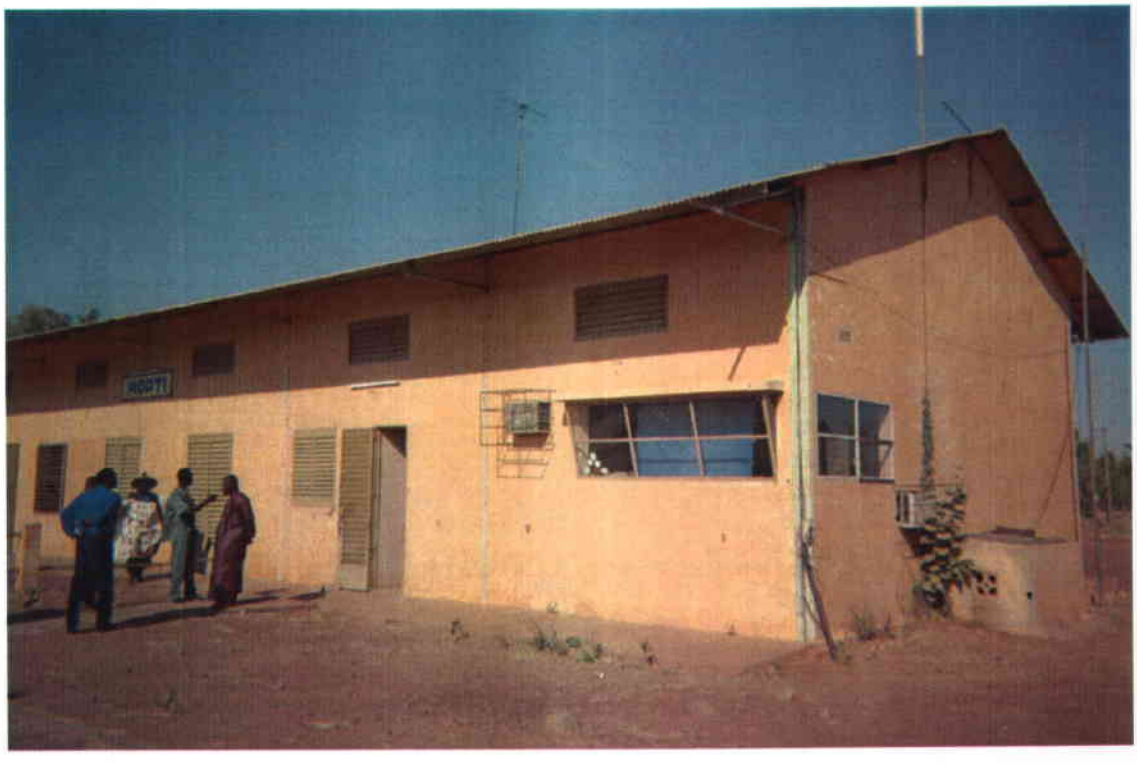


Photograph A-31. Communication Equipment in the Air Control's Room – Mopti Airport

Photograph A-32. Controller's Position in the Air Control's Room – Mopti Airport

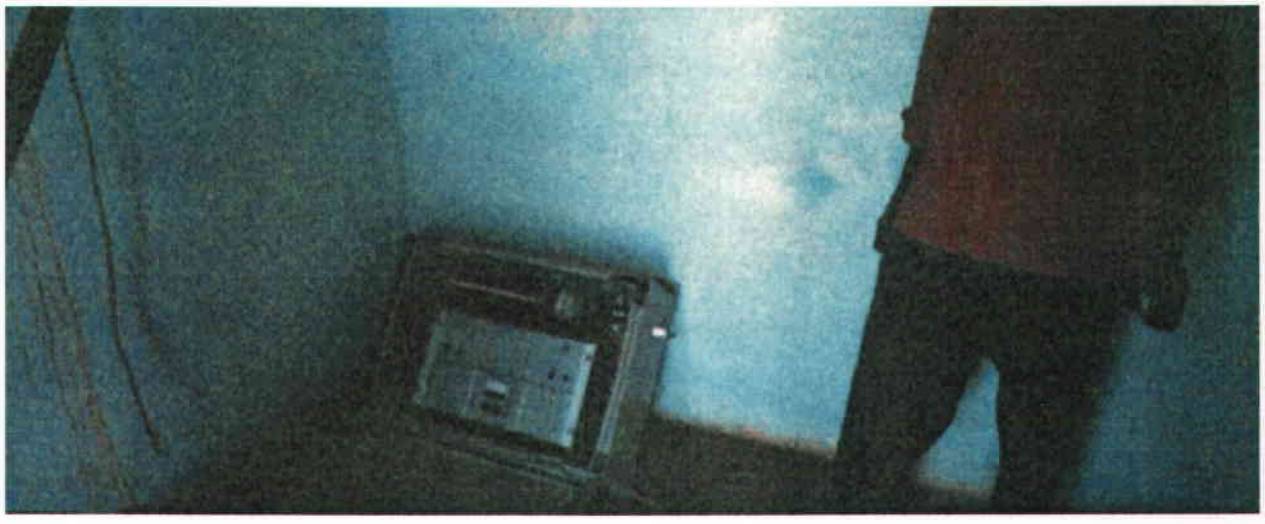
Photograph A-33. Terminal Building, Storage, ARFF and Water Tank – Mopti Airport

Photograph A-34. Terminal Building and Air Control Room (Right Corner) – Mopti Airport

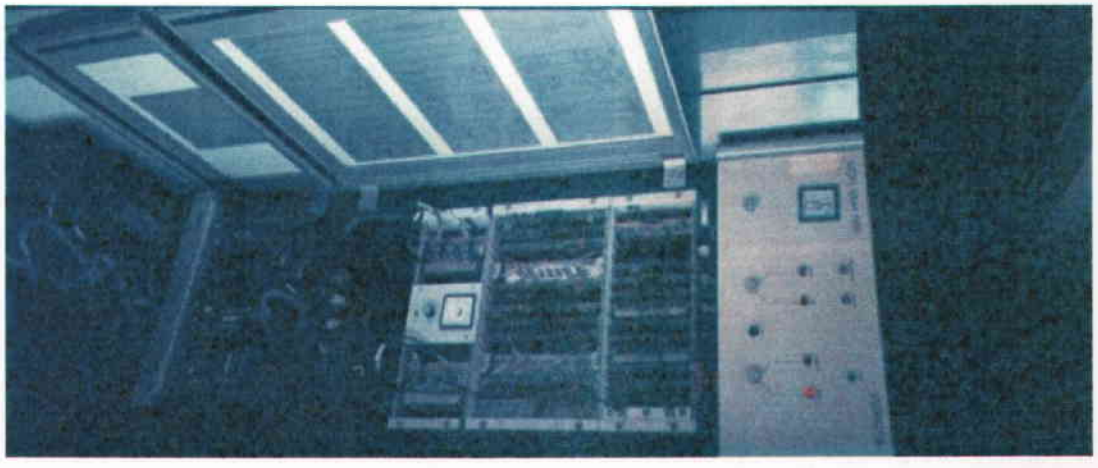


Photograph A-35. Power Station – Generators – Gao Airport

Photograph A-36. Equipment – Gao Airport



Photograph A-37. VOR Electronic Equipment – Gao Airport



Photograph A-38. NDB Antenna and NDB Transmitters

Photograph A-39. VOR

Photograph A-40. VOR

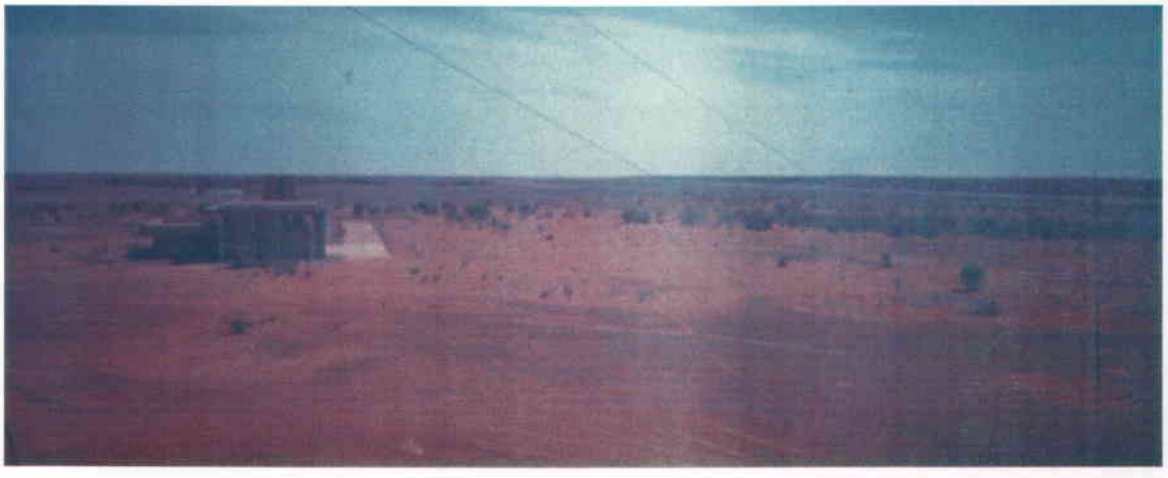
Photograph A-41. View of Apron – Gao Airport

Photograph A-42. Control Tower and Technical Building – Gao Airport

Photograph A-43. Meteo Farm – Gao Airport

Photograph A-44. North View from Gao's Control Tower

Photograph A-45. North East View from Gao's Control Tower



Photograph A-46. Control Tower and Controllers Position – Gao Airport

Photograph A-47. South West View from Gao's Control Tower – Terminal Building and Apron

Photograph A-48. Runway and Apron View at Gao Airport

Photograph A-49. Runway Conditions and Lighting at Gao Airport

Photograph A-50. Runway Edge at Gao Airport

Photograph A-51. Runway Condition at Gao Airport

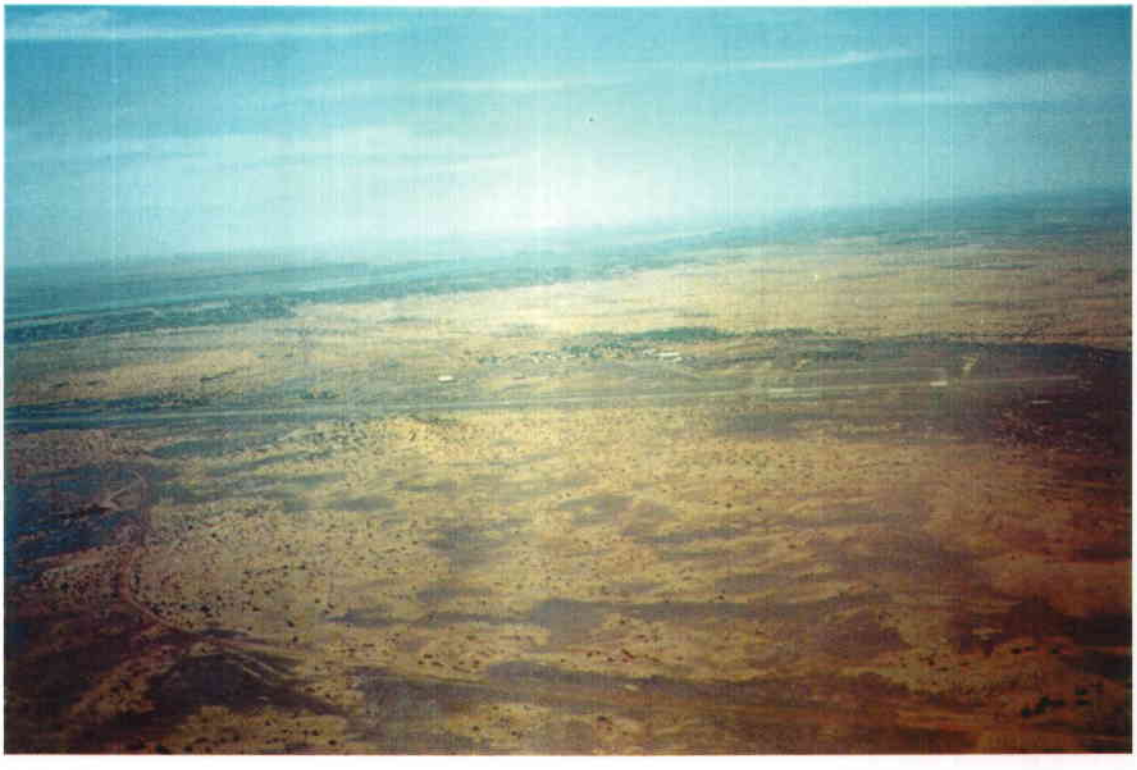
Photograph A-52. Runway Condition at Gao Airport

Photograph A-53. bRunway End and Marking at Gao Airport

Photograph A-54. Construction and Fuel Station at Gao Airport

Photograph A-55. Runway Centerline at Gao Airport

Photograph A-56. Aerial View of Gao Airport



Photograph A-57. Apron View at Tombouctou Airport

Photograph A-58. Old Control Tower at Tombouctou Airport

Photograph A-59. Apron and Apron Lighting at Tombouctou Airport

Photograph A-60. Apron View at Tombouctou Airport

Photograph A-61. Apron and Aircraft Parking at Tombouctou Airport

Photograph A-62. Terminal at Tombouctou Airport

Photograph A-63. Meteorological Farm at Tombouctou Airport

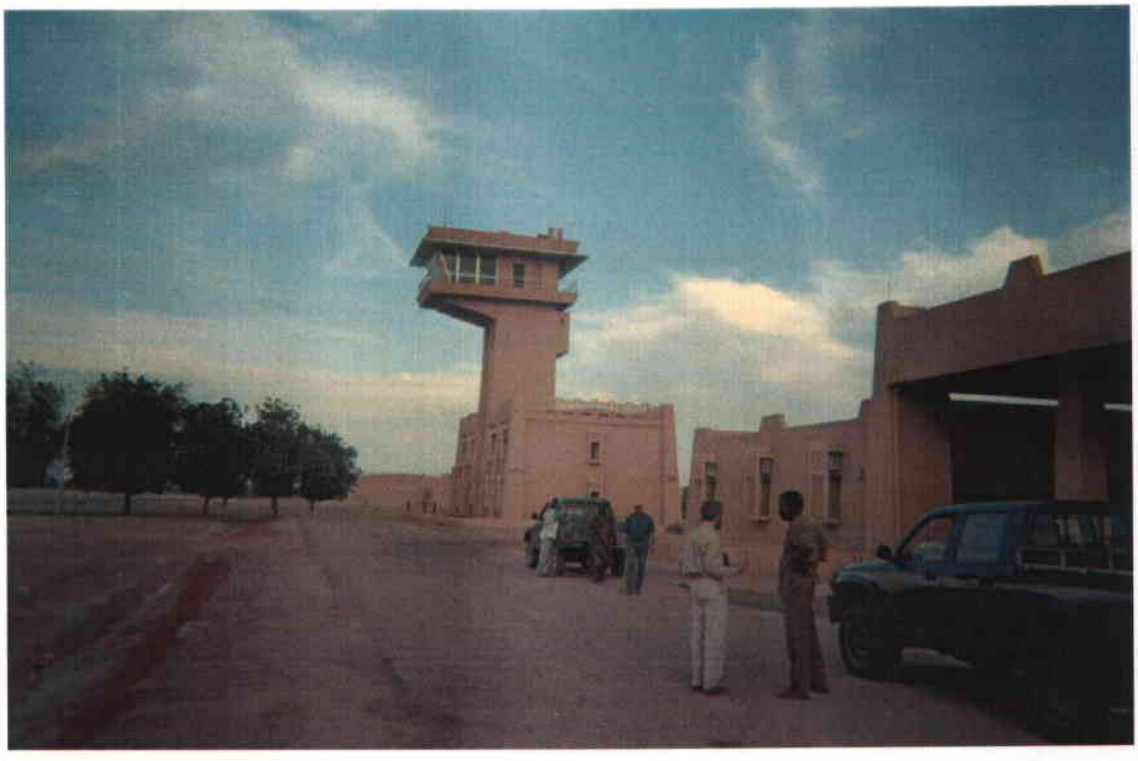
Photograph A-64. Electrical Station at Tombouctou Airport

Photograph A-65. Tomboctou Airport Terminal and Control Tower

Photograph A-66. ARFF Building at Tombouctou Airport

Photograph A-67. ARFF Building at Tombouctou Airport

Photograph A-68. Control Tower and Other Buildings at Tombouctou Airport



Photograph A-69. Runway Shoulders at Tombouctou Airport

Photograph A-70. Electrical Station at Tombouctou Airport

Photograph A-71. Runway Lighting and Marking at Tombouctou Airport

Photograph A-72. Runway End at Tombouctou Airport

Photograph A-73. Shoulders and Runway Lighting at Tombouctou Airport

Photograph A-74. Runway Markings at Tombouctou Airport

Photograph A-75. Tombouctou Airport

Photograph A-76. Terminal at Tombouctou Airport

Photograph A-77. Vehicle Parking at Tombouctou Airport

Photograph A-78. Aerial View of Tombouctou Airport

Photograph A-79. Generators – Tombouctou Airport

Photograph A-80. Future Meteo Farm – Tombouctou Airport

Photograph A-81. Electrical Station – Tombouctou Airport

Photograph A-82. Parking Lot – Tombouctou Airport

Photograph A-83. Terminal Building – Tombouctou Airport

Photograph A-84. Main Apron – Tombouctou Airport

Photograph A-85. Apron and Current Control Tower – Tombouctou Airport

Photograph A-86. New Control Tower – Tombouctou Airport

Photograph A-87. Communication Equipment – Tombouctou Airport

APPENDIX B
PAVEMENT EVALUATION

APPENDIX B. PAVEMENT EVALUATION

B.1 Methodology

The surface conditions of all of the airfield pavements were inspected visually. The level of pavement deterioration was identified based on its functionality. Although visual inspections do not identify structural failures of the pavement, they can identify areas that show signs of some types of structural failure and areas that require more in depth study.

The inspection of the present condition of the pavement consisted of a visual analysis of manifestations of pavement deterioration. During the visual inspection, data was obtained relating to the type of deterioration as noted by the deformations in the structure of the pavement, fissure characteristics or cracking.

In the context of this report, the term fissure refers to small shallow openings in the pavement. The term cracks refers to larger openings with definite patterns.

Different types of possible deterioration for the pavement structure are described in the following tables. Flexible pavement deterioration followed by concrete asphalts is only shown. Rigid pavement deterioration constructed with hydraulic concrete is not shown because there is only one connector with this material.

B.2 Types of Surface Conditions

Based on the severity and quantity of deterioration of the pavement, different zones are classified in the following categories according to their surface conditions:

• Excellent	Very good condition, with very few signs of deterioration. It has a long useful life.
• Very Good	Signs of light deterioration. Some reduction in useful life, but not significant.
• Good	Moderate signs of deterioration. Moderate reduction in useful life. Begin programming the rehabilitation of the pavement.

• Acceptable	Extensive signs of deterioration. About to significantly reduce its useful life. Rehabilitation should commence.
• Bad	Very extensive signs of deterioration. Useful life has been significantly reduced. Cost of rehabilitation has increased.
• Very Bad	Significantly deteriorated. Very little useful life remaining. Cost of rehabilitation is high.
• Total Failure	Complete deteriorated and no longer useful.

B.3 Types of Deterioration

The deterioration of flexible pavements, i.e., asphalt concrete, and the respective causes are detailed as follows:

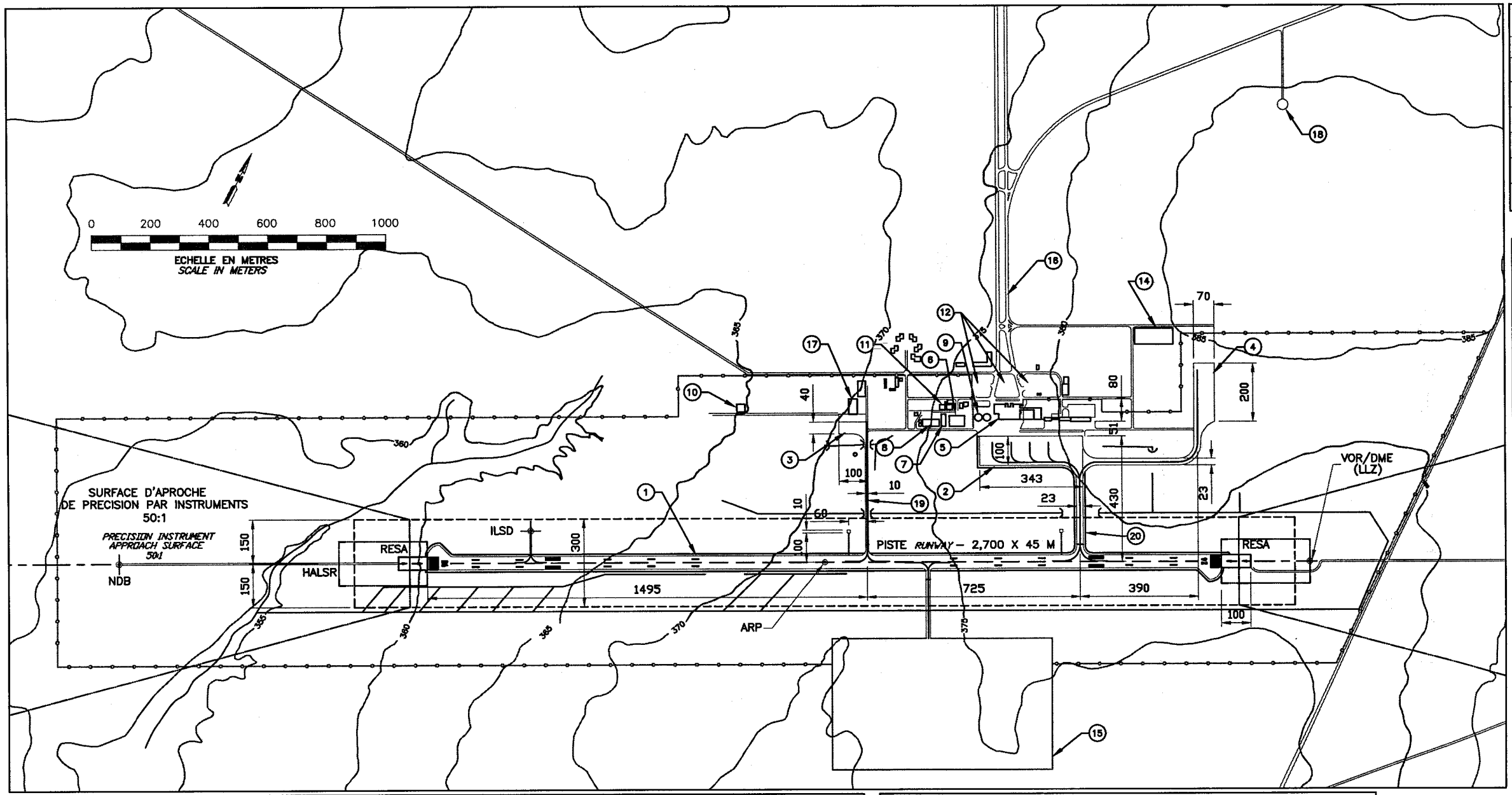
Type of Deterioration	**Mechanism or Cause**
• Crocodile skin	Load, fatigue failure.
• Seepage	Too much asphalt in the mix.
• Block cracks	Climatological, in particular, changes in temperature.
• Transverse ripples	Load, unstable base.
• Depressions	Load, soft base or construction defects.
• Carbonization	Use, superficial burns from jet motors.
• Crack reflection	Hydraulic concrete joints, if existing.
• Cracks	Construction defect, climate changes or a reflection of cracks beneath the asphalt.
• Fuel	Fuel spillage from aircraft.

Type of Deterioration	Mechanism or Cause
• Repairs	Defects previously repaired.
• Glossiness	Aggregate polished by aircraft.
• Weathering	Superficial wear, loss of aggregate and bituminous material due to climatological effects.
• Tracks	Load, permanent deformation of some of the layers of the structure.
• Pushing	Movement of the joints of the hydraulic concrete, if existing.
• Displacement	Aircraft stops or turns that displace and deform the pavement. Superficial layer of poor support capacity or poor binding between layers.
• Expansion	Expansive material or climatological conditions or hydraulic concrete detachments.

APPENDIX C
PLANS AND CADD DRAWINGS

Index of CADD Drawings and Plans

The figures presented on the following pages indicate the master plans for the airports included in the concession mandate. In the case of Bamako-Sénou International Airport, the plans include not only the existing airport facilities, but also the four phases of development forecast by the Government (Figures A4.1 – A4.5),:



LEGENDE *LEGEND*

	BATIMENTS	*BUILDINGS*
	ROUTES	*ROADS*
	CLOTURE	*FENCE LINE*
	APPROCHE	*APPROACH*
	DRAINAGE	*DRAINAGE*
375	LIGNE DE CONTOUR	*CONTOUR LINE*
	ZONE DE SECURITE	*SAFETY ZONE*

LEGENDE DES AIDES A LA NAVIGATION
NAVIGATIONAL AID LEGEND

PAPI	INDICATEUR DE PRECISION DE PENTE D'APPROCHE *PRECISION APPROACH PATH INDICATOR*
NDB	RADIOPHARE NON-DIRECTIONNEL *NON-DIRECTIONAL BEACON*
PI	INSTRUMENT DE PRECISION *PRECISION INSTRUMENT*
ARP	POINT DE REFERENCE DE L'AEROPORT *AIRPORT REFERENCE POINT*
VOR/DME	EQUIPMENT DE MESURE DE DISTANCE *DISTANCE MEASURING EQUIPMENT*
RESA	AIRE DE SECURITE DE FIN DE PISTE *RUNWAY END SAFETY AREA*
ILSD	SYSTEME D'ATTERRISAGE PAR INSTRUMENTS *INSTRUMENT LANDING SYSTEM*
HALSR	SYSTEME DE BALISAGE D'APPROCHE HAUTE INTENSITE *MEDIUM APPROACH LANDING SYSTEM WITH RUNWAY ALIGNMENT INDICATOR LIGHTS*
AMSL	SUR LE NIVEAU DE MER *ABOVE MEAN SEA LEVEL*

TABLEAU DES DONNEES DE BASE *BASIC DATA TABLE*

DONNEES DE PISTE *RUNWAY DATA*

DESCRIPTION	EXISTANT *EXISTING*
INSTRUMENT DE PRECISION *PRECISION INSTRUMENT*	OUI *YES*
RESISTANCE DU REVETEMENT *PAVEMENT STRENGTH (1000 LBS)*	PCN 59/F/B/X/T
SURFACES D'APPROCHE HORS OBSTACLES *UNOBSTRUCTED APPROACH SURFACES*	R/W 06 50:1 R/W 24 34:1
BALISAGE DE PISTE *RUNWAY LIGHTING*	HIRL
MARQUES DE PISTE *RUNWAY MARKING*	PI
AIDES A LA NAVIGATION ET VISUELLES *NAVAIDS; VISUAL AIDS*	PIPI R/W 24
ALTITUDE DE LA PISTE 06 *RUNWAY 06 ELEVATION*	362 M
ALTITUDE DE LA PISTE 24 *RUNWAY 24 ELEVATION*	379 M
COORDONNEES DU FIN DE PISTE 06 *RUNWAY 06 END COORDINATES*	12° 31' 36, 57" N 007° 57' 37, 25" W
COORDONNEES DU FIN DE PISTE 24 *RUNWAY 24 END COORDINATES*	12° 32' 24, 95" N 007° 56' 22, 34" W

DONNEES DE L'AEROPORT *AIRPORT DATA*

DESCRIPTION	EXISTANT *EXISTING*
ALTITUDE DE L'AEROPORT (AMSL) *AIRPORT ELEVATION*	380 M
COORDONNEES DU POINT DE REFERENCE DE L'AEROPORT *AIRPORT REFERENCE POINT (ARP) COORDINATES*	LAT 12° 32' 16" N LONG 007° 58' 36"
TEMPERATURE MOYENNE MAXIMUM *MAXIMUM AVERAGE DAILY TEMPERATURE*	32° C
AIDES A LA NAVIGATION DE L'AIRE TERMINAL ET DE L'AEROPORT *AIRPORT & TERMINAL NAVAIDS*	VOR/ILS
CATEGORIE DE L'AEROPORT *AIRPORT CATEGORY*	INTERNATIONAL
DECLINATION MAGNETIQUE *MAGNETIC DECLINATION*	7° W
RAPPORT D'APPROCHE DE FRANCHISSEMENT D'OBSTACLES *UNOBSTRUCTED APPROACH RATIO*	R/W 06 2% R/W 24 2%
CODE DE REFERENCE OACI DE L'AEROPORT *ICAO AIRPOT\RT REFERENCE CODE*	4E

INSTALLATIONS

1	PISTE *RUNWAY*	11	CENTRALE ELECTRIQUE *ELECTRICAL STATION*
2	AIRE DE TRAFIC COMMERCIALE *COMMERCIAL APRON*	12	STATIONNEMENT DES VEHICULES *PARKING (CARS)*
3	AIRE DE TRAFIC DE L'AVIATION GENERALE *GENERAL AVIATION APRON*	13	AEROGARE DU FRET *CARGO BUILDING*
4	AIRE DE MAINTENANCE *MAINTENANCE APRON*	14	RESERVOIRE DU CARBURANT *FUELING DEPOT*
5	AEROGARE *TERMINAL BUILDING*	15	AIRE MILITAIRE *MILITARY AREA*
6	TOUR DE CONTROLE *CONTROL TOWER*	16	ROUTE D'ACCES *ACCESS ROAD*
7	BATIMENT D'ASECNA *ASECNA BUILDING*	17	HANGAR (AVIATION PRIVEE) *HANGAR (PRIVATE AVIATION)*
8	SERVICE POMPIERS *ARFF*	18	RESERVOIR D'EAU *WATER TOWER*
9	BATIMENTS VIP *VIP BUILDINGS (2)*	19	CONNECTEUR "A" *CONNECTOR "A"*
10	INSTALLATIONS DE METEOROLOGIE *METERORLOGICAL FACILITIES*	20	CONNECTEUR "B" *CONNECTOR "B"*

NOTE:

LIMITES DE PASSAGES DE NAVIGATION PRIS DU PLAN DE PROPRIETE PREPARE PAR LA DIRECTION DE L'AEROPORT DE BAMAKO-SENOU (MALI). POUR LE SERVICE GENERAL D'ADMINISTRATION.

NAVIGATION EASEMENT LIMITS TAKEN FROM PROPERTY LINE MAP PREPARED BY BAMAKO-SENOU (MALI) AIRPORT AUTHORITY. FOR THE GENERAL SERVICE ADMINISTRATION.

NO.	DESCRIPTION	DATE

AIRPORT CONCESSION
PROJECT
REPUBLIC OF MALI

AAROTEC
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BAMAKO SENOU INTERNATIONAL
AIRPORT LAYOUT PLAN
EXISTING CONDITION

SCALE: GRAPHICAL		PROJECT NO. 8012	
FOR BIDDING		FILE NO.	
FOR CONSTRUCTION		DRAWING NO.	
DESIGNED: RCP	DRAWN: SDB	Figure A4.1	
REVISED: ILA	APPROVED: GU		

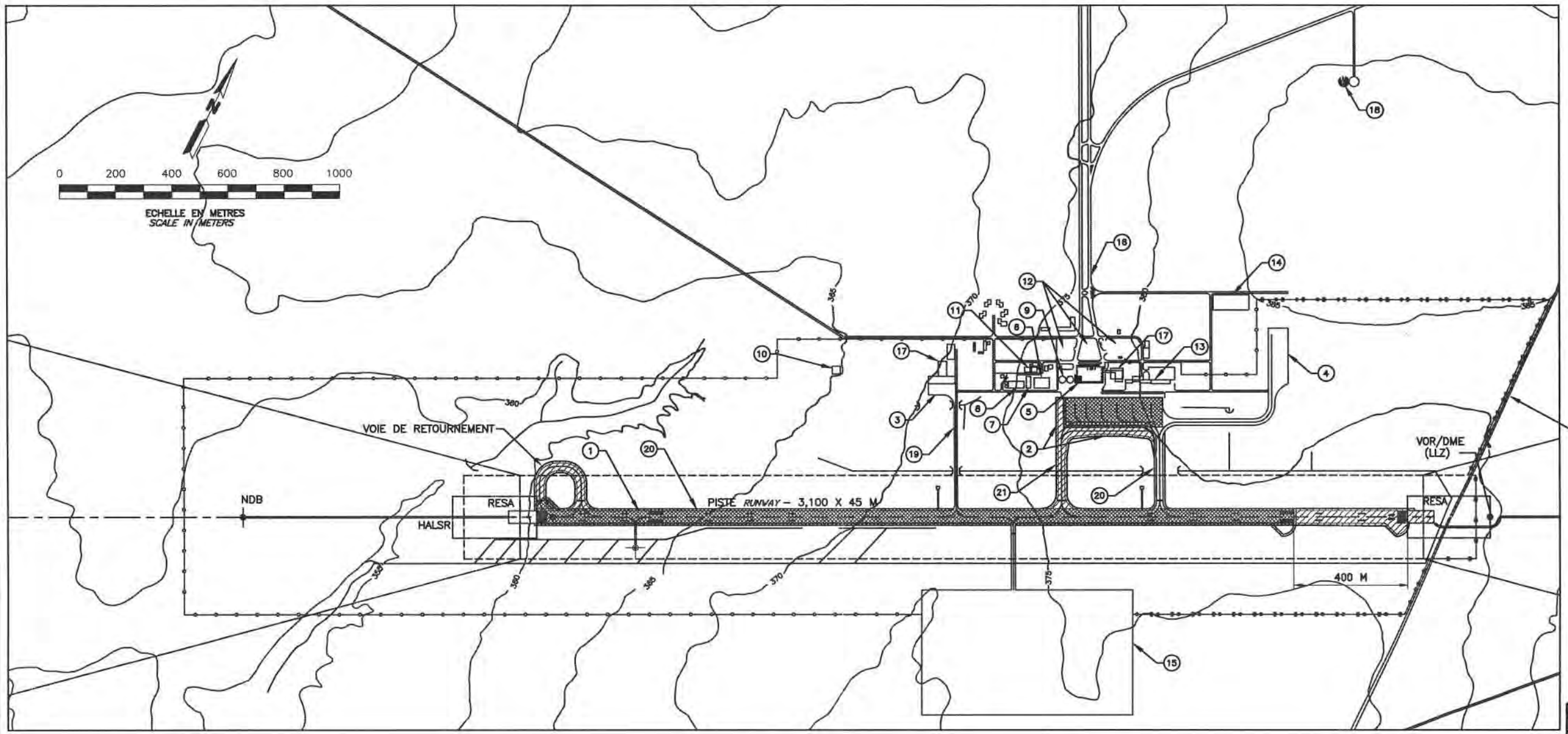

TABLEAU DES DONNEES DE BASE *BASIC DATA TABLE*

ARTICLE *ITEM*	DESCRIPTION	EXISTANT (2000) *EXISTING*	PROPOSE (2005) *PROPOSED*	ARTICLE *ITEM*	DESCRIPTION	EXISTANT (2000) *EXISTING*	PROPOSE (2005) *PROPOSED*
1	PISTE *RUNWAY*	2700 X 45 M	3100 X 45 M	11	CENTRALE ELECTRIQUE *ELECTRICAL STATION*	250 KVA	500 KVA
2	AIRE DE TRAFIC COMMERCIALE *COMMERCIAL APRON*	34,300 M²	47,870 M²	12	STATIONNEMENT DES VEHICULES *PARKING (CARS)*	17,000 M²	N/A
3	AIRE DE TRAFIC DE L'AVIATION GENERALE *GENERAL AVIATION APRON*	4,000 M²	N/A	13	AEROGARE DU FRET *CARGO BUILDING*	1,530 M²	
4	AIRE DE MAINTENANCE *MAINTENANCE APRON*	14,000 M²	N/A	14	RESERVOIRE DU CARBURANT *FUELING DEPOT*	2,272 M²	N/A
5	AEROGARE *TERMINAL BUILDING*	5,605 M²	6,685 M²	15	AIRE MILITAIRE *MILITARY AREA*	N/A	N/A
6	TOUR DE CONTROLE *CONTROL TOWER*	1,400 M²	N/A	16	ROUTE D'ACCES *ACCESS ROAD*	N/A	N/A
7	BATIMENT D'ASECNA *ASECNA BUILDING*	700 M²	N/A	17	HANGAR (AVIATION PRIVEE) *HANGAR (PRIVATE AVIATION)*	N/A	N/A
8	SERVICE POMPIER *ARFF*	437 M²	N/A	18	RESERVOIR D'EAU *WATER TANK*	300 M³	450 M³
9	BATIMENTS VIP *VIP BUILDINGS (2)*		N/A	19	CONNECTEUR "A" *CONNECTOR "A"*	448 X 10 M	N/A
10	INSTALLATIONS DE METEOROLOGIE *METEOROLOGICAL FACILITIES*	270 M²	N/A	20	CONNECTEUR "B" *CONNECTOR "B"*	266 X 23 M	N/A
				21	CONNECTEUR "C" *CONNECTOR "C"*	N/A	250 X 23 M

LEGENDE *LEGEND*

BATIMENTS	*BUILDINGS*
ACRONDISSEMENT BATIMENTS	*BUILDING EXPANSION*
ROUTES	*ROADS*
CLOTURE EXISTANT	*EXISTING FENCE*
NOUVELLE CLOTURE	*NEW FENCE*
APPROCHE	*APPROACH*
DRAINAGE	*DRAINAGE*
LIGNE DE CONTOUR	*CONTOUR LINE*
ZONE DE SECURITE	*SAFETY ZONE*
NOUVEAU REVETEMENT	*NEW PAVEMENT*
REVETEMENT	*REPAVEMENT*

NOTE:

1. LA CLOTURE QUI MANQUE EST APPROXIMATIVE. *MISSING FENCE IS APPROXIMATE.*

NO.	DESCRIPTION	DATE

AIRPORT CONCESSION PROJECT REPUBLIC OF MALI

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BAMAKO SENOU INTERNATIONAL AIRPORT LAYOUT PLAN PHASE I, 2000–2005

SCALE: GRAPHICAL		PROJECT NO. 8012	
FOR BIDDING		FILE NO.	
FOR CONSTRUCTION		DRAWING NO. Figure A4.2	
DESIGNED: RCP	DRAWN: SDB		
REVISED: ILA	APPROVED: GU		

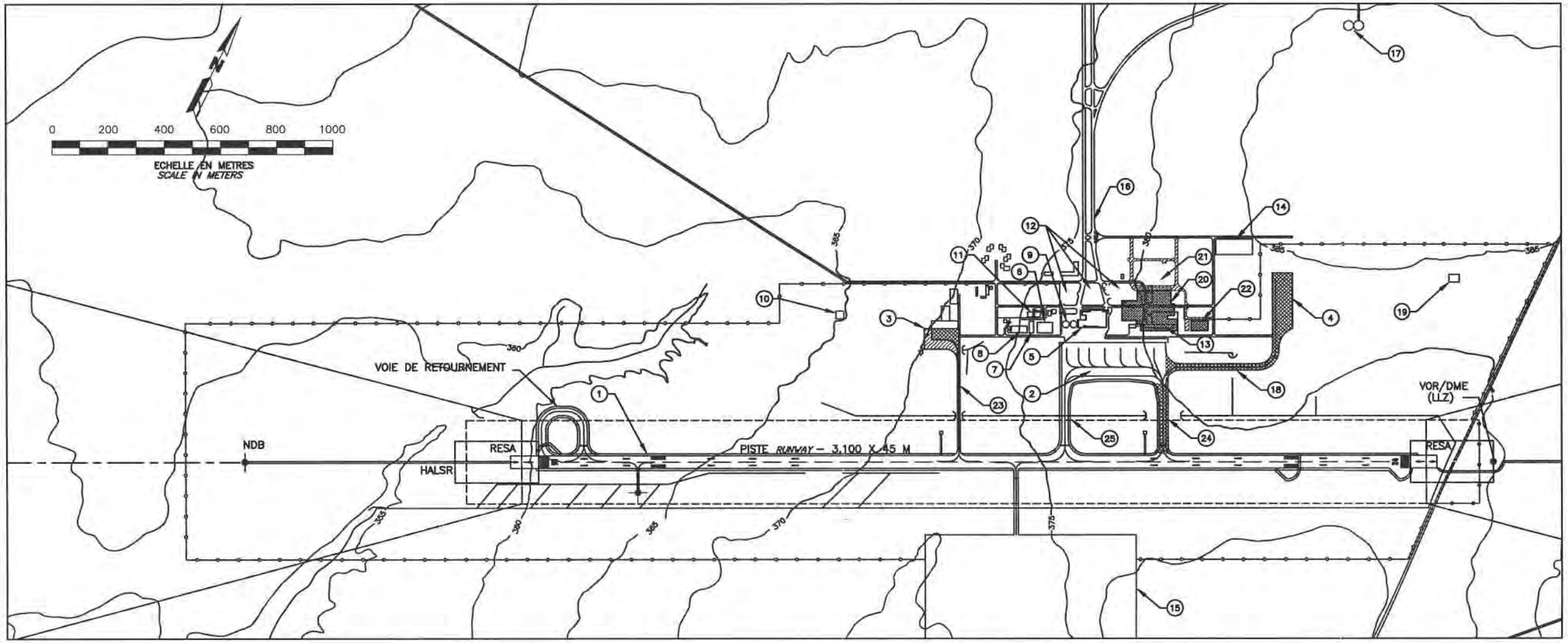

TABLEAU DES DONNEES DE BASE *BASIC DATA TABLE*

ARTICLE *ITEM*	DESCRIPTION	EXISTANT (2005) *EXISTING*	PROPOSE (2010) *PROPOSED*
1	PISTE *RUNWAY*	3100 X 45 M	N/A
2	AIRE DE TRAFIC COMMERCIALE *COMMERCIAL APRON*	47,870 M²	N/A
3	AIRE DE TRAFIC DE L'AVIATION GENERALE *GENERAL AVIATION APRON*	4,000 M²	9,000 M²
4	AIRE DE MAINTENANCE *MAINTENANCE APRON*	14,000 M²	OVERLAY
5	ANCIENNE AEROGARE OLD TERMINAL BUILDING	6,685 M²	N/A
6	TOUR DE CONTROLE *CONTROL TOWER*	1,400 M²	N/A
7	BATIMENT D'ASECNA *ASECNA BUILDING*	700 M²	N/A
8	SERVICE POMPIERS *ARFF*	437 M²	N/A
9	BATIMENTS VIP *VIP BUILDINGS (2)*	N/A	N/A
10	INSTALLATIONS DE METEOROLOGIE *METERONOLOGICAL FACILITIES*	270 M²	N/A
11	CENTRALE ELECTRIQUE *ELECTRICAL STATION*	500 KVA	N/A
12	STATIONNEMENT DES VEHICULES *PARKING (CARS)*	17,000 M²	N/A
13	AEROGARE DU FRET *EXISTING CARGO BUILDING*	1,530 M²	DEMOLISH

ARTICLE *ITEM*	DESCRIPTION	EXISTANT (2005) *EXISTING*	PROPOSE (2010) *PROPOSED*
14	RESERVOIRE DU CARBURANT *FUELING DEPOT*	2,272 M²	N/A
15	AIRE MILITAIRE *MILITARY AREA*	N/A	N/A
16	ROUTE D'ACCES *ACCESS ROAD*	N/A	N/A
17	RESERVOIR D'EAU *WATER TANK*	450 M³	N/A
18	VOIE DE CIRCULATION DE L'AIR DE MAINTENANCE *MAINTANANCE APRON CONNECTOR*	490 X 23 M	OVERLAY
19	CENTRALE DE TRAITEMENT DES EAUX USEES *SEWAGE TREATMENT PLANT*	N/A	120 M³
20	NOUVELLE AEROGARE INTERNATIONALE *NEW INT'L. TERMINAL BUILDING*	N/A	17,352 M²
21	NOUVEAU STATIONNEMENT DES VEHICULES VEHICULES DE L'AEROGARE INTERNATIONAL *NEW INT'L. TERMINAL PARKING*	N/A	13,000 M²
22	NOUVELLE AEROGARE DU FRET *NEW CARGO TERMINAL*	N/A	2016 M²
23	CONNECTEUR "A" *CONNECTOR "A"*	448 X 10 M	N/A
24	CONNECTEUR "B" *CONNECTOR "B"*	266 X 23 M	OVERLAY
25	CONNECTEUR "C" *CONNECTOR "C"*	266 X 23 M	N/A

LEGENDE *LEGEND*

BATIMENTS	*BUILDINGS*
ACRONDISSEMENT BATIMENTS	*BUILDING EXPANSION*
ROUTES	*ROADS*
CLOTURE	*FENCE*
APPROCHE	*APPROACH*
DRAINAGE	*DRAINAGE*
LIGNE DE CONTOUR	*CONTOUR LINE*
ZONE DE SECURITE	*SAFETY ZONE*
NOUVEAU REVETEMENT	*NEW PAVEMENT*
REVETEMENT	*REPAVEMENT*

NO.	DESCRIPTION	DATE

AIRPORT CONCESSION
PROJECT
REPUBLIC OF MALI

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BAMAKO SENOU INTERNATIONAL
AIRPORT LAYOUT PLAN
PHASE II, 2005–2010

SCALE: GRAPHICAL	PROJECT NO. 8012
FOR BIDDING	FILE NO.
FOR CONSTRUCTION	DRAWING NO.
DESIGNED: RCP / DRAWN: SDB	Figure A4.3
REVISED: ILA / APPROVED: GU	

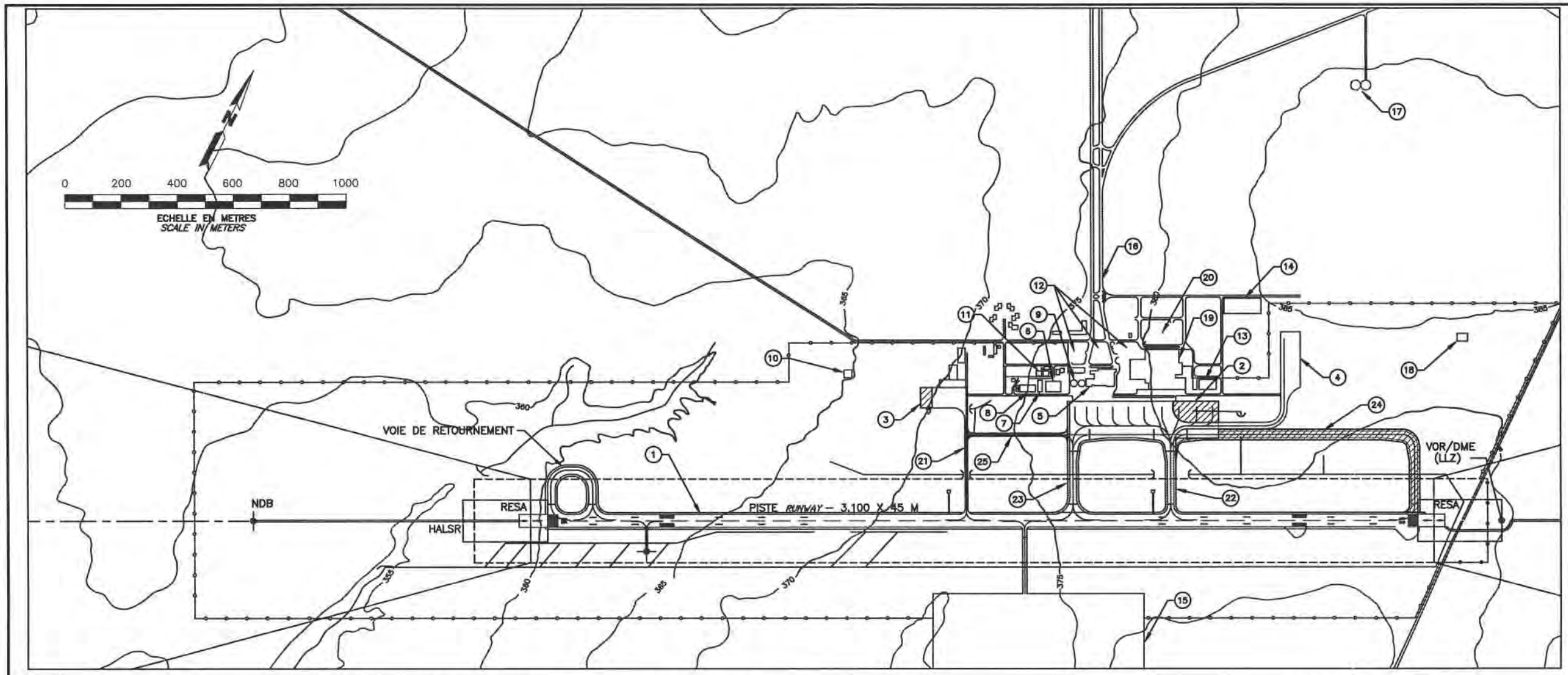

TABLEAU DES DONNEES DE BASE *BASIC DATA TABLE*

ARTICLE *ITEM*	DESCRIPTION	EXISTANT (2010) *EXISTING*	PROPOSE (2015) *PROPOSED*
1	PISTE *RUNWAY*	3100 X 45 M	N/A
2	AIRE DE TRAFIC COMMERCIALE *COMMERCIAL APRON*	47,870 M²	69,870 M²
3	AIRE DE TRAFIC DE L'AVIATION GENERALE *GENERAL AVIATION APRON*	9,000 M²	13,000 M²
4	AIRE DE MAINTENANCE *MAINTENANCE APRON*	14,000 M²	N/A
5	AEROGARE DES VOLS INTERIEURS *DOMESTIC TERMINAL BUILDING*	6,685 M²	N/A
6	TOUR DE CONTROLE *CONTROL TOWER*	1,400 M²	N/A
7	BATIMENT D'ASECNA *ASECNA BUILDING*	700 M²	N/A
8	SERVICE POMPIERS *ARFF*	437 M²	N/A
9	BATIMENTS VIP *VIP BUILDINGS (2)*	N/A	N/A
10	INSTALLATIONS DE METEOROLOGIE *METEOROLOGICAL FACILITIES*	270 M²	N/A
11	CENTRALE ELECTRIQUE *ELECTRICAL STATION*	500 KVA	N/A
12	STATIONNEMENT DES VEHICULES *PARKING (CARS)*	17,000 M²	N/A
13	AEROGARE DU FRET *CARGO BUILDING*	2016 M²	N/A

ARTICLE *ITEM*	DESCRIPTION	EXISTANT (2010) *EXISTING*	PROPOSE (2015) *PROPOSED*
14	RESERVOIRE DU CARBURANT *FUELING DEPOT*	2,272 M²	N/A
15	AIRE MILITAIRE *MILITARY AREA*	N/A	N/A
16	ROUTE D'ACCES *ACCESS ROAD*	N/A	N/A
17	RESERVOIR D'EAU *WATER TANK*	450 M³	N/A
18	CENTRALE DE TRAITEMENT DES EAUX USEES *SEWAGE TREATMENT PLANT*	120 M³	N/A
19	AEROGARE INTERNATIONALE *INTERNATIONAL TERMINAL BUILDING*	17,352 M²	N/A
20	STATIONNEMENT DES VEHICULES VEHICULES DE L'AEROGARE INTERNATIONAL *INTERNATIONAL TERMINAL PARKING*	13,000 M²	N/A
21	CONNECTEUR "A" *CONNECTOR "A"*	448 X 10 M	N/A
22	CONNECTEUR "B" *CONNECTOR "B"*	266 X 23 M	N/A
23	CONNECTEUR "C" *CONNECTOR "C"*	266 X 23 M	N/A
24	VOIE DE CIRCULATION "D" *PARALLEL TAXIWAY "D"*	N/A	958 X 23 M
25	VOIE DE CIRCULATION "E" *PARALLEL TAXIWAY "E"*	N/A	353 X 10 M

LEGENDE *LEGEND*

BATIMENTS *BUILDINGS*	
ACRONDISSEMENT BATIMENTS *BUILDING EXPANSION*	
ROUTES *ROADS*	
CLOTURE *FENCE*	
APPROCHE *APPROACH*	
DRAINAGE *DRAINAGE*	
LIGNE DE CONTOUR *CONTOUR LINE*	375
ZONE DE SECURITE *SAFETY ZONE*	
NOUVEAU REVETEMENT *NEW PAVEMENT*	
REVETEMENT *REPAVEMENT*	

NO.	DESCRIPTION	DATE

AIRPORT CONCESSION
PROJECT
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BAMAKO SENOU INTERNATIONAL
AIRPORT LAYOUT PLAN
PHASE III, 2010–2015

SCALE: GRAPHICAL	PROJECT NO. 8012
FOR BIDDING	FILE NO.
FOR CONSTRUCTION	DRAWING NO.
DESIGNED: RCP / DRAWN: SDB	Figure A4.4
REVISED: ILA / APPROVED: GU	

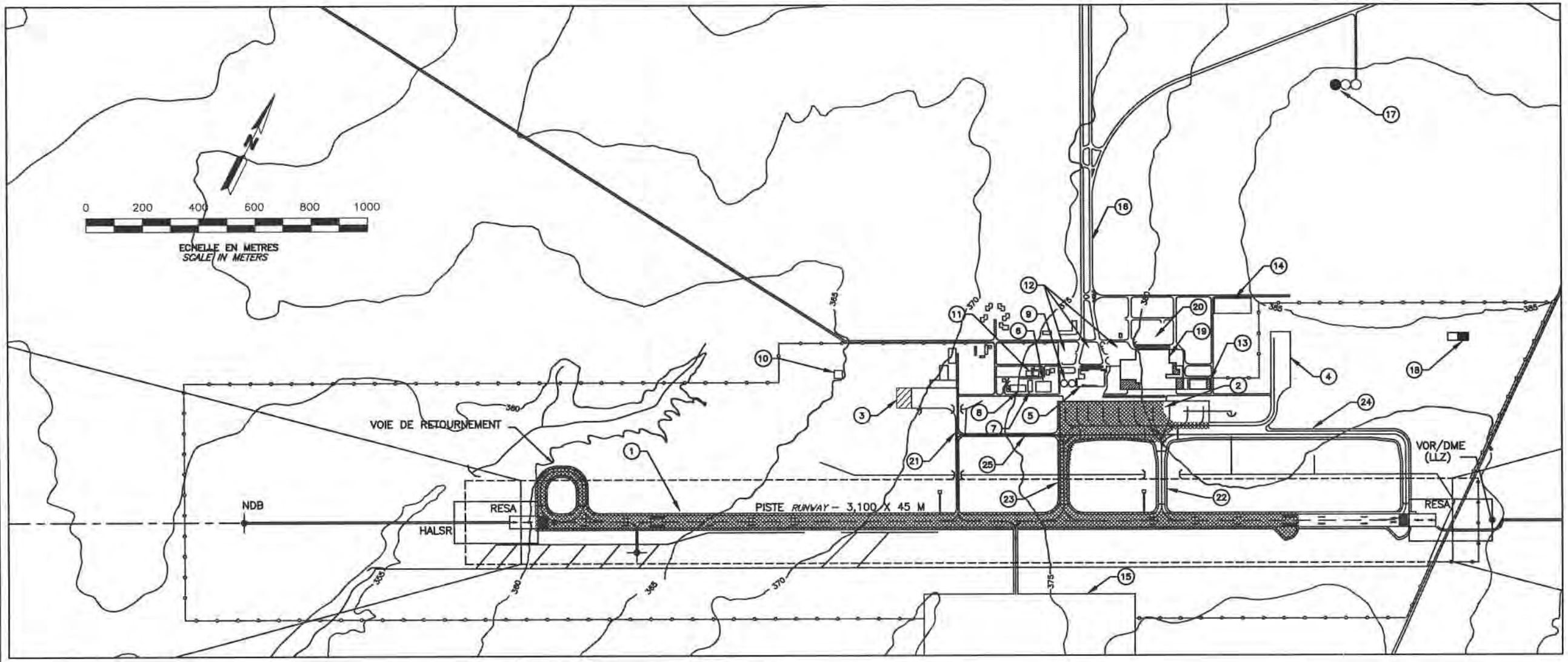

TABLEAU DES DONNEES DE BASE *BASIC DATA TABLE*

ARTICLE *ITEM*	DESCRIPTION	EXISTANT (2015) *EXISTING*	PROPOSE (2020) *PROPOSED*
1	PISTE *RUNWAY*	3100 X 45 M	N/A
2	AIRE DE TRAFIC COMMERCIALE *COMMERCIAL APRON*	69,870 M²	N/A
3	AIRE DE TRAFIC DE L'AVIATION GENERALE *GENERAL AVIATION APRON*	13,000 M²	16,000 M²
4	AIRE DE MAINTENANCE *MAINTENANCE APRON*	14,000 M²	N/A
5	AEROGARE DES VOLS INTERIEURS *DOMESTIC TERMINAL BUILDING*	6,685 M²	7,191 M²
6	TOUR DE CONTROLE *CONTROL TOWER*	1,400 M²	N/A
7	BATIMENT D'ASECNA *ASECNA BUILDING*	700 M²	N/A
8	SERVICE POMPIERS *ARFF*	437 M²	N/A
9	BATIMENTS VIP *VIP BUILDINGS (2)*	N/A	N/A
10	INSTALLATIONS DE METEOROLOGIE *METERORLOGICAL FACILITIES*	270 M²	N/A
11	CENTRALE ELECTRIQUE *ELECTRICAL STATION*	500 KVA	N/A
12	STATIONNEMENT DES VEHICULES *PARKING (CARS)*	17,000 M²	N/A
13	AEROGARE DU FRET *CARGO BUILDING*	2,016 M²	2,448 M²

ARTICLE *ITEM*	DESCRIPTION	EXISTANT (2015) *EXISTING*	PROPOSE (2020) *PROPOSED*
14	RESERVOIRE DU CARBURANT *FUELING DEPOT*	2,272 M³	N/A
15	AIRE MILITAIRE *MILITARY AREA*	N/A	N/A
16	ROUTE D'ACCES *ACCESS ROAD*	N/A	N/A
17	RESERVOIR D'EAU *WATER TANK*	450 M³	550 M³
18	CENTRALE DE TRAITEMENT DES EAUX USEES *SEWAGE TREATMENT PLANT*	120 M³	N/A
19	AEROGARE INTERNATIONALE *INTERNATIONAL TERMINAL BUILDING*	17,352 M²	23,816 M²
20	STATIONNEMENT DES VEHICULES VEHICULES DE L'AEROGARE INTERNATIONAL *INTERNATIONAL TERMINAL PARKING*	13,000 M²	17,000 M²
21	CONNECTEUR "A" *CONNECTOR "A"*	448 X 10 M	N/A
22	CONNECTEUR "B" *CONNECTOR "B"*	266 X 23 M	N/A
23	CONNECTEUR "C" *CONNECTOR "C"*	266 X 23 M	N/A
24	VOIE DE CIRCULATION "D" *PARALLEL TAXIWAY "D"*	958 X 23 M	N/A
25	VOIE DE CIRCULATION "E" *PARALLEL TAXIWAY "E"*	353 X 10 M	N/A

LEGENDE *LEGEND*

BATIMENTS	*BUILDINGS*
ACRONDISSEMENT BATIMENTS	*BUILDING EXPANSION*
ROUTES	*ROADS*
CLOTURE	*FENCE*
APPROCHE	*APPROACH*
DRAINAGE	*DRAINAGE*
LIGNE DE CONTOUR	*CONTOUR LINE*
ZONE DE SECURITE	*SAFETY ZONE*
NOUVEAU REVETEMENT	*NEW PAVEMENT*
REVETEMENT	*REPAVEMENT*

NO.	DESCRIPTION	DATE

AIRPORT CONCESSION PROJECT
REPUBLIC OF MALI

AAROTEC
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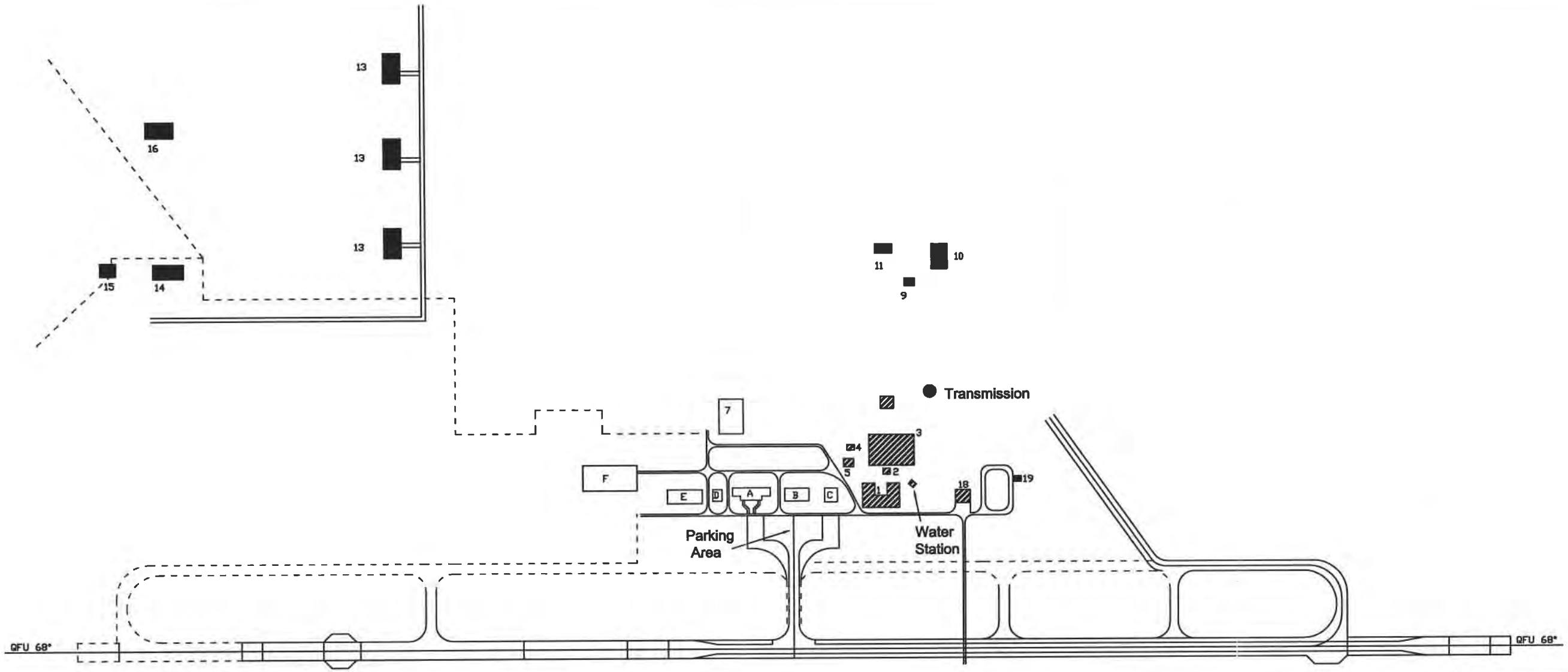
BAMAKO SENOU INTERNATIONAL AIRPORT LAYOUT PLAN
PHASE IV, 2015–2020

SCALE: GRAPHICAL	PROJECT NO. 8012
FOR BIDDING	FILE NO.
FOR CONSTRUCTION	DRAWING NO. Figure A4.5
DESIGNED: RCP / DRAWN: SDB	
REVISED: ILA / APPROVED: GU	



LEGENDE / *LEGEND*

INSTALLATIONS EXISTANTS / *EXISTING INSTALLATION*

1 Meteo et Bloc Technique *Meteo & Technical Bldg.*
2 Station de Meteorologie *Meteo Park*
3 Station de Radio Local *Local Radio Station*
4 Transformateur *Transformer*
5 Sub-Station Electrique *Airfield Lighting Station*
6 Hangar *Hangar*
7 Reservoir de Carburant *Fuel Farm*
8 Logements Police *Police Dwells*
9 Logements Militaire *Military Dwells*
10 Logements *Dwells*
11 Logements *Dwells*
12 Logements Meteorologie *Meteo Dwells*
13 Logements ATC *ATC Dwells*
14 Central Electrique *Electrical Station*
15 Emetteurs *Transmitters*
16 NDB *Radio Beacon*
17 Atterissage *Landing*
18 SSAS *ARFF*

PREMIER PHASE / *FIRST PHASE*

A Aerogare *Terminal Bldg.*
B Salle Presidential *Presidential Bldg.*

PHASE ULTERIEUR / *FUTURE PHASE*

C Bloc Technique *Technical Bldg.*
D Entrepot *Shelter for Runway material*
E Zone de Fret *Cargo Zone*
F Lot de Stationnement *Car Parking Zone*
G Zone de Carburant *Fuel Zone*
H Zone de Logements *Dwelling Zone*
I Emetteurs *Transmitter*

NO.	DESCRIPTION	DATE

AIRPORT CONCESSION
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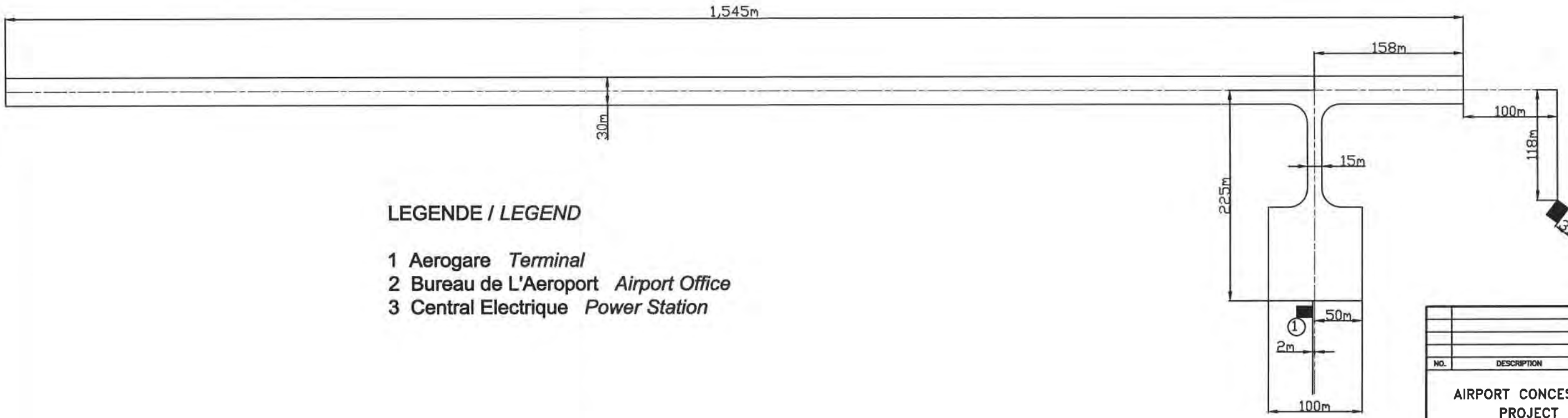
GAO AIRPORT
LAYOUT PLAN

SCALE:	PROJECT NO. 8012
FOR BIDDING	FILE NO.
FOR CONSTRUCTION	DRAWING NO.
DESIGNED: RCP / DRAWN: SDB	Figure A4.6
REVISED: ILA / APPROVED: GU	



LEGENDE / *LEGEND*

1 Aerogare *Terminal*
2 Bureau de L'Aeroport *Airport Office*
3 Central Electrique *Power Station*

NO.	DESCRIPTION	DATE

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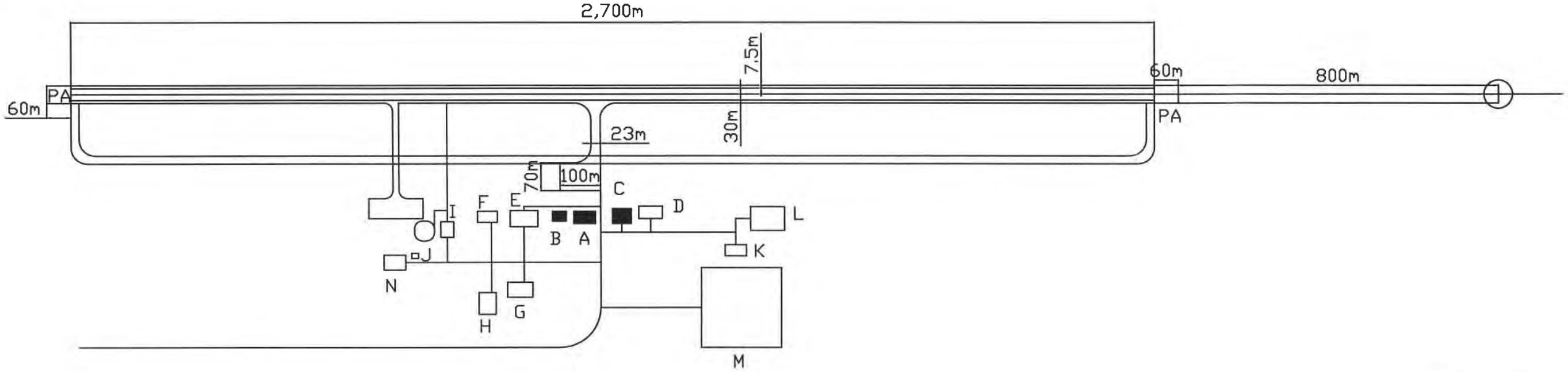
GOUNDAM AIRPORT
LAYOUT PLAN

SCALE:	PROJECT NO. 8012
FOR BIDDING	FILE NO.
FOR CONSTRUCTION	DRAWING NO. Figure A4.7
DESIGNED: RCP / DRAWN: SDB	
REVISED: ILA / APPROVED: GU	



LEGENDE / *LEGEND*

A- Aerogare *Terminal Bldg.*
B- Bloc Technique *Technical Bldg.*
C- Aides à la Navigation et Entrepot Meteorologique *Navaids and Meteorological Store*
D- Salle *VIP Room*
E- Zone de Fret *Cargo Terminal*
F- Bloc Maintenance *Maintenance Bldg.*
G- Reservoir de Carburant *Fuel Farm*
H- SSAS *ARFF*
J- Chateau d' eau *Water Tank*
K- NDB *Radio Beacon*
L- Station de Meteorologie *Meteorological Park*
M- Logements *Dwelling*
N- Aviation Generale *General Aviation*

Note:
La Longeur de la piste a été réduité de 2700m to 1600m dû à constraints budgétairé

Note:
The length of the runway has been reduced due to budgetary constraints from 2700m to 1600m

NO.	DESCRIPTION	DATE

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REPUBLIC OF MALI

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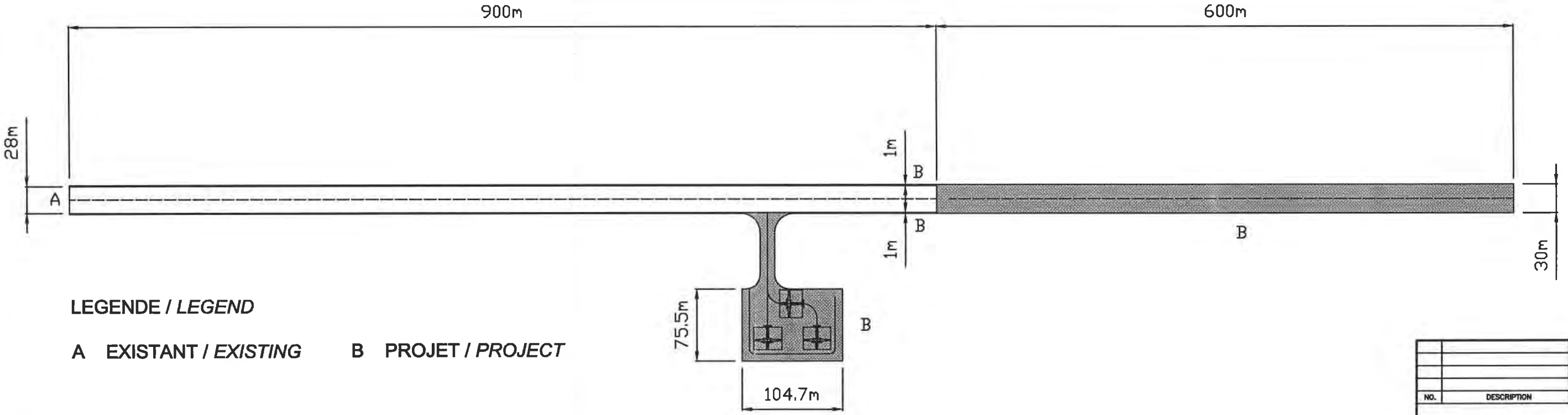
KAYES AIRPORT
LAYOUT PLAN

SCALE:	PROJECT NO. 8012
FOR BIDDING	FILE NO.
FOR CONSTRUCTION	DRAWING NO. Figure A4.8
DESIGNED: RCP / DRAWN: SDB	
REVISED: ILA / APPROVED: GU	



LEGENDE / *LEGEND*

A EXISTANT / *EXISTING* B PROJET / *PROJECT*

LES DONNEES EXISTANTES SOUS RESERVE DE VERIFICATION POUR CET AEROPORT
EXISTING DATA SUBJECT TO VERIFICATION FOR THIS AIRPORT

NO.	DESCRIPTION	DATE

AIRPORT CONCESSION
PROJECT
REPUBLIC OF MALI

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KENIEBA AIRPORT
LAYOUT PLAN

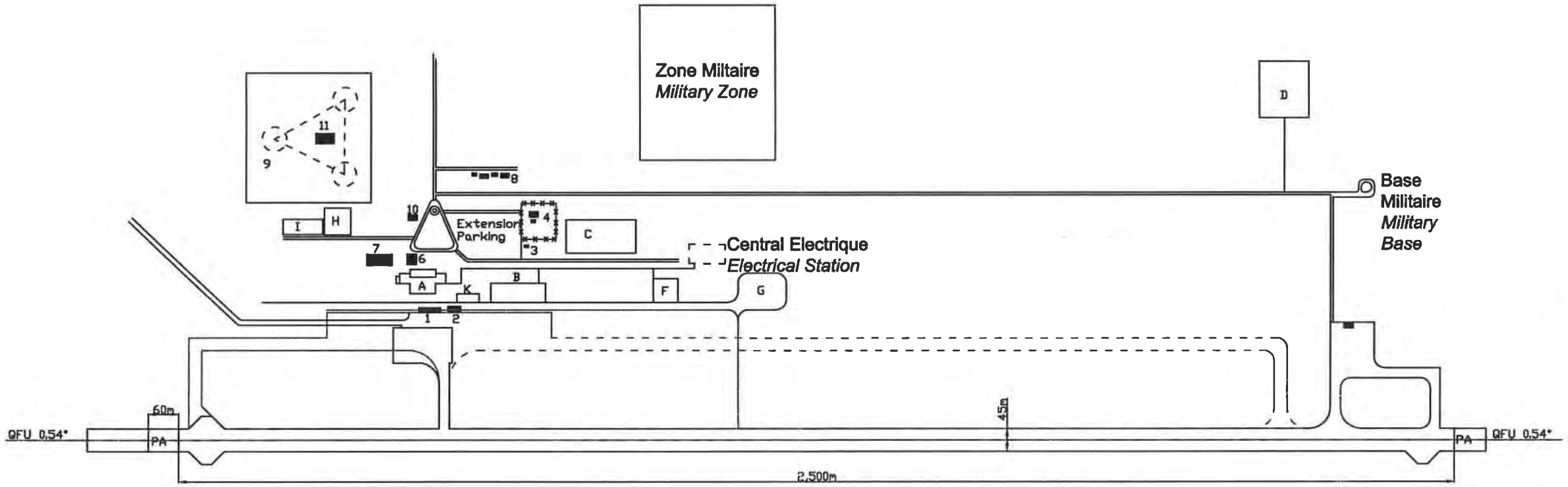
SCALE:	PROJECT NO. 8012
FOR BIDDING	FILE NO.
FOR CONSTRUCTION	DRAWING NO.
DESIGNED: RCP / DRAWN: SDB	Figure A4.9
REVISED: ILA / APPROVED: GU	

LEGENDE / *LEGEND*

EXISTANT / *EXISTING*
1 Aerogare et Bloc Technique *Technical & Terminal Bldg.*
2 Sécurite Incendie *ARFF*
3 Château d'eau *Water Tank*
4 Villa du commandant d'aérodome *Commander's Bldg.*
5 Parc Meteo *Meteorological Farm*
6 Abri à gonflement *Meteorological Bldg.*
7 Resrvoir de Carburant *Fuel Farm*
8 Logements *Housing*
9 Centre Emission *Radio Center*
10 Bâtiment de mesure de séisme *Earthquake Measurement Bldg.*
11 Central Electrique *Electrical Station*

PROJET / *PROJECT*
A Aerogare *Terminal*
B Bloc Technique *Technical Bldg.*
C Parc Metéo *Meteorological Farm*
D Centre Réception *Receiver*
E Central Eleqtrique *Electrical Station*
F Bâtiment SSIS *ARFF Bldg.*
G Reserve d'eau SSIS *ARFF Water Tank Reserve*

PHASE ULTERIEUR / *FUTURE PHASE*
H Zone Carburant *Fuel Area*
I Zone Frét *Cargo Area*
K Pavillon Presidentiel *President's Bldg.*



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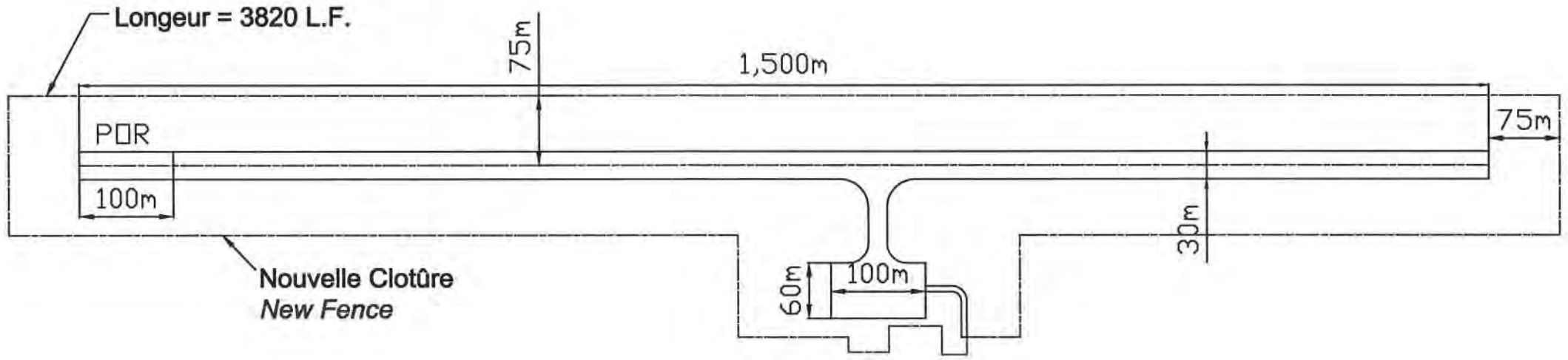
MOPTI AIRPORT
LAYOUT PLAN

SCALE:	PROJECT NO. 8012
FOR BIDDING	FILE NO.
FOR CONSTRUCTION	DRAWING NO. Figure A4.10
DESIGNED: RCP / DRAWN: SDB	
REVISED: ILA / APPROVED: GU	



LEGENDE / *LEGEND*

1 Carburant *Fuel*
2 Entrepot *Store House*
3 Bloc Technique *Technical Building*
4 Central Electrique *Power Station*
5 Station de Meteorologie *Meteo Farm*
6 Logements *Dwelling*
7 Garage *Garage*
8 Station de Meteorologie *Meteo Park*
9 Central Electrique *Electrical Station*
10 Toilettes *Restroom*
11 Reservoir *Water Tank*
12 SSAS *ARFF Hangar*
13 Relocalisation de la Route d'Acces *Relocated Access Road*

XXX Nouvelle Clotûre *New Fence*

NO.	DESCRIPTION	DATE

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NIORO AIRPORT
LAYOUT PLAN

SCALE:	PROJECT NO. 8012
FOR BIDDING	FILE NO.
FOR CONSTRUCTION	DRAWING NO. Figure A4.11
DESIGNED: RCP / DRAWN: SDB	
REVISED: ILA / APPROVED: GU	

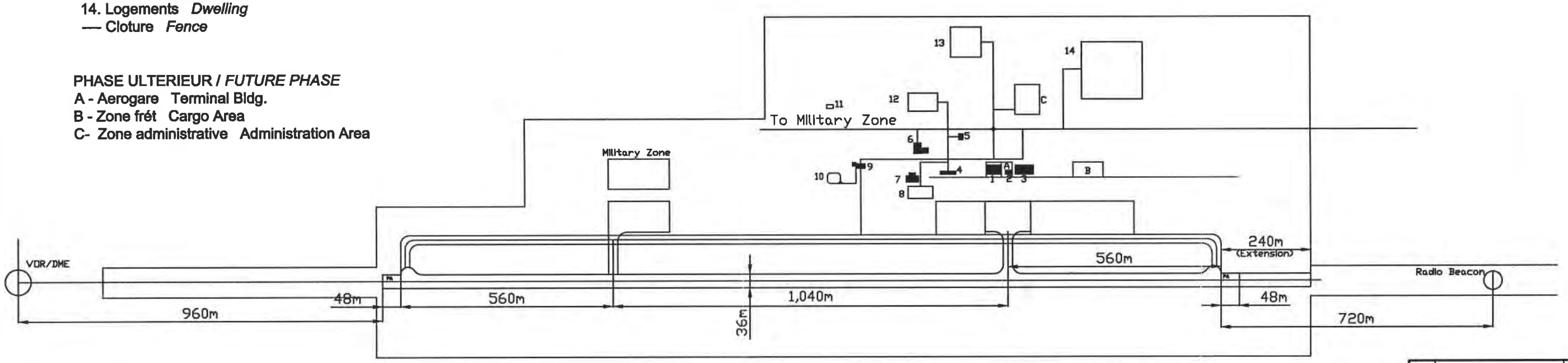
LEGENDE / *LEGEND*

1. Aerogare *Terminal Bldg.*
2. Abri à matériel de piste *Maintenance Bldg.*
3. Hangar Frét *Cargo Terminal*
4. Bloc Technique *Technical Bldg.*
5. Magasin NA-MTO *Navaids & Meteorological Store*
6. Central Electrique *Electrical Bldg.*
7. Abri à gonflement *Balloon Bldg. (Meteorological)*
8. Parc Météo *Meteor Park*
9. Batiment SSIS *ARFF Bldg.*
10. Réserve d'eau SSIS *ARFF Water Tank*
11. Forage et réserve d'eau *Water Tank*
12. Parc à carburant *Fuel Farm*
13. Centre réception *Receivers*
14. Logements *Dwelling*

— Cloture *Fence*

PHASE ULTERIEUR / *FUTURE PHASE*

A - Aerogare Terminal Bldg.
B - Zone frét Cargo Area
C- Zone administrative Administration Area



Note:
La Longeur de la piste a été réduité de 2700m to 1600m dû à constraints budgétairé

Note:
The length of the runway has been reduced due to budgetary constraints from 2700m to 1600m.

NO.	DESCRIPTION	DATE

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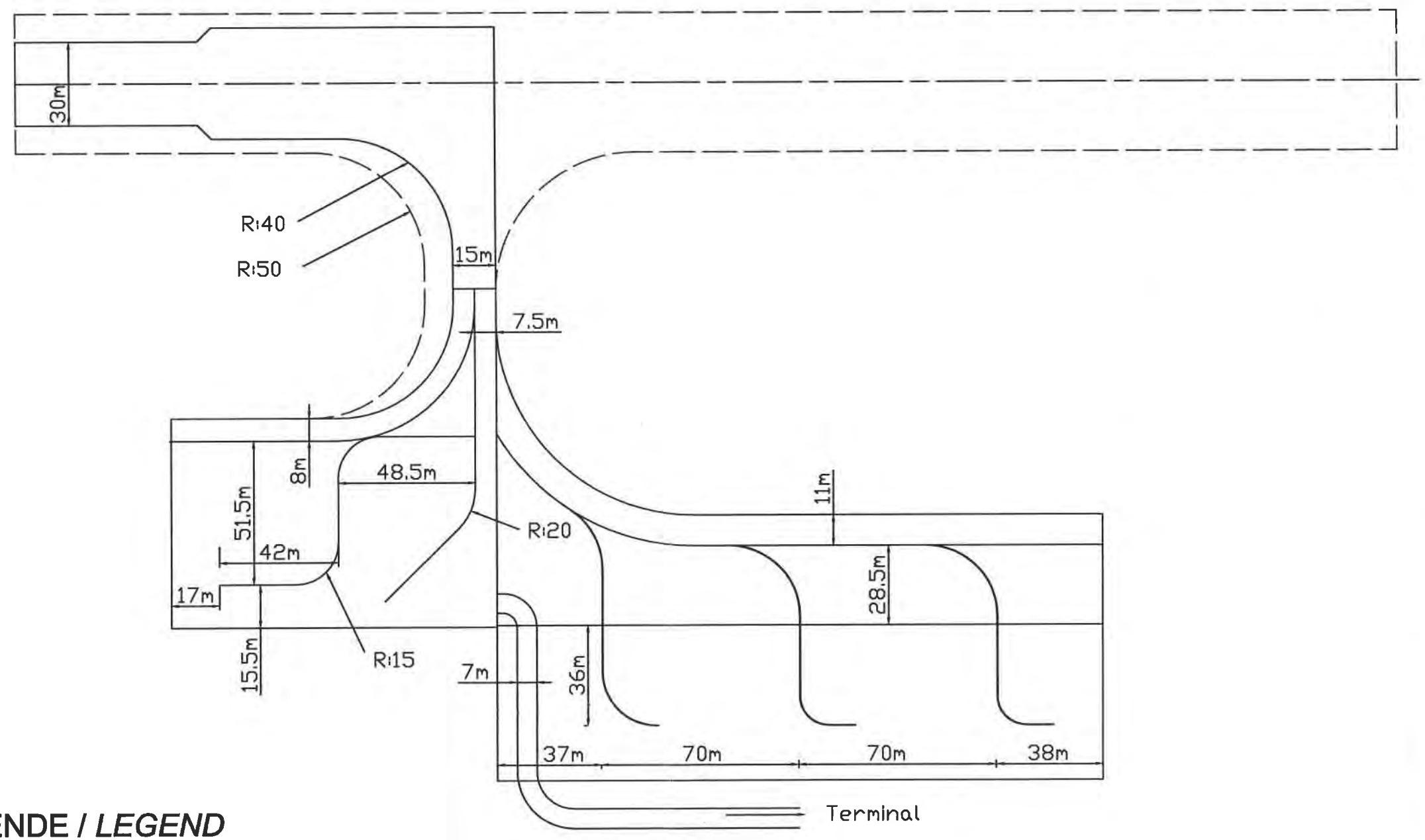
SIKASSO AIRPORT
LAYOUT PLAN

SCALE:	PROJECT NO. 8012
FOR BIDDING	FILE NO.
FOR CONSTRUCTION	DRAWING NO. Figure A4.12
DESIGNED: RCP / DRAWN: SDB	
REVISED: ILA / APPROVED: GU	



LEGENDE / *LEGEND*

Existent *Existing* ————

Proposé *Proposed* — — — —

NO.	DESCRIPTION	DATE

AIRPORT CONCESSION
PROJECT
REPUBLIC OF MALI

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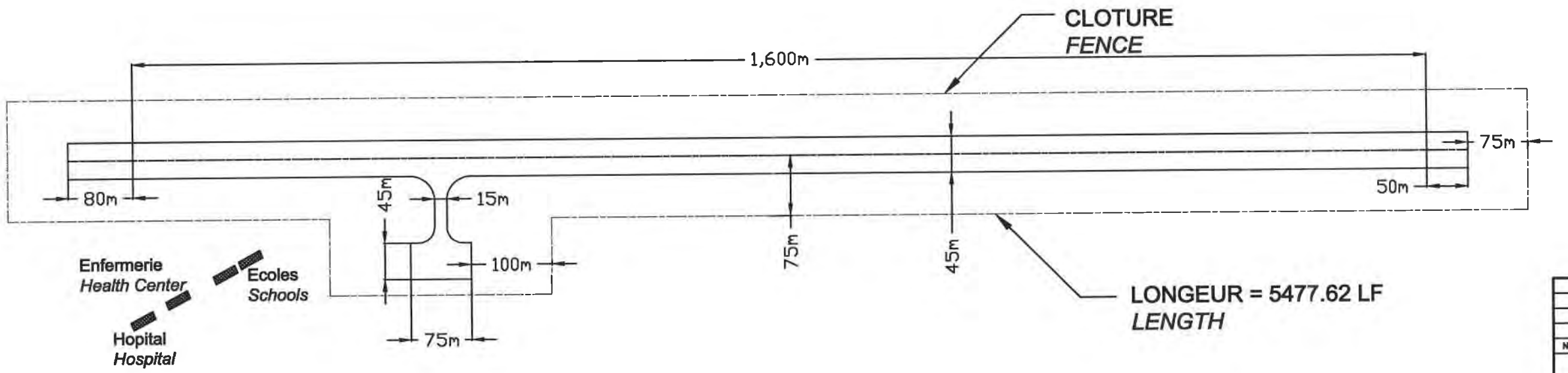
TOMBOUCTOU AIRPORT
LAYOUT PLAN

SCALE:	PROJECT NO. 8012
FOR BIDDING	FILE NO.
FOR CONSTRUCTION	DRAWING NO. Figure A4.13
DESIGNED: RCP / DRAWN: SDB	
REVISED: ILA / APPROVED: GU	



NO.	DESCRIPTION	DATE

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YELIMANE AIRPORT
LAYOUT PLAN

SCALE:	PROJECT NO. 8012
FOR BIDDING	FILE NO.
FOR CONSTRUCTION	DRAWING NO.
DESIGNED: RCP / DRAWN: SDB	Figure A4.14
REVISED: ILA / APPROVED: GU	

APPENDIX D
STATISTICAL AND DATA PROFILE OF MALI

APPENDIX D. STATISTICAL AND DATA PROFILE OF MALI

	1995	1998	1999
People			
Population, total	9.7 million	10.6 million	10.9 million
Population density (people per sq km)	8.0	..	..
Population growth (annual %)	2.7	2.9	2.9
Life expectancy at birth, total (years)	..	50.4	..
Fertility rate, total (births per woman)	..	6.5	..
Mortality rate, infant (per 1,000 live births)	..	116.5	..
Mortality rate, under-5 (per 1,000 live births)	..	218.0	..
Urban population (% of total)	26.8	28.7	29.4
Population density, rural (people per sq km)	210.2	..	..
Illiteracy rate, adult male (% of males 15+)	59.2	54.2	52.7
Illiteracy rate, adult female (% of females 15+)	74.0	68.9	67.3
School enrollment, primary (% net)	31.6	..	..
School enrollment, secondary (% net)	15.4	..	..
School enrollment, primary, female (% net)	25.0	..	..
School enrollment, secondary, female (% net)	11.1	..	..
Environment			
Surface area (sq km)	1.2 million	..	..
Forest area (sq. km)	115.9 thousand	..	..
Annual deforestation (% of change)	1.0	..	..
Economy			
GDP at market prices (current US$)	2.5 billion	2.6 billion	2.7 billion
GDP growth (annual %)	6.2	3.3	5.3
GNP, Atlas method (current US$)	2.4 billion	2.6 billion	2.6 billion
GNP per capita, Atlas method (current US$)	240.0	240.0	240.0
Agriculture, value added (% of GDP)	49.5	46.5	46.5
Industry, value added (% of GDP)	18.7	17.3	16.7
Services, etc., value added (% of GDP)	31.8	36.2	36.8
Exports of goods and services (% of GDP)	21.1	24.3	22.1
Imports of goods and services (% of GDP)	36.2	34.6	33.9
Gross domestic investment (% of GDP)	22.9	20.9	20.0
Money and quasi money growth (annual %)	7.3	4.2	1.0
Technology and infrastructure			
Telephone mainlines (per 1,000 people)	1.6	2.5	..
Telephone average cost of local call (US$ per three minutes)	0.2	0.1	..
Personal computers (per 1,000 people)	0.3	..	..
Roads, paved (%)	12.0	..	..
Aircraft departures	1,300.0	1,500.0	..
Trade and finance			
Trade (% of GDP, PPP)	15.5	15.1	..
Net barter terms of trade (1995=100)	100.0	..	..
Foreign direct investment, net inflows in reporting country (WDI, current US$)	12.0 million	17.0 million	..
Present value of debt (current US$)	..	2.2 billion	..
Total debt service (TDS, current US$)	86.1 million	81.9 million	..
Short-term debt outstanding (DOD, current US$)	71.6 million	187.7 million	..
Aid per capita (current US$)	55.8	33.0	..
Source: *World Development Indicators database, July 2000*			

APPENDIX E
OPERATION EXPENSES AND REVENUES

Table E-1. Operation and Maintenance Expenses- Bamako-Sénou Airport

Account: Number	Description	Actual 1996	Actual 1997	CFA Franc Actual 1998	Budget 1999	Actual 2000	Growth 1996-2000	Actual 1996	Actual 1997	US Dollar Actual 1998	Actual 2000	Actual 1999	Growth 1996-2000
60430000	Purchases - Maintenance Supplies	$-	$-	$37,180,495	$46,516,067	$33,447,107	25%	$-	$-	$62,173	$50,472	$77,783	25%
60470000	Purchases - Office	$-	$-	$28,804,758	$40,263,800	$70,123,849	40%	$-	$-	$48,167	$105,817	$67,329	40%
60520000	Purchases - Electricity & Water	$-	$-	$93,137,148	$103,724,779	$100,000,000	11%	$-	$-	$155,743	$150,900	$173,447	11%
60530000	Purchases - Fuel & Lubricants	$-	$-	$44,201,398	$73,566,522	$53,773,380	66%	$-	$-	$73,913	$81,144	$123,017	66%
60560000	Purchases - Supplies	$-	$-	$6,869,700	$3,398,050	$5,824,000	-51%	$-	$-	$11,487	$8,788	$5,682	-51%
60580000	Purchases - Equipment	$-	$-	$36,083,150	$54,273,785	$100,353,500	50%	$-	$-	$60,338	$151,434	$90,756	50%
61810000	Purchases - Travel Expenses	$-	$-	$9,640,067	$23,660,500	$3,124,900	145%	$-	$-	$16,120	$4,715	$39,565	145%
61840000	Purchases - Transportation	$-	$-	$14,088,521	$9,453,673	$5,491,685	-33%	$-	$-	$23,559	$8,287	$15,808	-33%
62200000	Purchases - Rent	$-	$-	$5,145,000	$4,995,000	$4,240,000	-3%	$-	$-	$8,603	$6,398	$8,353	-3%
62400000	Maintenance - Terminal	$-	$-	$5,137,705	$106,839,488	$120,242,000	1980%	$-	$-	$8,591	$181,445	$178,655	1980%
62410000	Maintenance Other Buildings	$-	$-	$80,052,224	$121,355,272	$128,028,133	52%	$-	$-	$133,862	$193,195	$202,928	52%
62420000	Maintenance Other Buildings	$-	$-	$2,182,400	$5,331,057	$2,462,000	144%	$-	$-	$3,649	$3,715	$8,915	144%
62430000	Maintenance – Runway	$-	$-	$38,678,709	$32,205,325	$74,940,571	-17%	$-	$-	$64,678	$113,085	$53,853	-17%
62440000	Maintenance – Other	$-	$-	$16,730,965	$50,880,327	$64,403,983	204%	$-	$-	$27,977	$97,186	$85,081	204%
62450000	Maintenance – Other	$-	$-	$2,376,613	$10,135,350	$17,982,600	326%	$-	$-	$3,974	$27,136	$16,948	326%
62460000	Maintenance – Salon	$-	$-	$18,802,433	$103,855,536	$3,087,140	452%	$-	$-	$31,441	$4,658	$173,666	452%
62470000	Maintenance - Terminal	$-	$-	$(6,000)	$(282,575)	$637,325	4610%	$-	$-	$(10)	$962	$(473)	4610%
62480000	Maintenance – Busses	$-	$-	$-	$-	$59,400	-	$-	$-	$-	$90	$-	-
62500000	Services – Insurance	$-	$-	$2,691,442	$2,892,997	$8,400,722	7%	$-	$-	$4,501	$12,677	$4,838	7%
62600000	Services – Research	$-	$-	$1,138,750	$2,799,445	$3,474,500	146%	$-	$-	$1,904	$5,243	$4,681	146%
62700000	Services – Public Relations	$-	$-	$7,850,092	$19,443,050	$17,500,900	148%	$-	$-	$13,127	$26,409	$32,512	148%
62800000	Services – Telephone	$-	$-	$33,639,002	$21,871,971	$1,811,206	-35%	$-	$-	$56,251	$2,733	$36,574	-35%
63100000	Finance Charges	$-	$-	$5,901,388	$3,530,923	$4,220,676	-40%	$-	$-	$9,868	$6,369	$5,904	-40%
63200000	Services -	$-	$-	$28,603,732	$10,573,134	$18,605,209	-63%	$-	$-	$47,831	$28,075	$17,680	-63%
63300000	Services - Personnel Training	$-	$-	$24,884,560	$14,178,436	$18,405,125	-43%	$-	$-	$41,612	$27,773	$23,709	-43%
63500000	Services - Contributions	$-	$-	$-	$1,938,736	$1,114,358	-	$-	$-	$-	$1,682	$3,242	-
63510000	Services -	$-	$-	$-	$5,554,602		-	$-	$-	$-	$-	$9,288	-
63600000	Services - Police	$-	$-	$53,993,521	$52,109,650	$97,984,800	-3%	$-	$-	$90,287	$147,859	$87,137	-3%
63700000	Services – Personnel	$-	$-	$600,000	$1,500,000	$288,000	150%	$-	$-	$1,003	$435	$2,508	150%
63820000	Services - Management	$-	$-	$1,440,000	$-	$117,500	-100%	$-	$-	$2,408	$177	$-	-100%
63830000	Services – Receptions	$-	$-	$17,375,419	$14,273,390	$38,551,200	-18%	$-	$-	$29,055	$58,174	$23,868	-18%
63840000	Services – Consultants	$-	$-	$10,794,000	$15,303,008	$11,605,000	42%	$-	$-	$18,050	$17,512	$25,589	42%
63850000	Services - Miscellaneous	$-	$-	$2,573,356	$15,127,354	$11,671,492	488%	$-	$-	$4,303	$17,612	$25,296	488%
64100000	Taxes	$-	$-	$20,744,276	$408,825	$3,119,744	-98%	$-	$-	$34,688	$4,708	$684	-98%
64500000	Taxes	$-	$-	$-	$4,439,422		-	$-	$-	$-	$-	$7,424	-
64700000	Finance Charges	$-	$-	$-	$72,000		-	$-	$-	$-	$-	$120	-
65810000	Other Charges – Tokens	$-	$-	$450,000	$410,000	$525,000	-9%	$-	$-	$752	$792	$686	-9%
65820000	Other Charges - Contributions	$-	$-	$986,000	$2,163,150	$1,055,000	119%	$-	$-	$1,649	$1,592	$3,617	119%
65900000	Other Charges - Reserves	$-	$-	$87,231,708	$-		-100%	$-	$-	$145,868	$-	$-	-100%

Account: Number	Description	Actual 1996	Actual 1997	CFA Franc Actual 1998	Budget 1999	Actual 2000	Growth 1996-2000	Actual 1996	Actual 1997	US Dollar Actual 1998	Actual 2000	Actual 1999	Growth 1996-2000
66100000	Personnel	$-	$-	$891,343	$3,783,447		324%	$-	$-	$1,490	$-	$6,327	324%
66110000	Personnel	$-	$-	$100,421,942	$144,656,270	$104,584,272	44%	$-	$-	$167,924	$157,818	$241,892	44%
66111000	Personnel	$-	$-	$6,220,551	$2,140,278		-66%	$-	$-	$10,402	$-	$3,579	-66%
66112000	Personnel	$-	$-	$11,806,611	$14,573,275	$17,028,394	23%	$-	$-	$19,743	$25,696	$24,369	23%
66113000	Personnel	$-	$-	$5,960,337	$24,403,168	$58,162,677	309%	$-	$-	$9,967	$87,768	$40,807	309%
66114000	Personnel	$-	$-	$7,564,651	$1,280,700	$2,361,734	-83%	$-	$-	$12,649	$3,564	$2,142	-83%
66120000	Personnel	$-	$-	$1,610,354	$-		-100%	$-	$-	$2,693	$-	$-	-100%
66170000	Personnel	$-	$-	$13,154,500	$19,968,035	$10,850,316	52%	$-	$-	$21,997	$16,373	$33,390	52%
66380000	Personnel	$-	$-	$96,505,457	$100,090,407	$109,656,069	4%	$-	$-	$161,375	$165,471	$167,370	4%
66381000	Personnel	$-	$-	$26,271,101	$1,209,371		-95%	$-	$-	$43,930	$-	$2,022	-95%
66382000	Personnel	$-	$-	$5,420,257	$12,879,304	$7,998,226	138%	$-	$-	$9,064	$12,069	$21,537	138%
66383000	Personnel	$-	$-	$3,359,009	$13,196,142	$16,315,914	293%	$-	$-	$5,617	$24,621	$22,066	293%
66384000	Personnel	$-	$-	$-	$587,983		-	$-	$-	$-	$-	$983	-
66410000	Personnel	$-	$-	$62,699,304	$66,234,089	$77,228,656	6%	$-	$-	$104,845	$116,538	$110,756	6%
66411000	Personnel	$-	$-	$15,042,492	$759,157		-95%	$-	$-	$25,154	$-	$1,269	-95%
66412000	Personnel	$-	$-	$3,921,255	$4,821,762	$5,273,833	23%	$-	$-	$6,557	$7,958	$8,063	23%
66413000	Personnel	$-	$-	$1,406,032	$8,049,627	$10,496,772	473%	$-	$-	$2,351	$15,840	$13,460	473%
67000000	Finance Charges	$-	$-	$47,097,889	$-	$1,073,843	-100%	$-	$-	$78,756	$1,620	$-	-100%
68100000	Depreciation	$-	$-	$190,559,036	$289,388,371	$-	52%	$-	$-	$318,650	$-	$483,911	52%
	Total	$-	$-	$1,339,914,653	$1,686,783,435	$1,447,702,711	26%	$-	$-	$2,240,585	$2,184,585	$2,820,614	26%

Table E-2. Operation and Maintenance Expenses-Domestic Airports

Account: Number	Description	Actual 1996	Actual 1997	CFA Franc Actual 1998	Actual 1999	Actual 2000	Growth 1996-2000	Actual 1996	Actual 1997	US Dollar Actual 1998	Actual 1999	Actual 2000	Growth 1996-2000
60430000	Purchases – Maintenance Supplies	$-	$-	$-	$-	$-	-	$-	$-	$-	$-	$-	-
60470000	Purchases – Office	$-	$-	$-	$-	$-	-	$-	$-	$-	$-	$-	-
60520000	Purchases – Electricity & Water	$-	$-	$-	$-	$-	-	$-	$-	$-	$-	$-	-
60530000	Purchases – Fuel & Lubricants	$-	$-	$(1,105,875)	$(2,670,540)	$(2,500,000)	50.35%	$-	$-	$(1,874)	$(4,342)	$(3,773)	52.20%
60560000	Purchases – Supplies	$-	$-	$-	$-	$-	-	$-	$-	$-	$-	$-	-
60580000	Purchases – Equipment	$-	$-	$-	$-	$-	-	$-	$-	$-	$-	$-	-
61810000	Purchases – Travel Expenses	$-	$-		$(10,650)	$-	-	$-	$-	$-	$(17)	$-	-
61840000	Purchases – Transportation	$-	$-	$(162,500)	$-	$-	-100.00%	$-	$-	$(275)	$-	$-	-100.00%
62200000	Purchases – Rent	$-	$-	$-	$-	$-	-	$-	$-	$-	$-	$-	-
62400000	Maintenance – Terminal	$-	$-	$(3,313,925)	$(4,337,030)	$(4,000,000)	9.86%	$-	$-	$(5,617)	$(7,051)	$(6,036)	12.04%
62410000	Maintenance and Repair	$-	$-	$-	$-	$-	-	$-	$-	$-	$-	$-	-
62420000	Maintenance and Repair	$-	$-	$-	$-	$-	-	$-	$-	$-	$-	$-	-
62430000	Maintenance and Repair of Transport Equipment	$-	$-	$(2,637,500)	$-	$-	-100.00%	$-	$-	$(4,470)	$-	$-	-100.00%
62440000	Material Maintenance and Repair	$-	$-	$-	$-	$-	-	$-	$-	$-	$-	$-	-
62450000	Information Material Maintenance and Repair	$-	$-	$-	$-	$-	-	$-	$-	$-	$-	$-	-
62460000	Maintenance – Salon	$-	$-	$-	$-	$-	-	$-	$-	$-	$-	$-	-
62470000	Maintenance – Bar	$-	$-	$(2,216,580)	$(2,144,780)	$(637,325)	-46.38%	$-	$-	$(3,757)	$(3,487)	$(962)	-3.66%
62480000	Maintenance – Bus	$-	$-	$-	$(2,028,281)	$(59,400)	-	$-	$-	$-	$(3,298)	$(90)	-
62500000	Services – Insurance	$-	$-	$-	$-	$-	-	$-	$-	$-	$-	$-	-
62600000	Services – Research	$-	$-	$-	$-	$-	-	$-	$-	$-	$-	$-	-
62700000	Services – Public Relations	$-	$-	$-	$-	$-	-	$-	$-	$-	$-	$-	-
62800000	Services – Telecommunications	$-	$-	$(186,090)	$-	$-	-100.00%	$-	$-	$(315)	$-	$-	-100.00%
63100000	Finance Charges	$-	$-	$-	$-	$-	-	$-	$-	$-	$-	$-	-
63200000	Services – Remunerations	$-	$-	$-	$-	$-	-	$-	$-	$-	$-	$-	-
63300000	Services – Personnel	$-	$-	$(3,125,277)	$(1,575,700)	$-	-100.00%	$-	$-	$(5,297)	$(2,562)	$-	-30.46%
63500000	Quotes	$-	$-	$-	$-	$-	-	$-	$-	$-	$-	$-	-
63510000	Social Corporate Activities	$-	$-	$-	$-	$-	-	$-	$-	$-	$-	$-	-
63600000	Services – Police	$-	$-	$-	$-	$-	-	$-	$-	$-	$-	$-	-
63700000	Services – Personnel	$-	$-	$-	$-	$-	-	$-	$-	$-	$-	$-	-
63820000	Services Management	$-	$-	$-	$-	$-	-	$-	$-	$-	$-	$-	-
63830000	Reception	$-	$-	$(25,000)	$-	$-	-100.00%	$-	$-	$(42)	$-	$-	-100.00%
63840000	Services – Mission	$-	$-	$-	$(125,000)	$-	-	$-	$-	$-	$(203)	$-	-
63850000	Various Management Charges	$-	$-	$-	$(462,230)	$-	-	$-	$-	$-	$(752)	$-	-
64100000	Import and Direct Taxes	$-	$-	$-	$-	$(480,877)	-	$-	$-	$-	$-	$(726)	-
64500000	Import and Indirect Taxes	$-	$-	$-	$-	$-	-	$-	$-	$-	$-	$-	-
64700000	Penalties and Tax Corrections	$-	$-	$-	$-	$-	-	$-	$-	$-	$-	$-	-
65810000	Other Charges – Tokens	$-	$-	$-	$-	$-	-	$-	$-	$-	$-	$-	-
65820000	Donations	$-	$-	$-	$-	$-	-	$-	$-	$-	$-	$-	-
65900000	Other Charges – Resserves	$-	$-	$-	$-	$-	-	$-	$-	$-	$-	$-	-

Account: Number	Description	Actual 1996	Actual 1997	CFA Franc Actual 1998	Actual 1999	Actual 2000	Growth 1996-2000	Actual 1996	Actual 1997	US Dollar Actual 1998	Actual 1999	Actual 2000	Growth 1996-2000
66100000	Direct Remunerations	$-	$-	$-	$-	$-	-	$-	$-	$-	$-	$-	-
66110000	Bamako-Sénou Personnel Salary	$-	$-	$-	$-	$-	-	$-	$-	$-	$-	$-	-
66111000	Salary for Duty Free Shop Personnel	$-	$-	$-	$-	$-	-	$-	$-	$-	$-	$-	-
66112000	Salary for Bus Personnel	$-	$-	$-	$-	$-	-	$-	$-	$-	$-	$-	-
66113000	Salary for Domestic Personnel	$-	$-	$-	$-	$(26,873,349)	-	$-	$-	$-	$-	$(40,552)	-
66114000	Other Personnel Charges	$-	$-	$-	$-	$-	-	$-	$-	$-	$-	$-	-
66120000	Interest and Royalties			$-	$-	$-	-					$-	-
66170000	Advantage en Nature (Habil. Pers,)	$-	$-	$-	$-	$-	-	$-	$-	$-	$-	$-	-
66380000	Personnel Indemnity Bamako-Senou	$-	$-	$-	$-	$-	-	$-	$-	$-	$-	$-	-
66381000	Personnel Indemnity Duty Free	$-	$-	$-	$-	$-	-	$-	$-	$-	$-	$-	-
66382000	Personnel Indemnity Bus	$-	$-	$-	$-	$-	-	$-	$-	$-	$-	$-	-
66383000	Personnel Indemnity Domestic	$-	$-	$-	$-	$-	-	$-	$-	$-	$-	$-	-
66384000	Retirement Indemnity	$-	$-	$-	$-	$-	-	$-	$-	$-	$-	$-	-
66410000	Social Charges Bamako-Senou	$-	$-	$-	$-	$-	-	$-	$-	$-	$-	$-	-
66411000	Social Charges Duty Fee	$-	$-	$-	$-	$-	-	$-	$-	$-	$-	$-	-
66412000	Social Charges Bus.	$-	$-	$-	$-	$-	-	$-	$-	$-	$-	$-	-
66413000	Social Charges Domestic	$-	$-	$-	$-	$-	-	$-	$-	$-	$-	$-	-
67000000	Finance Charges and Others	$-	$-	$-	$-	$-	-	$-	$-	$-	$-	$-	-
68100000	Subsidy	$-	$-	$-	$-	$-	-	$-	$-	$(21,649)	$(21,712)	$-	0.15%
	Total	$-	$-	$(12,772,747)	$(13,354,211)	$(34,550,951)	64.47%	$-	$-	$(41,299.45)	$(41,424.39)	$(50,137.43)	0.15%

Table E-3. Operation and Maintenance Expenses all Airports

	Description:	1996	1997	1998	1999	2000	% Inc/(Dec)	1996	1997	1998	1999	2000	% Inc/(Dec)
	Personnel	$-	$-	$387,739,756	$434,311,451	$411,776,639	3.05%	$-	$-	$657,186	$706,117	$621,371	7.45%
	Maintenance - Terminal	$-	$-	$5,131,705	$106,556,913	$116,242,000	375.94%	$-	$-	$8,698	$173,244	$175,409	1891.81%
	Maintenance - Salon	$-	$-	$18,802,433	$103,855,536	$3,087,140	-59.48%	$-	$-	$31,869	$168,852	$4,658	429.84%
	Maintenance - Other Buildings	$-	$-	$82,234,624	$126,686,329	$130,490,133	25.97%	$-	$-	$139,381	$205,971	$196,910	47.78%
	Maintenance - Buses	$-	$-	$-	$-	$-	-	$-	$-	$-	$-	$-	-!
	Maintenance - Airfield	$-	$-	$38,678,709	$32,205,325	$74,940,571	39.19%	$-	$-	$65,557	$52,360	$113,085	-20.13%
	Maintenance - Other	$-	$-	$19,107,578	$61,015,677	$82,386,583	107.65%	$-	$-	$32,386	$99,201	$124,321	206.31%
	Purchases - Maintenance Supplies	$-	$-	$37,180,495	$46,516,067	$33,447,107	-5.15%	$-	$-	$63,018	$75,627	$50,472	20.01%
	Purchases - Electricity & Water	$-	$-	$93,137,148	$103,724,779	$100,000,000	3.62%	$-	$-	$157,860	$168,639	$150,900	6.83%
	Purchases - Fuel & Lubricants	$-	$-	$44,201,398	$73,566,522	$51,273,380	7.70%	$-	$-	$74,918	$119,607	$77,372	59.65%
	Purchases - Other	$-	$-	$100,631,196	$136,044,808	$189,157,934	37.10%	$-	$-	$170,561	$221,186	$285,440	29.68%
	Services - Security	$-	$-	$53,993,521	$52,109,650	$97,984,800	34.71%	$-	$-	$91,514	$84,721	$147,859	-7.42%
	Services - Other	$-	$-	$106,105,793	$109,777,687	$112,852,087	3.13%	$-	$-	$179,840	$178,480	$170,294	-0.76%
	Finance Charges	$-	$-	$52,999,277	$3,602,923	$5,294,519	-68.39%	$-	$-	$89,829	$5,858	$7,989	-93.48%
	Taxes	$-	$-	$20,744,276	$4,848,247	$2,638,867	-64.33%	$-	$-	$35,160	$7,882	$3,982	-77.58%
	Other Charges	$-	$-	$88,667,708	$2,573,150	$1,580,000	-86.65%	$-	$-	$150,284	$4,184	$2,384	-97.22%
	Personnel (Domestic Airports)	$-	$-	$3,125,277	$1,575,700	$26,873,349	193.24%	$-	$-	$5,297	$2,562	$40,552	-51.64%
	Maintenance - Terminal (Domestic Airports)	$-	$-	$5,530,505	$6,481,810	$4,637,325	-8.43%	$-	$-	$9,374	$10,538	$6,998	12.42%
	Maintenance - Buses (Domestic Airports)	$-	$-	$-	$2,028,281	$59,400	-	$-	$-	$-	$3,298	$90	-!
	Maintenance - Airfield (Domestic Airports)	$-	$-	$2,637,500	$-	$-	-100.00%	$-	$-	$4,470	$-	$-	-100.00%
	Piurchases - Fuel & Lubricants (Domestic Airports)	$-	$-	$1,105,875	$2,670,540	$2,500,000	50.35%	$-	$-	$1,874	$4,342	$3,773	131.64%
	Purchases - Other (Domestic Airports)	$-	$-	$162,500	$10,650	$-	-100.00%	$-	$-	$275	$17	$-	-93.71%
	Services - Other (Domestic Airports)	$-	$-	$25,000	$587,230	$-	-100.00%	$-	$-	$42	$955	$-	2153.18%
	Total Operations & Maintenance Expenses	$-	$-	$1,161,942,274	$1,410,749,275	$1,447,221,834	11.60%	$-	$-	$1,969,394	$2,293,640	$2,183,859	16.46%

Table E-4. Non Aeronautical Revenues – Bamako-Sénou Airport

Account: Number	Description	Actual 1996	Actual 1997	CFA Franc Actual 1998	Actual 1999	Actual 2000	Growth 1996-2000	Actual 1996	Actual 1997	US Dollar Actual 1998	Actual 1999	Actual 2000	Growth 1996-2000
70610000	Passenger Service Charge	$645,044,461	$728,645,775	$777,134,600	$964,145,900	$1,038,667,550	11%	$1,271,274	$1,436,038	$1,299,513	$1,612,230	$1,567,351	6%
70611000	Fuel Charge	$60,803,675	$76,360,464	$100,837,785	$116,945,070	$84,978,766	18%	$119,834	$150,494	$168,619	$195,554	$128,233	13%
70612000	Cargo Charge	$83,414,945	$112,760,212	$100,973,605	$117,228,566	$85,905,392	9%	$164,397	$222,231	$168,847	$196,028	$129,631	4%
70613000	Interest Charge	$22,878,000	$-	$34,020,593	$23,756,000	$37,172,000	1%	$45,089	$-	$56,889	$39,724	$56,093	-3%
70614000	Security Charge	$28,272,244	$33,973,238	$193,766,500	$277,806,705	$302,166,740	77%	$55,720	$66,956	$324,013	$464,544	$455,970	70%
70730000	Land Rent	$26,875,006	$66,074,132	$57,535,150	$38,941,167	$48,470,593	10%	$52,966	$130,221	$96,209	$65,117	$73,142	5%
70731000	Building Rent	$121,872,312	$143,962,118	$123,885,650	$133,942,447	$118,541,979	2%	$240,190	$283,725	$207,160	$223,977	$178,880	-2%
70732000	Advertising Rent	$27,751,100	$10,900,750	$11,279,170	$11,952,000	$16,170,041	-19%	$54,693	$21,484	$18,861	$19,986	$24,401	-22%
70780000	Bus Commision	$9,533,200	$15,602,500	$2,247,000	$9,405,560	$3,546,000	0%	$18,788	$30,750	$3,757	$15,728	$5,351	-4%
70781000	Parking Commision	$9,287,950	$7,288,250	$(7,156,675)	$(9,398,600)	$18,963,200	-	$18,305	$14,364	$(11,967)	$(15,716)	$28,615	-
70782000	Bar Commission	$-	$-	$54,499	$449,400	$-	-	$-	$-	$91	$751	$-	-
70783000	Other Commisions	$21,033,657	$26,099,652	$62,279,178	$20,285,057	$49,535,328	-1%	$41,454	$51,438	$104,142	$33,920	$74,749	-5%
70784000	Electricity Reimbursment	$48,132,905	$51,573,901	$-	$61,556,191	$73,619,053	6%	$94,862	$101,643	$-	$102,933	$111,091	2%
70785000	Water Reimbursement	$195,135	$312,556	$-	$734,190	$2,841,286	39%	$385	$616	$-	$1,228	$4,288	34%
71810000	Subsidy (Exclude from Projections)	$1,727,263	$221,905,049	$(76,420)	$-	$-	-100%	$3,404	$437,338	$(128)	$-	$-	-100%
	Total	$1,106,821,853	$1,495,458,597	$1,456,780,635	$1,767,749,653	$1,880,577,928	12%	$2,181,360	$2,947,297	$2,436,007	$2,956,004	$2,837,794	8%

Table E-5. Non Aeronautical Revenues – Domestic Airport

Account: Number	Description	Actual 1996	Actual 1997	CFA Franc Actual 1998	Actual 1999	Actual 2000	Growth 1996-2000	Actual 1996	Actual 1997	US Dollar Actual 1998	Actual 1999	Actual 2000	Growth 1996-2000
70610000	Passenger Service Charge				$-	$-	-	$-	$-	$-	$-	$-	-
70611000	Fuel Charge				$-	$(2,048,846)	-	$-	$-	$-	$-	$(3,092)	-
70612000	Merchandize Charge				$-	$-	-	$-	$-	$-	$-	$-	-
70613000	Interest Charge				$(30,000)	$(45,000)	-	$-	$-	$-	$(49)	$(68)	-
70614000	Security Charge			$(7,381,000)	$(14,958,000)	$(8,571,000)	-	$-	$-	$(12,510)	$(24,319)	$(12,934)	-
70730000	Land Rent				$-	$-	-	$-	$-	$-	$-	$-	-
70731000	Building Rent				$-	$-	-	$-	$-	$-	$-	$-	-
70732000	Advertising Rent			$(90,000)	$-	$(4,147,963)	-	$-	$-	$(153)	$-	$(6,259)	-
70780000	Bus Commision			$(2,122,100)	$(1,910,100)	$(58,000)	-	$-	$-	$(3,597)	$(3,106)	$(88)	-
70781000	Parking Commision			$(16,908,500)	$(23,364,800)	$(17,438,300)	-	$-	$-	$(28,658)	$(37,987)	$(26,314)	-
70782000	Bar Commission			$(3,695,051)	$(3,419,350)	$(2,172,750)	-	$-	$-	$(6,263)	$(5,559)	$(3,279)	-
70783000	Other Commisions				$-	$-	-	$-	$-	$-	$-	$-	-
70784000	Electricity Reimbursment				$-	$-	-	$-	$-	$-	$-	$-	-
70785000	Water Reimbursement				$-	$-	-	$-	$-	$-	$-	$-	-
71810000	Subsidy			$(76,420)	$-	$-	-	$-	$-	$(130)	$-	$-	-
	Total	$-	$-	$(30,273,071)	$(43,682,250)	$(34,481,859)	-	$-	$-	$(51,310)	$(71,020)	$(52,033)	-

APPENDIX F
LIST OF POTENTIAL CONCESSIONAIRES

LIST OF POTENTIAL CONCESSIONAIRES FROM THE UNITED STATES

LIST OF POTENTIAL SUPPLIERS FROM THE UNITED STATES

LIST OF POTENTIAL AIRPORT MANAGEMENT CONCESSIONAIRES

31 October 2002

ABB Airport Technologies GmbH

(subsidiary Primkop Airport Management PAM)

Core airports: n.a.

Participations: Kruger Mpulalanga Int'l (Nelspruit, South Africa): 90%

Contacts: Frank Schleier, Project Development
frank.schleier@de.abb.com
Elias Mouallem
Vice President, Project Development
elias.mouallem@de.abb.com
Käfertaler Strasse 250
68167 Mannheim
Germany
Tel.: (49) 621 386 2243
Fax: (49) 621-386-2256

ADC (Airport Development Corporation)

Core airports: Toronto Terminal 3

Participations: Budapest (Joint venture with Aéroports de Montréal)

Contacts: Bela Danczkay, Michael Huang, principals
Mona, secretary
Peter Cheung, assistant
370, Queen's Quay West
Suite 300
Toronto (ON) M5V 3J3
Canada
Tel: 1 416 260 2333
Cell Danczkay / Budapest: 011 3630 475 9001
Cell Huang / Quito: 011 5939 726 2674
Fax: 1 416 260 2347
adc@adccanada.com

Aecon Group Inc.

Core airports: n.a.

Participations: Quito

Contacts: John Beck, President
Bill Pearson, Executive Vice President
Tel: 416-754-8735
Fax: 416-754-1988
Cell: 416-434-6291
bpearson@aecon.com
aecon@aecon.com

www.aecon.com

AENA INTERNACIONAL

Core airports:	Barcelona
	Madrid
Participations:	Mexico (12 airports): management contract
Contacts:	Javier Marín, Director de Desarrollo Internacional
	jmarin@aena.es
	Mª José Montero, Secretaria - Dirección General
	Arturo Soria 109 - 2ºplanta
	28043 Madrid
	mjmontero@aena.es
	Tel: 34 91 321 29 63
	Fax: 34 91 321 15 91

Aéroport de Bordeaux (CCI Bordeaux)

Core airports:	Bordeaux
Participations:	Société de l'Aéroport de Lomé – Tokoin: 5% (concession)
	Société des Aéroports de Mauritanie: 6% (concession)
Contacts:	Tel: (335) 56 34 5050
	Tel: (335) 57 92 8100
	Robert Beynat, Directeur de l'aéroport
	info@bordeaux.aeroport.fr

Aéroport de Paris (ADP)

Core airports:	Paris – Charles de Gaulle
	Paris – Orly
Participations:	Aéroports de Cameroun: management contract
	Beijing Capital Int'l Airport: 10%
	SAB Liège: 25%
	Mexico (North-central airports group): 25%
	Conakry
Contacts:	M. Dominique Pannier
	Directeur Général
	ADP International
	291, boul. Raspail
	75014 Paris
	France
	Tél: (33 1) 43 35 71 86
	dominique.pannier@adp.fr

Aeroporti di Roma

Core airports:	Rome – Fiumicino
	Rome – Leonardo da Vinci
	Rome – Ciampino

Participations: Airports Company of South Africa (ACSA): 20%
Società Aeroportuali di Calabria: 16.5%
Genoa: 15%
Contacts: Franco Pappalardo, President
Via dell'Aeroporto di Fiumicino
320, 00050 Fiumicino (Rome)

Aéroports de Montréal
Core airports: Montréal – Dorval
Montréal – Mirabel
Participations: Vatry – Europort (France)
Budapest – Ferihegy Terminal Company
Contacts: James Cherry, PDG
Pierre Martin, Président du Conseil d'Administration
1100, boul. René-Lévesque ouest, bureau 2100
Montréal (QC) H3B 4X8 Canada
1 514 394 7200 (T)
1 514 394 7356 (F)

Airports Company of South Africa
Contacts: P.O. Box 75480
Gardenview
2047
Republic of South Africa
Robina Dunn, secretary
robina@airports.co.za
Tel: (27) 11 723 1400
Fax: (27) 11 453 9354
Piet de Jager
Chief Executive, Airport Management Solutions
Tel: (27) 11 723 1458
piet@airports.co.za
www.airports.co.za

Airport Group International (AGI)
Division of TBI plc Group
Participations: Belfast Int'l (UK): 100% owned by TBI
Los Angeles International Airport: services contract
San Francisco International Airport: services contract
San Jose (CA) International Airport: services contract
San Jose (Costa Rica) International Airport: management contract
Bolivia (La Paz, Cochabamba, Santa Cruz): management contract
Cardiff Int'l (UK): 100% owned by TBI
London Luton (UK): 71% TBI ownership
Orlando – Sanford (USA): TBI ownership

Rochester (NY) International Airport: services contract
Atlanta-Hartsfield International Airport: management assistance
Shreveport (LA) Regional Airport: services contract
Stockholm-Skavsta (Sweden): TBI ownership

Contacts:
(AGI): 330 N. Brand Boulevard, Suite 300
Glendale, California 91203-2308
USA
Mac McGowan
Tel: (818) 409 7500
Fax: (818) 409 7979
airportservices@airportgroup.com
(TBI): 159 New Bond Street
London W1Y 9PA
UK
(44) 207 408 7300 (T)
(44) 207 408 7321 (F)

Alterra Partners
Bechtel Enterprises International and Singapore Changi Airport Enterprise pte Ltd.

Participations: London Luton (UK): 10%
Lima – Jorge Chavez Airport

Contacts:
Paul Unruh, President & Chief Operating Officer
Bechtel Enterprises International
50 California Street, Suite 2200
P.O. Box 193965
San Francisco, CA 94119
USA
Phone: +1 415 768 4452
Mark Nielson
dvlpmt@bechtel.com
Jaime Guillen, Chief Executive Officer
Tony Gollin, Senior Vice President
aegollin@alterra-partners.com
Alterra Partners
11 Pilgrim Street
London EC4V 6RN
United Kingdom
Tel: (44) 207 651 7693
Edificio Montes Urales III
Montes Urales 505, Piso 2
Col. Lomas de Chapultepec
Mexico, D.F. 11000
Phone: +525 201 3579

One Temasek Avenue
N° 23-00 Millenia Tower
Singapore 039192
Phone: +65 541 2292
Alterra Partners Costa Rica S.A.
Global Park
650 metros al este de Plaza Real Cariari
La Aurora, Heredia
Costa Rica,
Phone: +506 209-5600
Fax: +506 209-5656

ASECNA Services

Core airports:	24 airports (Dakar Convention, Art. 2): airside management contract
Participations:	Aéroports du Cameroun: 20% (Concession) Abidjan (AERIA): 3% (Concession) Libreville (ADL): 5% (Concession) Société des Aéroports de Mauritanie: 10% (Concession)
Contacts:	Ousmane Issoufou Oubandawaki Directeur Général Babacar S. Diagne A/s Directeur des études et orientations stratégiques Direction Générale de l'ASECNA 32-38, av. Jean-Jaurès BP 3144 Dakar Sénégal youssouf@asecna.org Tel: (221) 823 10 40 / 823 95 70 Fax: (221) 823 46 54

ATCO Airports

Core airports:	North Warning System Arctic Airports (US and Canada)
Participations:	Castlegar (Canada): management contract Portage la Praire: (Canada): management contract North Bay (Canada): management contract Shearwater (Canada): management contract Resolute (Canada): management contract Iqaluit (Canada): management contract Yellowknife (Canada): management contract
Contacts:	Jim Grecco, Managing Director, Airports jim.grecco@atcofrontec.com 204, 63 Airport Road Edmonton, AB T5G 0W6 Canada

Tel: 780 455 7847 (208)
Tel: 403 245 7925

Bechtel Enterprises International (affiliated with Alterra Partners)
See Alterra Partners

Bilfinger Berger BOT GmbH
Participations: n.a.
Contacts: Gustav-Nachtigal-Straße 3
65189 Wiesbaden
Tel: (49) 611 708 307 (433)
Fax: (49) 611 708 793 (309)
Gerhard Becher
gerhard.becher@bilfinger.de
Detlef Knop
detlef.knop@bilfinger.de

British Airports Authority (BAA) plc.
Core airports: London – Heathrow
London – Gatwick
London – Stanstead
Prestwick (Scotland)
Participations: Pacific airports group (Melbourne, etc. – Australia): 15%
Naples: 65%
Boston – Logan: retail concession management
Indianapolis: management contract
Pittsburgh: retail management
Oman
Contacts: Mike Hodgkinson, Chief Executive Officer
Tel: (44) 207 834 9449
For Europe and the rest of the world
BAA plc
5th floor South Roof Office Block
Gatwick Airport
West Sussex
United Kingdom
RH6 0NP
Sandy Lightfoot - International Retail Director
Telephone: (44) 1293 502 114
sandy_lightfoot@baa.co.uk
Duncan Tolson - Business Development Director, International Retail
Telephone: (44) 1293 503 762
duncan_tolson@baa.co.uk
For the Americas

BAA Pittsburgh Inc.
PO Box 12318
Pittsburgh International Airport
Pittsburgh PA 15230
Mark Knight - Regional Director, BAA USA
Telephone: (1 412) 472 5191
m_knight@baausa.com

Cintra Group (Spain)

Participations: Bristol: 100% (ownership)
Antofagasta, Chile: 100% (10-yr Concession)
Mexico: 25% (50 yr Concession)

Contacts: Juan Béjar Ochoa, Director General
Pza. Manuel Gómez Moreno, 2
Edificio Alfredo Mahou
28020 Madrid
Juan Béjar, Director and General Manager
Tomás Aranda, Airports Manager
mail@ferrovial.es
www.ferrovial.es

Copenhagen Airports Development S/A
Core airports: Copenhagen/Kastrup Int'l.
Participations: Newcastle (49%)

Contacts: Kjeld Binger
Executive Vice President, COO, CPH International
Box 74, Lufthavnsboulevarden 6
DK-2770 Kastrup
Denmark
Tel: (45) 3231 3231
Fax: (45) 3231 3132

Fraport AG

Core airports: Frankfurt – Main

Participations: Brisbane: 1%
Athens: retail concessions
Hahn: 75%
Hannover: 20%
Hong Kong Tradeport (cargo center): 37.5% (JV with Schiphol)
Philippine International Air Terminal Company: 30%
Athens: retail concessions
Anatalya (Turkey): retail concessions
Sarrebrücken: 51%

Contacts: Dr. Wilhelm Bender, CEO

Flughafen Frankfurt/Main AG
D-60547 Frankfurt am Main
(49) 69 6900 or 0 (800) 234-5679
Sabina Preuss
Airport Expert
(49) 69 690 71483
s.preuss@fraport.de
Cecil White
Akquisitionen & Beteiligungen (AUB)
Fraport AG
Frankfurt Airport Services Worldwide
Global Investments & Management
Building 664.2670
60547 Frankfurt am Main
Tel: (49) 69 690 73040
Fax: (49) 69 690 60008
c.white@fraport.de
www.fraport.de

Greater Toronto Airports Authority / Sanders Investment Ltd.

Core airports:	Toronto – Pearson
Participations:	Lagos – Murtala Muhammed
Contacts:	Louis Turpin, Managing Director
	Scott Armstrong, Communications Coordinator
	Lester B. Pearson International Airport
	P.O. Box 6031, 3111 Convair Drive
	Toronto AMF, Ontario - Canada - L5P 1B2
	Tel: 416 776 3580
	Fax: 416 776 7593
	Fax: 905 814 4050
	www.gtaa.com

Hochtief AirPort GmbH

Participations:	Düsseldorf, Athens, Hamburg
Contacts:	Edward Clayton, Head of Aviation
	Huyssenallee 100, 4th floor
	45128 Essen
	Germany
	Tel.: (49) 201 824 2206 / 2243
	Fax: (49) 201 824 1829 / 1838
	www.hochtief.de
	Wulf-Dieter Ziegenbein
	Manager International Projects
	Obernplatz 2
	45128 Essen

Germany
Tel: (49) 201-824-2122 / 2243
Fax: (49) 201-824-2575 / 1838
Marketing dept.
Bismarckstr. 39
45128 Essen
Germany
Tel: (49) 201 824 1522
Fax: (49) 201 824 1813
info@ha.hochtief.de

Houston Airport System Airport Development Corporation

Core airports:	Houston – Bush Int'l
	Hobby Field
	Ellington Field
Participations:	Quito
Contacts:	Hoyt Brown, Deputy Director of Marketing, HAS
	Tina Sceppi, assistant
	Houston Airport System
	16930 JFK Boulevard
	Houston, Texas 77032
	Tel. 281-233-3000
	Fax: 281 233 1859

Manchester Airport plc

Core airports:	Manchester Int'l
Participations:	Bournemouth Int'l Airport Ltd.
	East Midlands Int'l Airport Ltd
Contacts:	Manchester Airport PLC
	Manchester
	M90 1QX
	Telephone: (44) 161 489 3000
	Fax: (44) 161 489 3813
	www.manairport.co.uk

Office National des Aérodromes (ONDA), Morocco

Core airports:	all Moroccan airports
Participations:	new Dakar airport project (proposed)
Contacts:	Mohamed Amal Guédira, Director General
	Casa-Oasis – B.P. 8101
	Casablanca, Maroc
	Tel. (212-2) 33.90.40/33.91/40 Fax (212-2) 33.90.51
	onda@mtds.com

Pantares (joint venture of Fraport and Schiphol Group)

Core airports: Frankfurt – Main and Amsterdam – Schiphol
Participations: Hong Kong – Chek Lap Kok cargo and logistics center
Contacts: (same as Fraport)
Robert A. Payne
Manager International Press
Press and Publications (VSP)
60547 Frankfurt am Main
Germany
Tel: +49 69 690 78547
Fax: +49 69 690 60548
E-mail: r.payne@fraport.de
Internet: www.fraport.de
Corporate Communications & Public Affairs
P.O. Box 7501, 1118 ZG Schiphol
The Netherlands
Tel: +31 20 601 2177
Fax: +31 20 601 2253
E-mail: press@schiphol.nl
Internet: www.schiphol.nl
www.pantares.com

San Francisco International Airport
Core airports: San Francisco International
Contacts: P.O. Box 8097
San Francisco, CA 94128

Schiphol Group
Core airports: Amsterdam – Schiphol
Participations: Brisbane: 16%
Eindhoven (Holland): 51%
New York – JFK Terminal One: 40%
Contacts: G.J. Cerfontaine, President & Chief Executive Officer
P.O. Box 7501, 1118 ZG
Schiphol, The Netherlands
Tel: (31) 20 601 2177
Fax: (31) 20 601 2253

SEGAP (Société d'Exploitation et de Gestion Aéroportuaire)
Joint venture SOFREAVIA Services and CCI Marseille-Provence
Core airports: Marseille
Participations: Abidjan: 34%
Libreville
Contacts: 3, Carrefour de Weiden
92441 Issy-les-Moulinex Cédex
France

Christian Rognone, Directeur Général, AERIA (Abidjan)
07 BP 30, Abidjan 07 Côte d'Ivoire
(225) 21 27 87 96 (T)
(225) 21 27 73 22 (T)
(225) 21 27 73 37 (F)
e-mail: aeria_dg@aviso.ci

Singapore Airport Authority

Core airports: Singapore – Changi
Participations: Auckland Int'l (New Zealand)
Contacts: Singapore Changi Airport Enterprise (SCAE) Pte Ltd
Singapore Changi Airport
P.O. Box 1 Singapore 918141
Tel: (65) 541 2671; Fax: (65) 545 5369
E-mail: scae93@singnet.com.sg

SNC-Lavalin Inc.

Core airports: n.a.
Participations: Malta (with VIE, etc.)
Contacts: Henry Wakabayashi, VP Airport Development
3823 Henning Drive, suite 202
Burnaby, BC V5C 6P3
Canada
Tel: 604 299 8860
Fax: 604 299 8722
@: lkwan@pla.bc.ca
Pierre Anctil, President, SNC-Lavalin Investments
Tel: 514 393 1000

TBI Airports Group Ltd.

Participations: Belfast Int'l (UK): 100%
Bolivia (La Paz, Cochabamba, Santa Cruz)
Cardiff Int'l (UK): 100%
London Luton (UK): 71%
Orlando – Sanford (USA)
Skavsta (Sweden)
Contacts: 159 New Bond Street
London W1Y 9PA
(44) 207 408 7300 (T)
(44) 207 408 7321 (F)

Vienna Airport Authority
Core airports: Vienna Int'l. Airport
Participations: Ciudad Real (Spain): 18%
Berlin/Brandenburg: 7% (pending)
Bratislava (Slovakia): in negotiation
Contacts: Herbert Kaufman, Speaker of the Management Board
Tel: (43) 1
Fax: (43) 1

Vinci SA (France)
Core airports:

Participations: Mexico (22 airports, including Cancun
Beijing Airport
Phnom Penh and Siem Reap airports (Cambodia)
Offer to purchase TBI Airports (refused)
Contacts: Renaud de Matharel, Airport Management
Tel: 331 47 16 43 34
Fax: 331 47 16 34 53
@: rdematharel@groupe-vinci.com
Patrick Durand-Smet, Airport Services
Tel: 331 47 16 36 03
Fax: 331 47 16 35 30
@: pdurand-smet@groupe-vinci.com

Wiggins Airports and Property Group (UK)
Core airports:
Participations: Pilsen (Czech Republic)
Contacts:

YVR Airport Services Inc. (YVRAS)
Core airports: Vancouver Int'l. Airport
Participations: Dominican Republic: 7.75% of operating co. AERODOM
Hamilton (Bermuda)
Hamilton (Ontario): 12% of operating/dev't. co Tradeport
Providenciales (Turks & Caicos Islands): management
Santiago (Chile) Int'l: 10% of operating/management co. SCI
Contacts: Frank O'Neill, President
George H. Casey, VP Business Development
Winnie Cheng, Executive Assistant
P.O. Box 23750
Airport Postal Outlet
Richmond (BC) V7B 1Y7 Canada
1 604 276 6524 (T)
1 604 276 6505 (F)

Zurich Airport Authority
Core airports: Zurich
Participations:
Contacts: Albert Brunner, Max Basler
Peter Erickson, Head of Marketing
Flughafen Zurich AG
P.O. box
CH-8058 Zurich-Airport
Phone: (41) 1 816 22 11
(41) 1 816 21 00
(41) 1 816 21 01

(41) 1 816 49 31
www.uniqueairport.com

LIST OF POTENTIAL AIRPORT MANAGEMENT CONCESSIONAIRES FROM THE UNITED STATES

OR AFFILIATE US OFFICES

Aecon Group Inc.
Core airports: n.a.
Participations: Quito
Contacts: John Beck, President
Bill Pearson, Executive Vice President
Tel: 416-754-8735
Fax: 416-754-1988
Cell: 416-434-6291
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aecon@aecon.com
www.aecon.com

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Division of TBI plc Group
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San Francisco International Airport: services contract
San Jose (CA) International Airport: services contract
San Jose (Costa Rica) International Airport: management contract
Bolivia (La Paz, Cochabamba, Santa Cruz): management contract
Cardiff Int'l (UK): 100% owned by TBI
London Luton (UK): 71% TBI ownership
Orlando – Sanford (USA): TBI ownership
Rochester (NY) International Airport: services contract
Atlanta-Hartsfield International Airport: management assistance
Shreveport (LA) Regional Airport: services contract
Stockholm-Skavsta (Sweden): TBI ownership
Contacts: (AGI): 330 N. Brand Boulevard, Suite 300
Glendale, California 91203-2308
USA
Mac McGowan
Tel: (818) 409 7500
Fax: (818) 409 7979
airportservices@airportgroup.com
(TBI): 159 New Bond Street
London W1Y 9PA

UK
(44) 207 408 7300 (T)
(44) 207 408 7321 (F)

Alterra Partners
Bechtel Enterprises International and Singapore Changi Airport Enterprise Ltd.
Participations: London Luton (UK): 10%
Lima – Jorge Chavez Airport
Contacts: Paul Unruh, President & Chief Operating Officer
Bechtel Enterprises International
50 California Street, Suite 2200

P.O. Box 193965

San Francisco, CA 94119

USA

Phone: +1 415 768 4452

Mark Nielson
dvlpmt@bechtel.com
Jaime Guillen, Chief Executive Officer
Tony Gollin, Senior Vice President
aegollin@alterra-partners.com
Alterra Partners
11 Pilgrim Street
London EC4V 6RN
United Kingdom
Tel: (44) 207 651 7693
Edificio Montes Urales III
Montes Urales 505, Piso 2
Col. Lomas de Chapultepec
Mexico, D.F. 11000
Phone: +525 201 3579
One Temasek Avenue
N° 23-00 Millenia Tower
Singapore 039192
Phone: +65 541 2292
Alterra Partners Costa Rica S.A.
Global Park
650 metros al este de Plaza Real Cariari
La Aurora, Heredia
Costa Rica,
Phone: +506 209-5600
Fax: +506 209-5656

Bechtel Enterprises International (affiliated with Alterra Partners)
See Alterra Partners

British Airports Authority (BAA) plc.
Core airports: London – Heathrow
London – Gatwick
London – Stanstead
Prestwick (Scotland)
Participations: Pacific airports group (Melbourne, etc. – Australia): 15%
Naples: 65%
Boston – Logan: retail concession management
Indianapolis: management contract
Pittsburgh: retail management
Oman
Contacts: Mike Hodgkinson, Chief Executive Officer
Tel: (44) 207 834 9449
For Europe and the rest of the world
BAA plc
5th floor South Roof Office Block
Gatwick Airport
West Sussex
United Kingdom
RH6 0NP
Sandy Lightfoot - International Retail Director
Telephone: (44) 1293 502 114
sandy_lightfoot@baa.co.uk
Duncan Tolson - Business Development Director, International Retail
Telephone: (44) 1293 503 762
duncan_tolson@baa.co.uk
For the Americas
BAA Pittsburgh Inc.
PO Box 12318
Pittsburgh International Airport
Pittsburgh PA 15230
Mark Knight - Regional Director, BAA USA
Telephone: (1 412) 472 5191
m_knight@baausa.com

Houston Airport System Airport Development Corporation

Core airports: Houston – Bush Int'l
Hobby Field
Ellington Field

Participations: Quito

Contacts: Hoyt Brown, Deputy Director of Marketing, HAS
Tina Sceppi, assistant
Houston Airport System
16930 JFK Boulevard
Houston, Texas 77032
Tel. 281-233-3000
Fax: 281 233 1859

San Francisco International Airport

Core airports: San Francisco International

Contacts: P.O. Box 8097
San Francisco, CA 94128

APPENDIX . LIST OF POTENTIAL U.S. SUPPLIERS

1. Loading bridges (also aircraft tugs)
    - Jetway Systems, 1805 W. 2550 south, Ogden UT 84401
2. Apron and airfield lighting
    - Cooper Industries, Crouse-Hinds Division, 23 Spyce Mill Ct., Randallstown, MD 21133
3. Ground Service and cargo handling equipment
    - DevTech Corporation, 812 Bloomfiled Ave., Windsor, CT 06095
    - FMC Corporation, Airline Equipment Division, 7300 Presidents Drive, Orlando, FL 32809
4. Preconditioned air and 400 HX power
    - INET Airport Systems, 1871 S. Chris Lane, Anaheim, CA 92805
5. Aircraft docking systems
    - RLG, 12964 Moorpark St., Studio City, CA 91604
6. Hydrant refueling systems
    - Nova Group, Inc., 7411 Napa-Vallejo Highway, Napa, CA 94558
    - Caddell Construction Co., 2700 Logan Park Dr., Montgomery, AL 36109
7. Airport maintenance equipment
    - Defender Industries, P.O. Box 1775, Columbia, SC 29202
    - Athey Products Corp., P.O. Box 669, Raleigh, NC 27602
8. Baggage conveyors
    - BAE Automated Systems, Inc., P.O. Box 81902, Dallas, TX 75381

9. Escalators/elevators

- Otis Elevator, 10 Farm Springs, Farmington, CT 06031

10. Flight Information Display Systems (FIDS) and PA systems

- International Display Systems, 3131 S. Dixie, Dayton, OH 45439

11. Security systems

- Astrophysics Research Corp., 40312 Via Oro Ave., Long Beach, CA 90801

12. Kitchen equipment

- Marriott Corporation, 1 Marriott Drive, Washington, DC 20058
  (Marriott does not make but assembles and operates flight kitchens. Major equipment suppliers are Hobart, Vulcan, Bally and Emjac)

13. Terminal furnishings

- Davis Furniture Industries, Inc., P.O. Box 2065, High Point, NC 27261

14. Terminal Building Systems

- Air conditioning

  York International Corp., 8301 Patuxent Range Road, Jessup, MD 20794

- Roofing

  Carlisle Corp. P.O. Box 7000, Carlisle, PA 17013

- Flooring

  Dow Chemnical, 2864 N. Dug Gap Road, Dalton, GA 30720

- Curtain walls

  H.H. Robertson Co., Two Gateway Center, Pittsburgh, PA 15222

- Glass

  Globe Amerada Glass Co., 2001 Greenleaf Avenue, Elk Grove Village, IL 60007

- Automated Building Systems

  Honeywell, Honeywell Plaza, Minneapolis, MI 55408

- Cladding

  Reynolds Metal Co., P.O. Box 27003, Richmond, VA 23261

- Closed circuit TV

  Javelin Electronics, 19831 Magellan Drive, Torrance, CA 90502

- Signs

  Vomar, 16641 Roscoe Place, Sepulveda, CA 91343

- Doors

  Kawneer Company, Inc., 15651 Country Club Road, Harrisonburg, VA 22801

- Suspension ceilings

  Simplex Ceililng Corp., 50 Harrison Street, Hoboken, NJ 07030

- Skylights

  IBG International, P.O. Box 100, Wheeling, IL 60090

- Fire alarms, sprinkler systems

  Simplex, Gardner, MA 01441

  J&G Products Co., Inc., 2134 Espey Court, Crofton, MD 21114

15. Rescue & fire fighting

- Maryland Fire Equipment Corp., 12284 Wilkins Avenue, Rockville, MD 20852

- American Fire Equipment, Inc., 888-AFE-FIRE

16. Waste water treatment

- Envirotech Consutlants, Inc., 462 South Ludlow Alley, Columbus, OH 43215

17. Cargo handling

- Pacific Industries, Inc./Pacific Cargo Control, Inc. 1-800-821-8431, Tualatin, OR

18. Equipment Transportation

- Geologistics Services Inc., 205 South Whiting St., Suite 500, Alexandria, VA 22034

APPENDIX G
NOTICE OF REQUEST FOR PROPOSALS

REPUBLIC OF MALI
AIRPORTS CONCESSION

REQUEST FOR PROPOSALS

The Government of the Republic of Mali intends to select an operator/investor for the national airports system in the framework of a long term Concession Contract, in order to ensure the timely improvement of the facilities and services, as well as the expansion of capacities, at the country's airports.

The scope of the Concession comprises the international airport of the capital city, Bamako, as well as other airports open to public air traffic, to be proposed by the bidder. The Concessionaire will be responsible for the management, operation and maintenance of the above-mentioned airports, as well as the realization of an investment program aimed at the modernization, expansion and renovation of the airport facilities.

The Government invites interested parties to submit proposals for this concession. This invitation is open to national and international enterprises with experience in airport management, operation and maintenance. Submissions may be made by consortia or groups of enterprises.

The Bidding Documents may be consulted at the following address:

Direction Administrative et Financière
Ministère de l'Équipement et des Transports (DAF/MÉT)
Bamako, BP 78
République du Mali
Tél: (223) 222 23 81 / Fax: (223) 222 90 60

In order to obtain the Bidding Documents, the interested candidate must submit a written request to the Government, accompanied by a non refundable certified cheque in the amount of 150 000 FCFA plus applicable courier charges, made out to the *Ministère de l'Équipement et des Transports du Mali.*

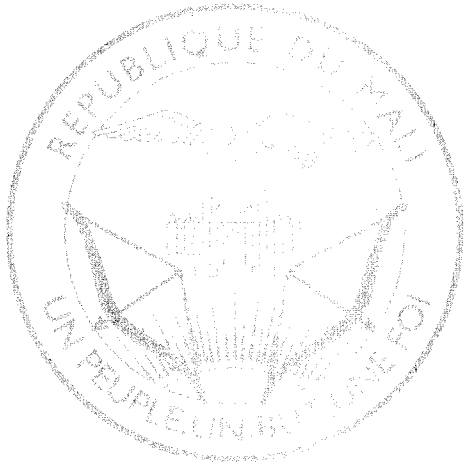
Interested parties may obtain further information from the Independent Consultant desigated by the Government:

Attention : Mr. S.J. Stein
AAROTEC Infrastructure Group Inc.
P.O. Box 4007, Oakton, VA 22124, USA
Tél: (1 703) 255 3701 / Fax: (1 703) 255-3703
mali_airports@aarotec.com, aarotec@aarotec.com,

The Bidding Documents are available as of **May 5, 2003**. Proposals must be received no later than **July 4, 2003** as stipulated in the Bidding Documents.

APPENDIX H
INSTRUCTIONS TO BIDDERS

Ministry of Industry Commerce and Transportation of the Republic of Mali



MALI AIRPORTS CONCESSION

INSTRUCTIONS TO BIDDERS

Revised 20 December 2002

MALI AIRPORTS CONCESSION INSTRUCTIONS TO BIDDERS

(Document revised following the Briefing of Bidders in Bamako from 16-17 December 2002)

Bidders must submit their official offers in conformity with the following instructions:

1. Technical Offer

1.1 Identification and Corporate Structure of the Bidder

The bidder must provide a description of its organization, including a breakdown of shareholdings, the capitalization of the enterprise and technical qualifications in the operation and development of airports.

1.2 Approach

The bidder must provide a description of its approach to the management and the operation of the airports forming part of the concession, including:

- The organizational structure of the management;
- The number and assignment of personnel to different sites and positions;
- The proposed measures of internal control and communication.

1.3 Investment Program

The bidder must provide a description of the investment program, which he proposes to implement. This program will include the specification of the works to be undertaken at each site and for each phase.

The bidder may propose an investment program, which is different from that, which is presented in Annex A4 and which should be considered only as an indication of the facility requirements at each site; in this case, the bidder must provide a justification of his proposed program.

2. Financial Offer

2.1 Proposal

The bidder must propose a financial offer comprising the following elements:

- A commitment to implement the proposed investment program;
- The level of participation of the Malian private sector;
- The level, structure and modalities of the concession fee to be paid to the State;

2.2 Demonstration of Financial Feasibility

The bidder must demonstrate the financial feasibility of his offer, including the implementation of the proposed investment program, by means of *pro forma* financial projections covering the period of the concession.

2.3 Participation in employee compensation plan

The bidder must present a proposal for participation in an employee compensation plan for the personnel of ADM and ASECNA affected by the concession, specifying:

- The number of personnel and the positions to be retained within the new organization for the operation and development of the airports;
- The modalities for indemnisation of the non-retained personnel.

3. Evaluation Criteria

The bids will be evaluated according to the following matrix and weighting of evaluation criteria:

ÉVALUATION CRITÈRIA	WÉIGHTING	
1. Technical Offer		**50%**
(a) Qualifications	20%	
(i) Financial capacity	10%	
(ii) Technical qualifications	10%	
• Airport development		
• Airport operation		
(b) Approach	10%	
(i) Management organization	5%	
(ii) Internal controls and communication	5%	
(c) Investment program	20%	
(i) Specific commitments and timetable	14%	
(ii) Justification of the proposed program	6%	
2. Financial Offer		**50%**
(a) Financial proposal	20%	
(i) Level of fee to be paid to the State	15%	
(ii) Participation of Malian private sector	5%	
(b) Demonstration of financial feasibility	14%	
(i) Structure of airport charges	7%	
(ii) Financial projections	7%	
(c) Participation in employee compensation plan	16%	
(i) Offer to personnel to be retained	8%	
(ii) Indemnisation of non-retained personnel	8%	
Total		**100%**

4. Deadline and submission of offers

4.1 Form

Submissions must be in the French language, with all references to dimensions in the metric system and all references to financial calculations in CFA francs.

4.2 Deposit

In order to be considered, all submissions must be accompanied by a deposit of 3,000,000 CFA francs, in the form of a certified check in the name of the *Ministère de l'Industrie, du Commerce et des Transports du Mali.* In the event that the offer of the bidder is not accepted, the check will be returned.

4.3 Deadline

Submissions must arrive at the office of the *Direction Administrative et Financière du Ministère de l'Équipement et des Transports* (DAF/MÉT) by 28 January 2003, before 16h00, local time. Any submissions received after the deadline will not be considered.

4.4 Place of Submission

The submissions must be sent to the following address:

Direction Administrative et Financière
Ministère de l'Équipement et des Transports (DAF/MÉT)
Bamako, BP 78
République du Mali

Tél (223) 222 23 81; Fax (223) 222 90 60
REPUBLIC OF MALI
AIRPORTS CONCESSION

APPENDIX I
TERMS OF REFERENCE AND QUESTIONNAIRE

MALI AIRPORTS CONCESSION

TERMS OF REFERENCE – QUESTIONNAIRE

PART I. TERMS OF REFERENCE

1 General Context

The Government of the Republic of Mali considers that the timely improvement of the facilities and services, as well as the expansion of throughput opacity, at the airports of the country constitutes a priority in order to enable air transportation to play the role of a driver for socio-economic and tourist development. In his context, the Government envisages the concession of the development and the management of its airport to a company set up under Malian law and managed by a private-sector professional airport operator (shareholder of reference). The Government recently launched a Call for Proposals in this regard, which was inconclusive. With this in mind, the Government is

The present process is undertaken in a spirit of openness and flexibility. It consists of, by means of a summary Terms of Reference and on the basis of a Questionnaire, in order to enable the Government to select a partner for negotiations aimed at the timely signature of an agreement or the airports concession.

2. Objectives of the Concession

- ✈ Ensure the maximum contribution of air transportation as a driver of socio-economic development, notably by the improvement of access to the country and its regions and the realization of its tourism potential;
- ✈ Improve the quality of the services available to airport users;
- ✈ Increase the throughput capacity of the airports in order to improve the air traffic potential and to reinforce the competitive position of the Malian airports in the West African region;
- ✈ Develop the potential of Bamako-Sénou International Airport as a hub for airlines in the West African region;
- ✈ Ensure the participation of the private sector in investment financing and airport management;
- ✈ Ensure the development and efficient management of the entire national system of airports open to public air traffic, as well as Bamako-Sénou International Airport;
- ✈ Implement the potential for development of the lands of the Bamako-Sénou airport zone for industrial and commercial activities, etc, in order to promote air traffic growth, optimize the value added and create employment, while at the same time taking into account among others, the "*Plan de Développement Intégré de la Zone Aéroportuaire de Bamako-Sénou*";

- ✈ Ensure the harmonious disengagement of the direct participation of the State in airports financing, management and development.

3. *Airports Included in the Concession*

The scope of the Concession includes as first priority the international airport of the capital city, Bamako-Sénou. This being said, the Concession of Bamako-Sénou airport can be modified to include as well some or all of the other airports open to public air traffic in Mali, notably the following sites:

Gao
Goundam
Kayes
Kéniéba
Mopti
Nioro
Sikasso
Tombouctou
Yélimané

The following table indicates the essential information for each of these airports.

Airport	Runway (m)	Remarks
Bamako-Sénou	2700 x 45	Capital city; international terminal building and wide-body aircraft parking apron; VOR; Category 1 ILS; runway lighting; control tower; HF/VHF
Gao	2500 x 45	Small terminal building; aircraft parking apron; control tower; VOR; NDB; HF/VHF
Goundam	1500 x 30	HF/VHF
Kayes	1600 x 40	Mid-range aircraft parking apron; VOR/DME; PAPI; day and night runway lighting; VHF
Kéniéba	900 x 28	HF/BLU
Mopti	2500 x 40	Small terminal building; aircraft parking apron; control tower; VOR; night runway lighting; VHF
Nioro	1500 x 30	Night runway lighting; VHF
Sikasso	1900 x 40	Mid-range aircraft parking apron; VOR/DME; PAPI; day and night runway lighting; VHF
Tombouctou	2100 x 30	New terminal building and aircraft parking apron control tower; day and night runway lighting; VHF
Yélimané	1600 x 45	HF/VHF

4. *Land and Assets Included in the Concession*

The scope of the Concession comprises the ensemble of the airport lands at the previously mentioned airports, excluding the presidential pavilion, military installations and technical facilities intended for use by ASECNA, such as control towers, air navigation aids, fire and rescue facilities, meteorological sites, etc.

More particularly, the airport property included in the concession comprises the runways, taxiways, aircraft parking and maneuvering areas, terminal buildings and other non-aeronautical facilities at the above-mentioned airports, as well as the lands associated with the protection of the airfield. In addition, the Concession comprises the lands and immovables situated within the airport boundary intended for commercial and industrial development.

The assets of the concession also include all fixed and mobile airport equipment presently belonging to the organization charged with the operation of the commercial aspects of the airports, i.e. ADM (*Aéroports du Mali*).

5. *Activities Included in the Concession*

The activities of the Concessionaire comprise the management, operation, maintenance and development of the previously mentioned airports. These activities complement those delegated by the State to other agencies, notably ASECNA (*Agence pour la Navigation Aérienne en Afrique et à Madagascar*). The following activities, among others, are included in the mandate of the Concession:

- ✈ Maintenance and upkeep of runways, taxiways, aircraft parking areas, terminal buildings and other airport facilities and lands at the previously mentioned airports;
- ✈ Provision of information, facilitation and services to passengers and visitors at the airports;
- ✈ Coordination of the activities of airlines and other users in the passenger terminal building and other parts of the airports conveyed to the Concessionaire;
- ✈ Provision of support, in terms of assistance and facilities, to the services of the State charged with safety and security at the airports, such as Customs, Immigration, Police, Health, etc.;
- ✈ Promotion and development of air traffic at the airports conveyed to the Concessionaire;
- ✈ Development, promotion and marketing of the lands and real estate property conveyed to the Concessionaire, including the development of a Duty Free Zone at Bamako-Sénou International Airport;
- ✈ Coordination and supervision of the ground handling services provided to the airlines, in respect of international and national regulations.

6. *Activities Not Included in the Concession*

The activities not included in the Concession comprise, among others:

- Air navigation and air traffic control services;
- Fire-fighting and rescue services (FFRS);
- Meteorological services;
- Aviation safety, security, border control, sanitary inspection services and other State services;
- Aircraft ground handling services.

7. *Investment Program*

The mandate of the Concession comprises the realization of an airport investment program intended to satisfy the objectives of the Government. This program comprises the investments required in order to ensure among others the development, modernization, expansion, renovation, operation and maintenance of the airport facilities and services according to international and domestic standards in force, including improvement of safety and security conditions and increase of throughput capacity.

The attached Annex presents a breakdown of the investment requirements at each airport, including a brief description of the works and a timetable for their implementation. This program is based on studies performed by the Government and its consultants in the framework of the present airports concession process. In particular, it takes account of the recent significant capital investments already realized recently by the Government at the airports of Bamako, Tombouctou, Kayes, Mopti and Sikasso.

The investment program presented in the Annex is presented only as an indication of the facility requirements at each site; the Concessionaire may however propose another program, while at the same time maintaining the priority of Bamako-Sénou International Airport.

The Concessionaire will be responsible for the mobilization of all financing necessary to ensure the realization of these investments with no guarantee, participation or assistance on the part of the Malian State and will be entirely responsible for the reimbursement and/or the renewal of the financial instruments, which are put into place.

The Concessionaire must provide a description of the investment program, which he proposes to implement. This program will comprise the specification of the works to be effected by site and by phase.

8. Obligations of the Concessionaire

Personnel:

The Concessionaire must choose his personnel from among the present employees of ADM and those of ASECNA assigned to the maintenance of the runways and airfield areas. The Concessionaire must propose an Employee Compensation Plan aimed at indemnifying the personnel currently employed by ADM or ASECNA who will not be retained by the Concessionaire. The modalities of this plan will be negotiated between the Concessionaire and the Government and will form an integral part of the Concession Contract.

Insurance:
The Concessionaire must hold an insurance policy covering third party liability and contractual liability with respect to the assets conveyed, the works to be undertaken and the risks associated with the operation of an airport.

Existing Contractual Obligations:
The Concession comprises the respect of the commercial and contractual obligations in force associated with the management and take-over of the airport property.

Guarantee:
The Concessionaire must deposit a financial guarantee in favor of the Concession Authority, the modalities of which will be specified in the Concession Contract.

Concession royalty:
The Concessionaire will pay a concession royalty to the Government, of which the Concessionaire in his offer will propose the amount and the modalities of payment.

9. Rights and Privileges of the Concessionaire

The Concessionaire will have the right to collect fees, rentals and other remuneration related to the exercise of his mandate, notably:

- a portion of the aircraft landing fees;
- a portion of the aircraft parking fees;
- a portion of the fees for the use of the airfield lighting system;
- passenger fees;
- royalties on aircraft fuel;

- fees for the use of the check-in counters;
- remuneration for the use of the passenger terminal car parking lot;
- concession fees on businesses in the terminal building;
- rental charges for the occupation of space in the terminal building;
- remuneration for the provision of services authorized by the Concession Authority;
- fees for the use of airport facilities for commercial purposes;
- rental charges and/or concession fees for the occupation of land and/or facilities comprising the portions of the airport property conveyed to the Concessionaire.

10. Technical Offer

Identification and Corporate Structure of the Bidder

The bidder must provide a description of the proposed organization, including a breakdown and distribution of the shareholding, capitalization and technical qualifications in the field of airport operation and development.

Approach

The bidder must provide a description of the proposed approach to the management and operation of the airports forming part of the concession, including:

- The management organizational structure;
- The number and assignment of personnel to the different sites and positions;
- The proposed measures of internal control and communication.

Investment Program

The bidder must provide a description of the investment program, which he proposes to implement. This program should comprise specification of the works to be realized at each site and for each phase.

11. Financial Offer

Proposal

The bidder must propose a financial offer comprising the following elements:

- ✈ Commitment to realize the proposed investment program;
- ✈ The level of participation of the Malian private sector;
- ✈ The level, structure and modalities of the concession royalty to be paid to the State.

Demonstration of Financial Feasibility

The bidder must demonstrate the financial feasibility of his offer, including the implementation of the investment program, by means of *pro forma* financial projections covering the period of the concession.

Participation in Employee Compensation Plan

The bidder must submit a proposal for participation in an Employee Compensation Plan covering the personnel of ADM and ASECNA affected by the concession, specifying:

- The number of personnel and positions to be retained within the new corporate structure for the operation and development of the airports;
- The modalities of indemnisation for the personnel not retained.

12. Consultative Process

All candidates interested in the airports concession must provide responses to the questionnaire included as **Part II** (pages 8-10) of the present document. The two candidates having presented the best offers on the basis of the questionnaire will be retained for negotiations. As a first step, the bidder having presented the highest number of points will be invited to undertake direct negotiations with the Government with a view to signing a Memorandum of Agreement for the concession. In the event of that these negotiations are inconclusive, the Government will proceed with direct negotiations on the same basis with the second candidate. The process of consultation will take place according to the following timetable:

Distribution of the Terms of Reference – Questionnaire	05.05.2003
Submission of responses (deadline)	04.07.2003
Evaluation of responses and selection of provisional partners	18.07.2003
Negotiation and signature of Memorandum of Agreement	24.07.2003
Negotiation and signature of Concession Contract	15.08.2003

13. Deadline and Submission of Offers

Form

Submissions must be in the French language, with all reference to dimensions in the metric system and all reference to financial calculations in CFA francs.

Deadline

PART II. QUESTIONNAIRE

Candidates for the concession of "*Aéroports du Mali*" must provide responses to the following questions. The responses will be evaluated according to a weighting system based on a total score of 100 points.

1. BAMAKO-SENOU INTERNATIONAL AIRPORT

1.1 Investment Program: 25 points

Specify the level and the timing of the investment program, which you propose to implement at Bamako-Sénou International Airport.

Level of investment:	15
Timing of implementation	10

Weighting: 25 points

1.2 Qualifications of the Concessionaire: 15 points

Indicate your technical qualifications with respect to airport operation and development.

General experience		3
Experience in airport management		6
Financial capability		6
Balance sheet	2	
Total revenue	2	
Bank references	2	

Weighting: 15 points

1.3 Corporate Structure of the Concessionaire: 10 points

Indicate the corporate structure of the company, which you propose for the airports concession, including a breakdown of the shareholding and the participation of the Malian private sector.

Weighting: 10 points

Submissions must arrive at the office of the *Direction Administrative et Financière du Ministère de l'Équipement et des Transports* (DAF/MÉT) on May 5, 2003, before 15h00, local time. Any submission received after the deadline will not be considered.

Place of Submission

Submissions must be sent to the following address:

Direction Administrative et Financière
Ministère de l'Équipement et des Transports (DAF/MÉT)
Bamako, BP 78, République du Mali
Tél (223) 222 23 81; Fax (223) 222 90 60

1.4 Royalty to be Paid to the State: 10 points

Specify the level of the concession royalty to be paid to the State and the mode of determination of this royalty.

Level of the royalty	5
Mode of determination	3
Mode of payment	2

Weighting: 10 points

Term of the Concession: 5 points

Indicate the period of the Concession that you propose.

Weighting: 5 points

2.0 OTHER AIRPORTS

2.1 Airports Included in the Concession: 9 points

Specify the airports to be included in the concession, in addition to Bamako-Sénou.

- 1 point per airport

Weighting: 9 points

2.2 Management Model for Other Airports: 5 points

Specify the management model, which you propose for the operation of the other airports not included in the concession.

Weighting: 5 points

2.3 Investment Program – Other Airports: 6 points

Specify the level and the timing of the investment program, which you propose to implement at the airports other than Bamako-Sénou International Airport.

Level of investment:	3
Timing of implementation	3

Weighting: 6 points

3.0 EMPLOYEE COMPENSATION PLAN

3.1 Employee Compensation Plan: 5 points

Indicate the number and positions of the personnel, which you propose to retain within the new corporate structure for the operation and development of the airports, as well as the modalities for indemnisation of non-retained personnel.

- Number of personnel retained 2
- Levels of retained positions 2
- Proposal for non retained personnel 1

Weighting: 5 points

1.1 SCOPE OF THE CONCESSION

4.1 Activities Included in the Concession: 5 points

Specify the activities which you propose to include in your concession mandat.

Weighting: 5 points

4.2 Sources of Revenue: 5 points

Specify the sources of revenue which you propose to include in your rights and privileges.

Weighting: 5 points

SYNTHÈSIS TABLE – WEIGHTING OF EVALUATION CRITERIA		
1.	*BAMAKO-SENOU INTERNATIONAL AIRPORT*	
1.1	Investment Program	25
1.2	Qualifications of the Concessionaire	15
1.3	Corporate Structure of the Concessionaire	10
1.4	Royalty to be Paid to the State	10
1.5	Term of the Concession	5
2.	*OTHER AIRPORTS*	
2.1	Airports Included in the Concession	9
2.2	Management Model for Other Airports	5
2.3	Investment Program – Other Airports	6

APPENDIX J
REFERENCES

APPENDIX C. REFERENCES

1. Main Characteristics of Aerodromes in Mali
2. Aeroport Gao – Mesures des Deflexions
3. Aeroport Gao – Renforcement des Aires de Mouvement
4. Aeroport Mopti – Mesures de Deflexions
5. Aeroport Mopti – Renforcement des Aires de Mouvement
6. Aeroport Nioro du Sahel - Renforcement des Aires de Mouvement
7. Etude Preliminaire de l'Aerodrome de Mopti
8. Etude Preliminaire des Aerodromes de Goundam, Yelimane, Kenieba, Nioro, Nara and Kayes et des Stations Meteorologiques de Kidal, Menaka and Hombori
9. Plan Directeur de Development de Tourisme (1985)
10. La problematique et les priorites du developpement touristique au Mali
11. Statistiques par Aerodrome
12. Statistique Annuelle 2000 – Aeroports du Mali
13. Tombouctou – Justification
14. Création d'une compagnie aérienne au Mali
15. Situation economique et sociale du Mali en 1999 et perspectives pour 2000
16. Annuaire Statistique des Transports – Res. 1999
17. Map of Africa North and West
18. Aerodrome de Mopti Barbé, Plan de Masse, Plan d'Implantation
19. Aéroport de Gao, Plan de Masse
20. Aéroport de Bamako-Senou, Plan de Masse

21. Aerodrome de Goundam, Plan de Masse

22. Aéroport de Kayes, Plan d'ensemble des travaux

23. Aerodrome de Nioro, Plan de Masse

24. Aerodrome de Yelimane, Implantation

25. Aéroport de Kayes, Plan de Situtation

26. Aeroport de Kayes – Volet Genie Civil, Chaussees Aeronautiques et Routieres: IV – Nature et Dimensionnement des Travaux

27. Aeroport de Kayes – Volet Genie Civil, Chaussees Aeronautiques et Routieres: Note Technique

28. Note de Présentation – Aeroport de Kayes

29. Aeroport de Sikasso – Volet Genie Civil, Chaussees Aeronautiques et Routieres: Note Technique

30. Aeroport de Sikasso – Volet Genie Civil, Chaussees Aeronautiques et Routieres

31. Nouvel Aeroport de Sikasso, Avant Projet de Plan de Masse

32. Situation des Aerodromes (Airspace Classification and Air Navigation Services) ASECNA