

# REPUBLIC OF CHAD



MINISTRY OF PLANNING AND COOPERATION

follow-up meeting on  
the geneva round table  
December 85

## **TRANSPORT SECTOR**

VOLUME 1

**PRESENTATION OF THE STRATEGY  
AND OF THE DEVELOPMENT PROGRAM  
FOR 1988 - 1993**

FEBRUARY 1988

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## ANALYTICAL SUMMARY

Following several years of war and drought, the Republic of Chad has embarked on a policy of rehabilitation and stimulation of the national economy.

Starting in 1982, reconstruction programs have been initiated in different sectors, the public finances of the country have been extensively reorganized, and company operations have been stimulated. In a word, very substantial efforts have been accomplished, to the extent that the economic situation of the country has climbed back to a level slightly in excess of that at the end of the 1970's.

**Despite external difficulties, substantial handicaps but also a certain number of advantages**

The Republic of Chad is one of the poorest countries in the world, and this situation has been further aggravated by recent events, combined with the fall in international cotton prices, cotton being the main export resource of the country. The principal handicaps which the Republic of Chad has to combat are its land-locked geographical position in the centre of the African continent, the extensive surface area of the country, its situation in the Sahelian zone with frequently unfavourable climatic conditions, and the weakness of its stable export resources.

On the other hand, the main elements on which possibilities for future development are based include major potentials in the agricultural and livestock breeding area, encouraging indications in the mining sector, with particular reference to oil, and possible developments in other sectors of the economy, associated with the dynamism of the national population.

**The Chad Government has stimulated the economy, basing its actions on an effective strategy**

In order to channel development efforts, and coordinate the action of the funding sources, two conferences have been held with the latter in Geneva, in 1982 and 1985. The first conference was aimed at meeting urgent needs of all types, characterizing the situation in the Republic of Chad. At the second conference, the Government presented a development strategy for a three-year period, defined within the framework of the 1986-1988 Interim Plan.

In global terms, and despite innumerable difficulties, the results obtained are encouraging, being reflected in a constant GNP rise since 1982. However, the cotton crisis has led to an aggravation of the current account and balance of payments deficit.

As a result of this financial situation, the Republic of Chad is obliged to continue to rely on international aid, for funding investments essential for national development, and part of the cost of operating the public services.

#### **Coordination with the funding sources**

Following the 1985 Geneva conference, it was decided that the sectorial programs and strategies would be set out in detail, and submitted for financing by the funding sources on the occasion of subsequent meetings.

The present meeting is concerned with the transport sector, and forms part of the planned series of discussions.

The Government hopes that the presentation of its strategy for this sector, and the resultant action program, will meet with the approval of its partners.

**Elimination of travel difficulties paralysing future development in the Republic of Chad**

The present situation in the transport sector is characterized by the following:

- partially rehabilitated infrastructures (the 2000 km of roads scheduled in the interim phase have been completed, together with the runways at N'Djamena and Abeche airports). However, much remains to be done, in order to ensure that the links between the main centres are permanent, faster and technically safer. Despite the efforts of the Government, maintenance of the rehabilitated roads cannot be ensured in full by OFNAR alone.
- transport resources in sufficient quantities to meet current needs for passenger traffic and the transport of merchandise, both between urban centres and in the capital N'Djamena. Heavy vehicle capacity is currently in excess of demand, but problems could be encountered with respect to short- and medium-term replacement of these vehicles.
- Institutions the terms of reference of which are in course of redefinition, and for which training and the setting up of simple, efficient management systems are essential.

**Realistic Government transport policy compatible with available funding**

To deal with this unsatisfactory situation, the Government has strengthened its objectives and priorities in this sector, indicated its strategy, and defined the resultant programs and projects.

Policy in the transport sector is architected round the guideline:

- priority road system concept, defining the infrastructures to be rehabilitated, where appropriate, as a complement to those already rehabilitated. Priorities are defined according to the importance of the economic links to be maintained or reestablished, the need to improve access to the main regions of the country, and the provision of a minimum level of public services.
- complementarity of road and air transport. Although the two forms of transport have separate vocations, this complementarity is essential for maintaining the essential permanency of certain links, in particular during the rainy season, in terms of quality and speed and at cost levels compatible with available funding.

To implement this policy and allocate reasonable financial resources, with no major risk of putting the brakes on investment in other sectors, the Government has added the following action principles to the orientations previously established:

- definition of road rehabilitation and maintenance standards.

These standards take account of differences between the regions concerned, and traffic levels and aggressivity, and are designed to minimize maintenance costs, while holding road rehabilitation costs at reasonable levels.

- definition of a maintenance policy. Essential for maintaining the level of service of the rehabilitated infrastructures, continued prosecution of this policy requires intervention by the funding sources, insofar as available national resources are and continue to be inadequate.
- institutional reorganization and promotion of the private sector

The objective here is to clarify the respective missions of the various entities (public service, companies, etc.), and to improve skills and reduce costs.

**This policy has led to the 1988-1993 action program, for which the State is making a major financial effort**

The action program resulting from governmental strategy includes a number of segments, covering rehabilitation, maintenance and reorganization, and support for operation of institutions or companies.

**This program is based on closely monitored road rehabilitation and maintenance**

Insofar as the road system is concerned, a further 1800 km of road will be rehabilitated by 1993, while maintenance must be provided for the complete renovated system (3800 km). The weakness of State resources, despite tax appropriations for road maintenance, makes it necessary to call on the funding sources to assume responsibility for maintenance of the infrastructures, to the rehabilitation of which they have contributed, for at least the period of the program.

**Priority air safety program and transport company organization and training actions**

Airports in the Republic of Chad have undergone varying degrees of rehabilitation. Apart from N'Djamena, it is essential to ensure the safety of aircraft movements, both on the ground and in flight. The program defined in this area is therefore aimed at meeting priority needs relating to the overhaul of airports, communications and radio navigation facilities, and the meteorological network. Maintenance and personnel training are also included in the program.

### **Air transport companies**

Transport resources are generally adequate to meet existing and foreseeable medium-term needs. On the other hand, training actions should be undertaken in order to improve the management of these resources, and adaptation of the services provided.

### **Redefinition of public service missions and strengthening of the institutions**

This program is completed by actions in the institutional sector. Government philosophy in this area is to liberalize what can be liberalized, at a rate compatible with the evolution of the national economy. This implies redefinition of the role of the various participants, and alignment of their skills with their new functions. It is consequently necessary to strengthen the two Ministries involved in this sector, by means of technical assistance and training of personnel, equipping the latter to carry out design and control missions in the sectors concerned.

### **Promotional plan in favour of the private sector**

In parallel, the Government is anxious for the private sector to play a larger part in the rehabilitation and maintenance of infrastructures, and that promotional actions should be undertaken in favour of the private sector. Insofar as CTT is concerned, this cooperative should return to its initial function of providing assistance, in the form of services to carriers, and be relieved of missions concerned with the collection of taxes and distribution of freight.

Actions in favour of Air Tchad are restricted to maintaining technical assistance, and the training of personnel.

**Action program for the next 5 years, amounting to F.CFA 97 billion at already 65% funded**

The total cost of the program is estimated at F.CFA 97 billion (January 1988), spread over the period 1988-1993. Funding has already been obtained to an amount of F.CFA 64 billion. A further F.CFA 33 billion must therefore be found, to complete the funding of this coherent, comprehensive program, so that the latter can be completed on schedule, accelerate the process of improving access to the regions, and thus contribute to stimulation of economic activities.

## LIST OF ABBREVIATIONS USED

AAA	Action Agro Allemande
ACDI	Agence Canadienne pour le Développement International
ASECNA	Agence pour la Sécurité de la Navigation Aérienne
BID	Banque Islamique de Développement
BDEAC	Banque de Développement des Etats de l'Afrique Centrale
CCCE	Caisse Centrale de Coopération Economique
CT	Care Tchad
CTT	Coopérative des Transporteurs Tchadiens
DAC	Direction de l'Aviation Civile
DTT	Direction des Transports Terrestres
EDF	European Development Fund
ENTP	Ecole Nationale des Travaux Publics
FAC	Fonds d'Aide et de Coopération
FAD	Fonds Africain de Développement
FAI	Fonds d'Aide Italien
FSD	Fonds Saoudien de Développement
GNP	Gross National Product
GTZ	Gesellschaft für Technische Zusammenarbeit
ICAO	International Civil Aviation Organization
IDA	International Development Association
KEW	Kreditanstalt für Wiederaufbau
MTAC	Ministère des Transports et de l'Aéronautique Civile
MTPHU	Ministère des Travaux Publics, de l'Habitat, et de l'Urbanisme
OFCA	Office des Carrières
OFNAR	Office National des Routes
OMVSD	
ONDR	
UDEAC	Union Douanière des Etats de l'Afrique Centrale
UNCCD	United States Conference on Commerce and Development
USAID	United States Agency for International Development
UTA	Union des Transport Aériens

## CHAPTER I

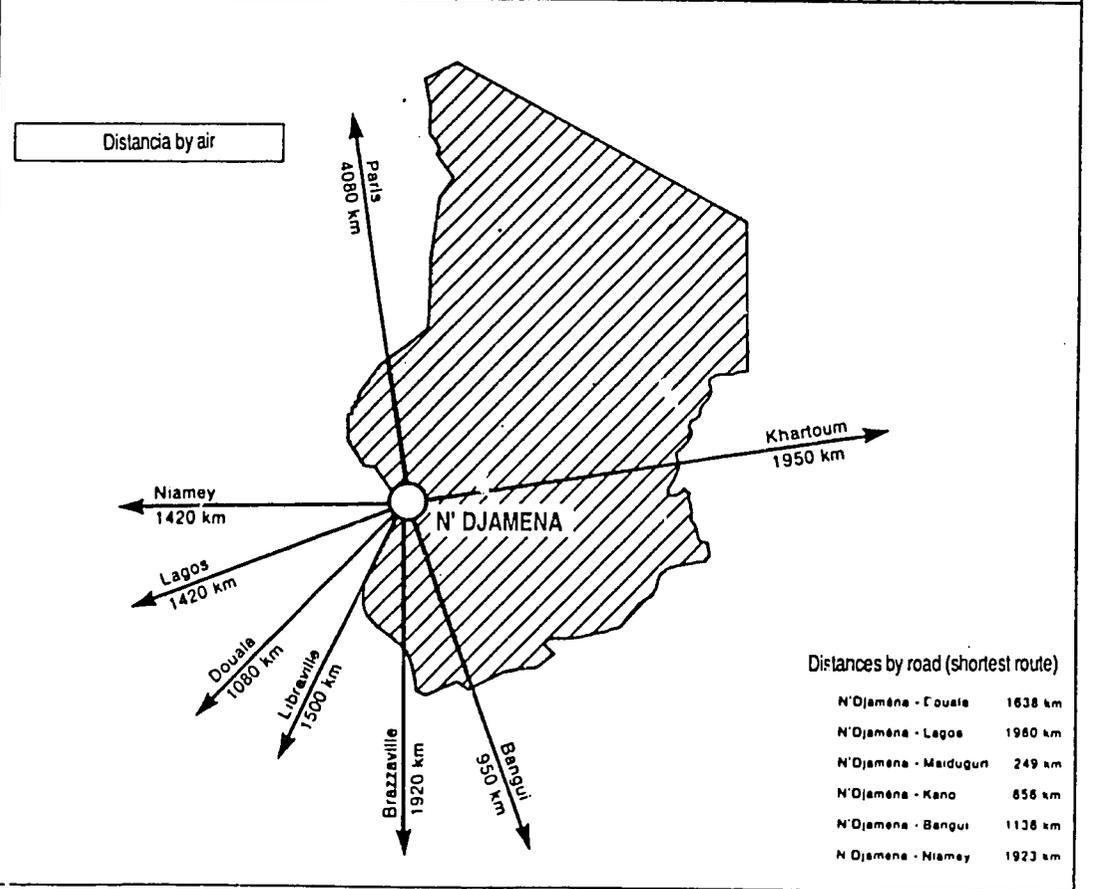
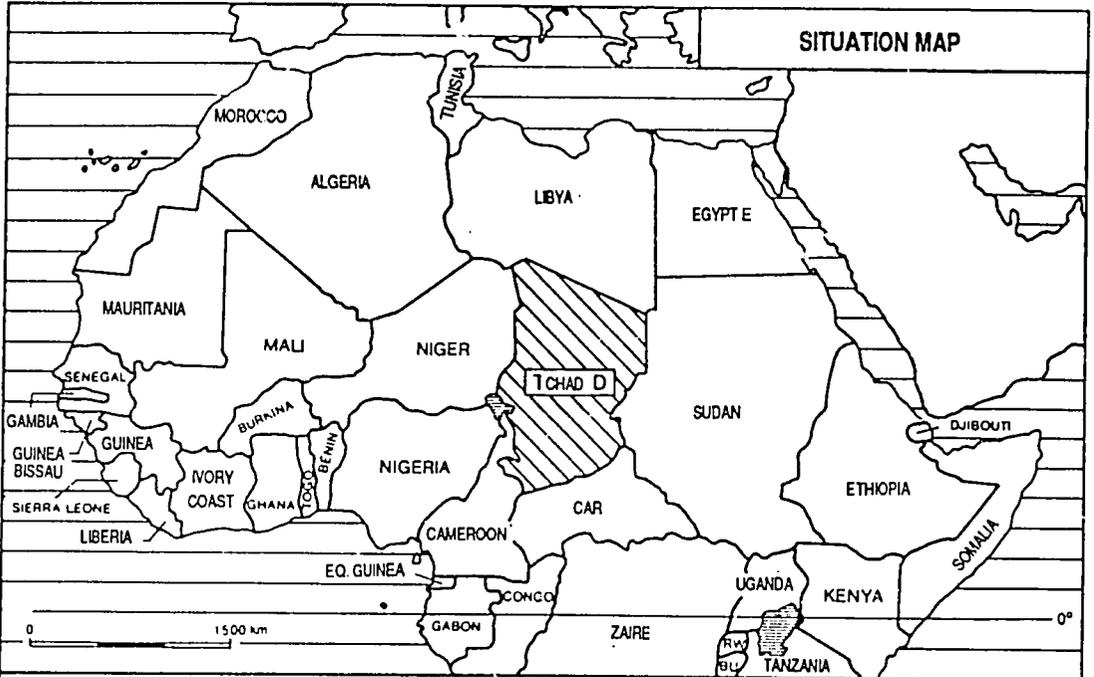
### ECONOMIC SITUATION AND DEVELOPMENT OPTIONS

#### INTRODUCTION

Situated in the heart of the African continent and with a vast surface area (1,284,000 km<sup>2</sup>), The Republic of Chad is totally land-locked between Libya to the North, Sudan to the East, the Central African Republic to the South, and Cameroon, Nigeria and Niger to the West. This geographical situation, together with considerable internal distances, such as that to the nearest point on the sea coast, constitute two major handicaps for a developing country with very limited internal resources.

This internally and externally land-locked situation can be illustrated by a few facts and figures:

- externally, the nearest sea port (Douala) is 1700 km away, and transport to N'Djamena is by rail as far as N'Gaoundere, and then by road, at a mean cost of F.CFA 80,000/tonne (or F.CFA 45/tonne.km).
- internal distances are also considerable (N'Djamena-Abeche: 762 km, N'Djamena-Sahr: 559 km), and transport costs are even higher (between F.CFA 50 and 140/tonne.km). The first rehabilitation program (covering approx. 2000 km of road) achieved a marked increase in basic road speed (70 to 80 kph for light vehicles), but road speed is still very low on that part of the system which has not yet been reconstructed (approx. 30 kph). Communications become even more difficult (and sometimes impossible) during the rainy season. Air transport is consequently an essential complement to the road links. However, the provincial airports are inadequately equipped and maintained, and present problems of safety for aircraft movements.



## 1.1 - PHYSICAL AND HUMAN CHARACTERISTICS

### Young population unevenly distributed over the national territory

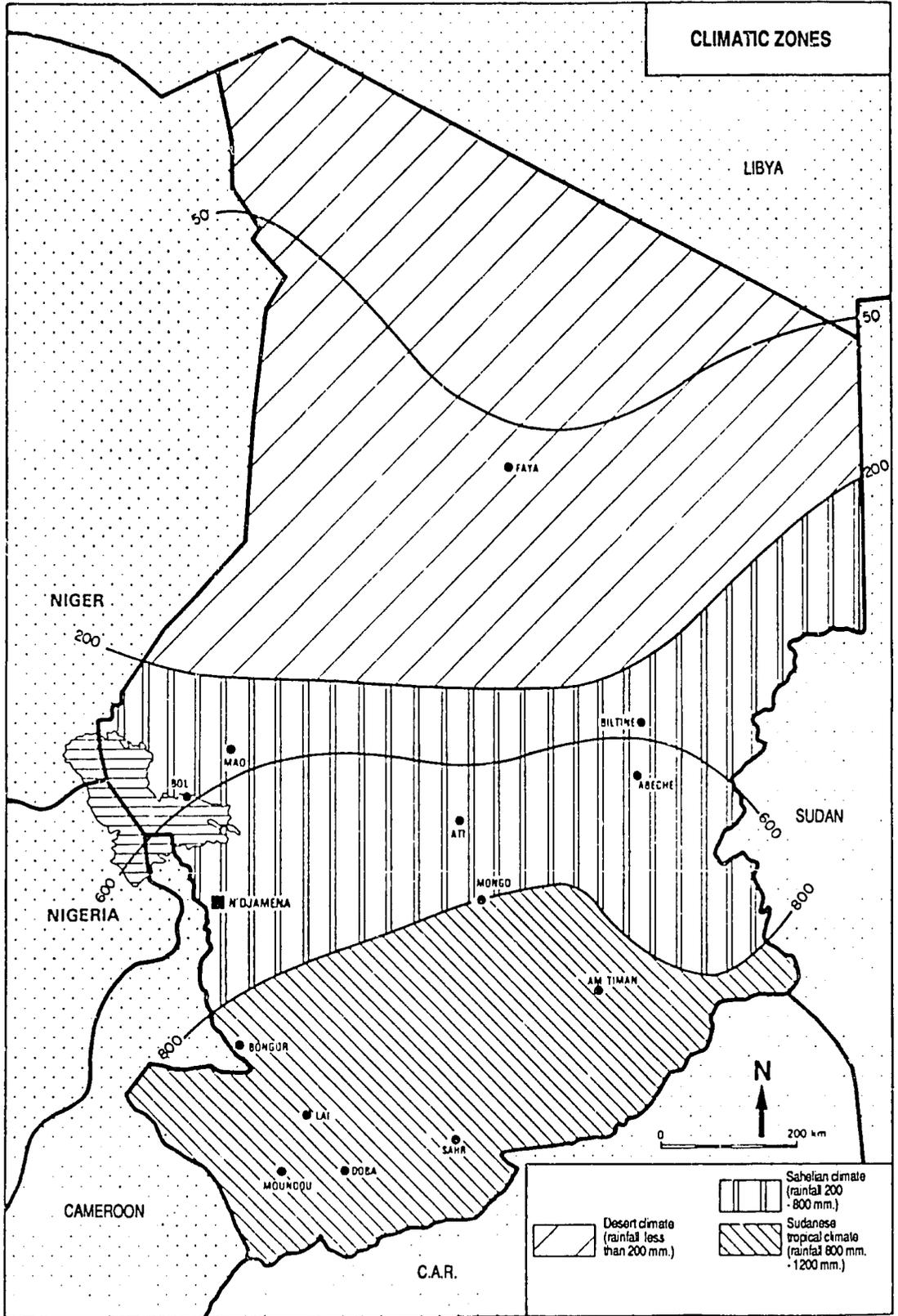
The current population of the Republic of Chad is estimated at 5.4 million, and current annual growth rate is 2.4%. The urban population, which appears to be increasing at an annual rate exceeding 5%, should top 1.2 million in 1988. The population of the Republic of Chad is extremely young, with 50% aged under 20, and only 5% over 60.

This population is very unevenly distributed throughout the country. Population density is very low in the North, increasing towards the South as climatic and pedological conditions improve.

### Physical and economic environment divided into three climatic zones

The country is traditionally divided into three zones, the climatic conditions of which have a decisive influence on the local economy:

- The Saharan zone (BET province in the North) occupies approximately one-third of the national territory, but contains only about 2% of total population. The inhabitants of this zone (approximately 100,000) lead a sedentary existence in small, widely scattered townships, or a nomadic life. In the recently liberated areas, the Chad Government is supplying food and services to a civilian population ravaged by the hostilities, while supporting the land forces in order to ensure national security. Distances are considerable, while the traffic levels involved are relatively low as a result of the economic disruption in this part of the country.



- The Sahelian zone (central part of the country including the prefectures of Kanem, Lac, Batha, Biltine, Ouaddai, Chari-Baguirmi, Guera and Salamat) contains something over half the total population of the country, and approximately one-half the total surface area. About one-third of the population of this zone lives in urban centres, the largest of which are the capital N'Djamena (400,000 to 500,000 inhabitants), and the regional capitals of Abeche (60,000), Mongo, Ati and Mao (each with between 20,000 and 35,000 inhabitants), and Biltine, Am Timan and Bol (less than 10,000 inhabitants each).

The rural population comprises sedentary or semi-nomadic livestock breeders, and farmers, principally engaged in the cultivation of millet and sorgho. In years of normal rainfall, the region is relatively self-sufficient in terms of food production, as a result of the combination of excess cereal production in the South and East, and cattle breeding in the Northern and Western parts. These groups were particularly hard hit during the drought years, especially in the case of the livestock breeders, who experienced a sharp drop in their monetary revenue.

- The Sudanese zone (Southern part of the country, including the prefectures of Mayo-Kebbi, Tandjile, Western Logone, Eastern Logone and Middle Chari) contains the other half of the national population. This zone covers less than 20% of the total surface area of the country. The region enjoys favourable rainfall conditions, and agriculture is well developed. The major industrial activities of the Republic of Chad (production of beer, sugar, cotton goods and cottonseed by-products) are located in the towns of Moundou (100,000 inhabitants), Sarh (105,000 inhabitants) and Bongor, Lai and Doba (70,000 to 85,000 inhabitants each).

This region has always produced cotton, the main export product of the Republic of Chad. The growing of rice was introduced recently, to serve a developing urban market. Local climatic and soil conditions are suitable for diversified agriculture, which could supply goods for trade with neighbouring countries (Cameroon and C.A.R.), and with other regions in the Republic of Chad.

## 1.2 - NATIONAL ECONOMY AND RECENT EVOLUTION

The Republic of Chad is one of the poorest countries in the world, mean annual income per head of population being estimated at \$ 164 (\$ 1 = F.CFA 300).

### **Inadequacies and potentialities**

The economic structures of the Republic of Chad are similar to those of neighbouring countries. Agriculture and livestock breeding represent the main productive activities in the country (55% of total national added value), while the level of industrial production is relatively low (20%) and extensively dominated by cotton processing. Services and trade also hold a fairly modest position (25%).

The numerous handicaps and difficulties with which the Chad economy is faced include:

- **irregular rainfall.** The recent consequences of the drought are no secret: drop in agricultural production, destabilization of livestock population and grazing habits, and the obligation to call on international aid for food supplies.

Even outside the periods of major drought, rainfall is irregular from region to region, and it is therefore essential to be able to compensate food production shortfalls on the one hand by excess production on the other.

- **insufficient level of exports.** Export revenue stems principally from cotton, and to a lesser extent from cattle. The sharp drop in international cotton prices in 1985, further aggravated by the fall in the value of the US dollar in 1986, caused a substantial reduction in monetary and tax revenue, further weakening the financial position of the Government.

Cattle is exported to Nigeria, and to a lesser extent to Cameroon and C.A.R., principally on the hoof. Other sources for the export of carcass meat to the countries of Central Africa existed in the past, constituting far from negligible additional resources.

- scattered and limited global activity (providing little encouragement to trade), coupled with global investment, in particular in the private sector, still inadequate in the face of potentially high needs.

On the other hand, the economy of the Republic of Chad possesses undeniable advantages for the support of future development, including in particular:

- agricultural, forestry and livestock breeding potentialities comprising the availability of cultivatable land (Salamat, Ouaddai and Lake Chad region in particular), enormous possibilities for irrigation, and a livestock population rapidly restored following the drought period, more rational exploitation of which will contribute to increased monetary revenue in the Northern provinces.
- in the mining sector, encouraging indications for a number of minerals. Efficient exploitation of an oilfield to the North of Lake Chad could enable the country to achieve self-sufficiency in terms of standard hydrocarbon products.
- genuine industrial potential, even though the small size of the domestic market makes exploitation difficult, which could be developed employing cheap, reliable labour and aiming at the larger markets in neighbouring countries.
- traditional economy which has made a rapid recovery since 1982, providing a large number of functions efficiently in the craft, services, trade and real-estate sectors. The traditional economy has proved that it is able to adapt to circumstances with evident dynamism.

### **Encouraging evolution of production**

During the last few years, the poverty of the country has been accentuated by war and drought, followed by the sharp drop in cotton prices, cotton being the main commercial crop grown in the Republic of Chad.

The GNP was F.CFA 162 billion in 1977. This figure then declined, dropping to a level of F.CFA 118 billion in 1980. From 1982 onwards, stimulated by the Government, the GNP again moved forward, climbing back to approximately the 1977 level by 1985. This economic recovery was then compromised by the effects of the 1984-1985 major drought period, followed by the collapse of cotton prices, further accentuated by the fall in the value of the US dollar in 1986. Nevertheless, the estimated GNP for 1986 was F.CFA 285 billion (current), representing a slight increase over 1985 when expressed in constant francs.

The Republic of Chad has received very substantial assistance from the international community in dealing with these serious problems. Between 1983 and 1985, the country received emergency aid estimated at F.CFA 150 billion, comprising 10% budgetary support, 50% in the form of foodstuffs, and 40% development aid.

At the Geneva conference in December 1985, the International Community undertook to assist the Republic of Chad to consolidate its reconstruction phase, and support the recovery of its economy. At the same time, an emergency program was developed for the cotton sector in 1986, for the purpose of mobilizing complementary aid designed to attenuate the effects of the cotton crisis.

The consolidated central Government budget amounted to F.CFA 24.3 billion in 1986, whereas domestic income was only F.CFA 16.8 billion, due to the almost total disappearance of revenue from cotton exports. Public investment, estimated at F.CFA 30 billion, was funded exclusively by external aid, which also covered a major percentage of related recurring expenses.

According to estimates, total 1986 outgoings related to external aid amounted to F.CFA 44.5 billion, of which F.CFA 9.5 billion (approx. 21%) was assigned to the transport sector (15% for roads and 6% for air transport).

### **1.3 - DEVELOPMENT STRATEGY**

Prepared in a context of economic and financial uncertainty, the 1986-1988 interim development plan was designed to cover transition from a reconstruction phase, incomplete at the time, to a future difficult to interpret. The wish expressed by the Government at this time was to complete reconstruction of the country, and establish the basis of a sound economy.

For this purpose, the Government prepared a global strategy for national development, which was then used as a guide for the individual sectorial strategies and various action programs.

The global strategy was based on four major objectives, and constant concertation with the funding sources in order to obtain and coordinate the funds required.

#### **Four strategic objectives**

Immediately after the war, and following a prolonged, severe period of drought, two of the objectives answered problems of immediate urgency:

- . provision of the essential needs of the population;
- . correction of the consequences of the drought. The aim was to eliminate the effects of recent perturbations for the national population, while attempting to establish a more stable situation for the future.

The other two objectives were of a structural nature, and expressed a general determination to achieve national development:

- . durable increase in national production;
- . equitable distribution of revenue.

These more permanent objectives constitute a complement to the first two, in the establishment of a sounder national economic structure.

The four major objectives were expressed in more detail as follows:

**1st objective:** Guaranteed provision of the essential needs of the population, even in the event of a return or continuation of the drought.

Over and above the obvious urgent needs of the time, this objective was and still is aimed at providing an adequate subsistence level for the population, starting with the poorest regions and guaranteeing minimum health care for all.

**2nd objective :** Rapid correction of the persistent consequences of the drought.

The effects of the drought are known only too well: population exodus, abandoned villages, decimated herds, damaged wells, etc. The objective was not to return to a situation where everything was as it was before, but to restore the economic structures damaged by the drought, improving those aspects considered deficient.

This objective related to the following:

- short-term restoration of livestock herds on a rational operating basis (this objective is now considered almost completely achieved).

- achievement of conditions for permanent settlement of displaced populations within a period of 2 years. It was essential to regularize the situation, avoiding leaving these populations in temporary premises (this objective is in course of achievement).
- reengagement of the country in the fight against desertification, calling for long-term basic actions.
- acceleration of the hydraulic program, concerning both rehabilitation and recommencement of a maintenance program.

**3rd objective : Durable increase in production.**

This objective is aimed at establishing the basis for regular growth, by progressive mobilization of national resources with respect to existing markets. The following are concerned:

- intensification and diversification of vegetable and animal production, and the achievement of exportable surpluses.
- achievement of better agriculture-livestock breeding-forestry integration, with consequent preservation of the natural environment while maintaining a balance between the different activities.
- maximum exploitation of natural resources, and the most intensive processing possible of these resources. All productive sectors are concerned, including mines and oil, as also industrial crops and the processing industries.
- reorganization and improvement of commercial and industrial structures, so that at least the levels of service and efficiency existing before the war are reobtained.

- development of balanced trading with neighbouring countries, and compensation of the land-locked situation of the country.

**4th objective : Equitable distribution of revenue.**

This objective reflects the Government's determination to avoid merely leaving market supply and demand to have their effect, but rather to intervene for the purpose of correcting certain inequalities, and achieve more balanced development.

This objective embraces the following sub-objectives:

- continued reduction of regional disparities, and improvement of access to isolated regions.

Apart from a desire to consolidate the state of peace in the Republic of Chad, this objective also reflects that of harmonizing revenue and living conditions, by means of actions relating to production, the infrastructures and trade.

- Development of all forms of active participation by the population in the solutions to their problems. The idea here is to encourage the population to look after itself, and to participate actively in the development of the country.
- Increased monetary revenue for the rural populations. The production objectives guarantee these populations a minimum amount of food, but conditions must also be created whereby they can purchase the agricultural inputs and manufactured goods which they need.
- Improved efficiency of the Administration. This is essential for implementation of planned objectives, and guaranteeing the results. This calls for an increase in State resources, in order to provide the administrative authorities with the means to operate correctly, improved departmental organization and intensified training of staff.

### **Intensified concertation with funding sources**

Implementation of the development programs resulting from the above objectives still calls for intervention on the part of the International Community, to obtain the requisite funding. The Republic of Chad has only very limited resources for operating its administrative services, and public investment must be covered in its totality by external aid.

The Government therefore considers it essential to associate the funding sources with the choice of options adopted by the Republic of Chad, so that the actions initiated by the funding sources may be as efficient and closely coordinated as possible.

Two conferences with the funding sources have been held in Geneva for this purpose. On the occasion of the first conference in December 1982, the Government presented an action program, designed to meet the urgent requirements of all types with which the country was faced. Actions undertaken by the funding sources subsequently made it possible to clear a fair number of situations, by providing emergency aid for the population, making the most urgent investments to enable restart of a minimum level of activities, and getting the Administration functioning again.

The second conference met in December 1985, and on this occasion the Government presented a general national development strategy, and corresponding action program designed to ensure the recovery of economic activities, while consolidating the situations already reestablished.

Detailed development of sectorial strategies, as also the programs and projects which the Government wishes to implement, are submitted for financing by the funding sources at sectorial meetings held in N'Djamena. The first of these meetings, devoted to the agricultural, forestry and livestock breeding sector, was held in December 1986.

The present conference on transport is the second of these meetings, and will be followed in the near future by a meeting concerned with the human resources sector.

It is hoped that these meetings will provide the opportunity for the funding sources to understand the preoccupations of the Government, and the role which it intends the sector concerned to play in the global development process. It is also hoped that discussions will then be opened, so that funding can be obtained for the projects presented by the Government, and that said projects can be articulated harmoniously with respect to each other.

On its side, the Government of the Republic of Chad, which has succeeded in substantially increasing the absorption capacity of the country, in particular as a result of actions by numerous financial institutions and organizations, is continuing with organizational improvement of the Administration, in order to ensure proper information and efficient coordination of intervention by the funding sources. Institutional strengthening actions have led to recommencement of activities by the main Government departments, and the Ministry for Planning and Cooperation is currently restructuring its internal organization, so as to be able to act as a more efficient fulcrum for coordination of the actions undertaken.

To back this process, the Government is currently preparing a financial rehabilitation program, which will make it possible to eliminate rapidly all constraints on the institutional operation of the country, and thus improve the absorption capacity of the Administration and para-governmental institutions, while reducing the current account and balance of payments deficit. This program represents a first step towards structural adjustment, the objective of which will be to accelerate growth, while holding inflation within reasonable limits.

## CHAPTER II

### PRESENTATION OF THE TRANSPORT SECTOR

With the support of numerous sources of external aid, the Republic of Chad is moving progressively away from the difficulties with which it has been faced over the last few years. The global situation is marked by a very substantial increase in the level of economic activity, although this is still impeded by transport problems. Distances are considerable in the Republic of Chad, already representing an initial handicap. But in addition, the condition of the road system, despite exemplary rehabilitation work, remains precarious and restricts traffic volumes to an essential minimum. International transport also suffers from the same problem of distance, combined with a shortage of experience on the part of the Chad carriers.

Air transport is consequently an essential complement to road transport. However, apart from N'Djamena, and more recently Abeche, safety conditions for aircraft movements remain precarious.

In the past, a river navigation system operated between the Southern provinces and Lake Chad, carrying foodstuffs (including sugar) to the capital. The present irregular flow of the river, combined with the high cost of rehabilitation work essential for the reestablishment of these links, have led the Government to defer any investment in this sector beyond the 1993 horizon.

Rail transport is non-existent and no action in this sector is planned for the present.

Transport resources are sufficient to meet demand, but their organization and management must be restructured.

These then are the principal aspects of the current situation, examined in detail in the following pages, starting with the road infrastructures, followed by the air transport infrastructures, and concluding with operational details for the two cases.

## 2.1 - INFRASTRUCTURAL SITUATION

### 2.1.1 - ROAD INFRASTRUCTURES

#### **Road system in generally bad condition**

The road system comprises 7300 km of roads and classified tracks (including 250 km of asphalted road, and approximately 1500 km of improved earth road) and 24,000 km of unclassified tracks serving the rural zones.

In 1982, only 40 km of asphalted road remained, and the improved earth roads were almost totally destroyed.

The generalized bad condition of the system, resulting from events occurring between 1979 and 1982, constitutes an obstacle to the development of economic relations in the Republic of Chad. Traffic volumes are relatively low, and in 1987, had not returned to the 1979 level. This low volume of traffic is directly related to the condition of the road system, which imposes major constraints on road usage.

#### **2000 km of rehabilitated road**

Certain rehabilitation work has been completed or undertaken on the road system, with the support of international or bilateral aid, in the context of the Interim Plan.

The principal rehabilitation work concerned the following sections, representing a total of almost 2000 km (see map below):

- 1) **Sahr-Moundou-Lere** unsurfaced road (623 km), connecting the cotton and food production regions of the Southern part of the country with the Cameroon road system (funded by EDF and IDA).

- 2) **Sahr-Guelengdeng** unsurfaced road (379 km) connecting the Tandjile region with the central road system in the Republic of Chad (EDF funding).
- 3) **N'Djamena-Djermaya-Massaguet-N'Goura** and **Lake Fitri** region: rehabilitation of earth road included in emergency program (FAC funding).
- 4) **N'Goura-Mongo**: improvement of sections with poor accessibility during the rainy season (303 km) (FAC funding).
- 5) **Am Timan-Mongo**: improvement of sections with poor accessibility during the rainy season (bridges) (253 km) (EDF funding).
- 6) **Mongo-Ati**: improvement of river crossings (154 km) (EDF funding).

Traffic surveys conducted in 1985 and 1987, demonstrate a marked increase in traffic on the rehabilitated axes. The increase observed was of the order of 80% in the Southern zone, and 100% in the Northern zone.

#### **Maintenance actions undertaken**

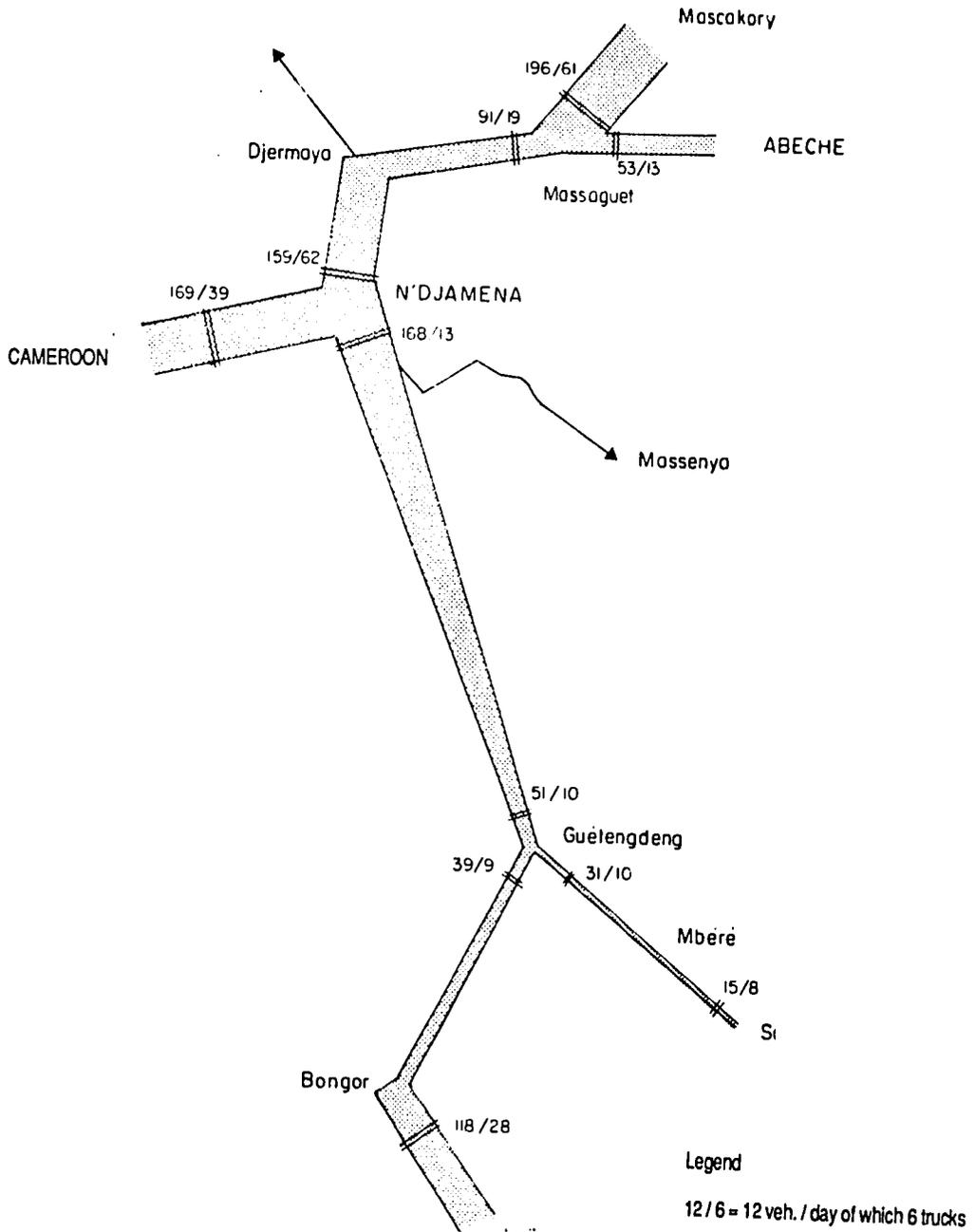
The Government has taken the following steps to preserve the improvements mentioned above:

- creation of OFNAR (National Roads Bureau) in 1984, OFNAR being responsible for road maintenance operations,
- renewed utilization of rain gates, accompanied by strict measures to ensure proper observance of the gates, in order to protect the road improvements made,
- road traffic survey programs at a rate of three per year, for the purpose of accurate measurement of actions to be undertaken in the context of coherent road system management.



### TRAFFIC - COUNTS

Average daily traffic - October 1987





## 2.1.2 - AIR TRANSPORT INFRASTRUCTURES

### **Major rehabilitation work at N'Djamena and Abeche, but insufficient level of safety on provincial airports**

Apart from N'Djamena international airport, the Republic of Chad has three main national airports (Sahr, Moundou and Abeche), together with a number of secondary airports and numerous small landing strips handling private, military or charter air traffic.

The situation with airport installations is as follows:

- N'Djamena airport has received most attention since the war. The terminal building has been completely reconstructed, and was recommissioned at the beginning of 1985. The technical block (control tower, beacon system and fire station) is operating, and an ILS reduced visibility landing guidance system has been reinstalled. The runway has been strengthened and uprated to handle large transport aircraft (B.747). The flight information centre (this service is currently relayed by Brazzaville) will again be operational in the early future.
- The Abeche runway has just been entirely reconstructed, together with the marker system.
- Sahr airport has been partially reequipped (VHF station and fire trucks).
- Generally speaking, all other national airports fail to meet safety standards. The runways have not yet been rehabilitated, and existing equipment is obsolescent (where it is still functioning).
- Numerous runways are in such poor condition that Air Tchad can no longer serve the airports concerned. The precarious position of other runways makes them dangerous, particularly during the rainy season.

- The air navigation information systems have only been partially rehabilitated. Apart from a few exceptions, radio navigation resources are operating under satisfactory conditions. On the other hand, radio communications and met. information resources are in a seriously inadequate condition.

## **2.2 - TRANSPORT ACTIVITIES**

Transport activities come under the administrative responsibility of the Ministry of Transport and Civil Aviation, the attributions of which are as follows:

- definition of road transport regulations for the whole of the country;
- study and drafting of bilateral or multilateral agreements with neighbouring countries, and control of compliance with these agreements;
- study of tariff setting;
- programming and coordination of the transport needs of the State and of the country as a whole.

### **2.2.1 - ROAD TRANSPORT**

#### **Rudimentary interurban passenger transport but subject to foreseeable expansion**

Interurban passenger transport is currently operating at a lower level than 10 years ago, principally due to degradation of the infrastructures. For journeys from N'Djamena to Abeche, Lake Chad and the North of the country, passengers are carried in trucks, as the roads are impassable for light vehicles. Towards the South, where the roads

are not in such bad condition, at least during the dry season, passenger transport is provided by pick-ups fitted out to carry passengers and their baggage. In the past, the journey from N'Djamena to Sahr or Moundou took one longish day. At the present time, at least one overnight stop is required.

It does not appear that the pick-up owners, who are small investors rather than professional carriers, are short of capital. Nor does the return obtained from a pick-up appear to be inadequate or uncertain. As the quality of the roads improves, pick-ups will replace trucks for passenger transport, and will in turn be replaced or complemented by minibuses or buses.

#### **Adequate urban transport but requiring monitoring and control**

The situation is comparable in the urban transport sector. In N'Djamena, there are currently about 400 taxis, 150 twelve-seater minibuses (taking up to 27 in exceptional cases) and about 50 hire cars (with or without chauffeur). In the provinces, there are about 12 taxis in Sahr and as many in Moundou. These vehicles are owned by investors, and are operated by professional drivers on a fixed daily fee basis. Practically all taxi owners are grouped in a voluntary cooperative, providing management assistance and defending the interests of members vis à vis the Administration and the police. Eighty-five new taxis were registered between 1st January and 30th September 1987, again demonstrating that there is no shortage of capital.

The main obstacle to travel in N'Djamena is the very poor state of the roads, and the resultant chaotic traffic conditions.

Passenger transport regulations are simple and adequate. An indicative tariff system exists, but effective prices are the result of the free interplay of supply and demand. Thus, a journey in the provinces costs more during the rainy season than in the dry season.

There is no reason to envisage State intervention for increasing or restricting passenger transport supply, nor to regulate operation of this transport service. On the other hand, it would be desirable to improve control of this sector by improved knowledge of the vehicle fleet in service and traffic flows, strict inspection of vehicles and proper observance of regulations and tax obligations.

#### **Adequate truck fleet but requiring organization of its management**

Insofar as freight transport is concerned, distinction should be made between heavy transport and the carriage of small loads. Small loads of a few tonnes predominate in the domestic transport sector, and are intimately linked with retail trade. The majority of traders possess a pick-up or medium capacity truck, and carry for their own account. There is also a small domestic transport grouping activity, operated by brokers or commission agents on the N'Djamena market. The heavy transport activity is conducted by professional carriers for their customers. Very few companies carry their own merchandise, this being the case for both domestic and international transport.

The professional carriers operate a fleet of about 400 heavy vehicles, adequate in terms of current needs. It is also true that the Chad carriers do not absorb their quota of international supply transport activities for their country, but this is a problem of management and presence in other countries, rather than one of fleet capacity. Vehicle turn-round rate is grossely insufficient, seriously compromising profitability.

It is reckoned that a truck is worn out after three years or 150,000 km. Certain regions (Bol, Faya-Largeau) can only be accessed if the vehicle is underladen, or by using excessively powerful trucks (6 x 4 or 6 x 6 type). The cost price per tonne/km is consequently increased by 30% or more. As the fleet is in an advanced state of wear, problems of fleet replacement are to be anticipated over the next two years. At the present time, it is impossible for a carrier, even of some stature (certain carriers own 20 or 30 heavy vehicles or more) to obtain bank credit for the purchase of a new vehicle.

### **Carrier cooperative operating under State supervision**

The carriers are grouped in a cooperative, set up during the 1960s for the purpose of strengthening the technical competence and commercial dynamism of small Chad investors, faced with competition from the large companies left over from the colonial era. This cooperative subsequently obtained a freighting monopoly, and any carrier must therefore be a member of the cooperative.

The fee collected for management expenses, corresponding to genuine services (but which certain carriers can do without), is 10% of turnover. CTT (Chad Carriers' Cooperative) currently provides the functions of freight exchange (all freight must consequently be processed by CTT), representation vis à vis customers in the Republic of Chad and other countries, deduction at source of social charges and taxes, accounting, advances on income for the purchase of supplies, etc. CTT is also in the process of setting up a cooperative vehicle maintenance garage.

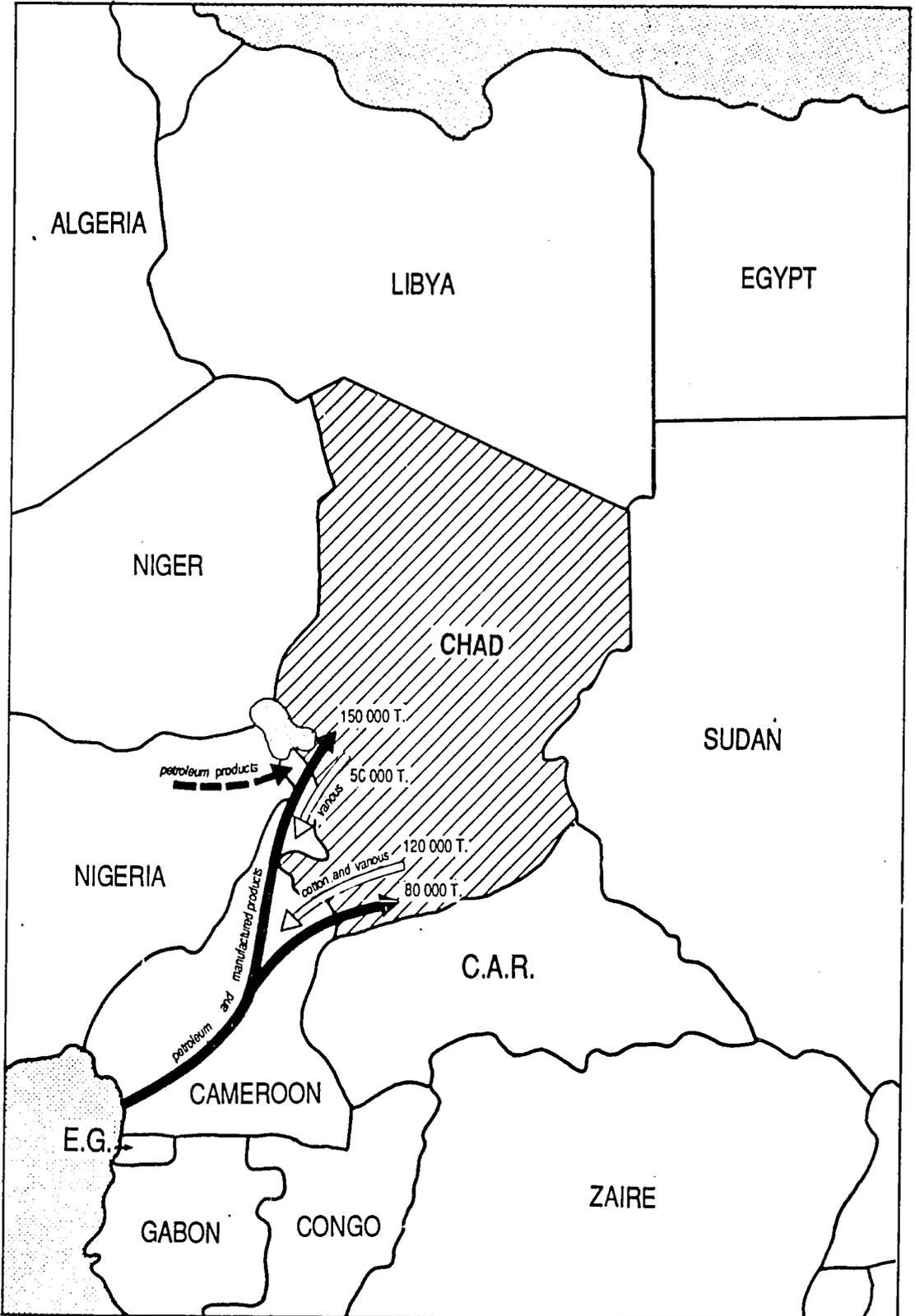
CTT was formed as a private company, but now has a management team appointed by the Government. As CTT also provides administrative functions, including management of the transport sector, control of correct observance of freight sharing agreements with neighbouring countries, and collection of taxes and social charges, its importance is undeniable although incompletely perceived by the various parties involved. CTT is faced with sharp criticism of its operation. Transport customers complain of the quality and reliability of the carriers, and the smaller carriers feel that they do not hold the position which they merit in management of the cooperative and allocation of freight loads.

The freighting monopoly is in fact relatively flexible, as unofficial matching of supply and demand is widely tolerated, provided the parties concerned subsequently regularize their dealings with the cooperative. However, no-one disputes the need for organization of the transport sector, and a professional association responsible for sustaining and developing the expertise of the small carriers.

The auxiliary function for national transport is provided by small Chad brokers and commission agents. Due to the diffuse character of the national transport activity, there is no call for intervention other than to supervise the honesty of operations, proper observance of regulations, and the payment of taxes.

**Transit transport operations conducted by four companies**

Four large companies are present in the international transit field, engaging in both export and import operations. The role of these companies is of particular importance in cases where goods transit via Cameroon and are subject to trans-shipment. The agencies of these companies in Douala and Ngaoundere represent, in situ, the owners of the goods located in the Republic of Chad. These agencies therefore have the power of decision for selection or acceptance of a road carrier operating to Chad.



The international transit situation is currently in a transitional phase, following the recent disappearance (November 1987) of the Cameroon national forwarding agent Sogetrans, which previously held a dominant situation in the road freighting sector.

## 2.2.2 - AIR TRANSPORT

### **Institutional framework**

The institutional organization of civil aviation in the Republic of Chad is based on two separate entities:

- ASECNA,
- DAC (Civil Aviation Department).

The fundamental vocation of ASECNA is the control of national air space and air safety, these being "communal" activities. The Government has also made ASECNA responsible for management of a large number of airports, thus constituting a management unit. In this context, ASECNA undertakes a certain amount of investment, and provides a maintenance service within the very narrow limits of the available budget.

DAC acts on behalf of the State, in regulatory and trustee capacities. Its activities are therefore concentrated in the legal, air transport, air crew, aircraft and general aviation fields. On the other hand, DAC plays practically no part with respect to airport infrastructures. DAC has very limited human and material resources. The modest nature of revenue available for balancing a civil aviation budget has made it necessary to call on FAC, UNDP and German cooperation where investments of any importance are involved.

### Continuing limited level of air traffic

Air transport services are provided in the Republic of Chad, among other countries, by two partially State-owned companies:

- Air Afrique: multinational company with an exclusive franchise for the regular international lines, under the terms of the Yaounde Treaty.
  
- Air Tchad: formed in 1966, the Republic of Chad national airline company holds an exclusive franchise, under the terms of a governmental decree, for all air activity inside the national territory (regular and on-demand air transport, and other forms of air work). In line with the reservations expressed by the Republic of Chad at the time of signature of the Yaounde Treaty, Air Tchad can also serve other neighbouring or Central African countries, subject to the agreement of Air Afrique.

A capital increase is currently in course of ratification, following the gift to the company by the State of Chad, of its Fokker 27 and Twin Otter aircraft. The State will then control the company with a 98% holding (UTA retaining 2%).

Air Tchad currently employs 66 persons, but gaps must be filled both in the operations sector (mechanics and assistant personnel) and in the commercial management of the company.

Air Tchad serves the towns of Sahr, Moundou, Abeche, Am Timan, Bol, Mao, Mongo, Pala and Bongor with regular flights. Other towns are connected to N'Djamena by flights of variable frequency, or on demand.

The level of commercial air traffic is low. International passenger traffic reached a total of 32,146 in 1985, corresponding to 58% of the 1979 level, while the 9553 passengers carried by Air Tchad in 1986 represent scarcely half the total for this activity prior to the war. Only the radial links between N'Djamena and Sahr and N'Djamena and Moundou produce a significant volume of traffic (approximately 3000 passengers and 30 tonnes of freight carried in both directions in 1986).

Together with the N'Djamena-Abeche route (2000 passengers and 7 tonnes of freight), these services represent 80% of total domestic traffic handled by Air Tchad. Two particularities of this traffic should be stressed:

- The highly seasonal nature of demand, dropping almost to zero during the dry season, with consequently very low annual utilization of the aircraft, making it impossible to cover fixed operating costs (annual flying time for the Fokker 27 amounts to only 750 hours, whereas a total of 1800 hours would be required to achieve profitability).
- Sensitivity of demand to the economic situation of the country. The 1986 recession had a heavy impact on air traffic.

Apart from the three aircraft owned by Air Tchad in 1987, there are also 17 light aircraft registered in the Republic of Chad, belonging to 10 private owners. These aircraft are available for charter.

#### Public service constraints borne by Air Tchad

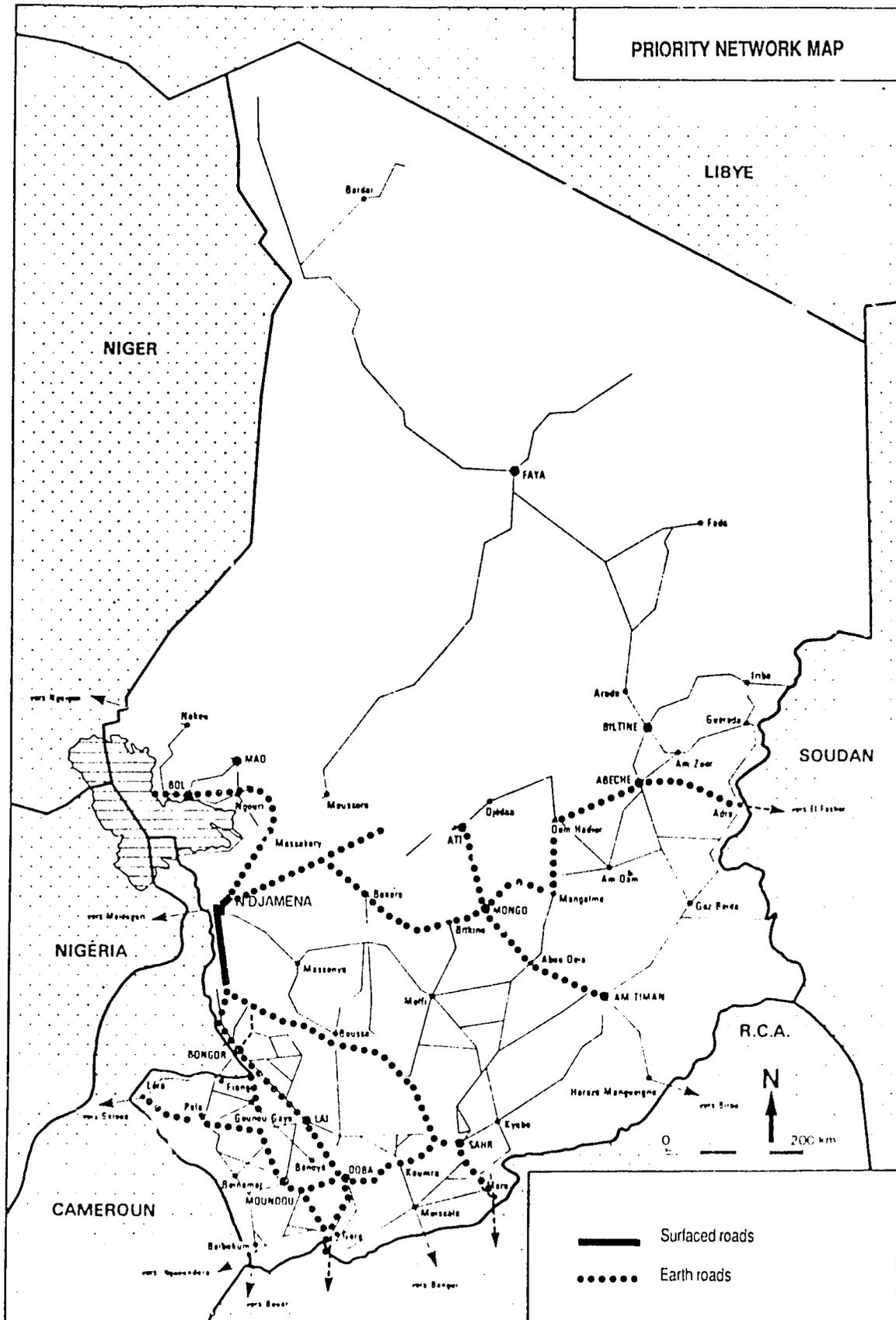
Air Tchad is constantly losing money, due to the low level and seasonal nature of demand, as mentioned above.

Tariffs are insufficient to cover costs, although too high for the majority of potential users. A return ticket for N'Djamena-Abeche or N'Djamena-Sahr costs F.CFA 82,000 or F.CFA 65,000 respectively (corresponding prices for road travel are about F.CFA 30,000 and F.CFA 20,000 respectively).

France is providing technical aid (three pilots and an accountant under the terms of a cooperation agreement), and day-to-day management of the company is conducted satisfactorily. To cover its deficit, Air Tchad has engaged in profitable air freight transport operations with Jeddah and Europe, as also charter flights for pilgrims travelling to Jeddah. Air Tchad is currently investing in ground support equipment, so as to

be in a position to provide ground support at lower cost for its own flights, and possibly for other charter flights also. Air Tchad is nevertheless obliged to bear the weight of its public service vocation, and therefore the provision of intrinsically unprofitable services, at least in the shorter and medium term. The maintenance of technical assistance and ancillary activities makes it possible to balance operating results, and ensure that the company functions efficiently.

PRIORITY NETWORK MAP



### CHAPTER III

#### TRANSPORT STRATEGY

To complete and update the objectives assigned to the transport sector in the Interim Plan, the Government undertook an in-depth reappraisal of the situation, leading to the establishment of a set of principles serving as a guide for future actions in this sector. The list of these principles takes account of the degree of achievement of the global and sectorial objectives included in the Interim Plan, but also those programs and projects so far left on one side, the execution of which now proves necessary for coherent implementation of a transport policy.

The six principles concerned are as follows:

1 - Definition of a priority system

The absence of even the most rudimentary transport plan constituted a handicap, which had to be overcome with the means available. The study of a priority transport system was therefore undertaken, estimating freight and passenger transport needs for the main axes between the principal centres, while assuring the security of service which is essential from the economic, political and social points of view.

2 - Complementarity of transport modes

This first principle is aimed at recognition of the specific nature of road and air transport, but also, and this for reasons of cost, at increasing the complementarity of the two modes. Independently from the nature of the services provided by these two modes of transport, permanent and reliable road service can only be provided in certain regions at the cost of substantial investment, representing a very heavy burden with respect to the funding capacity available in the Republic of Chad.

The permanence and/or speed of travel represent an obvious necessity which air transport can provide as a complement to the road system.

3 - Continuation of rehabilitation programs

The programs presented in the Interim Plan were aimed at rehabilitation of the most urgently required road axes (totalling 2000 km), and the airports in most intensive use.

With this first phase almost complete, the Government established the principle of continuing rehabilitation of the existing infrastructures, raising them to a level of service compatible with the volume of traffic, while guaranteeing a minimum level of safety. The objective was not therefore to construct new infrastructures, but rather to undertake an investment program compatible with funding available in the Republic of Chad, in order to restart productive activities as quickly as possible, develop exchanges between the points of production and consumption and consequently accelerate the process of improving regional access.

4 - Definition of road construction and maintenance standards

The plurality of intervention by the funding sources and contracting companies has led to an obvious disparity of construction methods. The Ministry of Public Works has consequently drafted a set of road rehabilitation standards, which take account

of local conditions (climate, soils and construction materials available in the immediate vicinity), and the volume and aggressivity of the traffic carried (vehicle types and loads).

These standards were prepared with the aim of facilitating maintenance, and subsequently minimizing maintenance costs.

5 - Definition of a maintenance policy

The justification for this principle is obvious, if it is judged essential, as desired by the Government, to maintain the level of service resulting from the rehabilitation work executed. The formation of OFNAR in 1984, and the allocation of tax revenue for funding its activities, provide an answer, although insufficient, to this problem. The Government consequently earnestly invites the funding sources to participate more actively in the maintenance programs, in the ways described below.

6 - Institutional reorganization and promotion of the private sector

The State and para-State institutions in the transport sector are functioning, although their duties require clarification, their resources are limited, and their personnel require training.

Allocation of tasks must be made between the public and private sectors, in all cases where the latter offers the requisite level of skills, in order to ensure optimum efficiency in the execution of work, or the provision of this or that service.

In concrete terms, this principle is based on redefinition of the public service missions for which these institutions are responsible, strengthening of the institutions in terms of resources and personnel, encouragement of private contractors by means of an appropriate incentive policy, and technical training and management actions. In line with this policy of enhancing and developing the private sector, the Government has decided to privatize exploitation of the quarries.

### 3.1 - TRANSPORT INFRASTRUCTURES

#### 3.1.1 - ROAD INFRASTRUCTURES

##### **Priority system concept**

The classified road system in the Republic of Chad comprises a total of 7300 km of roads and tracks, and total rehabilitation of the system cannot be envisaged in the medium term (6 years).

Following an analysis of road transport needs, firstly with a view to reestablishing international links with the Chad road system, and secondly to establishing internal links of primary necessity (prefectures, agricultural or industrial production centres), the Government has identified a basic priority growth road system in agreement with the various funding sources.

The priority system comprises some 3800 km (over 50% of the classified system), and represents the rehabilitation and maintenance objective to be achieved by 1993. A total of 2000 km have already been rehabilitated by 1988. The additional 1800 km to be reopened in 1993, will enable the Government to ensure minimum essential traffic flow, both in terms of passenger and freight transport and the provision of public services (health, administration and education).

Road maintenance work must be conducted on the totality (3800 km) on a regular basis.

With this in view, and concerned with meeting its obligations effectively and optimizing the aid obtained, the Government has prepared a set of standards, designed to link road construction and rehabilitation standards with those covering routine and periodic maintenance.

### **Need for technical road construction and rehabilitation standards**

The relief and geology of the Republic of Chad make the choice of basic road construction standards difficult. Forming an old lacustrine basin, the country is flat, and a large part of the total surface area is subject to flooding. In the Northern part, dunes and clay-silt soils provide a mediocre base structure. Natural laterite gravel aggregate materials are rare, and in some cases must be transported over considerable distances. In the South of the country, frequent and intensive rainfall calls for costly drainage systems. The changing hydrology of the Chari and Benoué rivers and Lake Chad, combined with crop irrigation needs, further complicate the situation. Laterite soils suitable for road construction are only found in the Southern and Eastern parts of the country. Traffic volumes are generally low, although the percentage of frequently overlaid heavy vehicles is high, accelerating deterioration of the roads.

In order to assess the standards to be adopted for road construction and maintenance under such unfavourable conditions, a specific study was undertaken for the purpose of defining those types of construction which guarantee permanent serviceability of the lines of communication, at reasonable maintenance cost levels.

A document presenting technical guidelines for road system standards in the Republic of Chad has been prepared (see Volume 2, Appendix B).

The investment program proposed for the transport sector takes account of costs associated with the proposed construction standards, and represents a reasonably accurate estimate of the cost of rehabilitation of a priority system comprising approximately 3800 km of roads and tracks offering all-weather serviceability.

The estimated cost of rehabilitation projects undertaken so far by external funding sources, varies between F.CFA 1.5 and 10 million per km for an earth road. In numerous cases, road construction work undertaken at lower cost levels has not succeeded in guaranteeing all-weather serviceability. Furthermore, routine maintenance in such cases is difficult and costly, where it is not frankly impossible.

The proposed set of standards make it possible to make selections providing this guarantee in each region, taking due account of the nature of the soil and anticipated traffic volume. Application of the proposed standards will also make it possible to estimate construction and maintenance costs with maximum accuracy.

The Government is adamant that these standards should be taken into account in the preparation of road construction projects to be executed on the priority system.

#### **Adoption of road maintenance methods**

At the time when the Republic of Chad is starting to plan its development, it has become clear that the national road management policy must be reviewed. It is extremely likely that the renovated road system will grow more rapidly than the financial or technical capacity of the country to provide even routine maintenance for the system. Due to the accumulated backlog of emergency maintenance work, the current cost of the maintenance program for the priority system exceeds the financial resources of OFNAR.

An appropriate road maintenance system must be established, linking this action with structural reorganization and an extended training program for management staff, enabling the latter to acquire the management and supervisory skills required in this field.

Road maintenance as programmed by the Administration involves two main types of intervention:

**Routine maintenance**

This covers repetitive activities such as the repair of potholes, removal of corrugated sheet, maintenance of drainage structures and bridges, maintenance of ferries and the approaches to same, protection of earth roads by rain gates, and reconstruction of deformed subgrades.

**Periodic maintenance**

This covers work, scheduled over a number of years, on replacing the wearing course of earth roads, and resurfacing asphalted roads.

An annual program covering the different types of routine and periodic maintenance on the road system must be prepared, making it possible to establish a technical and financial plan of campaign, providing for the follow-up of actions and ensuring their efficiency.

A number of traffic surveys (January, April and September) should make it possible to monitor the evolution of traffic levels, in terms of quality and composition. An initial survey was conducted in October 1987 covering all roads (40 survey points operating for one week on a 24-hour basis: see maps included in Chapter II). To obtain a better knowledge of the traffic spectrum, axle-weight inspection programs should be planned on the main axes, in order to determine the components of deterioration on both surfaced and earth roads.

The organization set up for the surveillance and maintenance of the road system comprises five regional sub-divisions (N'Djamena, Mongo, Abeche, Sahr and Moundou).

A series of interventions have been organized within the framework of these decentralized departments, for the purpose of supervising and safeguarding the national road system patrimony. The installation of rain gates, which functioned satisfactorily during the 1987 rainy season, has made it possible to protect the latest sections of rehabilitated road (over 1700 km). The good results obtained stem largely from awareness of the problem, and instructions emanating from

the highest governmental levels, and the support of all departments in the ministries concerned (Public Works, Interior, Police, Military Authorities, etc.).

The Ministry of Public Works, Housing and Urban Development and OFNAR are in the process of setting up decentralized road maintenance structures. These include sub-divisional premises (workshops and offices), equipment and tools. A training program for executive and supervisory personnel has been prepared, and will be implemented in 1988.

#### Road maintenance costs and funding requirements

Road maintenance represents a major financial burden for the State, and funding needs have been estimated on the basis of mean costs calculated according to road safety level, physical environment (local climate and soils), and type of maintenance.

Indicative maintenance costs are given below, expressed in F.CFA per kilometer per year:

##### a) Earth roads

###### Northern zone

Routine maintenance	F.CFA 300,000 to 700,000 per km, according to traffic.
Periodic maintenance	F.CFA 15,000,000 per km, every 7 to 8 years according to traffic.

###### Southern zone

Routine maintenance	F.CFA 160,000 to 550,000 per km per year, according to traffic.
Periodic maintenance	F.CFA 4,000 per km, every 5 to 7 years according to traffic.

b) **Asphalted roads**

Northern zone and Southern zone:

Routine maintenance                      F.FCA 150,000 per km

Periodic maintenance:

- Wearing courses                      F.CFA 8,500,000 per km every 6 years
- Repair of shoulders                      F.CFA 4,000,000 per km every 5 years

The Republic of Chad has made a major effort to contribute to road maintenance costs, allocating part of petroleum tax revenue to the OFNAR operating budget. For various reasons, this tax revenue has not reached the level originally forecast. However, the elimination of constraining factors (both internal and external) will improve this tax yield. A cost recovery study is in course of execution, from which concrete proposals for the elimination of difficulties encountered and increasing the level of resources are awaited. However, the situation in the country does not make it possible to increase the tax burden without damage, and it is for this reason that the funding sources should contribute, at least during the period covered by the program, to conjoint financing of the rehabilitation and maintenance of these roads.

**Importance of rural tracks**

The importance of agricultural and livestock production means that the secondary road network, and the rural tracks in particular, must be improved without delay.

In the cotton production zone the rural project fund financed by IDA was reactivated in 1983. It is planned to continue this effort, with extension to include the livestock breeding zone (with funding by IDA, Italy and GFR). A current study will make it possible to determine priorities and funding requirements.

### 3.1.2 - AIR TRANSPORT INFRASTRUCTURES

#### **Complementarity of the air transport system**

The domestic airports play an important role in the Republic of Chad as a complement to road transport, even in the case of destinations already, or which will be correctly served by a renovated road system. Some roads are not serviceable throughout the year, and during the rainy seasons air transport provides a certain degree of continuity for commercial and administrative relations, and for emergencies.

Furthermore, we observe that the heaviest air traffic flows coincide with the highest levels of road traffic (Sahr and Moundou), as is generally the case in other countries.

Furthermore, a certain number of destinations, such as Faya-Largeau in particular, require good air service, as the distances involved and the nature of the soils make road construction projects difficult.

Consequently airport investments are subject to the following dual priority:

- principal emphasis on flight safety, ahead of more qualitative elements such as passenger handling and the living conditions of airport personnel,
- priority treatment for the major commercial centres, and among the centres of secondary importance, those not enjoying, or which will not enjoy in the medium term, a rehabilitated road service.

## 3.2 - MANAGEMENT OF TRANSPORT SYSTEMS

### 3.2.1 - ROAD SYSTEM MANAGEMENT

The Ministry of Public Works, Housing and Urban Development (MTPHU) is responsible, via the Public Works Department (DTP), for programming development of the road system. Responsibility for road maintenance is held by the National Roads Bureau (OFNAR), an autonomous agency operating under the aegis of MTPHU. Apart from personnel engaged in programming, management and study activities, the majority of DTP personnel have been transferred to OFNAR.

In order to improve management of the road system, the Government plans to increase the capacity of the Ministry of Public Works for the definition and application of a coherent transport policy.

A certain number of essential developments must be undertaken in connection with road system management.

#### **Redefinition of public service missions**

Responsibility for programming improvements to the road system should continue to be held by the Ministry of Public Works. OFNAR will be responsible for programming the execution and supervision of road maintenance. Maintenance work will be shared progressively between force work executed by OFNAR, and work contracted out to independent companies.

OFNAR must be ready to act flexibly, and employ its financial resources not only for force work operations, but also for maintenance work executed by national and foreign contractors. In the context of the road maintenance project, a reorganization study of OFNAR is in course of execution, designed to enable OFNAR to match its structure to the missions for which it is responsible.

### **Need for reinforcement of institutional expertise**

To increase absorption capacities in this field, the Ministry of Public Works is planning to increase its departmental human resources. A program for the recruitment and assignment of numerous technicians is in course of preparation in this connection, with the aim of strengthening existing structures. Two forms of intervention must be applied to strengthen the human potential, these being a series of basic and refresher courses to improve the level of technical qualification of each agent, and a medium-term technical training program in appropriate schools, for young Chad technicians and engineers. An effort is required to intensify in-service training, and to organize training courses in other countries, in order to improve the technical capacity of management staff and executive technicians working in this department and with OFNAR.

IDA, FAD, EDF and USAID have already undertaken a certain number of training actions, which must be developed and intensified in the future.

### **Repair and maintenance: an opportunity for the private sector**

In the context of its general policy, the Government wishes to restrict growth of the public sector in the future, encouraging the private sector and small- and medium-sized companies in particular. The planned road repair and maintenance program offers an excellent opportunity for encouraging development of the building and public works industry in the Republic of Chad.

There are approximately 200 small contractors with experience in the building sector in the country. The few local firms with the requisite level of experience to undertake public works assignments are under foreign control. The Government is preparing an action plan in connection with the road maintenance project financed by IDA, designed to provide small contractors in the public works field with necessary support for the organization, management and financing of their businesses, also providing essential additional training, thus placing them in a position to undertake periodic maintenance work, and certain routine maintenance tasks.

To cover all maintenance activities, it is therefore planned to assign certain tasks progressively to private companies, which will then complement the force work operations conducted by OFNAR.

The recommended strategy is therefore to execute all periodic maintenance work on a contracting basis, reduce that part of routine maintenance executed on a force work basis under the direct responsibility of OFNAR progressively, and develop the capacity of jobbers and small building companies to carry out routine road maintenance and the repair of bridges. Solutions of this type must be accompanied by development of the institutional capacity of DTP for road system management, and of OFNAR for programming and supervision of maintenance activities conducted on a contracting basis.

#### **Revised role of OFCA**

The National Roads Bureau (OFCA) also operates under the aegis of the Ministry of Public Works. OFCA was set up to manage exploitation of quarries in the Republic of Chad, and the Mani quarry in particular. The many road construction projects which will be initiated in 1988 and continued through to 1990, raise the problem of the supply of large quantities of crushed material (crusher-run stone) and aggregate from the Mani quarry.

The State must therefore maintain its role in regulating exploitation of the quarries, in the public interest. However, it is not appropriate for the State to concern itself with the commercial side of these activities, the control of which will be obtained more efficiently by private contractors, under conditions of open competition. Cost recovery and regulation of access to resources can be ensured by a system of dues, operated by a governmental organization. It is therefore appropriate to relieve OFCA of its operator function, handing over management of the important crushing operation at Mani to the private sector.

To obtain satisfactory production of these road construction materials in terms of quantity, quality and availability when required, current actions should lead to the formation of a private company with State participation.

### 3.2.2 - ROAD TRANSPORT

Passenger transport requirements are met satisfactorily at the present time, in a liberal context. As for freight, particularly in the case of international transport, the Chad carriers (with a few exceptions) require strengthening of their organization, technical expertise and management. In a weakened economy such as that of the Republic of Chad, over-fast liberalization would clearly lead to excessive concentration of supply, and quickly result in price increases or abandonment of the less profitable services (internal links in particular).

The orientation defined by the Government consists in progressive liberalization of the road transport sector, over the period of the present program. To this end, the Government will ensure separation of the Cooperative Professional Group function from that of freighting management. A structure other than this Group will be responsible for despatching supply and demand, and recording and declaring operations to the tax authorities. Practical procedures for this separation of functions are the subject of a current study, the conclusions of which will be known in the Spring of 1988.

### 3.2.3 - AIR TRANSPORT

#### **Domestic traffic**

Given the political and economic context in which Air Tchad is operating (effects of the war, combined with denial of access to potentially profitable neighbouring services to Cameroon and Nigeria), the results achieved by the company can be considered very commendable.

Air Tchad has adopted a very prudent medium-term expansion policy. Possibilities for development are beginning to appear, but do not justify major investment over the next 6 years. Given the weakness of demand, the Fokker 27 with its combined passenger and freight capacity, and the Twin Otter with its operating performance (short take-off) appear to be the aircraft best suited to the system, traffic and runways, most of which are unsurfaced. The Fokker 27 (17 years) and Twin Otter (8 years) both have potential lifetimes more than sufficient to cover the period of the plan considered here.

Current under-utilization of these aircraft, and their foreseeable remaining lifetime, do not justify the acquisition of new aircraft before 1993.

#### **International and inter-regional traffic**

Development of this traffic is primarily dependent on bilateral agreements which the Republic of Chad negotiates with its immediate neighbours on the one hand, and other customer and supplier countries on the other. For the immediate future, recourse to the regular airline companies and charter freighting by Air Tchad appear to be the most suitable ways of initiating import/export movements. Air Tchad is well placed to generate profits from charter freighting operations, and is already experienced in this field.

However, the needs expressed by the leading exporters of products which can be transported by air (meat, cattle on the hoof, gum arabic, etc.) must be monitored, in order to provide the appropriate responses when these needs are confirmed.

CHAPTER IV  
TRANSPORT SECTOR ACTION PROGRAM  
(1988 - 1993)

An action program has been established for the six-year period from 1988 to 1993. The program has been sub-divided into two phases: 1988-1990 and 1991-1993.

**4.1 - ROAD INFRASTRUCTURES**

Actions to be undertaken with respect to road infrastructures can be grouped under two headings:

- Road rehabilitation
- Road maintenance

**Road rehabilitation program covering 1800 km**

The priority road system rehabilitation program presented here represents a continuation of the major efforts already undertaken by the Government, in association with the funding sources, on the 2000 km emergency system defined in the Interim Plan, and by now completed or in course of completion.

Those parts of the system concerned during the period of the action program (1988-1993) comprise the following routes:

- 1) Peripheral road round Lake Chad (160 km): earth road connecting the towns of Bago Sola, Bol, Ngouri, Massakory and Massaguet, funded by FAI and UNDP, with additional funding still to be obtained (data sheets 22 and 16).
- 2) Djermaya-N'Djamena (32 km): asphalted road under reconstruction, funded by IDA (data sheet 4).
- 3) N'Djamena-Guelengdeng (146 km): asphalted road under reconstruction, providing a key link with Sarh, Bongo and Moundou, funded by IDA (data sheets 2 and 3).
- 4) N'Djamena bypass (20 km): asphalted road enabling heavy traffic to avoid the centre of the town, funded by FAD (data sheet 15).
- 5) Djermaya-Dandi (66 km): earth road providing an essential link with the Mani quarry, funded by USAID (data sheet 14).
- 6) Sahr-Sido (122 km): gravel road providing a connection with the road system in C.A.R., funded by EDF (data sheet 21).



- 7) Guelengdeng-Bongor (83 km): key section of the N'Djamena-Moundou link. Funding under discussion with GFR (data sheet 27).
- 8) Bongor-Moundou (approx. 256 km): earth road - feasibility study and advanced preliminary design in course of funding by IDA (data sheet 18).
- 9) Maikoro-Gore-Bedaoyo (110 km): gravel road, funding by EDF (data sheet 19).
- 10) Doba-Gore (102 km): earth road (data sheet 20).
- 11) Mongo-Oum Hadjer (228 km): earth road, key section of the N'Djamena-Moundou-Abeche route (data sheet 10).
- 12) Oum Hadjer-Abeche (146 km): earth road forming part of the N'Djamena-Abeche link (data sheet 11).
- 13) Abeche-Adre and Sudanese frontier (167 km): earth road (data sheet 12).
- 14) Abeche-Biltine (92km): earth road (data sheet 13).
- 15) Djermaya-Massaguet (46 km): earth road section, carrying heavy traffic to Abeche, Bol and Mao, and the BET region (data sheet 5).
- 16) Massaguet-Ngoura (125 km): earth road requiring rehabilitation to meet the standards adopted, in order to facilitate subsequent maintenance (data sheet 6).

- 18) Ngoura-Mongo (303 km): earth road, requiring . improvement of difficult sections of the existing road. Work commenced in 1987 (data sheet 7).
- 19) Mongo-Am Timan (253 km): earth road. Road construction work must be undertaken to bring this complete route up to the required standards (data sheet 28).
- 20) Mongo-Ati (154 km): earth road, requiring improvement to bring it up to the required standards, reusing drainage structures built in 1986 and 1987 (data sheet 9).
- 21) Sahr-Moundou-Lere (623 km): this route is mentioned here as a reminder that rehabilitation was undertaken in the period 1986-1987, and that this route forms part of the rehabilitated road system in service as from 1988).

This part of the program amounts to a total of F.CFA 57.45 billion, and is presented in Table 4.1 below.

#### **Organization of road maintenance for 3800 km of road**

The objective of the road maintenance program is to ensure execution of maintenance work on the 2000 km already rehabilitated by 1988, then extending maintenance coverage as rehabilitation work is continued, up to a total of 3800 km (1993).

The routine maintenance budget, estimated on the basis of the mean costs per km already indicated, will rise from F.CFA 800 million in 1988 to F.CFA 1.8 billion in 1993. It should be noted that this budget of F.CFA 1.8 billion corresponds to approximately 3% of invested capital at end 1993 (F.CFA 57.45 billion) (data sheet 23).

Recovery of costs from petroleum taxes reached only F.CFA 600 million in 1987, and it cannot be denied that complementary funding will be required to meet the assigned objective.

Despite efforts already undertaken, the Government knows that it cannot handle this important task of maintaining the road system patrimony in good condition with its tax resources alone, and therefore requests that financing of rehabilitation work by the funding sources should be linked with participation in the cost of routine maintenance for a period of a few years.

Following this line of thought, maintenance of the Sahr-Lere and Sahr-Guelengdeng roads has already been taken over by EDF, following rehabilitation of these sections (data sheet 24). This example should be followed by the funding sources, to enable the Republic of Chad to get through the difficult 1988-1993 period.

The intervention of private companies is planned for periodic maintenance tasks, requiring the mobilization of major resources at intervals of a few years. Only one periodic maintenance operation is scheduled during the period of the program (data sheet 25).

TABLE N° 4.1  
TRANSPORT SECTOR INVESTMENT PROGRAM

(F.CFA billion)

data sheet No	Current 1987 (1)	1988	1989	1990	1991	1992	1993	Total for projects 1988- 1993	
<b>A/ ROAD INFRASTRUCTURE</b>									
	km								
1 Sahr-Houndou-Lere	623	0,500						0,000	
2 N'Djanena- Guelengdeng	146		5,000	7,000				12,000	
3 Guelengdeng-Sahr	379	0,600						0,000	
4 N'Djanena-Djemaya	30		2,500	1,000				3,500	
5 Djemaya-Massaguet	46		0,500	1,000				1,500	
6 Massaguet-Ngoura	125			0,800		0,700		1,500	
7 Ngoura-Mongo	303	0,750	1,050	0,200				1,250	
8 Mongo-Am Timan	253	0,400		0,300	1,400			1,700	
9 Mongo-Ati	154		0,400	0,500				0,900	
10 Mongo-Dun Hadjer	228			0,150	3,000			3,150	
11 Houn Hadjer-Abéché	146			0,300	1,000	0,700		2,000	
12 Abéché-Adre	167				1,000	1,200		2,200	
13 Abéché-Biltine	92				0,600			0,600	
14 Djemaya-Dandi	67		1,000	1,200				2,200	
15 N'Djanena bypass	20		0,500	2,000	1,500			4,000	
16 Massaguet-Massakory	68				1,300			1,300	
17 Guelengdeng-Bongor	83			1,200				1,200	
18 Bongor-Houndou	250		1,500	1,500	0,800			3,800	
19 Mankoro-Gore- Bedayo	110		1,000					1,000	
20 Doba-Gore	102				0,700			0,700	
21 Sahr-Sido	122		0,400	0,500				0,900	
22 Massakory-Bol- Baga Sola	260		5,100	3,100	1,600			9,800	
<b>Total A-1 : REPAIRS</b>	<b>3 774</b>	<b>2,250</b>	<b>18,950</b>	<b>20,750</b>	<b>11,300</b>	<b>3,000</b>	<b>1,200</b>	<b>0,000</b>	<b>55,200</b>
<b>2/ ROAD MAINTENANCE</b>									
23 Routine maintenance		0,800	1,100	1,500	1,800	1,800	1,900	1,800	9,800
24 Intensif routine maintanance (EDF)			1,460	1,400	1,400				4,260
25 Periodic maintenance						1,300	1,200		2,500
<b>Total A-2 : MAINTENANCE</b>		<b>0,800</b>	<b>2,560</b>	<b>2,900</b>	<b>3,200</b>	<b>1,800</b>	<b>3,100</b>	<b>3,000</b>	<b>16,560</b>
<b>TOTAL A : ROAD INFRASTRUCTURE</b>		<b>3,050</b>	<b>21,510</b>	<b>23,650</b>	<b>14,500</b>	<b>4,800</b>	<b>4,300</b>	<b>3,000</b>	<b>71,760</b>

#### 4.2 - AIR TRANSPORT INFRASTRUCTURE

The work required on the airports is of limited amplitude compared with work on the roads, and could possibly be carried out more rapidly (Ati airport for example). Usable airports will remain necessary on certain sites, until rehabilitation work on the roads has been completed, and even beyond that time to provide for special or emergency transport needs.

Investment requirements can be assessed on the basis of various technical considerations:

- The aircraft flown by Air Tchad will not require replacement over the next three years. Only a highly specific study would make it possible for the company to assess the interest of acquiring a jet aircraft with a capacity exceeding that of the Fokker 27 at a later date. Such a need does not appear clearly at the present time. Runways will therefore be dimensioned accordingly.
- Long haul international freight and passenger traffic will be handled exclusively at N'Djamena (and possibly Abeche).
- The radio navigation network is globally satisfactory, apart from a few adjustments which are required.
- The radiocommunications network is extremely deficient, as also the met. system.
- Finally, the investments to be programmed must be so dimensioned that operating and maintenance costs remain within the limits of financial capacities in the Republic of Chad. The possibility of obtaining regular supplies of spares must be one of the basic criteria for the implementation of projects.

### **Adaptation of safety to air traffic needs**

The above considerations lead to adoption of the following actions on a priority basis:

- repair of runways at Sahr, Moundou, Am Timan, Ati, Mao, Bol and Biltine airports for an initial phase, followed by Fada, Mongo, Bongor and Goz Beida at a later stage.
- upgrading of N'Djamena airport to international standards with respect to passenger safety.
- completion of work for recommencement of Chad air space control by the Civil Aviation Authority.
- reestablishment of an air-to-ground and ground-to-ground communications network, with associated electric power supplies, in order to improve flight safety.
- complementary equipment for the radio navigation network, principally at Faya, and rehabilitation of existing resources at Moundou and Sahr in particular.
- provision of the main airports with aircraft fire-fighting resources (Moundou, Am Timan, Abeche, Mongo and Faya).
- renovation and completion of the met. information network.
- continuation with personnel training programs, in particular in the radioelectrical and fire-fighting fields, as also in techniques specific to Air Tchad (mechanicals and ground assistance).
- improved operation of airports in the Republic of Chad, and more efficient maintenance in particular. This requires the mobilization of public funds, in addition to resources generated by air transport activities. The supply of spares must be covered by external aid.

At a second level of urgency, and provided financial conditions permit, the following actions should be undertaken:

- renovation of other secondary runways.



- renovation or construction of air terminal buildings,
- renovation of personnel residential quarters,
- if prospects for Air Tchad activities lead to utilization of a larger aircraft in the future, the extension and asphaltting of Sahr airport would then be necessary. However, this hypothesis is doubtless situated beyond the 1993 horizon.

#### 4.3 - INSTITUTIONAL STRENGTHENING

##### 4.3.1 - MINISTRY OF PUBLIC WORKS

The structural strengthening of the Public Works Central Division (DGTP) requires technical assistance intervention as follows:

- DGTP: provision of two advisers and one specialist for management of the IDA project,
- OFNAR: provision of three advisers to the heads of the sub-divisions, two site managers and two specialists in equipment maintenance. A monitoring unit for the decentralized departments has also been set up in the OFNAR central management division, and includes a technical adviser for essential liaison tasks, programming and maintenance and logistic support. This technical assistance team is also responsible for training the personnel of the sub-divisions according to immediate needs. Strengthening of OFNAR resources includes the acquisition of equipment, ferries and public works vehicles, the construction of buildings for the Moundou, Sahr and Mongo sub-divisions, and rehabilitation of the N'Djamena sub-division buildings (data sheet 26).

Substantial participation by USAID has made it possible to strengthen the structures and resources of the OFNAR central departments in N'Djamena. The garages and central stores of the equipment division, and management, financial department and training centre offices have been rebuilt. The purchase of public works equipment has made it possible to set up a training-production team, which has been operational since November 1987. Technical assistance has been provided for central management, the programming and financial departments, mechanical tools division and training department (data sheet 27).

Resources have also been strengthened by means of aid provided by EDF, for the purpose of acquiring equipment for two light maintenance gangs, responsible for routine maintenance of the Sahr-Lere road (data sheet 28).

FAD has participated in the strengthening of material resources for manual maintenance, and in-service training of management and administrative personnel, drivers and road maintenance operatives (data sheet 29).

Reconstruction of the National School of Public Works, demolished during the war, is now required urgently in order to provide formal training for public works, building, survey and municipal works technicians (data sheet 30).

The Department of Public Works requires the services of consultants to meet study and assistance needs (data sheet 31).

TABLE N° 4.2  
TRANSPORT SECTOR INVESTMENT PROGRAM

Data sheet No	Current 1987 (1)	1988	1989	1990	1991	1992	1993	Total for projects 1988- 1993
<b>B/ AIR TRANSPORT INFRASTRUCTURE</b>								
32 N'Djamena airport		0,400	0,200	0,200	0,500	0,600		1,900
33 Faya airport		0,400	0,250					0,650
34 Sahr, Houndou and Abeche airports		0,400	2,800	2,180				5,380
35 Secondary airports		0,400	0,600	0,620				1,620
<b>TOTAL B/AIR TRANSPORT INFRASTRUCTURE</b>	<b>0,000</b>	<b>1,600</b>	<b>3,850</b>	<b>3,000</b>	<b>0,500</b>	<b>0,600</b>	<b>0,000</b>	<b>9,550</b>

TABLE N° 4.3  
TRANSPORT SECTOR INVESTMENT PROGRAM

(F.CFA billion)

Data sheet No	Current 1987 (1)	1988	1989	1990	1991	1992	1993	Total for projects 1988- 1993
<b>C/ MTHU INSTITUTIONAL STRENGTHENING</b>								
26 OFNAR/IDA	2,500	4,000			0,700			4,700
27 OFNAR/USAID	1,780	1,110	1,610	0,900				3,620
28 Equipment/EDF		1,530						1,530
29 Equipment and training (FAD)		1,100	0,100					1,200
30 Réhabilitation of ENTP		0,300	0,200					0,500
31 Consultant service		0,300	0,500	0,200				1,000
<b>TOTAL C/MTHU INSTITUTIONAL STRENGTHENING</b>	<b>4,280</b>	<b>8,340</b>	<b>2,410</b>	<b>1,100</b>	<b>0,700</b>	<b>0,000</b>	<b>0,000</b>	<b>12,550</b>

#### 4.3.2 - TRANSPORT SECTOR

##### **Ministry of Transport and Civil Aviation**

Actions are on hand aimed at improving the control of this Ministry of its sector. Technical assistance comprising a transport economist, systems analyst and a number of modal specialists is due to be set up in the near future, for the purpose of defining a policy, and the ways and means of its application. The result will be the creation of a planning unit, capable of interpreting governmental orientations in terms of transport. This assistance, programmed for 1988-1990, will probably require extension in the form of more specific actions over the period 1991-1993 (data sheets 38 and 40).

The matching of transport supply and demand by the creation of a freight exchange, will require the assistance of a team of experienced operatives, even if the expertise currently available at CTT is reused. The future freight exchange must be equipped with modern communications facilities, and must be represented in Ngaoundere, Douala and Nigeria (data sheet 39).

##### **Support for the private sector**

In an ideal situation, the free play of competitive forces ensures minimum cost and maximization of the interests of the community. However, the conditions for application of this theorem are not currently present in the Republic of Chad. Support for the private sector is designed to raise the technical level of all carriers, so that a competitive situation can have a beneficial effect.

An assistance scheme for vehicle maintenance is currently being set up with funding from GFR. This comprises the creation of a maintenance workshop and spares stores, and a training program for mechanics. The expertise of the carriers must then be developed in commercial and management terms, on the one hand by providing training in these disciplines, and on the other by offering those carriers who are also

investors a permanent service for the completion of administrative formalities, book-keeping, surveillance of vehicles during transport, and the defence of their interests both in the Republic of Chad and in other countries (data sheets 39 and 41).

### **Transit transport**

The land-locked situation of the Republic of Chad raises the specific problem of the transit of import and export loads via neighbouring countries. The Chad carriers do not obtain their share of this traffic, as they are poorly represented in the sea ports and at the Ngaoudere railhead. Consequently they react more slowly than the local competition. Once again, the real requirement is for strengthening the practical position of the Chad carriers, by setting up efficient commercial offices, equipped with modern communications facilities (data sheets 40 and 42).

### **Civil Aviation Department (DAC)**

The DAC suffers from the effects of disparate recruitment, not corresponding precisely to the specific disciplines required for the execution of its functions.

- Training or conversion courses are required, to prepare existing staff for the functions to be provided, particularly in the fields of air transport and infrastructures.
  
- Decent premises must be provided, in parallel to this action.

Following this initial reorganization phase, the DAC could extend the field of its competence, firstly by providing effective supervision for the "national" activities conducted by ASECNA, and then by taking over direct responsibility for ASECNA attributions concerning the activities covered by articles 10 and 12 of the agreement under which ASECNA was set up. This new orientation has been decided by the ASECNA Ministerial

Council, and must therefore be implemented progressively and prudently. This will require the transfer of a certain number of personnel from ASECNA to the DAC. When the time has come to take over direct control of the activities covered by articles 10 and 12, the moment will also doubtless be ripe to change the status of the DAC to that of an autonomous agency.

The DAC training and reorganization program is covered by data sheets 36 and 37.

#### Air Tchad

No increase in the number of aircraft operated by Air Tchad is required for the period 1988-1993. However, emphasis must be placed on aircraft maintenance, aircraft operation and commercial policy. These factors relate generally to human problems, and call for the following:

- training program for fully qualified pilots,
- training program for mechanics and handling agents, providing for the development of air transport sector ancillary activities,
- continued technical assistance, by maintaining the presence of the four specialists (pilots, mechanics and administrative personnel) already in the Republic of Chad, and strengthening of this team for one year by the addition of a further two specialists (mechanic and commercial expert).

This program is presented in data sheet 36.

TABLE N° 4.4  
TRANSPORT SECTOR INVESTMENT PROGRAM

(F.CFA billion)

Data sheet No	Current							Total for projects 1988- 1993
	1987 (1)	1988	1989	1990	1991	1992	1993	
<b>D/ MTAC INSTITUTIONAL STRENGTHENING</b>								
36 Training of civil aviation personnel		0,080	0,070					0,150
37 Civil aviation institutional strengthening		0,100	0,190	0,110				0,400
38 MTAC institutional strengthening		0,200	0,110					0,310
39 Strengthening of domestic carriers		0,100	0,200					0,300
40 Transport sector development studies		0,200	0,200	0,200				0,600
41 MTAC personnel training		0,100	0,100					0,200
42 Enhancement of Douala transit capacity		0,800	0,500					1,300
43 Strengthening of DAC maintenance resources		0,050	0,050	0,050	0,050	0,050	0,050	0,300
<b>TOTAL D/MTAC INSTITUTIONAL STRENGTHENING</b>		<b>0,000</b>	<b>0,830</b>	<b>1,720</b>	<b>0,860</b>	<b>0,050</b>	<b>0,050</b>	<b>3,580</b>

#### 4.4 - PROGRAM FUNDING

Domestic resources are still insufficient to cover program investment costs, and the funding sources are requested to finance the major part of same. The total debt of the Republic of Chad is close to F.CFA 30 billion. An aggravation of this debt would be incompatible with national resources. It is therefore requested that the maximum amount of the funding required should be provided under concessional conditions (grants, long-term borrowing with repayment over an extended period and at a low rate of interest).

New petroleum tax laws were passed by the Government in July 1987, in the form of a single domestic consumption tax, 20% of the revenue obtained being paid to OFNAR. As a result of this high percentage, and greater efficiency in the collection of tax on petroleum products, OFNAR resources will increase substantially.

However, these resources will be insufficient to cover maintenance costs in full, and the funding sources are also requested to provide finance over a certain period, for maintenance of the infrastructures for which they will have contributed to the creation.

##### 4.4.1 - TRANSPORT PROGRAM FUNDING NEEDS

The investment program amounts of F.CFA 97.4 billion, estimated on the basis of January 1988 values.

The various components of this program are as follows:

##### A) Infrastructure

- |                   |                     |
|-------------------|---------------------|
| 1 - Roads         | F.CFA 71.76 billion |
| 2 - Air transport | F.CFA 9.55 billion  |

B) Institutional strengthening

3- Public works	F.CFA 12.55 billion
4 - Transport	<u>F.CFA 3.56 billion</u>
TOTAL	F.CFA 97.42 billion

4.4.2 - FUNDING OBTAINED AND ADDITIONAL NEEDS

This situation reflects funding already committed, obtained and under negotiation, and funding not yet under discussion with genuinely interested parties.

Table 4.5 below summarizes aid obtained from the principal funding sources concerned in the transport sector.

The amount of current funding, and funding obtained and contracted, amounts of F.CFA 64.64 billion for the period 1988-1993.

Comparison of global needs and funding obtained identifies the amount of additional funding still required.

In global terms, funding still required amounts to F.CFA 32.78 billion, this amount breaking down by period as follows:

- 1988-1990: F.CFA 34.75 billion
- 1991-1993: F.CFA 8.03 billion

## REPUBLIC OF CHAD

AID (F.CFA BILLION)

## TRANSPORT SECTOR INVESTMENT PROGRAM

REF : INVEST.FON 2 AT 10/12/87

DATA SHEET NUMBER	TOTAL 1987-1993	IDA	FUNDING OBTAINED AND IN COURSE OF NEGOTIATION					UNDP/FAI	NATIONAL	TOTAL FUNDING PAD 1988-1993	EXPENDITURE COMMITTED 1987	FUNDING TO BE OBTAINED		
			US/AID	FAD	FAC	GFR	EDF							
<b>A : ROAD INFRASTRUCTURE</b>														
<b>1/ ROAD REPAIRS</b>														
	Distance (km)													
1	SARH-MOUNDOU LERE	623	0,000								0,000	0,500	0,000	
2	MDHAMENA-GUELENGDENG	146	12,000	12,000							12,000	0,000	0,000	
3	GUELENGDENG-SARH	379	0,000						0,000		0,000	0,600	0,000	
4	NDJAMENA-DJERMAYA	30	3,500	3,500							3,500	0,000	0,000	
5	DJERMAYA-MASSAGUET	46	1,500								0,000	0,000	-1,500	
6	MASSAGUET-NGOURA	125	1,500								0,000	0,000	-1,500	
7	NGOURA-MONGO	303	1,250			1,250					0,000	0,000	-1,500	
8	MONGO-AM TIMAN	253	1,700								1,250	0,750	0,000	
9	MONGO-ATI	154	0,900								0,400	0,400	-1,300	
10	MONGO-OUM HADJER	228	3,150								0,000	0,000	-0,900	
11	OUM HADJER-ABECHE	146	2,000				2,000				0,000	0,000	-3,150	
12	ABECHE-ADRE	167	2,200								2,000	0,000	0,000	
13	ABECHE-BILTINE	92	0,600								0,000	0,000	-2,200	
14	DJERMAYA-DANDI	67	2,200	1,600							0,000	0,000	-0,600	
15	NDJAMENA BYPASS	20	4,000							0,600	2,200	0,000	0,000	
16	MASSAGUET-MASSAKORY	68	1,300		3,600					0,400	4,000	0,000	0,000	
17	GUELENGDENG-BONGOR	83	1,200								0,000	0,000	-1,300	
18	BONGOR-MOUNDOU	250	3,800				1,200				1,200	0,000	0,000	
19	MAIKORO-GORE-BEDAJOYO	110	1,000								0,000	0,000	-3,800	
20	DOBA-GORE	102	0,700								0,000	0,000	-1,000	
21	SARH-SIDO	122	0,900							0,900	0,000	0,000	-0,700	
22	MASSAKORY-BOL-BAGA SOLA	260	9,800							0,900	0,900	0,000	0,000	
	TOTAL A-1 : REPAIRS	3 774	55,200	15,500	1,600	3,600	1,250	3,200	1,300	9,800	1,000	37,250	2,250	-17,950
<b>2/ ROAD MAINTENANCE</b>														
23	OFNAR		9,800								9,800	12,800	0,000	0,000
24	EDF MAINTENANCE		4,260						4,260			0,000	0,000	0,000
25	PERIODIC MAINTENANCE		2,500									0,000	4,300	-2,500
	TOTAL A-2 : MAINTENANCE		16,560	0,000	0,000	0,000	0,000	0,000	4,260	0,000	9,800	14,060	0,800	-2,500
	TOTAL A : ROAD MAINTENANCE		71,760	15,500	1,600	3,600	1,250	3,200	5,560	9,800	10,800	51,310	3,050	-20,450
<b>CARRIED FORWARD</b>														
	(1) OFNAR maintenance - 1987-1990 = 5,200 - 1991 - 1993 = 7,400		71,760	15,500	1,600	3,600	1,250	3,200	5,560	9,800	10,800	51,310	3,050	-20,450

## REPUBLIC OF CHAD

AID (F.CFA BILLION)

## TRANSPORT SECTOR INVESTMENT PROGRAM

REF : INVEST.FOM 2 AT 10/12/87

DATA SHEET NUMBER	TOTAL 1987-1993	IDA	FUNDING OBTAINED AND IN COURSE OF NEGOTIATION					UNDP/FAI	NATIONAL	TOTAL FUNDING PAID 1988-1993	EXPENDITURE COMMITTED 1987	FUNDING TO BE OBTAINED
			USAID	FAD	FAC	GFR	EDF					
BROUGHT FORWARD	71,760	15,500	1,600	3,600	1,250	3,200	5,560	9,800	10,800	51,310	3,050	-20,452
B : AIR TRANSPORT INFRASTRUCTURE												
32 NDJAMENA AIRPORT	1,900									0,000	0,000	1,900
33 FAYA AIRPORT	0,650									0,000	0,000	-0,650
34 SAHR, MOUNDOU AND ABEICHE AIRPORTS	5,380					0,270				0,270	0,000	5,110
35 SECONDARY AIRPORTS	1,620									0,000	0,000	-1,620
TOTAL B : 1988-1993	9,550	0,000	0,000	0,000	0,000	0,270	0,000	0,000	0,000	0,700	0,000	-9,280
C : MTHU INSTITUTIONAL STRENGTHENING												
26 OFNAR/IDA	4,700	4,000										
27 OFNAR/USAID	3,620		3,620						0,300	4,300	2,500	-0,400
28 EQUIPMENT/EDF	1,530							1,530		3,620	1,780	0,000
29 EQUIPMENT/FAD	1,200			1,080						1,530	0,000	0,000
30 REHABILITATION OF ENTP	0,500								0,120	1,200	0,000	0,000
31 CONSULTANT SERVICE	1,000	1,000								0,000	0,000	-0,500
TOTAL C : MTHU INSTITUTIONAL STRENGTHENING	12,550	5,000	3,620	1,800	0,000	0,000	1,530	0,000	0,420	11,650	4,280	-9,000
CARRIED FORWARD	93,860	20,500	5,220	4,680	1,250	3,470	7,090	9,800	11,220	63,230	7,330	-30,630

## REPUBLIC OF CHAD

AID (F.CFA BILLION)

## TRANSPORT SECTOR INVESTMENT PROGRAM

REF : INVEST.FOM 2 AT 10/12/87

DATA SHEET NUMBER	TOTAL 1987-1993	IDA	FUNDING OBTAINED AND IN COURSE OF NEGOTIATION					UNPD/FAI	NATIONAL	TOTAL FUNDING PAID 1988-1993	EXPENDITURE COMMITTED 1987	FUNDING TO BE OBTAINED
			US/AID	FAD	FAC	GFR	EDF					
BROUGHT FORWARD	93,860	20,300	5,220	4,680	1,250	3,470	7,090	9,800	11,220	63,230	7,330	-30,630
C : MTAC INSTITUTIONAL STRENGTHENING												
36 CIVIL AVIATION PERSONNEL TRAINING	0,150									0,000	0,000	-0,150
37 CIVIL AVIATION INSTITUTIONAL STRENGTHENING	0,400									0,000	0,000	-0,400
38 MTAC INSTITUTIONAL STRENGTHENING	0,310	0,310								0,300	0,000	0,000
39 DOMESTIC CARRIERS	0,300	0,200				0,100				0,300	0,000	0,000
40 TRANSPORT SECTOR DEVELOPMENT STUDIES	0,600	0,600								0,600	0,000	0,000
41 MTAC PERSONNEL TRAINING	0,200	0,200								0,200	0,000	0,000
42 ENHANCEMENT OF DOUALA TRANSIT CAPACITY	1,300									0,000	0,000	-1,300
43 STRENGTHENING OF DAC MAINTENANCE RES.	0,300									0,000	0,000	-0,300
TOTAL D : MTAC INSTITUTIONAL STRENGTHENING	3,560	1,310	0,000	0,000	0,000	0,100	0,000	0,000	0,000	1,410	0,000	-2,150
TOTAL INVESTMENT COST	97,420	21,810	5,220	4,680	1,250	3,570	7,090	9,800	11,220	64,640	7,330	-32,780
TOTAL COST OF 1998-1990 PROGRAM	83,370	21,810	5,220	4,680	1,250	3,570	7,090	9,800	5,200	58,620	7,330	-24,750
TOTAL COST OF 1991-1993 PROGRAM	14,050	0,000	0,000	0,000	0,000	0,000	0,000	0,000	6,020	6,020	0,000	-8,030

#### 4.4.3 - CONCLUSION

While the Republic of Chad is entering a development phase following the years of war and later reconstruction, the present condition of the transport infrastructures continues to represent a handicap for trade and travel, thus exerting a braking effect on the efforts undertaken to stimulate activities in the different sectors.

An initial rehabilitation phase has dealt with the most urgent needs. With the help of the funding sources, priority roads have been resurfaced, the OFNAR maintenance teams have been partially reequipped, and an initial phase of top priority work has been commenced on the domestic airports, N'Djamena airport having undergone comprehensive rehabilitation.

A second phase is now essential. Faced with the immensity of the needs arising in this sector, the Government has defined a prudent strategy, corresponding to the rehabilitation of a priority communications system, based on the complementarity of road and air links, and the maintenance of reconstructed and rehabilitated installations and infrastructures. The objective of lowest costs has led to the application of construction and maintenance standards, training of local personnel, and promotion of the private sector or progressive privatization of activities currently controlled by the State.

For its part, the Government has decided to allocate a portion of petroleum tax revenue, despite a permanent budget deficit, to the funding of OFNAR in order to meet part of the road system maintenance costs. However, this major effort for the Republic of Chad falls short of the financial needs of the transport sector, and even of the amount required for road maintenance alone. The Government therefore urgently requests the funding sources to maintain the aid for which they have already commitments, and to extend this aid so that this coherently defined program can be funded in full, and completed by 1993.

In particular, it is urgently desired that precise guarantees should be obtained with respect to maintenance, without which the programmed rehabilitation actions are meaningless. The obvious inadequacy of State resources in this field, lead the Government to request the funding sources to make a global commitment for the rehabilitation projects and corresponding maintenance actions.

For the Republic of Chad, this general transport sector program constitutes a primordial condition for the success of development actions to be undertaken in other sectors.

ADMINISTRATIVE DISTRICTS

NIGER

LIBYA

• Bardai

Tibesti

Borkou

● FAYA

B. E. T.

Ennedi

● Fada

Nord-Kanem

KANEM

Ouaddi-Rimé

BILTINE

• Iriba

Nokou

● MAO

BATHA

BILTINE

• Guera



● BOL

• Ngouri

• Moussara

• Massakory

ATI

• Dum Hadjer

• ABECHE

• Adre

NIGERIA

■ N'DJAMENA

• Bokoro

MONGO

• Mangalme

• Am Dam

SUDAN

• Gor Bada

OUADDAI

Bikine

• Abou Dera

• AM TIMAN

SALAMAT

• Haraze Manguoué

• Massena

BAGUIRMI

• Melli

GUERA

MAYO

• Fouso

• Bongor

TAND. ILE

• Kelo

• LAI

• Kyabé

• Léré

• Fianga

• Pala

• Kéba

• LOBA

• Koumra

• SAHR

• Maro

WESTERN LOGONE

• Barbakum

• Core

MIDDLE CHARI

CAMEROON

EASTERN LOGONE

CAR

N

0 200 km

Boundaries

— State

— Prefectoral district

- - - Sub-prefectoral district

■ Capital

● MAO Prefecture

● Maro Sub-prefecture

- 1 MOUNDOU
- 2 Banaya
- 3 Beinamar
- 4 Gounou Gaya
- 5 Bobadye

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PNAB D. 838

# REPUBLIC OF CHAD

MINISTRY OF PLANNING AND COOPERATION

follow-up meeting on  
the geneva round table  
December 85

## **TRANSPORT SECTOR**

**VOLUME 2**

**PRESENTATION OF THE STRATEGY  
AND OF THE DEVELOPMENT PROGRAM  
FOR 1988 - 1993**

**APPENDICES**

FEBRUARY 1988

## **APPENDIX A**

1 - traffic

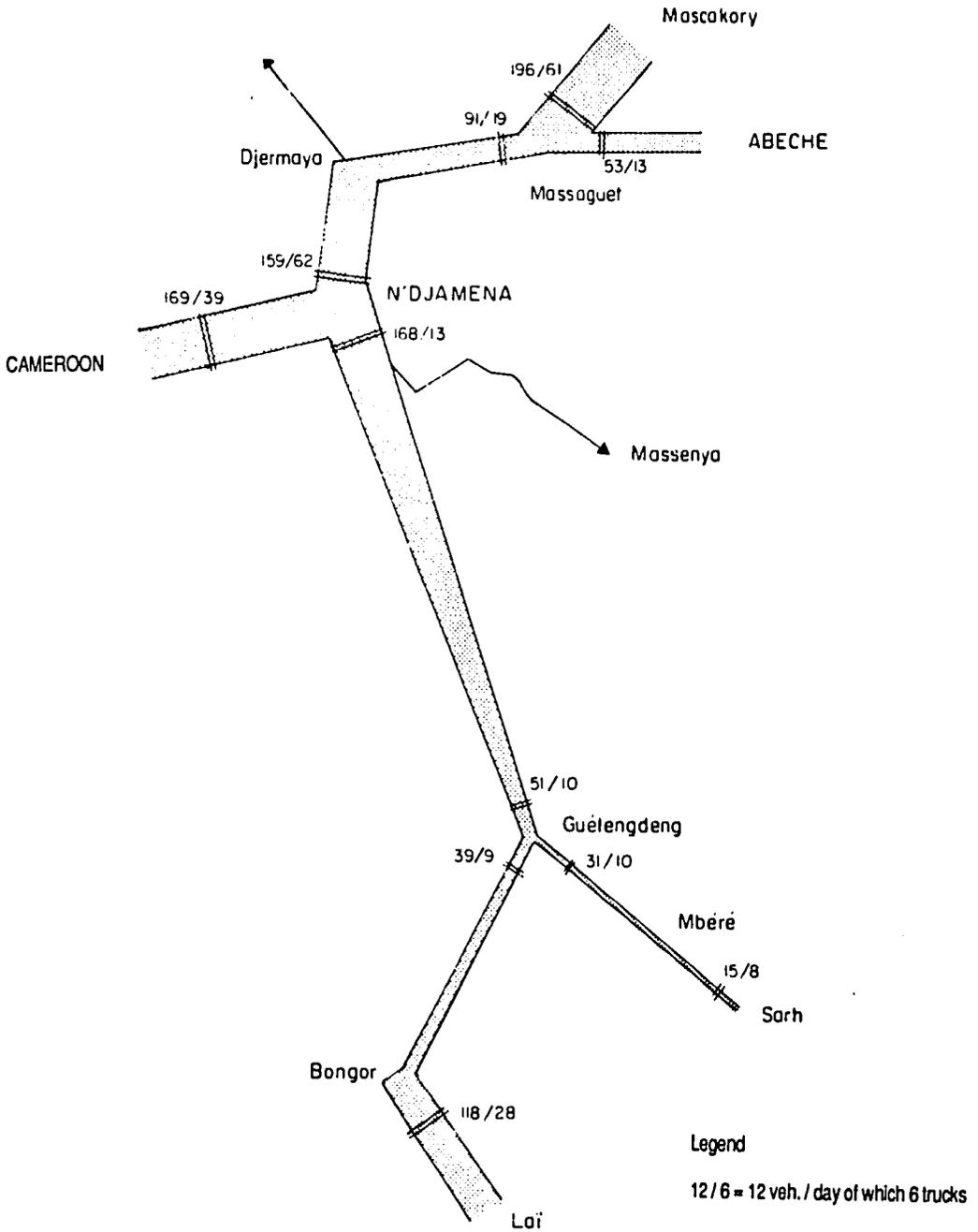
2 - Investment

3 - project data sheets

1 - traffic

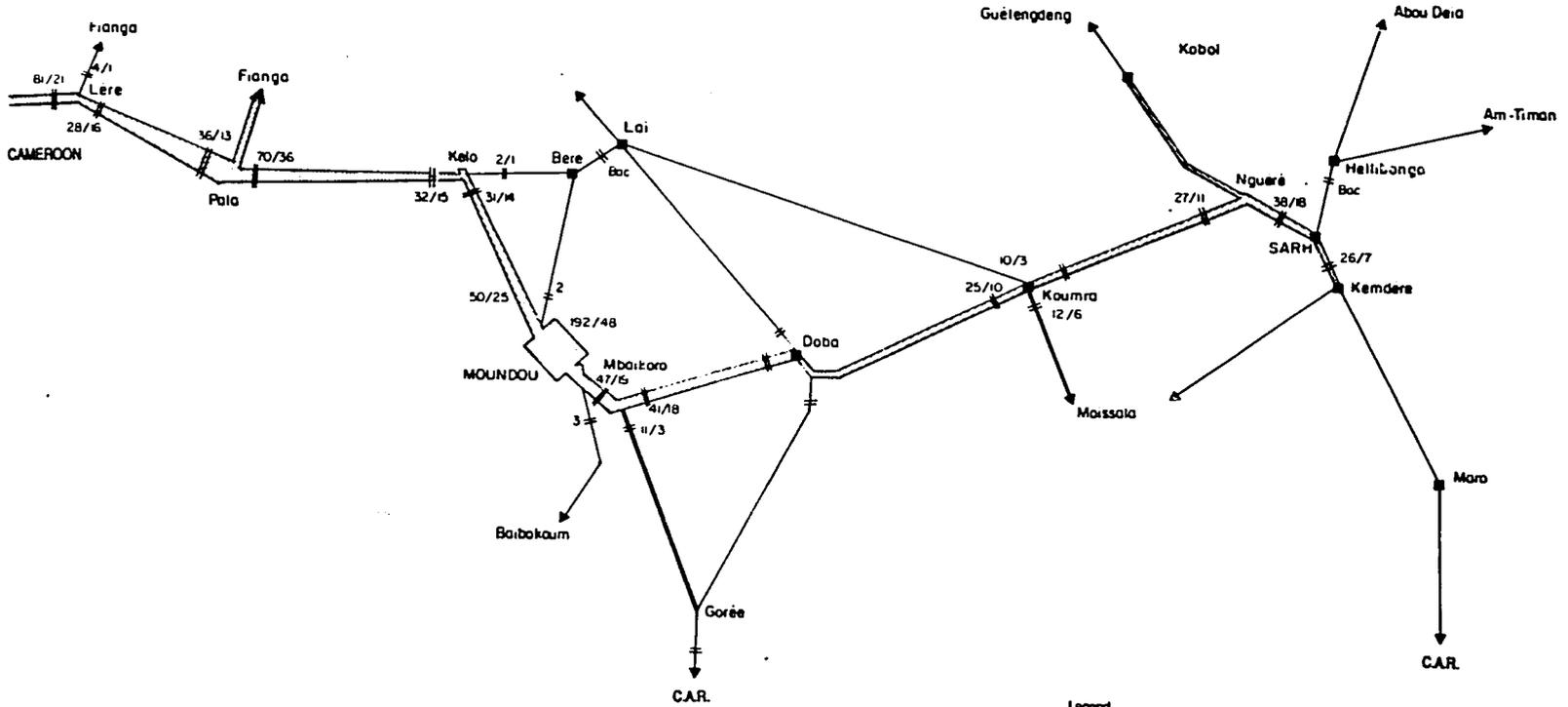
# TRAFFIC - COUNTS

Average daily traffic - October 1987



TRAFFIC - COUNTS

Average daily traffic - October 1987



Legend

12/6 = 12 veh. / day of which 6 trucks

77.

REPUBLIQUE DU TCHAD

MINISTERE DES TRAVAUX PUBLICS  
DE L'HABITAT ET DE L'URBANISME

DIRECTION GENERALE DES TRAVAUX PUBLICS

DEPOUILLEMENT DES COMPTAGES ROUTIERS SEPTEMBRE ET OCTOBRE 1987

Ref : COMPTAGE.87 1

SEMAINE DU	AU	NUMERO POSTE	SECTION DE A	TRAFIC EN VEHICULES/J			CATEGORIES DE VEHICULES			TOTAL VEHICULES V/JOUR			
				PERIODES 6/14 B	JOURNALIER 14/22 H	22/6 H	VOIT.LRG.	CANION +PICK-UP	CANION +BENHOQ.		TRACTEUR SEMI-REM.		
14/09	AO	20/09	1	N'DJAMENA-Pt de NGOLLI	TOTAL	734	442	5	909	19	17	236	1181
					MOYEN/J	105	63	1	130	3	2	34	169
					%/TOTAL	62,15%	37,43%	0,42%	76,97%	1,61%	1,44%	19,98%	100,00%
						TOTAL PL %				23,03%			
14/09	AO	20/09	2	BIFORC-Pte NGOLLI-GUELENDENG	TOTAL	660	453	65	1084	82	8	4	1178
					MOYEN/J	94	65	9	155	12	1	1	168
					%/TOTAL	56,83%	38,46%	5,52%	92,02%	6,96%	0,68%	0,34%	100,00%
						TOTAL PL %				7,98%			
16/09	AO	22/09	3	N'DJAMENA-PL 21 DJERHATA	TOTAL	472	529	110	681	232	11	187	1111
					MOYEN/J	67	76	16	97	33	2	27	159
					%/TOTAL	42,48%	47,61%	9,90%	61,30%	20,88%	0,99%	16,83%	100,00%
						TOTAL PL %				38,70%			
16/09	AO	22/09	4	MASSAGDET-DJERHATA	TOTAL	262	314	60	502	92	8	34	636
					MOYEN/J	37	45	9	72	13	1	5	91
					%/TOTAL	41,19%	49,37%	9,43%	78,93%	14,47%	1,25%	5,35%	100,00%
						TOTAL PL %				21,07%			
16/09	AO	22/09	5	MASSAGDET-MASSAKORT	TOTAL	562	561	250	949	227	54	143	1373
					MOYEN/J	80	80	36	136	32	8	20	196
					%/TOTAL	40,93%	46,86%	18,21%	69,12%	16,53%	3,93%	10,42%	100,00%
						TOTAL PL %				30,88%			
16/09	AO	22/09	6	MASSAGDET-vers NGOUBA	TOTAL	125	170	77	277	50	12	33	372
					MOYEN/J	18	24	11	40	7	2	5	53
					%/TOTAL	33,60%	45,70%	20,78%	74,46%	13,44%	3,23%	8,87%	100,00%
						TOTAL PL %				25,54%			
26/09	AO	9/10 (14 jours)	7	GUELENDENG-vers N'DJAMENA	TOTAL	395	259	59	577	63	19	54	713
					MOYEN/J	28	19	4	41	5	1	4	51
					%/TOTAL	55,40%	36,33%	8,27%	60,93%	8,84%	2,66%	7,57%	100,00%
						TOTAL PL %				19,07%			
26/09	AO	5/10 (10 jours)	8	GUELENDENG-vers BOUSSO	TOTAL	197	125	48	285	63	2	20	370
					MOYEN/J	20	13	5	29	6	0	2	37
					%/TOTAL	53,24%	33,78%	12,97%	77,03%	17,03%	0,54%	5,41%	100,00%
						TOTAL PL %				22,97%			
26/09	AO	9/10 (14 jours)	9	GUELENDENG-vers BONGOR	TOTAL	105	105	6	147	63	0	6	216
					MOYEN/J	8	8	0	11	5	0	0	15
					%/TOTAL	48,61%	48,61%	2,78%	68,06%	29,17%	0,00%	2,78%	100,00%
						TOTAL PL %				31,94%			
1/10	AO	7/10	10	BONGOR-vers GUELENDENG	TOTAL	107	104	31	201	37	0	4	242
					MOYEN/J	15	15	4	29	5	0	1	35
					%/TOTAL	44,21%	42,98%	12,81%	83,06%	15,29%	0,00%	1,65%	100,00%
						TOTAL PL %				16,94%			

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REPUBLIQUE DU TCHAD

MINISTRE DES TRAVAUX PUBLICS  
DE L'HABITAT ET DE L'URBANISME

DIRECTION GENERALE DES TRAVAUX PUBLICS

DEPOUILLEMENT DES COMPTAGES ROUTIERS SEPTEMBRE ET OCTOBRE 1987

Ref : COMPTAGE.87 3

SEMAINE DU	NUMERO D AU	POSTE	SECTION DE	A	TRAFIC EN VEHICULES/J PERIODES JOURNALIER				CATEGORIES DE VEHICULES			TOTAL VEHICULES V/JOUR	
					6/14 H	14/22 H	22/6 H	VOIT. LEG.	CAMION +PICE-OP	CAMION SOLO	TRACTEUR +REMORQ.		SEMI-REM.
5/10 AU 11/10	20	KELO-vers MOONDOU			TOTAL	94	113	7	121	36	4	53	214
					MOYEN/J	13	16	1	17	5	1	8	31
					%/TOTAL	43,93%	52,80%	3,27%	56,54%	16,82%	1,87%	24,77%	100,00%
						TOTAL PL %						43,46%	
5/10 AU 11/10	21	KELO-vers PALA			TOTAL	92	108	22	119	57	3	43	222
					MOYEN/J	13	15	3	17	8	0	6	32
					%/TOTAL	41,44%	48,65%	9,91%	53,60%	25,66%	1,35%	19,37%	100,00%
						TOTAL PL %						46,40%	
5/10 AU 11/10	22	MOONDOU-MAIKORO			TOTAL	170	149	9	195	75	9	49	328
					MOYEN/J	24	21	1	28	11	1	7	47
					%/TOTAL	51,83%	45,43%	2,74%	59,45%	22,87%	2,74%	14,94%	100,00%
						TOTAL PL %						40,55%	
5/10 AU 11/10	23	MAIKORO-DOBA			TOTAL	152	125	-	162	70	8	44	284
					MOYEN/J	22	18	1	23	10	1	6	41
					%/TOTAL	53,52%	44,01%	2,46%	57,04%	24,65%	2,82%	15,49%	100,00%
						TOTAL PL %						42,96%	
5/10 AU 11/10	24	MAIKORO-CORRE			TOTAL	33	40	2	57	10	1	7	75
					MOYEN/J	5	6	0	8	1	0	1	11
					%/TOTAL	44,00%	53,33%	2,67%	76,00%	13,33%	1,33%	9,33%	100,00%
						TOTAL PL %						24,00%	
21/09 AU 27/09	25	MOONDOU-vers KELO			TOTAL	193	143	15	178	102	3	68	351
					MOYEN/J	28	20	2	25	15	0	10	50
					%/TOTAL	54,99%	40,74%	4,27%	50,71%	29,06%	0,65%	19,37%	100,00%
						TOTAL PL %						49,29%	
21/09 AU 27/09	26	MOONDOU-BERE			TOTAL	6	11	0	15	2	0	0	17
					MOYEN/J	1	2	0	2	0	0	0	2
					%/TOTAL	35,29%	64,71%	0,00%	88,24%	11,76%	0,00%	0,00%	100,00%
						TOTAL PL %						11,76%	
21/09 AU 27/09	27	MOONDOU-ARKHOBON(KOUTOU)			TOTAL	737	539	66	1012	249	9	72	1342
					MOYEN/J	105	77	9	145	36	1	10	192
					%/TOTAL	54,92%	40,16%	4,92%	75,41%	18,55%	0,67%	5,37%	100,00%
						TOTAL PL %						24,59%	
21/09 AU 27/09	28	MOONDOU-BAIBOKOON			TOTAL	9	12	0	11	10	0	0	21
					MOYEN/J	1	2	0	2	1	0	0	3
					%/TOTAL	42,86%	57,14%	0,00%	52,38%	47,62%	0,00%	0,00%	1,56%
						TOTAL PL %						47,62%	

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REPUBLIQUE DU TCEAD

MINISTERE DES TRAVAUX PUBLICS  
DE L'HABITAT ET DE L'URBANISME

DIRECTION GENERALE DES TRAVAUX PUBLICS

DEPOUILLEMENT DES COMPTAGES ROUTIERS SEPTEMBRE et OCTOBRE 1987

Ref : COMPTAGE.87 4

SEMAINE DU	AU	NUMERO D POSTE	SECTION DE	A	TRAFFIC EN VEHICULES/J PERIODES JOURNALIER				CATEGORIES DE VEHICULES			TOTAL VEHICULES V/JOUR	
					6/14 H	14/22 H	22/6 H	VOIT. LEG.	CANTON +PICK-UP	CANTON +BENORQ.	TRACTEUR SEMI-BEN.		
5/10 AU	11/10	29	DOBA-vers	NAIKORO	TOTAL	134	125	11	181	43	8	38	270
					MOYEN/J	19	18	2	26	6	1	5	39
					%/TOTAL	49,63%	46,30%	4,07%	67,64%	15,93%	2,96%	14,07%	100,00%
					TOTAL PL %						32,96%		
5/10 AU	11/10	30	DOBA-vers	LAI	TOTAL	22	17	5	25	16	0	3	44
					MOYEN/J	3	2	1	4	2	0	0	6
					%/TOTAL	50,00%	36,64%	11,36%	56,62%	36,36%	0,00%	6,82%	100,00%
					TOTAL PL %						43,18%		
5/10 AU	11/10	31	DOBA-vers	KOUMBA	TOTAL	91	72	6	82	41	7	39	169
					MOYEN/J	13	10	1	12	6	1	6	24
					%/TOTAL	53,85%	42,60%	3,55%	48,52%	24,26%	4,14%	23,08%	100,00%
					TOTAL PL %						51,48%		
5/10 AU	11/10	32	DOBA-vers	GOBE	TOTAL	11	15	2	11	12	0	5	28
					MOYEN/J	2	2	0	2	2	0	1	4
					%/TOTAL	39,29%	53,57%	7,14%	39,29%	42,86%	0,00%	17,86%	100,00%
					TOTAL PL %						60,71%		
20/09 AU	26/09	33	(SARR)NGOERE	vers BOUSSO	TOTAL	38	35	4	39	31	0	7	77
					MOYEN/J	5	5	1	6	4	0	1	11
					%/TOTAL	49,35%	45,45%	5,15%	50,65%	40,26%	0,00%	9,09%	100,00%
					TOTAL PL %			--			49,35%		
20/09 AU	26/09	34	NGOERE-vers	KOUMBA	TOTAL	83	100	6	105	61	4	19	189
					MOYEN/J	12	14	1	15	9	1	3	27
					%/TOTAL	43,92%	52,91%	5,17%	55,56%	52,26%	2,12%	10,05%	245,45%
					TOTAL PL %						44,44%		
20/09 AU	26/09	35	NGOERE-SARR		TOTAL	126	134	7	142	94	4	27	267
					MOYEN/J	18	19	1	20	13	1	4	38
					%/TOTAL	47,19%	50,19%	2,62%	53,18%	35,21%	1,50%	10,11%	346,75%
					TOTAL PL %						46,82%		
20/09 AU	26/09	36	SARR-PK 21	vers SIDO	TOTAL	131	51	3	139	34	1	11	185
					MOYEN/J	19	7	0	20	5	0	2	26
					%/TOTAL	70,81%	27,57%	1,62%	75,14%	18,38%	0,54%	5,95%	100,00%
					TOTAL PL %						24,86%		
28/09 AU	4/10	37	KOUMBA-LAI		TOTAL	39	28	2	52	17	0	0	69
					MOYEN/J	6	4	0	7	2	0	0	10
					%/TOTAL	56,52%	40,58%	2,90%	75,36%	24,64%	0,00%	0,00%	100,00%
					TOTAL PL %						24,64%		

REPUBLIQUE DU TCHAD

MINISTRE DES TRAVAUX PUBLICS  
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DIRECTION GENERALE DES TRAVAUX PUBLICS

DEPOUILLEMENT DES COMPTAGES ROUTIERS SEPTEMBRE ET OCTOBRE 1987

Ref : COMPTAGE.87 5

SEMAINE DU	AD	NOMERO D POSTE	SECTION DE	A	TRAFFIC EN VEHICULES/J PERIODES JOURNALIER			CATEGORIES DE VEHICULES			TOTAL VEHICULES V/JOUR		
					6/14 H	14/22 H	22/6 H	VOIT.LEG. +PICK-UP	CANION SOLO	CANION +REMORQ.		TRACTEURS SEMI-REM.	
28/09	AD	4/10	38	LOUMBA-vers SARR (NGOERE)	TOTAL	76	103	7	114	48	3	21	186
					MOYEN/J	11	15	1	16	7	0	3	27
					%/TOTAL	40,86%	55,38%	3,76%	61,29%	25,81%	1,61%	11,29%	100,00%
						TOTAL PL %						38,71%	
28/09	AD	4/10	39	LOUMBA-MOISSALA	TOTAL	57	26	3	45	39	0	2	86
					MOYEN/J	8	4	0	6	6	0	0	12
					%/TOTAL	66,28%	30,23%	3,49%	52,33%	45,35%	0,00%	2,33%	100,00%
						TOTAL PL %						47,67%	
28/09	AD	4/10	40	LOUMBA-DOBA	TOTAL	99	73	1	107	41	3	22	173
					MOYEN/J	14	10	0	15	6	0	3	25
					%/TOTAL	57,23%	42,20%	0,58%	61,85%	23,70%	1,73%	12,72%	100,00%
						TOTAL PL %						38,15%	

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## 2 - investment

REPUBLIQUE DU TCHAD

PROGRAMME DES INVESTISSEMENTS DU SECTEUR DES TRANSPORTS

Ref : INVESTPL.FON 1 A

N° FICHE		LONGUEUR/KM	P.M. EN COURS 1987 ( 1 )	en MILLIARDS de F.CFA					MONTANTS PROJETS 1988-1993	
				1988	1989	1990	1991	1992		1993
<b>A : ROAD INFRASTRUCTURE</b>										
-----										
<b>1/ REFECTION ROUTES</b>										
-----										
1	SARH-MOUNDOU-LERE	623	0,500							0,600
2	M'DJAMENA-GUELENGDENG	146		5,000	7,000					12,000
3	GUELENGDENG-SARH	379	0,600							0,600
4	M'DJAMENA-DJERMAYA	30		2,500	1,000					3,500
5	DJERMAYA-MASSAGUET	46		0,500	1,000					1,500
6	MASSAGUET-NGOURA	125			0,800	0,700				1,500
7	NGOURA-MONGO	303	0,750	1,050	0,200					1,250
8	MONGO-AM TIMAN	253	0,400		0,300	1,400				1,700
9	MONGO-ATI	154		0,400	0,500					0,900
10	MONGO-DUM HADJER	228			0,150	3,000				3,150
11	DUM HADJER-ABECHE	146			0,300	1,000	0,700			2,000
12	ABECHE-ADRE	167					1,000	1,200		2,200
13	ABECHE-BILTINE	92					0,600			0,600
14	DJERMAYA-DANDI	67		1,000	1,200					2,200
15	CONTOURNEMENT DE M'DJAMENA	20		0,500	2,000	1,500				4,000
16	MASSAGUET-MASSAKORY	68				1,300				1,300
17	GUELENGDENG-BONGOR	83			1,200					1,200
18	BONGOR-MOUNDOU	250		1,500	1,500	0,800				3,800
19	MAIKORO-GORE-BEDAOYO	110		1,000						1,000
20	GORA-GORE	102					0,700			0,700
21	SARH-SIDO	122		0,400	0,500					0,900
22	MASSAKORY-BOL-BASA SOLA	260		5,100	3,100	1,600				9,800
	<b>TOTAL A-1/ REFECTION</b>	<b>3774</b>	<b>2,250</b>	<b>18,950</b>	<b>20,750</b>	<b>11,300</b>	<b>3,000</b>	<b>1,200</b>	<b>0,600</b>	<b>55,200</b>
<b>2/ ENTRETIEN ROUTIER</b>										
-----										
23	ENTRETIEN COURANT		0,800	1,100	1,500	1,800	1,800	1,800	1,800	9,600
24	ENTRETIEN COURANT INTENSIF FED			1,460	1,400	1,400				4,260
25	ENTRETIEN PERIODIQUE							1,300	1,200	2,500
	<b>TOTAL A-2/ ENTRETIEN</b>		<b>0,800</b>	<b>2,560</b>	<b>2,900</b>	<b>3,200</b>	<b>1,800</b>	<b>3,100</b>	<b>3,000</b>	<b>16,560</b>
	<b>TOTAL A/ INFRASTRUCTURE ROUTIERE</b>		<b>3,050</b>	<b>21,510</b>	<b>23,650</b>	<b>14,500</b>	<b>4,800</b>	<b>4,300</b>	<b>3,000</b>	<b>71,760</b>
	<b>A REPORTER PAGE SUIVANTE</b>		<b>3,050</b>	<b>21,510</b>	<b>23,650</b>	<b>14,500</b>	<b>4,800</b>	<b>4,300</b>	<b>3,000</b>	<b>71,760</b>

REPUBLIQUE DU TCHAD

PROGRAMME DES INVESTISSEMENTS DU SECTEUR DES TRANSPORTS

Ref : INVESTPL.FON I B

en MILLIARDS de F.CFA

N° FICHE	EN COURS							MONTANTS PROJETS 1988-1993
	1987 ( 1 )	1988	1989	1990	1991	1992	1993	
REPORT DE LA PAGE PRECEDENTE	3,050	21,510	23,650	14,500	4,800	4,300	3,000	71,760
<b>B : AIR INFRASTRUCTURE</b>								
32 AEROPORT DE N'DJAMENA		0,400	0,200	0,200	0,500	0,600		1,900
33 AEROPORT DE FAYA		0,400	0,250					0,650
34 AEROPORTS SARH-MOUNDOU-ABECHE		0,400	2,800	2,180				5,380
35 AEROPORTS SECONDAIRES		0,400	0,600	0,620				1,620
TOTAL B / INFRASTRUCTURE AERIENNE	0,000	1,600	3,850	3,000	0,500	0,600	0,000	9,550
<b>C : INSTITUTIONAL STRENGTHENING OF M.T.H.U.</b>								
25 RENFORCEMENT OFNAR/ IDA	2,500	4,000			0,700			4,700
27 RENFORCEMENT OFNAR/ USAID	1,780	1,110	1,610	0,900				3,620
28 RENFORCEMENT PARC MATERIEL / FED		1,530						1,530
29 PARC MATERIEL ET FORMATION / FAD		1,100	0,100					1,200
30 REHABILITATION DE L'E N T P		0,300	0,200					0,500
31 SERVICE DE CONSULTANTS		0,300	0,500	0,200				1,000
TOTAL C/ RENFORCEMENT INSTITUTIONNEL MTHU	4,280	8,340	2,410	1,100	0,700	0,000	0,000	12,550
A REPORTER PAGE SUIVANTE	7,330	31,450	29,910	18,600	6,000	4,900	3,000	93,860

REPUBLIQUE DU TCHAD

PROGRAMME DES INVESTISSEMENTS DU SECTEUR DES TRANSPORTS

Ref : INVESTPL.FOM I C

en MILLIARDS de F.CFA

N° FICHE	EN COURS	1988	1989	1990	1991	1992	1993	MONTANTS PROJETS 1988-1993
	1987 ( 1 )							
REPORT DE LA PAGE PRECEDENTE	7,330	31,450	29,910	18,600	6,000	4,900	3,000	93,860
<b>D : INSTITUTIONAL STRENGTHENING OF M.T.A.C.</b>								
=====								
36	FORMATION PERSONNEL AERONAUTIQUE CIVILE	0,080	0,070					0,150
37	RENFORCEMENT INSTITUTION AVIATION CIVILE	0,100	0,190	0,110				0,400
38	RENFORCEMENT INSTITUTIONNEL M T A C	0,200	0,110					0,310
39	RENFORCEMENT TRANSPORTEURS TCHADIENS	0,100	0,200					0,300
40	ETUDES DEVELOPPEMENT TRANSPORTS	0,200	0,200	0,200				0,600
41	FORMATION PERSONNEL M T A C	0,100	0,100					0,200
42	RENFORCEMENT CAPACITE TRANSIT A DOUALA		0,800	0,500				1,300
43	RENFORCEMENT MOYENS MAINTENANCE DAC	0,050	0,050	0,050	0,050	0,050	0,050	0,300
TOTAL D/ RENFORCEMENT INSTITUTIONNEL MTAC	0,000	0,830	1,720	0,860	0,050	0,050	0,050	3,560
Pour mémoire Dépenses 1987	7,330							
COUT TOTAL DES INVESTISSEMENTS 1988-1993		32,280	31,630	19,460	6,050	4,950	3,050	97,420
.....								
COUT TOTAL DU PROGRAMME 1988-1990		32,280	31,630	19,460				83,370
COUT TOTAL DU PROGRAMME 1991-1993					6,050	4,950	3,050	14,050

NOTA : ( 1 ) Cette colonne concerne les financements déjà accordés qui ont débuté en 1987 et qui se poursuivent au delà de cette année

	R E C A P I T U L A T I F G E N E R A L		
	BESOINS	AIDES	A
	TOTAUX	PREVUES	RECHERCHER
1988/1990	83,370	58,620	-24,750
1991/1993	14,050	6,020	-8,030
TOTAL 1988/1993	97,420	64,640	-32,780

*De*

3 - project data sheets

R E P U B L I C   O F   C H A D

"UNITE - TRAVAIL - PROGRES"

TRANSPORT SECTOR

DATA SHEET No. 1

**PROJECT:** REHABILITATION OF SARH - MOUNDOU - LERE  
EARTH ROAD (623 km) ON FORCE WORK BLSIS

1. **SUB-SECTOR:** Road infrastructure
2. **LOCATION:** Mayo - Kebi - Western Logone -Middle Chari
3. **SUPERVISORY AUTHORITY:** Ministry of Public Works, Housing and Urban Development
4. **EXECUTIVE AUTHORITY:** OFNAR (National Roads Bureau)
5. **JUSTIFICATION:** This road axis is the main channel for the evacuation and supply of the complete Southern part of Chad. It provides communication between two prefectures and a number of sub-prefectures, and an international link with Cameroon, together with various connections with C.A.R. Mean traffic varies between 50 and 80 vehicles/day according to section.
6. **DESCRIPTION:** General reworking of the sub-grade, and application of a gravel wearing course. Finished sub-grade width: 7.00 m, gravel wearing course width: 6.00 m.
7. **COST:** Rehabilitation: F.CFA 500 million
8. **TIME SCHEDULE:** November 1986 - November 1987
9. **PROJECT STATUS:** Rehabilitation work completed in November 1987
10. **FUNDING POSITION:** Funding obtained from IDA (F.CFA 400 million) and OFNAR (F.CFA 100 million).



REPUBLIC OF CHAD

"UNITE - TRAVAIL - PROGRES"

TRANSPORT SECTOR

DATA SHEET No. 2

**PROJECT: RECONSTRUCTION OF N'DJAMENA - GUELENGDENG  
SURFACED ROAD (146 km)**

1. **SUB-SECTOR:** Road infrastructure
2. **LOCATION:** Chari -Baguirmi
3. **SUPERVISORY AUTHORITY:** Ministry of Public Works, Housing and Urban Development
4. **EXECUTIVE AUTHORITY:** DTP (Public Works Department)
5. **JUSTIFICATION:** The greater part of this old asphalted road (1973) has been destroyed. This route represents the main axis connecting N'Djamena and the agricultural regions of the South. Reconstruction of this road is an undeniably urgent necessity for the harmonious development of Chad, and for the achievement of a substantial reduction of transport costs. Mean traffic: 120 vehicles/day. Profitability factor: > 20%.
6. **DESCRIPTION:** The tender documents are in course of preparation. Preselection of potential contractors has been commenced. The reconstruction work covers:
  - General reworking of the sub-grade
  - Construction of sub-base and road base courses
  - Application of bituminous surfacingFinished sub-grade width: 8.00 m, surfacing width: 6.00 m.
7. **COST:** F.CFA 12 billion
8. **TIME SCHEDULE:** June 1988 - June 1990
9. **PROJECT STATUS:** Choice of contractors from the preselected candidates will be made in January 1988. Commencement of the work is scheduled for June 1988.
10. **FUNDING POSITION:** Funding obtained from IDA (emergency program)

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R E P U B L I C   O F   C H A D

"UNITE - TRAVAIL - PROGRES"

TRANSPORT SECTOR

DATA SHEET No. 3

**PROJECT: REHABILITATION OF SARH - GUELENGDENG  
EARTH ROAD (379 km)**

1. **SUB-SECTOR:** Road infrastructure
2. **LOCATION:** Middle Chari - Chari Baguirmi
3. **SUPERVISORY AUTHORITY:** Ministry of Public Works, Housing and Urban Development
4. **EXECUTIVE AUTHORITY:** DTP/EDF (European Development Fund)
5. **JUSTIFICATION:** This earth road has suffered major degradation, and is now unsuitable for traffic. Rehabilitation work was commenced at the end of 1985. This axis forms a major link for improved accessibility to the North of the agricultural region of Sarh, and is of international interest as a connection with the Transafrican Highway (N'Djamena - Bangui). Mean traffic: 20 vehicles/day (October 1987).
6. **DESCRIPTION:** General reworking and widening of earthworks structures. Application of a wearing course and repair of drainage systems. Finished sub-grade width: 7.00 m.
7. **COST:** F.CFA 600 million for 1987
8. **TIME SCHEDULE:** 1987
9. **PROJECT STATUS:** Rehabilitation work will be completed in December 1987
10. **FUNDING POSITION:** Funding obtained from EDF

R E P U B L I C   O F   C H A D

"UNITE - TRAVAIL - PROGRES"

TRANSPORT SECTOR

DATA SHEET No. 4

**PROJECT: RECONSTRUCTION OF DJERMAYA - N'DJAMENA  
SURFACED ROAD (32 km)**

1. **SUB-SECTOR:** Road infrastructure
2. **LOCATION:** Chari - Baguirmi
3. **SUPERVISORY AUTHORITY:** Ministry of Public Works, Housing and Urban Development
4. **EXECUTIVE AUTHORITY:** DTP
5. **JUSTIFICATION:** Bituminous surfacing was laid on this road in 1971. A substantial volume of traffic has been carried over the last few years, and the pavement structures have suffered considerable degradation. This route is of primordial importance for links with Eastern and Northern Chad. The road will carry heavy traffic from the Mani quarry, for the supply of crushed aggregate materials for all road, urban development and building projects in the N'Djamena region. Mean traffic: 150 vehicles/day (October 1987).
6. **DESCRIPTION:** General reworking of the pavement and surfacing. Restoration of initial sub-grade width. Application of a new pavement in crushed aggregate, and bituminous surfacing. Final sub-grade width: 8.00 m, bituminous surfacing width: 6.00 m.
7. **COST:** F.CFA 3.5 billion
8. **TIME SCHEDULE:** 1988-1989 (12 months)
9. **PROJECT STATUS:** The choice of contractors from the preselection list will be made in January 1988. Commencement of the work is scheduled for June 1988.
10. **FUNDING POSITION:** Funding obtained from IDA (emergency program)

R E P U B L I C   O F   C H A D

"UNITE - TRAVAIL - PROGRES"

TRANSPORT SECTOR

DATA SHEET No. 5

**PROJECT: RECONSTRUCTION OF DJERMAYA - MASSAGUET EARTH  
ROAD (45 km)**

1. **SUB-SECTOR:** Road infrastructure
2. **LOCATION:** Chari -Baguirmi
3. **SUPERVISORY AUTHORITY:** Ministry of Public Works, Housing and Urban Development
4. **EXECUTIVE AUTHORITY:** DTP (Public Works Department)
5. **JUSTIFICATION:** This old surfaced road has been entirely destroyed, and is now used as an earth road. This is the continuation of the N'Djamena - Djermaya section, and has the same importance as the latter for communication with the Eastern and Northern parts of Chad. Immediate rehabilitation of the earth road is urgently required. Bituminous surfacing must be envisaged for the medium term. Mean traffic: 90 vehicles/day (October 1987).
6. **DESCRIPTION:** Short term: reconstruction of earthworks in the heavily eroded zones, application of a wearing course, and repair of drainage structures. A study must be undertaken for preparation of a file covering execution of the work on a contract basis, in anticipation of a Call for Tenders.  
Finished sub-grade width: 7.00 m, wearing course width: 6.00 m.  
For subsequent bituminous surfacing, a feasibility study must be undertaken in order to take account of projections of future anticipated traffic from the North-West (Lake Chad) and East (Abeche and Mongo).
7. **COST:** Studies, execution of work and supervision: F.CFA 1.5 billion (1990-1991).  
- Surfacing: TBD at a later stage.
8. **TIME SCHEDULE:** 1989-1990 (work on earth road)
9. **PROJECT STATUS:** Study to be executed
10. **FUNDING POSITION:** Funding to be obtained

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R E P U B L I C   O F   C H A D

"UNITE - TRAVAIL - PROGRES"

TRANSPORT SECTOR

DATA SHEET No. 6

**PROJECT: REHABILITATION OF MASSAGUET - N'GOURA  
EARTH ROAD (125 km)**

1. **SUB-SECTOR:** Road infrastructure
2. **LOCATION:** Chari - Baguirmi
3. **SUPERVISORY AUTHORITY:** Ministry of Public Works Housing and Urban Development
4. **EXECUTIVE AUTHORITY:** DTP
5. **JUSTIFICATION:** Principal axis serving the Eastern regions of Chad (Abeche-Mongo). Following an initial general restructuring operation funded by FAC (1984-1986), this section must be reconstructed to road standards compatible with future traffic levels. The work will be executed on a contract basis, and an execution study must be programmed urgently (1989) for this purpose. Mean traffic: 50 vehicles/day (October 1987).
6. **DESCRIPTION:** Restructuring and reworking of the sub-grade, and application of a wearing course. Tender documents to be prepared for execution of the work on a contract basis.  
Finished sub-grade width: 9.00 m, wearing course width: 8.00 m.
7. **COST:** F.CFA 1.5 billion (studies, execution of work and supervision)
8. **TIME SCHEDULE:** 1989-1990
9. **PROJECT STATUS:** Rehabilitation work study to be conducted
10. **FUNDING POSITION:** Funding to be obtained

R E P U B L I C   O F   C H A D

"UNITE - TRAVAIL - PROGRES"

TRANSPORT SECTOR

DATA SHEET No. 7

PROJECT: IMPROVEMENT OF N'GOURA - MONGO ROAD (303 km)

1. SUB-SECTOR: Road infrastructure
2. LOCATION: Chari Baguirmi - Guera
3. SUPERVISORY AUTHORITY: Ministry of Public Works, Housing and Urban Development
4. EXECUTIVE AUTHORITY: Force work financed by FAC (Aid and Cooperation Fund).
5. JUSTIFICATION: Priority route for essential links with the prefectures of Eastern Chad, and transport of supplies for the extremely isolated regions of Ouaddai and Biltine. There is an existing track in very poor condition, suitable for off-road vehicles only. This project covers the rehabilitation of an earth road serviceable during the dry season only, with improvement of sections where transit is difficult, and application of a wearing course in cohesive materials in sandy or "fech-fech" areas. Mean traffic: 10 vehicles/day (October 1987).
6. DESCRIPTION: General reworking of the sub-grade, digging of ditches and application of a wearing course.  
Finished sub-grade width: 5.00 to 7.00 m, wearing course width: 4.00 to 5.00 m.
7. COST: F.CFA 2 billion
8. TIME SCHEDULE: 1987-1989
9. PROJECT STATUS: Work in course of execution, scheduled for completion by mid-1989.
10. FUNDING POSITION: Funding obtained from French Aid and Cooperation Fund (FAC).

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R E P U B L I C   O F   C H A I

"UNITE - TRAVAIL - PROGRES"

TRANSPORT SECTOR

DATA SHEET No. 8

PROJECT: IMPROVEMENT OF MONGO - AM TIMAN ROAD (253 km)

1. SUB-SECTOR: Road infrastructure
2. LOCATION: Guera - Salamat
3. SUPERVISORY AUTHORITY: Ministry of Public Works, Housing and Urban Development
4. EXECUTIVE AUTHORITY: DTP
5. JUSTIFICATION: This road provides improved access between the Am Timan production area and less favoured agricultural regions, and communication between two prefectures. Apart from the action already commenced (repair of sections presenting difficulties during the rainy season), it is important to provide a certain homogeneity of road conditions on this route, by means of essential road structure and drainage improvements.  
Mean traffic: 5 vehicles/day (October 1987).
6. DESCRIPTION: Construction of bridges by EDF in 1986-1987. General road improvements required, including construction of a sub-grade and application of a gravel wearing course. Preliminary design study to be executed.  
Final sub-grade width: 7.00 m, wearing course width: 6.00 m.
7. COST: Total F.CFA 2.1 billion of which:  
EDF program (1987): F.CFA 400 million  
Road studies and construction work: F.CFA 1.7 billion
8. TIME SCHEDULE: Bridges: end 1987, road construction work: 1989-1990
9. PROJECT STATUS: Bridge construction work will be completed by the end of 1987. Road construction study to be undertaken.
10. FUNDING POSITION: Funding obtained from EDF (F.CFA 400 million) for the bridges. Funding to be obtained for road studies and construction work.

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R E P U B L I C   O F   C H A D

"UNITE - TRAVAIL - PROGRES"

TRANSPORT SECTOR

DATA SHEET No. 9

PROJECT: IMPROVEMENT OF MONGO - ATI EARTH ROAD (154 km)

1. SUB-SECTOR: Road infrastructure
2. LOCATION: Guera - Batha
3. SUPERVISORY AUTHORITY: Ministry of Public Works, Housing and Urban Development
4. EXECUTIVE AUTHORITY: DTP
5. JUSTIFICATION: Essential link between two prefectures, also serving for evacuation and supply of the population of Ati. Some bridges were repaired with assistance from FAC and EDF. Mean traffic: 5 vehicles/day (October 1987).
6. DESCRIPTION: Construction of a rough earth road over a distance of 154 km. Sub-grade width: 7.00 m, wearing course width: 6.00 m. Preparation of a study file is urgently required.
7. COST: F.CFA 900 million
8. TIME SCHEDULE: 1988-1989
9. PROJECT STATUS: Study to be executed.
10. FUNDING POSITION: Funding to be obtained

R E P U B L I C   O F   C H A D

"UNITE - TRAVAIL - PROGRES"

TRANSPORT SECTOR

DATA SHEET No. 10

**PROJECT: CONSTRUCTION OF MONGO - MANGALME - OUM HADJER  
EARTH ROAD (228 km)**

1. **SUB-SECTOR:** Road infrastructure
2. **LOCATION:** Guera - Batha
3. **SUPERVISORY AUTHORITY:** Ministry of Public Works, Housing and Urban Development
4. **EXECUTIVE AUTHORITY:** DTP
5. **JUSTIFICATION:** The existing rough track is inadequate for normal road transport to the prefecture of Ouaddai via Mangalme and Oum Hadjer. The study of an earth road must be undertaken, in order to reduce the number of water courses (wadis) crossed by the existing track by the selection of a better route, and to improve the quality of the wearing surface by the application of cohesive gravel material. Mean traffic: 10 vehicles/day (October 1987).
6. **DESCRIPTION:** Preparation of a preliminary design study for bridges, earthworks and gravel wearing course.  
Finished sub-grade width: 7.00 m, wearing course width: 6.00 m.
7. **COST:** Total     F.CFA 3.15 billion of which:  
          Studies: F.CFA 150 million  
          Work:     F.CFA 3.0 billion
8. **TIME SCHEDULE:** Study: 1989 - Execution of work: 1990-1991
9. **PROJECT STATUS:** Studies urgently required.
10. **FUNDING POSITION:** Funding to be obtained

R E P U B L I C   O F   C H A D

"UNITE - TRAVAIL - PROGRES"

TRANSPORT SECTOR

DATA SHEET No. 11

**PROJECT: CONSTRUCTION OF OUM HADJER - ABECHÉ  
EARTH ROAD (146 km)**

1. **SUB-SECTOR:** Road infrastructure
2. **LOCATION:** Batha - Ouaddai
3. **SUPERVISORY AUTHORITY:** Ministry of Public Works, Housing and Urban Development
4. **EXECUTIVE AUTHORITY:** DTP
5. **JUSTIFICATION:** This section is the continuation of the Mongo - Oum Hadjer road (data sheet No. 10), and provides a link between the prefectures of Ouaddai and Biltine. Mean traffic: 15 vehicles/day (October 1987).
6. **DESCRIPTION:** Technical file study for the construction of an earth road (earthworks, bridges and 20 cm grading course).  
Finished sub-grade width: 7.00 m, wearing course width: 6.00 m.
7. **COST:** F.CFA 2 billion (studies: F.CFA 100 million, execution of work: F.CFA 1.9 billion).
8. **TIME SCHEDULE:** Study: 1989 - Execution of work: 1990-199
9. **PROJECT STATUS:** Studies to be executed.
10. **FUNDING POSITION:** Under discussion with GFR.

R E P U B L I C   O F   C H A D

"UNITE - TRAVAIL - PROGRES"

TRANSPORT SECTOR

DATA SHEET No. 12

PROJECT: CONSTRUCTION OF ABEICHE - ADRE  
EARTH ROAD (167 km)

1. SUB-SECTOR: Road infrastructure
2. LOCATION: Ouaddai
3. SUPERVISORY AUTHORITY: Ministry of Public Works, Housing and Urban Development
4. EXECUTIVE AUTHORITY: DTP
5. JUSTIFICATION: International link between prefecture of Ouaddai and the Sudanese frontier, also serving as a collector for a system of rural tracks from the South. This road provides for supplying Eastern Chad from the road and rail systems of the Sudan. Anticipated traffic level: 15 vehicles/day.
6. DESCRIPTION: Preliminary design study to be executed. Improvement to earth road quality: general earthworks and drainage systems. Finished sub-grade width: 7.00 m, wearing course width: 6.00 m.
7. COST: F.CFA 2.2 billion
8. TIME SCHEDULE: Studies: 1989 - Execution of construction work:  
1991-1993
9. PROJECT STATUS: Studies to be executed.
10. FUNDING POSITION: Under discussion with GFR.

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R E P U B L I C   O F   C H A D

"UNITE - TRAVAIL - PROGRES"

TRANSPORT SECTOR

DATA SHEET No. 13

**PROJECT: IMPROVEMENT OF ABECHE - BILTINE  
EARTH ROAD (92 km)**

1. **SUB-SECTOR:** Road infrastructure
2. **LOCATION:** Ouaddai
3. **SUPERVISORY AUTHORITY:** Ministry of Public Works, Housing and Urban Development
4. **EXECUTIVE AUTHORITY:** DTP
5. **JUSTIFICATION:** This route forms a link between the prefectures of Ouaddai and Biltine. It also provides improved access to an agricultural production region to the East of Biltine (Am Zoer, Guereda, etc.). This project covers upgrading of the existing track to earth road quality. Anticipated traffic: 10 vehicles/day.
6. **DESCRIPTION:** Improvement of earth road: earthworks, drainage structures and wearing course.  
Finished sub-grade width: 7.00 m, wearing course width: 6.00 m.
7. **COST:** F.CFA 600 million
8. **TIME SCHEDULE:** Studies: 1988-1990 - Execution of work: 1991-1993
9. **PROJECT STATUS:** Studies to be executed.
10. **FUNDING POSITION:** Funding to be obtained

R E P U B L I C   O F   C H A D

"UNITE - TRAVAIL - PROGRES"

TRANSPORT SECTOR

DATA SHEET No. 14

**PROJECT: CONSTRUCTION OF DJERMAYA - DANDY  
EARTH ROAD (66 km)**

1. **SUB-SECTOR:** Road infrastructure
2. **LOCATION:** Chari - Baguirmi
3. **SUPERVISORY AUTHORITY:** Ministry of Public Works, Housing and Urban Development
4. **EXECUTIVE AUTHORITY:** USAID
5. **JUSTIFICATION:** This road is required to serve the Mani quarry, producing aggregate for the major road construction work to be undertaken between 1988 and 1992 in the N'Djamena region. This road is also the main axis for evacuation of agricultural produce from the concentration zone to the South of Lake Chad. This road currently serves the Douguia tourist centre. Mean traffic: 40 vehicles/day.
6. **DESCRIPTION:** Execution of earthworks, drainage structures, sub-base and wearing course.  
Finished sub-grade width: 9.50 m, wearing course width: 9.00 m.
7. **COST:** F.CFA 2.2 billion
8. **TIME SCHEDULE:** 1988
9. **PROJECT STATUS:** Negotiation of the work is in hand
10. **FUNDING POSITION:** Obtained from USAID (F.CFA 1.6 billion). OFNAR participation for an amount of F.CFA 600 million is also scheduled.

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R E P U B L I C   O F   C H A D

"UNITE - TRAVAIL - PROGRES"

TRANSPORT SECTOR

DATA SHEET No. 15

**PROJECT: RECONSTRUCTION OF N'DJAMENA SURFACED  
BYPASS ROAD (20.3 km)**

1. **SUB-SECTOR:** Road infrastructure
2. **LOCATION:** N'Djamena
3. **SUPERVISORY AUTHORITY:** Ministry of Public Works, Housing and Urban Development
4. **EXECUTIVE AUTHORITY:** DTP
5. **JUSTIFICATION:** The road system in N'Djamena is not suitable for easy transit by heavy vehicles, and the construction of a heavy vehicle ring road round the centre of the town, also ensuring better distribution of traffic from the periphery of the town to the North and East, is planned. Improvements to crossroads and link roads will make it possible to connect the bypass with the urban and extra-urban road system. Mean traffic: > 200 vehicles/day (October 1987).
6. **DESCRIPTION:** General repair of earthworks, and execution of a sub-base and road base in 0/31.5 mm crushed aggregate. Execution of all bridge structures and access ways to the urban road system. Creation of a customs area close to the new road. Bituminous surfacing width: 7.00 m. Shoulders surfaced in urban area. Finished sub-grade width: 9.00 m.
7. **COST:** F.CFA 4 billion
8. **TIME SCHEDULE:** 1988-1990
9. **PROJECT STATUS:** Preselection of contractors has already started. Commencement of the work is scheduled for June 1988.
10. **FUNDING POSITION:** Funding obtained from FAD (F.CFA 3.6 billion), with participation by the Government of Chad (F.CFA 400 million).

R E P U B L I C   O F   C H A D

"UNITE - TRAVAIL - PROGRES"

TRANSPORT SECTOR

DATA SHEET No. 16

**PROJECT: REHABILITATION OF MASSAGUET - MASSAKORY  
EARTH ROAD (68 km)**

1. **SUB-SECTOR:** Road infrastructure
2. **LOCATION:** Chari - Baguirmi
3. **SUPERVISORY AUTHORITY:** Ministry of Public Works, Housing and Urban Development
4. **EXECUTIVE AUTHORITY:** DTP
5. **JUSTIFICATION:** This route which connects the road circumventing Lake Chad (see data sheet No. 22: Baga Sola - Bol - Massakory road) with the national road system (to N'Djamena via Djermaya), is of economic importance for access to the Northern part of Chad. This route also has the advantage of serving important markets on the border of the Sahelian zone. Improvement of this road calls for genuine priority treatment, in association with current improvement work on the road circumventing Lake Chad, financed by FAI/UNDP. Mean traffic exceeding 80 vehicles/day (October 1987).
6. **DESCRIPTION:** General repair of earthworks. Execution of a sub-base and wearing course. Repair and construction of drainage systems. Finished sub-grade width: 7.00 m, wearing course width: 6.00 m.
7. **COST:** F.CFA 1.3 billion (studies: F.CFA 100 million - execution of work: F.CFA 1.2 billion).
8. **TIME SCHEDULE:** Studies: 1989-1990 - Construction work: 1991-1993
9. **PROJECT STATUS:** Final study to be executed
10. **FUNDING POSITION:** Funding to be obtained

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"UNITE - TRAVAIL - PROGRES"

TRANSPORT SECTOR

DATA SHEET No. 17

**PROJECT:** REHABILITATION OF GUELENGDENG - BONGOR  
EARTH ROAD (83 km)

1. **SUB-SECTOR:** Road infrastructure
2. **LOCATION:** Mayo - Kebbi
3. **SUPERVISORY AUTHORITY:** Ministry of Public Works, Housing and Urban Development
4. **EXECUTIVE AUTHORITY:** DTP
5. **JUSTIFICATION:** This road forms the continuation of the N'Djamena - Guelengdeng asphalt surfaced road (to be reconstructed). Rehabilitation of this section as an earth road represents a first step towards the short-term establishment of a permanent link on the N'Djamena - Moundou road axis. A feasibility study is being conducted for the purpose of determining the different options for routing the Guelengdeng -Moundou - Bongor highway. The Mayo - Kebbi link with the Northern part of the country must take this road. Mean traffic: 25 vehicles/day (October 1987).
6. **DESCRIPTION:** General straightening of the road axis, and execution of earthworks, bridges and drainage systems. Application of a gravel pavement (sub-base and wearing course).  
Finished sub-grade width: 9.00 m, wearing course width: 8.00 m.
7. **COST:** F.CFA 1.2 billion (earth road)
8. **TIME SCHEDULE:** 1989-1990
9. **PROJECT STATUS:** Current feasibility study due for completion by approx. April 1988.
10. **FUNDING POSITION:** Under discussion with GFR for road construction work.

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TRANSPORT SECTOR

DATA SHEET No. 18

**PROJECT: CONSTRUCTION OF BCNGOR - MOUNDOU  
EARTH ROAD (236 km)**

1. **SUB-SECTOR:** Road infrastructure
2. **LOCATION:** Mayo Kebbi - Tandjile
3. **SUPERVISORY AUTHORITY:** Ministry of Public Works, Housing and Urban Development
4. **EXECUTIVE AUTHORITY:** DTP
5. **JUSTIFICATION:** The existing track between Bongor and Moundou is in poor condition, and is not suitable for normal use during the rainy season. All traffic for N'Djamena must transit via the Cameroon road system. The direct distance from Moundou to N'Djamena is 550 km, compared with 730 km via Cameroon. This road is the main axis for agricultural development in the Mayo - Kebbi, Western Logone and Eastern Logone regions. A current study is concerned with definition of the itinerary and structural characteristics of this road. For the shorter term, it has been decided that the development project should include the construction of a modern earth road. Estimated mean traffic: 40 vehicles/day.
6. **DESCRIPTION:** Execution of earthworks, drainage systems and bridges, and application of a sub-base and wearing course.  
Finished sub-grade width: 9.00 m, wearing course width: 8.00 m.
7. **COST:** F.CFA 3.8 billion
8. **TIME SCHEDULE:** 1989-1990
9. **PROJECT STATUS:** Current feasibility study due for completion by approx. April 1988.
10. **FUNDING POSITION:** Funding to be obtained

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"UNITE - TRAVAIL - PROGRES"

TRANSPORT SECTOR

DATA SHEET No. 19

PROJECT: REHABILITATION OF MAIKORO - GORE - BEDAOYO  
(C.A.R. frontier) EARTH ROAD (110 km)

1. SUB-SECTOR: Road infrastructure
2. LOCATION: Western Lagone
3. SUPERVISORY AUTHORITY: Ministry of Public Works, Housing and Urban Development
4. EXECUTIVE AUTHORITY: DTP
5. JUSTIFICATION: This road is of regional importance, and provides a link with C.A.R. The road also serves to improve access to the Gore production zone. Mean traffic: 10 vehicles/day (October 1987).
6. DESCRIPTION: General repair of earthworks. Reworking of the sub-grade. Application of a gravel wearing course.  
Finished sub-grade width: 7.00 m, wearing course width: 6.00 m.
7. COST: F.CFA 1 billion
8. TIME SCHEDULE: 1988-1989
9. PROJECT STATUS: Technical studies available
10. FUNDING POSITION: Funding obtained from EDF (regional fund)

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"UNITE - TRAVAIL - PROGRES"

TRANSPORT SECTOR

DATA SHEET No. 20

**PROJECT:** REHABILITATION OF DOBA - GORE  
EARTH ROAD (102 km)

1. **SUB-SECTOR:** Road infrastructure
2. **LOCATION:** Eastern Lagone
3. **SUPERVISORY AUTHORITY:** Ministry of Public Works, Housing and Urban Development
4. **EXECUTIVE AUTHORITY:** DTP
5. **JUSTIFICATION:** Road of local importance, providing administrative and economic links between the prefecture of Doba and the South. This project covers rehabilitation of the earth road. Mean traffic: 10 vehicles/day (October 1987).
6. **DESCRIPTION:** Execution of earthworks and general reworking of the sub-grade. Application of a gravel sub-base and wearing course. Finished sub-grade width: 7.00 m, wearing course width: 6.00 m.
7. **COST:** F.CFA 7 million (studies: F.CFA 60 million, execution of work: F.CFA 640 million).
8. **TIME SCHEDULE:** 1991
9. **PROJECT STATUS:** Preliminary design study to be executed in 1989
10. **FUNDING POSITION:** Funding to be obtained

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"UNITE - TRAVAIL - PROGRES"

TRANSPORT SECTOR

DATA SHEET No. 21

PROJECT: REHABILITATION OF SARH - SIDO  
EARTH ROAD (122 km)

1. SUB-SECTOR: Road infrastructure
2. LOCATION: Middle Chari
3. SUPERVISORY AUTHORITY: Ministry of Public Works, Housing and Urban Development
4. EXECUTIVE AUTHORITY: DTP/EDF
5. JUSTIFICATION: This road is of international importance, providing a link between Chad and C.A.R., and forming a spur of the Lagos - Mombasa Transafrican Highway. Mean traffic: 25 vehicles/day (October 1987).
6. DESCRIPTION: Execution of earthworks on degraded sections, general reworking of the sub-grade, and application of a sub-base and wearing course in laterite gravel.  
Finished sub-grade width: 7.00 m, wearing course width: 6.00 m.
7. COST: F.CFA 900 million
8. TIME SCHEDULE: 1988-1990
9. PROJECT STATUS: Technical studies available
10. FUNDING POSITION: Funding obtained from EDF

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"UNITE - TRAVAIL - PROGRES"

TRANSPORT SECTOR

DATA SHEET No. 22

**PROJECT: CONSTRUCTION OF MASSAKORY - BOL - BAGA SOLA  
EARTH ROAD (260 km)**

1. **SUB-SECTOR:** Road infrastructure
2. **LOCATION:** Kanem
3. **SUPERVISORY AUTHORITY:** Ministry of Public Works, Housing and Urban Development
4. **EXECUTIVE AUTHORITY:** UNDP/FAI
5. **JUSTIFICATION:** An agricultural development program is in course of implementation on the Northern shores of Lake Chad. This road should provide for the evacuation of produce, and carry incoming supplies for the Bol and Baga Sola region. The road should also be connected to the national highway system, following construction of the Massakory -Massaguet section (see data sheet No. 16). In the longer term, this road will represent the commencement of improved access to Niger. Estimated traffic: 15 vehicles/day.
6. **DESCRIPTION:** Construction of an earth road, including earthworks, bridges and drainage systems, sub-base and wearing course, and logistic back-up for this work: drilling, workshops, base camps, etc.  
Finished sub-grade width: 9.00 m, wearing course width: 8.00 m.
7. **COST:** F.CFA 9.8 billion
8. **TIME SCHEDULE:** 1987-1990
9. **PROJECT STATUS:** Work in course of execution
10. **FUNDING POSITION:** Funding obtained from Italian Aid Fund (FAI) and UNDP

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"UNITE - TRAVAIL - PROGRES"

TRANSPORT SECTOR

DATA SHEET No. 23

**PROJECT:** ROUTINE MAINTENANCE OF PRIORITY ROAD SYSTEM  
1987 - 1990 (OFNAR)

1. **SUB-SECTOR:** Road infrastructure
2. **LOCATION:** Priority road system
3. **SUPERVISORY AUTHORITY:** Ministry of Public Works, Housing and Urban Development
4. **EXECUTIVE AUTHORITY:** OFNAR
5. **JUSTIFICATION:** The National Roads Bureau (OFNAR) was set up in 1984, for the purpose of maintaining the national road system. OFNAR is responsible for recovery of costs from road users, and the planning, management and execution (force work and contract basis) of road maintenance. OFNAR funding capacity is insufficient, and the Government has taken steps to improve OFNAR funding. This project is designed to project the funding possibilities of OFNAR in connection with the short-term program.
6. **DESCRIPTION:** Manual and mechanized maintenance of the rehabilitated road system (recently rehabilitated and due for rehabilitation by 1990), corresponding to a total of about 3800 km.
7. **COST:** 1987-1990 period: F.CFA 5.2 billion (1987: F.CFA 800 million, 1988: F.CFA 1.1 billion, 1989: F.CFA 1.5 billion, 1990: F.CFA 1.8 billion).  
  
1991-1993 period: F.CFA 7.6 billion (1991: F.CFA 2.1 billion, 1992: F.CFA 2.5 billion, 1993: F.CFA 3 billion).
8. **TIME SCHEDULE:** 1988-1993
9. **PROJECT STATUS:** Current maintenance is in course of execution on the priority road system, by five OFNAR territorial sub-divisions.
10. **FUNDING POSITION:** Funding partially obtained by OFNAR

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"UNITE - TRAVAIL - PROGRES"

TRANSPORT SECTOR

DATA SHEET No. 24

**PROJECT:** CONTRACT MAINTENANCE OF SARH - GUELENGDENG ROAD (379 km)  
AND SARH - SIDO ROAD (122 km), AND FORCE WORK MAINTENANCE  
OF SARH - MOUNDOU - LERE ROAD (623 km)

1. **SUB-SECTOR:** Road infrastructure
2. **LOCATION:** Middle Chari - Tandjile - Mayo - Kebi
3. **SUPERVISORY AUTHORITY:** Ministry of Public Works, Housing and Urban Development
4. **EXECUTIVE AUTHORITY:** DTP
5. **JUSTIFICATION:** The Sarh - Guelengdeng, Sarh - Sido and Sarh - Moundou - Lere roads (representing a total of 1124 km) have recently been rehabilitated. To ensure normal maintenance of these roads, routine maintenance units must be set up rapidly in order to ensure an acceptable level of service. This project covers execution of maintenance of the Sarh - Guelengdeng and Sarh - Sido roads on a contract basis, and force work maintenance of the Sarh - Moundou - Lere road.  
Mean traffic: Sarh-Guelengdeng: 20 vehicles/day (October 1987)  
Sarh-Sido: 25 vehicles/day (October 1987)  
Sarh-Moundou-Lere: 50-80 vehicles/day (October 1987)
6. **DESCRIPTION:** 1) Contract maintenance of Sarh - Guelengdeng and Sarh -Sido roads, following rehabilitation of the Sarh - Sido road (see data sheet No. 21) over a three-year period (1988-1990). Execution of work + supervision + training: F.CFA 2.58 billion.  
2) Force work maintenance of Sarh - Moundou - Lere road: operation + technical assistance: F.CFA 1.68 billion
7. **COST:** F.CFA 4.26 billion
8. **TIME SCHEDULE:** 1988-1990
9. **PROJECT STATUS:** Commencement of force work maintenance is scheduled for January 1988. EDF equipment is due to arrive in June 1988, and contract maintenance will start in about January 1989.
10. **FUNDING POSITION:** Funding obtained from EDF

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"UNITE - TRAVAIL - PROGRES"

TRANSPORT SECTOR

DATA SHEET No. 25

**PROJECT: PERIODIC MAINTENANCE OF PRIORITY ROAD SYSTEM**

1. **SUB-SECTOR:** Road infrastructure
2. **LOCATION:** Nationwide
3. **SUPERVISORY AUTHORITY:** Ministry of Public Works, Housing and Urban Development
4. **EXECUTIVE AUTHORITY:** OFNAR
5. **JUSTIFICATION:** By 1990, the earth roads rehabilitated between 1987 and 1990 will become due for periodic maintenance, this work consisting of renewal of the wearing course. This work will be put out to contractors, as the total need exceeds the capacity of the OFNAR mechanized maintenance gangs. The scheduled rate is approx. 200 km per year.
6. **DESCRIPTION:** Supply, application, compacting and grading of a 15 cm wearing course.  
Finished wearing course width: 6.00 m.
7. **COST:** 1990: F.CFA 1 billion, 1991: F.CFA 1.16 billion,  
1992: F.CFA 1.12 billion, 1993: F.CFA 1.2 billion.  
Total: F.CFA 4.38 billion
8. **TIME SCHEDULE:** 1990-1993
9. **PROJECT STATUS:** Precise programming of the work to be executed
10. **FUNDING POSITION:** Funding to be obtained

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"UNITE - TRAVAIL - PROGRES"

TRANSPORT SECTOR

DATA SHEET No. 26

**PROJECT: STRENGTHENING OF MTPHU AND OFNAR INSTITUTIONS (IDA)**

1. **SUB-SECTOR:** Road infrastructure
2. **LOCATION:** Nationwide
3. **SUPERVISORY AUTHORITY:** Ministry of Public Works, Housing and Urban Development
4. **EXECUTIVE AUTHORITY:** Public Works Department Management Division (DGTP) and OFNAR
5. **JUSTIFICATION:** To enable central management of the Public Works Department to increase its absorption capacity during execution of the various investment programs, it is essential to strengthen existing structures and also create new structures. For this purpose, temporary technical assistance, amplification of technical resources (equipment and buildings) and training actions must be undertaken, throughout the intensive period of investment.
6. **DESCRIPTION:** Strengthening of institutions and resources:
  - 1) DGTP: project coordination, project management department, follow-up of studies.
  - 2) OFNAR: supervision of force work rehabilitation of Sarh - Moundou - Lere road, road maintenance monitoring team and supervision of OFNAR sub-divisions, and acquisition of public works equipment and ferries. Construction and fitting out of buildings for four sub-divisions (Moundou, Sarh, Mongo and N'Djamena), and encouragement of small and medium-sized road maintenance contractor companies. Training of supervisory and executive personnel.
  - 3) Extension of MTPHU offices: studies and execution of the work.
7. **COST:** F.CFA 7.2 billion (technical assistance, equipment and training: F.CFA 6.5 billion, extension of MTPHU offices: F.CFA 700 million).
8. **TIME SCHEDULE:** 1987-1988: technical assistance for DGTP and OFNAR, 1990-1993: extension of MTPHU office premises.
9. **PROJECT STATUS:** Technical assistance for DGTP and OFNAR already set up. Equipment tenders processed. Arrival of the equipment is scheduled for approx. April 1988.
10. **FUNDING POSITION:** Funding obtained from IDA (F.CFA 6.2 billion) and OFNAR (F.CFA 300 million). A further F.CFA 700 million remains to be obtained for the MTPHU office extensions.

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TRANSPORT SECTOR

DATA SHEET No. 27

**PROJECT: IMPROVEMENT OF OFNAR FACILITIES (USAID)**

1. **SUB-SECTOR:** Road infrastructure
2. **LOCATION:** N'Djamena
3. **SUPERVISORY AUTHORITY:** Ministry of Public Works, Housing and Urban Development
4. **EXECUTIVE AUTHORITY:** OFNAR
5. **JUSTIFICATION:** OFNAR is required to cope with urgent restimulation of road maintenance activities, and an improvement program for OFNAR facilities has been set up as a result of emergency aid obtained from USAID. This strengthening of technical and institutional structures was the first such project undertaken back in 1986. A training-production facility has been programmed for training executive personnel.
6. **DESCRIPTION:** Reconstruction of OFNAR central department buildings: mechanical tools division, central management, accounts department, training premises, fencing, stores and miscellaneous offices. Technical assistance for supervisory personnel: equipment, accounts and training. Acquisition of equipment for the training facility, and assistance with training programs.
7. **COST:** F.CFA 5.4 billion
8. **TIME SCHEDULE:** 1986-1990
9. **PROJECT STATUS:** This project was initiated in 1986. Public works equipment was delivered in October 1987, and the buildings were handed over during the same month.
10. **FUNDING POSITION:** Funding obtained from USAID

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TRANSPORT SECTOR

DATA SHEET No. 28

**PROJECT: IMPROVEMENT OF OFNAR EQUIPMENT RESOURCES (EDF)**

1. **SUB-SECTOR:** Road infrastructure
2. **LOCATION:** Middle Chari - Eastern and Western Lagone
3. **SUPERVISORY AUTHORITY:** Ministry of Public Works, Housing and Urban Development
4. **EXECUTIVE AUTHORITY:** OFNAR
5. **JUSTIFICATION:** Force-work maintenance of the Sarh - Moundou - Lere road (see data sheet No. 24) required the provision of new equipment to replace existing OFNAR equipment. This partial replacement forms part of the improvement program for OFNAR technical resources. This equipment will operate for a three-year period (1988-1990) on credits obtained from EDF, and will then be handed over to OFNAR which will then assume financial responsibility for the equipment.
6. **DESCRIPTION:** Purchase of public works equipment for two mechanized light road maintenance gangs.
7. **COST:** F.CFA 1.53 billion
8. **TIME SCHEDULE:** 1988
9. **PROJECT STATUS:** A Call for Tenders has been issued. The equipment will be accepted during June 1988 or thereabouts.
10. **FUNDING POSITION:** Funding obtained from EDF

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"UNITE - TRAVAIL - PROGRES"

TRANSPORT SECTOR

DATA SHEET No. 29

**PROJECT: REHABILITATION OF SCHOOL OF PUBLIC WORKS PREMISES IN N'DJAMENA (ENTP)**

1. **SUB-SECTOR:** Road infrastructure
2. **LOCATION:** N'Djamena
3. **SUPERVISORY AUTHORITY:** Ministry of Public Works, Housing and Urban Development
4. **EXECUTIVE AUTHORITY:** ENTP
5. **JUSTIFICATION:** The premises of the School of Public Works were badly damaged during the war. The purpose of this school is to train public works, building, topographical survey and municipal works technicians for Chad and neighbouring countries. Initial work has covered very rudimentary rehabilitation of the laboratory adjacent to the school. The teaching premises of ENTP are unusable. Urgent action is necessary to enable this school, of regional importance, to operate efficiently.
6. **DESCRIPTION:** Reconstruction of all roofs, ceilings and walls destroyed, replacement of all doors and windows, reestablishment of water and electricity utilities, repair of certain reinforced concrete structures, overhaul of all external works, acquisition of student and teaching equipment, and reconstruction of the Principal's residential quarters.
7. **COST:** F.CFA 500 million
8. **TIME SCHEDULE:** 1988-1989
9. **PROJECT STATUS:** Preparation of technical reconstruction file required urgently.
10. **FUNDING POSITION:** Funding to be obtained

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"UNITE - TRAVAIL - PROGRES"

TRANSPORT SECTOR

DATA SHEET No. 30

**PROJECT: PURCHASE OF EQUIPMENT AND TRAINING FOR  
OFNAR (FAD)**

1. **SUB-SECTOR:** Road infrastructure
2. **LOCATION:** All OFNAR public works sub-divisions
3. **SUPERVISORY AUTHORITY:** Ministry of Public Works, Housing and Urban Development
4. **EXECUTIVE AUTHORITY:** OFNAR
5. **JUSTIFICATION:** In connection with restructuring the OFNAR decentralized sub-divisions (Sarh, Moundou and Mongo), and stimulation of routine maintenance activities, it has been necessary to provide these operational units with new equipment and to train personnel. This action is a complement to that of IDA (see data sheet No. 26), concerning the training of OFNAR management personnel.
6. **DESCRIPTION:** Purchase of public works equipment for OFNAR for the manual maintenance gangs, and training of personnel in management, road maintenance, and equipment operation and maintenance disciplines.
7. **COST:** F.CFA 1.2 billion (equipment: F.CFA 1 billion, training: F.CFA 200 million)
8. **TIME SCHEDULE:** 1988-1989
9. **PROJECT STATUS:** Negotiation of loan completed (October 1987). Calls for Tender will be issued in January 1988, and training will start in April 1988.
10. **FUNDING POSITION:** Funding obtained (F.CFA 1.02 billion) from FAD (African Development Fund) plus Government participation (F.CFA 120 million).

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"UNITE - TRAVAIL - PROGRES"

TRANSPORT SECTOR

DATA SHEET No. 31

**PROJECT: CONSULTANCY SERVICE FOR DEVELOPMENT OF ROAD SECTOR ON BEHALF OF MINISTRY OF PUBLIC WORKS, HOUSING AND URBAN DEVELOPMENT**

1. **SUB-SECTOR:** Road infrastructure
2. **LOCATION:** Nationwide
3. **SUPERVISORY AUTHORITY:** Ministry of Public Works, Housing and Urban Development
4. **EXECUTIVE AUTHORITY:** DTP
5. **JUSTIFICATION:** A number of technical fields require more detailed analysis and diagnostic, to ensure development with the maximum degree of efficiency. A number of study and consultancy service actions must therefore be scheduled from the start of the program, to ensure that the work planned can be executed, and to structure the necessary institutional support. The studies are to be undertaken in 1989.
6. **DESCRIPTION:** The following studies are planned to meet specific public works requirements: diagnostic of rural track system, road construction material quarries, road map, various road preliminary design and feasibility studies, diagnostic of existing bridges, training of DGTP management personnel, encouragement of small- and medium-sized road construction companies, institutional and technical consultancy service for DGTP, etc.
7. **COST:** F.CFA 1 billion (global)
8. **TIME SCHEDULE:** 1988-1990
9. **PROJECT STATUS:** Programming of studies and establishment of priorities to be defined.
10. **FUNDING POSITION:** Under discussion with IDA

REPUBLIC OF CHAD

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TRANSPORT SECTOR

DATA SHEET No. 32

**PROJECT: EMERGENCY AND DEVELOPMENT PROGRAM FOR N'DJAMENA  
INTERNATIONAL AIRPORT**

1. **SUB-SECTOR:** Air transport infrastructure
2. **LOCATION:** N'Djamena
3. **SUPERVISORY AUTHORITY:** Ministry of Transport and Civil Aviation
4. **EXECUTIVE AUTHORITY:** DAC (Civil Aviation Department)
5. **JUSTIFICATION:** Chad urgently needs an international class airport, for improvement of external access to and from the country, involving rehabilitation of N'Djamena airport and consolidation of its existing facilities. Certain phases in the development of this airport correspond to essential needs, and must be covered in the short term, combined with priority development to eliminate current inadequacies (met. service, fencing, pilgrim air terminal).
6. **DESCRIPTION:** 1) Urgent needs: completion of certain parts of manoeuvring areas, automatic message handling centre and NDB beacon, met. centre equipment and safety improvements, with installation of appropriate inspection and detection equipment.  
2) Development: DNE installations, additional met. equipment, construction of safety fence.  
3) Pilgrim terminal building.
7. **COST:** Total F.CFA 1.9 billion (urgent work: F.CFA 250 million, development: F.CFA 550 million, and F.CFA 1.1 billion for pilgrim air terminal (after 1991)).
8. **TIME SCHEDULE:** 1988-1993
9. **PROJECT STATUS:** Need diagnostic data available
10. **FUNDING POSITION:** Funding to be obtained (1988-1990: F.CFA 800 million, 1991-1993: F.CFA 1.1 billion).

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TRANSPORT SECTOR

DATA SHEET No. 33

**PROJECT: URGENT AND DEVELOPMENT NEEDS FOR FAYA-LARGEAU AIRPORT**

1. **SUB-SECTOR:** Air transport infrastructure
2. **LOCATION:** Faya-Largeau (BET)
3. **SUPERVISORY AUTHORITY:** Ministry of Transport and Civil Aviation
4. **EXECUTIVE AUTHORITY:** DAC
5. **JUSTIFICATION:** Faya-Largeau airport has been totally destroyed. Reconstruction of technical buildings and reinstallation of airport services are essential and urgently required. Rehabilitation of the communications, met. and beacon systems are required in the short term, to reestablish the efficiency of this airport.
6. **DESCRIPTION:** 1) Urgent requirements: repair of buildings, purchase and installation of communications and fire-fighting equipment.  
2) Development: extension of communications, met., electric power supply, beacon and service vehicle facilities.
7. **COST:** Total F.CFA 650 million (urgent: F.CFA 300 million, development: F.CFA 350 million).
8. **TIME SCHEDULE:** 1988-1990
9. **PROJECT STATUS:** Final project studies to be executed
10. **FUNDING POSITION:** Funding to be obtained

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TRANSPORT SECTOR

DATA SHEET No. 34

**PROJECT: EMERGENCY AND DEVELOPMENT PROGRAM FOR SARH, MOUNDOU AND ABEICHE AIRPORTS**

1. **SUB-SECTOR:** Air transport infrastructure
2. **LOCATION:** Sarh, Moundou and Abeche
3. **SUPERVISORY AUTHORITY:** Ministry of Transport and Civil Aviation
4. **EXECUTIVE AUTHORITY:** DAC
5. **JUSTIFICATION:** The airports at Moundou, Sarh and Abeche were badly damaged during the period 1979-1981. Rehabilitation work has been commenced, but safety conditions remain precarious. The urgent needs covered by this project include the upgrading to international operating standards of radio communications and met. equipment, and repair of technical buildings and residential quarters for personnel working on these airports. Part of the runways and manoeuvring areas of the Sarh and Moundou Airports must be repaired, to allow development of air transport services to these two major centres. A technical study must be undertaken as soon as possible, for accurate assessment of the essential work to be undertaken.
6. **DESCRIPTION:** 1) Urgent needs: repair of technical and residential buildings, and communications and met. installations, purchase of safety, power supply, and transport equipment, and manoeuvring area and runway repair work at Sarh and Moundou Airports. 2) Development: extension of logistic, communications and met. resources, rehabilitation of residential quarters and installation of beacons.
7. **COST:** Total F.CFA 5.38 billion
8. **TIME SCHEDULE:** 1988-1990
9. **PROJECT STATUS:** Diagnostic study of urgent needs available
10. **FUNDING POSITION:** GFR: F.CFA 270 million for Abeche.  
Funding to be obtained: total F.CFA 5.11 billion  
Note: Breakdown of needs  
1988-1990  
Sarh            2600  
Moundou       2480  
Abeche         300  
  
F.CFA million    5380

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"UNITE - TRAVAIL - PROGRES"

TRANSPORT SECTOR

DATA SHEET No. 35

**PROJECT: REHABILITATION OF SECONDARY AIRPORTS**

1. **SUB-SECTOR:** Air transport infrastructure
2. **LOCATION:** All secondary airports
3. **SUPERVISORY AUTHORITY:** Ministry of Transport and Civil Aviation
4. **EXECUTIVE AUTHORITY:** DAC
5. **JUSTIFICATION:** Rehabilitation of Am Timan, Bol and Mao secondary airports, used regularly by Air Tchad, and Biltine airstrips. This rehabilitation work is essential in order to maintain administrative links, and improve economic accessibility. Short-term development must be programmed, covering rehabilitation of basic infrastructures.  
Secondary priority: rehabilitation of Fada, Mongo, Bongor and Goz Beida airstrips.
6. **DESCRIPTION:** 1) Urgent needs: repair of manoeuvring areas, and acquisition of communications equipment.  
2) Development: renovation of buildings, establishment of met. network, and acquisition of power supply equipment and ground logistic resources.
7. **COST:** Total F.CFA 1.62 billion (urgent: F.CFA 660 million, development: F.CFA 960 million).
8. **TIME SCHEDULE:** 1988-1990
9. **PROJECT STATUS:** Diagnostic study available
10. **FUNDING POSITION:** Funding to be obtained

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"UNITE - TRAVAIL - PROGRES"

TRANSPORT SECTOR

DATA SHEET No. 36

PROJECT: TRAINING OF CIVIL AVIATION AND AIR TCHAD PERSONNEL

1. SUB-SECTOR: Air transport infrastructure
2. LOCATION: N'Djamena
3. SUPERVISORY AUTHORITY: Ministry of Transport and Civil Aviation
4. EXECUTIVE AUTHORITY: DAC/Air Tchad
5. JUSTIFICATION: With the prospect of recommencement of activities on a large number of airports, it is important to provide training for management and executive personnel. Two forms of action are scheduled: training in Chad of radio and safety department personnel for all principal and secondary airports, and training grants for N'Djamena and Faya airport management personnel, and Air Tchad freight agents, instructor pilots and technical staff.
6. DESCRIPTION: 1) Local training of following personnel:  
30 radio operators and 25 firemen for the principal and secondary airports.  
2) Training grants: 35 persons to provide management staff for the recommencement of national activities by DAC and Air Tchad.
7. COST: F.CFA 150 million
8. TIME SCHEDULE: 1988-1990
9. PROJECT STATUS: Needs defined and estimates available
10. FUNDING POSITION: Funding to be obtained

R E P U B L I C   O F   C H A D

"UNITE - TRAVAIL - PROGRES"

TRANSPORT SECTOR

DATA SHEET No. 37

**PROJECT: INSTITUTIONAL STRENGTHENING OF DAC, ASSESSMENT OF AIR TRANSPORT MANAGEMENT AND EXPANSION PLAN FOR AIR TCHAD**

1. **SUB-SECTOR:** Air transport infrastructure
2. **LOCATION:** N'Djamena
3. **SUPERVISORY AUTHORITY:** Ministry of Transport and Civil Aviation
4. **EXECUTIVE AUTHORITY:** DAC
5. **JUSTIFICATION:** For the purpose of restructuring DAC in order to ensure efficient management of national activities, a certain number of expert advisers would be required. An assessment of air transport management within the framework of Air Tchad would make it possible to implement the expansion plan for the latter. To be in a position to execute its new tasks, DAC requires new premises in addition to its existing facilities.
6. **DESCRIPTION:** This project requires:
  - A) Seconding of expert advisers to DAC and Air Tchad:
    - 1) Civil aviation consultant/project coordinator (24 months)
    - 2) Administrative and financial management specialist (12 months)
    - 3) Radio communications specialist (6 months)
    - 4) Fire safety and rescue specialist (3 months)
    - 5) Transport management and economics expert (12 months)
  - B) Extension of DAC premises.
  - C) Continued technical assistance to Air Tchad:
    - 3 pilots,
    - 1 financial and commercial specialist.
7. **COST:** Total F.CFA 1 billion (1988: F.CFA 200 million, 1989: F.CFA 290 million, 1990: F.CFA 210 million).
  - A) Expert advisers: F.CFA 300 million
  - B) Premises: F.CFA 100 million
  - C) Tech. Assist.: F.CFA 600 million
8. **TIME SCHEDULE:** 1988-1990
9. **PROJECT STATUS:** Diagnostic study available
10. **FUNDING POSITION:** Funding to be obtained (funding for C) provided by French cooperation scheme in 1988).

R E P U B L I C   O F   C H A D

"UNITE - TRAVAIL - PROGRES"

TRANSPORT SECTOR

DATA SHEET No. 38

**PROJECT: INSTITUTIONAL STRENGTHENING OF MINISTRY OF TRANSPORT AND CIVIL AVIATION**

1. **SUB-SECTOR:** Road transport
2. **LOCATION:** N'Djamena
3. **SUPERVISORY AUTHORITY:** Ministry of Transport and Civil Aviation
4. **EXECUTIVE AUTHORITY:** DGT
5. **JUSTIFICATION:** The Ministry of Transport and Civil Aviation requires restructuring to be in a position to handle its responsibilities. For this purpose, technical assistance for this Ministry has been programmed for a two-year period, covering transport economics, statistics and general transport policy (tariff-setting, safety and training). This technical assistance should be continued, as needed, over the period 1991-1993.
6. **DESCRIPTION:** Creation of a technical assistance team for the Ministry of Transport and Civil Aviation, comprising:
  - Transport economist
  - Systems analyst
  - Various specialists in economics, data processing, traffic, road transport, aviation, tariff-setting, vehicle safety and training, with course instructors.
7. **COST:** F.CFA 310 million
8. **TIME SCHEDULE:** 1988-1990
9. **PROJECT STATUS:** Technical assistance covered by this project should be set up by the beginning of 1988.
10. **FUNDING POSITION:** Funding obtained from IDA

R E P U B L I C   O F   C H A D

"UNITE - TRAVAIL - PROGRES"

TRANSPORT SECTOR

DATA SHEET No. 39

**PROJECT: INSTITUTIONAL STRENGTHENING OF CHAD CARRIER ORGANIZATIONAL STRUCTURES**

1. **SUB-SECTOR:** Road transport
2. **LOCATION:** N'Djamena
3. **SUPERVISORY AUTHORITY:** Ministry of Transport and Civil Aviation
4. **EXECUTIVE AUTHORITY:** DGT
5. **JUSTIFICATION:** This institutional strengthening program started with technical assistance supplied to CTT (Chad Carriers' Cooperative) by the German Federal Republic. Development of this program is essential to ensure improved performance by CTT, the role of which should be more clearly defined following a current study. Form and details of this intervention must be defined, and complementary funding (estimated at F.CFA 200 million) must be found.
6. **DESCRIPTION:**
  - 1) Technical assistance to CTT maintenance department (provided by GFR).
  - 2) Technical assistance to Carriers (estimated at approx. 40 man/months, to be confirmed by current study).
7. **COST:** Total F.CFA 300 million (GFR: F.CFA 100 million, IDA: F.CFA 200 million).
8. **TIME SCHEDULE:** 1988-1990
9. **PROJECT STATUS:** First part in course of execution (funded by GFR). The second part is in course of preparation, by means of the transport industry study financed by IDA.
10. **FUNDING POSITION:** Funding obtained from GFR for first part, and under discussion with IDA for second part.

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R E P U B L I C   O F   C H A D

"UNITE - TRAVAIL - PROGRES"

TRANSPORT SECTOR

DATA SHEET No. 40

**PROJECT: TRANSPORT SECTOR DEVELOPMENT STUDI**

1. **SUB-SECTOR:** Road transport
2. **LOCATION:** Nationwide
3. **SUPERVISORY AUTHORITY:** Ministry of Transport and Civil Aviation
4. **EXECUTIVE AUTHORITY:** DGT
5. **JUSTIFICATION:** Development of the transport sector requires a certain number of analytical and diagnostic approaches, and the effective setting up of management and training resources. More detailed studies and actions must be undertaken in the short term for this purpose, in relation with recommendations emerging from analyses and studies in course of execution during 1988.
6. **DESCRIPTION:** The following studies and actions are planned:
  - Republic of Chad transport plan
  - Air transport development study
  - Training of carriers
  - Studies and location of road transport termini
  - Urban transport study
  - Creation of international freight bureau organization, etc.
7. **COST:** F.CFA 600 million (global estimate)
8. **TIME SCHEDULE:** 1988-1989
9. **PROJECT STATUS:** Recommendations resulting from current studies (transport industry, air transport diagnostic, etc.) will be available by about March 1988, and will determine principal subsequent actions.
10. **FUNDING POSITION:** Under discussion with ID/

R E P U B L I C   O F   C H A D

"UNITE - TRAVAIL - PROGRES"

TRANSPORT SECTOR

DATA SHEET No. 41

PROJECT: TRAINING OF MINISTRY OF TRANSPORT AND CIVIL AVIATION  
MANAGEMENT, ADMINISTRATIVE AND FINANCIAL DEPARTMENT  
PERSONNEL

1. SUB-SECTOR: Road transport
2. LOCATION: N'Djamena
3. SUPERVISORY AUTHORITY: Ministry of Transport and Civil Aviation
4. EXECUTIVE AUTHORITY: DGT
5. JUSTIFICATION: Restructuring of MTAC involves the employment of executive personnel specialized in the collection of road transport data. Personnel urgently required in this connection must be recruited and trained. The setting up of a training program must be prepared in liaison with DGT, and on the basis of recommendations emerging from current studies.
6. DESCRIPTION: Training of personnel assigned to the Ministry of Transport and Civil Aviation must be based on the following three themes:
  - Transport and traffic surveys
  - Transport statistics
  - Analysis of vehicle resources
7. COST: Estimated total: F.CFA 200 million
8. TIME SCHEDULE: 1988-1990
9. PROJECT STATUS: Analysis of needs should be completed by early 1988, in relation with technical assistance to MTAC.
10. FUNDING POSITION: Funding to be obtained

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R E P U B L I C   O F   C H A D

"UNITE - TRAVAIL - PROGRES"

TRANSPORT SECTOR

DATA SHEET No. 42

PROJECT: PROVISION OF CUSTOMS BONDED FACILITIES AT PORT OF DOUALA,  
AND ACQUISITION OF HANDLING EQUIPMENT

1. SUB-SECTOR: Transport infrastructure
2. LOCATION: Cameroon
3. SUPERVISORY AUTHORITY: Ministry of Transport and Civil Aviation
4. EXECUTIVE AUTHORITY: DGT
5. JUSTIFICATION: A long-term bonded storage zone has been assigned, to enable the Republic of Chad to improve the transit of merchandise through the port of Douala. This zone must be fitted out (construction of warehouses and offices, and external works) and handling equipment purchased.
6. DESCRIPTION: Construction of customs bonded depot at port of Douala, preparation of storage zones, and acquisition of handling equipment.
7. COST: Total F.CFA 1.3 billion (construction work: F.CFA 1.1 billion, equipment: F.CFA 200 million).
8. TIME SCHEDULE: 1990-1993
9. PROJECT STATUS: Final project to be prepared
10. FUNDING POSITION: Funding to be obtained

R E P U B L I C   O F   C H A D

"UNITE - TRAVAIL - PROGRES"

TRANSPORT SECTOR

DATA SHEET No. 43

**PROJECT: STRENGTHENING OF AIR TRANSPORT INFRASTRUCTURE MAINTENANCE RESOURCES**

1. **SUB-SECTOR:** Air transport infrastructure
2. **LOCATION:** N'Djamena
3. **SUPERVISORY AUTHORITY:** Ministry of Transport and Civil Aviation
4. **EXECUTIVE AUTHORITY:** DAC
5. **JUSTIFICATION:** Strengthening of maintenance facilities for radio navigation aids, radio communications resources and met. equipment calls for the availability of spares. The diversity of the equipment involved makes it impossible to hold adequate stocks in situ, and operation via a central purchasing unit will facilitate procurement of maintenance equipment.
6. **DESCRIPTION:** 1) Urgent needs: purchase of spares from a European organization, which would be responsible for procurement and dispatch, against orders issued by DAC.
7. **COST:** F.CFA 300 million
8. **TIME SCHEDULE:** 1988-1993
9. **PROJECT STATUS:** Diagnostic study available
10. **FUNDING POSITION:** Funding to be obtained

## **APPENDIX B**

### Technical guidelines for road system standards

**TECHNICAL GUIDELINES**  
**FOR ROAD SYSTEM STANDARDS**

**INTRODUCTION**

Road construction in the Republic of Chad has always proved difficult, and the results obtained frequently disappointing. This situation is the result of local climatic conditions, the poor quality of available road construction materials, the total absence of gravel aggregate in the North of the country, and the very flat terrain combined with highly plastic soil, frequently subject to distension.

These unfavourable parameters frequently result in failure at the road construction stage, and also generate excessive maintenance costs if the road surface is to remain compatible with the traffic carried.

The cost of routine maintenance quickly becomes prohibitive in relation to initial investment and the volume of traffic using the road.

A technical investigation was therefore undertaken, aimed at achieving adequation between road construction and maintenance.

Pavement and associated ancillary structures must be capable of withstanding traffic aggression, and other difficulties linked to climatic or geotechnical phenomena. The construction design solutions defined reduce the risks involved, and ensure the durability of the initial investment.

The various components of road structures have been analysed, and the proposed solutions are based on subsequent maintenance procedures to be employed.

The proposed technical guidelines are principally concerned with the following:

- choice of materials to be used for earthworks and pavement, according to geological zone and traffic volume,
- dimensioning of structures according to natural ground bearing capacity, traffic volume and types of material used,

- simplification of routine maintenance procedures, this criterion being designed to eliminate over-sophisticated or excessively fragile solutions,
- construction rules concerning the essential emergence of the sub-grade.

As a result of these actions, technical guidelines have been established for road system standards, leading to:

- greater optimization of total investment + maintenance cost,
- reduction of random factors during construction, by proper protection of earthworks and pavement,
- harmonization of road investments, improving the homogeneity of the rehabilitated road system,
- facilitated maintenance, and more regular technical and budgetary programming, with consequent standardization of costs and techniques employed.

The combination of these construction and maintenance standards represents the basis of the strategy which the Government plans to apply, for successful implementation of the transport sector development program in the Republic of Chad.

## PART 1

### GENERAL CONTEXT AND ROAD SYSTEM

#### 1.1. CLIMATE

The main climatological zones covering the Republic of Chad occur in the order shown below, from South to North :

##### 1) Sudano-Guinean zone in the South

Semi-humid tropical climate - Moundou, Sarh region

- Annual rainfall: 1350 to 950 mm.
- Rainy season: 6 to 7 months - May to November with maximum rainfall in July, August and September.
- Dry season: 5 to 6 months - November to April, with no rainfall in December and January.
- Mean annual temperatures: of the order of 28°C with monthly maxima of 38°C.

##### 2) Sahelo-Sudanese zone

Dry tropical climate - N'Djamena, Bongor, Bokoro, Mongo and Am Timan region.

- Annual rainfall: 950 to 500 mm.
- Rainy season: 4 to 5 months - May-June to September, with maximum rainfall in July and August (300 mm in East, 250 mm in the N'Djamena area).
- Dry season: 7 to 8 months - October to April-May, no rainfall in November, December and January (East), and December, January and February (N'Djamena).
- Mean annual temperatures : 28° to 30°C, with monthly maxima exceeding 40°C.

### 3) Sahelo-Saharan zone

Semi-desert climate - Bol, N'Gouri, Am N'Djamena and Abeche region.

- Annual rainfall: 500 to 200 mm.
- Rainy season: 3 months - July to September, with max. rainfall in July and August (over 150 mm).
- Dry season: 9 months - October to June, no rainfall from November to March.
- Mean monthly temperatures: 28°C with maxima exceeding 50°C on bare ground.

### 4) Saharan zone

Tropical and Saharan desert climate - Fada, Faya, Bardai and Aouzou region.

- Annual rainfall: 200 to 50 mm.
- Sparse rainfall possible between July and September.
- Mean annual temperatures: 35°C with maxima exceeding 50°C on bare ground.

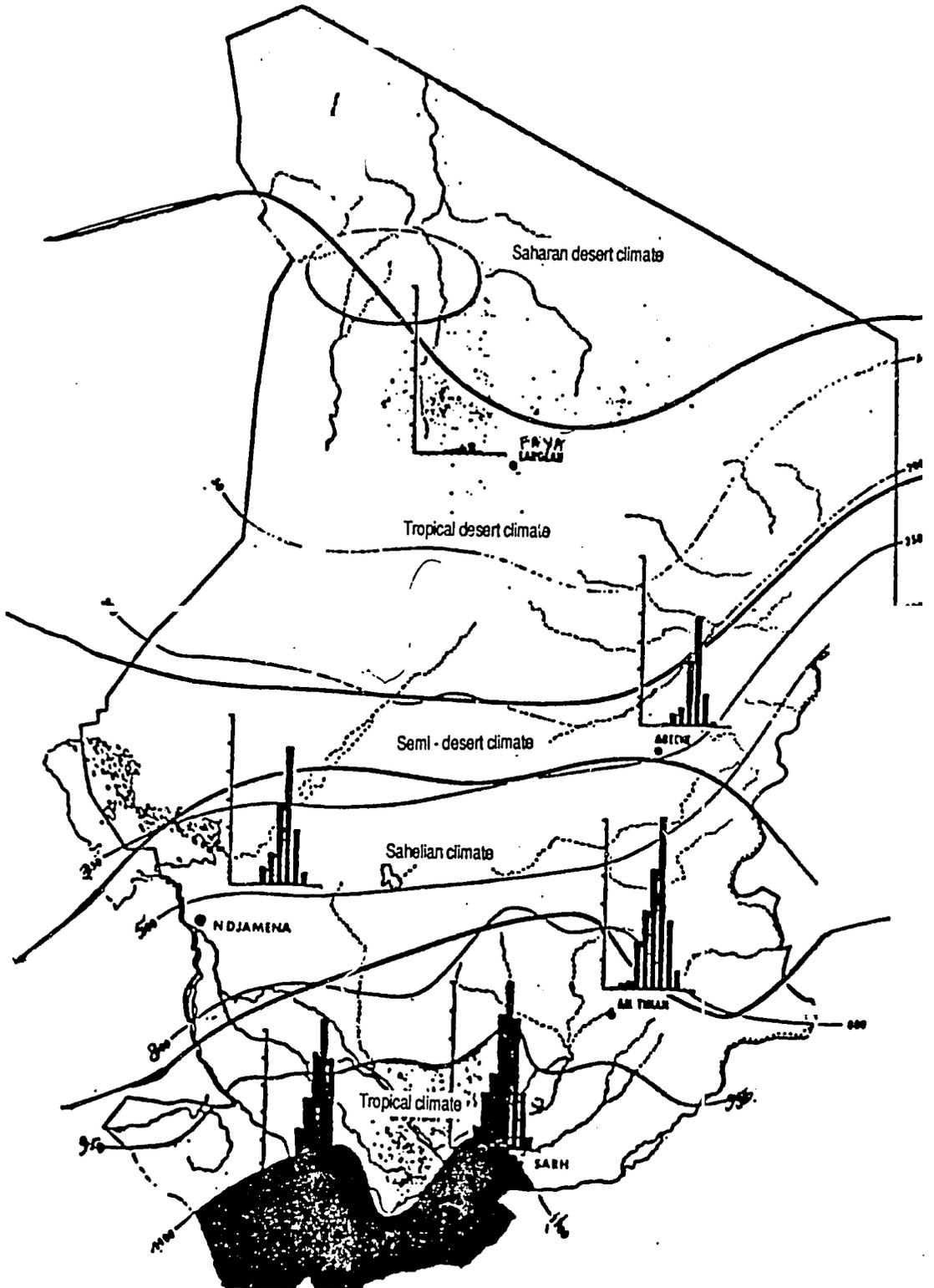
With respect to hygrometry, air water vapour content is close to saturation during the rainy season, and low to very low during the dry season. The humidity level varies substantially during the day in the dry season, and less in the rainy season.

Evaporation is considerable, increasing from South to North. Approximate annual values are 2000 mm in the South, 3000 mm in the central zone, and in excess of 4000 mm in the desert zone (evaporation values measured with a PICHE instrument).

Major variations in annual rainfall from year to year should also be noted. In 1984, the 200 mm isohyet was situated close to N'Djemena, Ati and Abeche, whereas in a normal year, these towns are not far from the 500 mm isohyet.

Rainfall distribution is indicated on the following map.

# RAINFALL MAP



## 1.2. SOILS

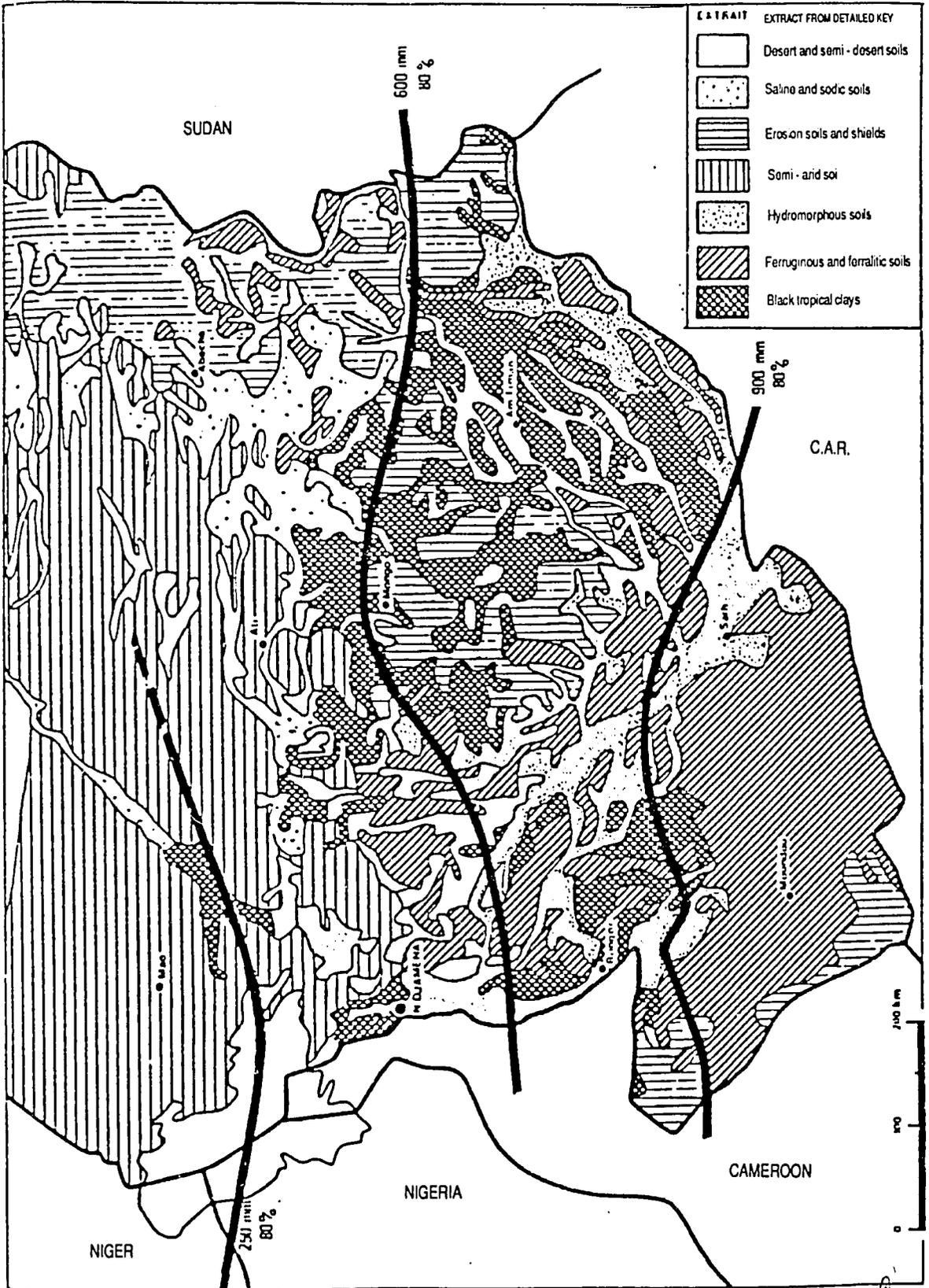
The soils encountered in Chad correspond to the following geological formations:

- Terminal continental
- Old quaternary
- Recent quaternary
- primary (solid rock)

Various geological soil formations can be observed:

- primary formations: granitic rock;
- terminal continental and old to middle quaternary formations:
  - . old, shallow or outcropping ferruginous shields,
  - . ferralitic levels,
  - . old series adulterated with more or less silty sands;
- recent quaternary formations:
  - . fluvio-lacustrian series with clay-sands, incorporating limestone nodules, covered to a greater or lesser extent by clays or silts,
  - . fluvio-lacustrian series with erg sand-clays, incorporating quartz and coarse sands,
  - . recent sandy series, accumulated in the major river depressions, resulting from sedimentation, and progressively finer towards the North,
  - . recent lacustrian clay series, with fine clay sediment, and gravelly sand or pebbly clay in piedmont areas,
  - . very recent to contemporary alluvial series, with clay-silt or silt-sand sediment.

### SOIL POTENTIALITY



Few of these soils present good road construction characteristics. Distribution of the different types is excessively interleaved. The southern part of Chad includes ferruginous and ferralitic soils. Along the rivers (Logone and Chari) hydromorphous soils are encountered, bordered by black tropical clays, extended substantially to the East of the Chari and round Lake Chad, with semi-arid and ferralitic soil intrusions.

Erosion soils are encountered to the North of a line from N'Djemena to Abeche, with sandstone and sandy desert soils in the dry valleys of the far north. Depressions are frequently filled with saline and sodic soils (see map). In view of the diversity, heterogeneity and dispersion of the soils, a simplified classification system has been adopted, based on CBR bearing capacity after 4-day soaking, giving a direct indication of "road" quality for earthworks.

#### SOIL CLASSIFICATION

Class	CBR bearing capacity
S1	< 5%
S2	5 to 10%
S3	10 to 15%
S4	15 to 30%
S5	> 30%

### 1.3. PRIORITY ROAD SYSTEM

With a view to initiating a rehabilitation program for the main road system in the Republic of Chad, a priority system has been defined, together with a program of actions to be undertaken between 1986 and 1991 (1986-1988 emergency program and 1989-1991 complementary program).

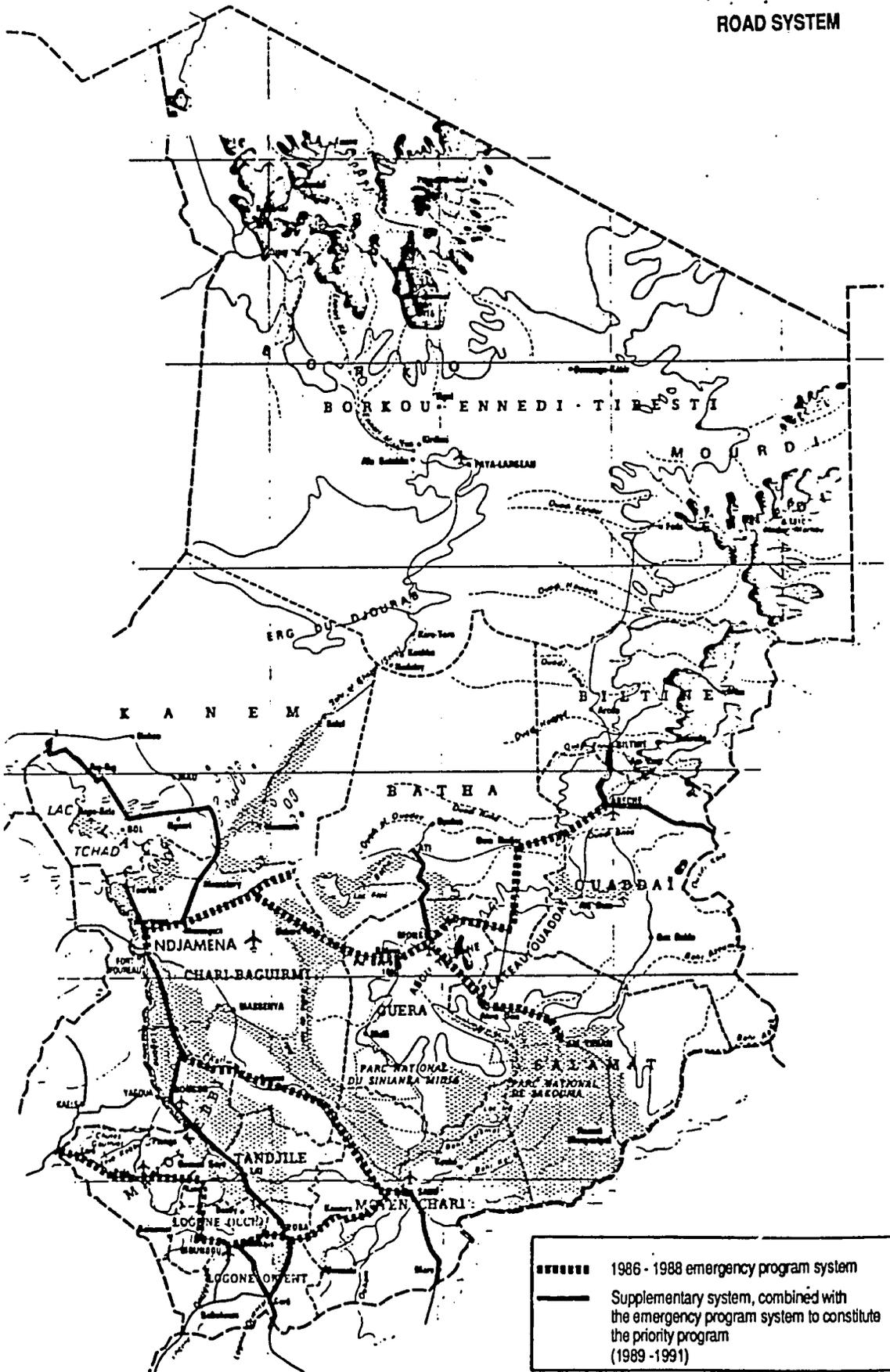
The priority system corresponds to a total of 3959 km. A list of the routes concerned is given on page 8.

**PRIORITY ROUTES AND MAP LOCATIONS**

- N'Djamena - approach road to Kousseri junction at the Ngeli bridge over the Logone (route surfaced in 1985 over a distance of 6.4 km)	6 km
- N'Djamena-Guelengdeng via Koundoul (starting from the Kousseri junction, route surfaced in 1969-1971)	140 km
- N'Djamena bypass	20 km
- Guelengdeng-Bongor	83 km
- Bongor-Moundou	250 km
- Guelengdeng-Guere via Bouso (rehabilitation work started in October 1985)	379 km
- Sarh-Moundou-Lere-Frontier with Cameroon via Koumra-Doba-Maikoro-Kelo-Pala (maintenance work commenced end 1986)	623 km
- Sarh-Sido (frontier with C.A.R.) via Maindou-Marou	122 km
- Deba-Gore	102 km
- Maikoro-Bedaoyo (frontier with C.A.R.) via Gore	110 km
- Massaguet-Massakory-Ngouri-Bol-Baga Sola (emergency road, trial sections constructed in 1986)	328 km
- N'Djamena-Massaguet via Djermaia (route surfaced in 1968-1971)	76 km
- Djermaia-Dandi Quarry via Douguia-Mani	67 km
- Massaguet-Ngoura via Karne-Bisney (under construction and maintenance 1983-1986)	125 km
- Ngoura-Mongo via Moyto-Bokoro-Arboutchatak-Bitkine (under construction between Ngoura and Moyto since early March 1987)	303 km
- Mongo-Ati via Delep-Ngara (route intended for improved regional access)	154 km
- Mongo-Abeche via Mangalme-Oum Hadjer	374 km
- Mongo-Am Timan via Dafra-Abou Deta-Deresna (under construction since September 1986)	253 km
- Abeche-Adre via Moura Goulem-Bioke (link route with Sudan)	167 km
- Abeche-Biltine	92 km
<b>TOTAL</b>	<b>3774 km</b>

Recently surfaced routes	6 km
Old surfaced routes in highly degraded state	255 km
Unsurfaced routes of recent construction, or in course of construction, rehabilitation or maintenance	1803 km
Other unsurfaced routes	1710 km
	<hr/>
TOTAL	3774 km

# ROAD SYSTEM



----- 1986 - 1988 emergency program system

———— Supplementary system, combined with the emergency program system to constitute the priority program (1989 - 1991)

#### 1.4. TRAFFIC

Traffic data has been obtained from surveys conducted in 1985/1986, for definition of the Republic of Chad road rehabilitation and maintenance program.

Traffic levels are modest, this phenomenon being accentuated by the fact that the survey period was extremely short, a situation of economic recovery barely commenced, and a road system in extremely poor condition, tending to restrict traffic still further. However, general approximations can be obtained from these results, making it possible to assess the various classes of traffic using the system.

It should be noted that a high percentage of heavy vehicles (TLW exceeding 3 T) uses these roads, representing between 38 and 75% of total traffic, with over 60% for the majority of routes (see table below).

Traffic categories have been determined for the purpose of present and future road classification.

For surfaced roads, the aggressivity of heavy vehicles with respect to the performance of the pavement and surfacing in time, has been taken into account in the selection of traffic categories, firstly by expressing mean annual daily traffic as a number of heavy vehicles (TLW exceeding 3 T), and secondly as a cumulative number of heavy vehicles over a 15-year period, allowing for foreseeable growth in traffic levels. The latter indicator makes it possible to associate the state of the road at a given point in time, with the quantity of traffic carried since the road was commissioned. Finally, to provide for correlation with traffic realities, each category corresponds to a mean annual daily traffic level for all types of vehicle taken together.

#### TRAFFIC CATEGORIES FOR SURFACED ROADS IN THE REPUBLIC OF CHAD

Surfaced road traffic category	Mean daily heavy vehicle traffic	Cumulative heavy vehicle traffic for 15 years	Mean traffic correspondence (all vehicles)
T 1	< 45	< $5 \cdot 10^5$	< 75
T 2	45 to 150	$5 \cdot 10^5$ to $1,5 \times 10^6$	250 to 750
T 3	150 to 450	$1,5 \times 10^6$ to $4,5 \times 10^6$	250 to 750

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For unsurfaced roads, traffic levels are lower and the categories adopted correspond to levels of service with generally shorter lifetimes. There are 5 traffic categories for these roads, expressed firstly in terms of mean annual daily traffic (number of heavy vehicles), and secondly as mean annual daily traffic correspondence (all vehicles).

Levels N 1 to N 3 are type T 1 ( $< 5 \times 10^5$ ), and level N 4 is type T 2.

**TRAFFIC LEVELS**  
**FOR UNSURFACED ROADS**  
**IN THE REPUBLIC OF CHAD**

Unsurfaced road traffic category	Traffic level	Mean daily heavy vehicle traffic	Correspondence (all vehicles)
T 1	N 1	< 5	< 10
	N 2	5 to 10	10 to 20
	N 3 A	10 to 15	20 to 30
	N 3 B	15 to 20	30 to 45
T 2	N 4	> 20	> 45

**ANALYSIS OF TRAFFIC ON PRINCIPAL ROADS  
IN PRIORITY SYSTEM**

Source: 1985/86 survey (August 1986) for road rehabilitation and maintenance program.

Route	Traffic category/section length			
Daily total	Traffic category origin			
Daily total	Number of vehicles/% heavy vehicles			
N'Djamena-Guelengdeng Kousseri junction 146 km	1/12 km Kousseri 67/57%	2/134 km Koundoul 27/63%		
Guelengdeng-Gore 434 km	1/83 km Guelengdeng 17/59%	2/148 km Bongor 21/38%	3/108 km Lai 8/38%	4/95 km Doba 2/38%
Guelengdeng-Sarh 406 km	1/149 km Guelengdeng 12/63%	2/230 km Bouso 10/63%	3/27 km N'Guere 28/63%	
Frontier with Cameroon 607 km	1/164 km N'Guere 18/75%	2/89 km Doba 21/75%	3/20 km Maikoro 26/75%	4/104 km Moundou 32/75%
Sarh-Sido 122 km	1/30 km Sarh 31/69%	2/22 km Bambara 6/69%	3/70 km Danamadji 3/69%	
Maikoro-Bedaoyo 110 km	1/82 km Maikoro 2/75%	2/28 km Gore 4/57%		
Massaguet-Baga-Sola 306 km	1/66 km Massaguet 22/43%	2/84 km Massakory 7/66%	3/156 km Ngouri 3/66%	

N'Djamena-Massaguet 78 km	1/32 km N'Djamena 54/43%	2/46 km Djermaia 49/43%	Category 1 traffic does not include vehicles coming from the Dandi quarries
Djermaia-Dandi 70 km	1/70 km Djermaia 2/43%		Traffic on this route does not include vehi- cles coming from the Dandi quarries
Massaguet-Ngoura 125 km	1/125 km Masseguet 13/66%		
Ngoura-Am Djamena 118 km	1/118 km Ngoura 7/66%		
Ngoura-Mongo 303 km	1/102 km Ngoura 4/66%	2/201 km Bokoro 3/66%	
Mongo-Ati 154 km	1/154 km Mongo 4/66%		
Mongo-Abeche 374 km	1/374 km Mongo 4/66%		
Mongo-Am Timan 253 km	1/253 km Mongo 1/66%		
Abeche-Adre 167 km	1/167 km Abeche 1/66%		

## PART 2

### TECHNICAL STANDARDS FOR ROADS

#### 2.1. GEOMETRICAL STANDARDS

The geometrical standards applicable to the road system in the Republic of Chad are illustrated in diagrams 2/1 and 2/2 on pages 16 and 17.

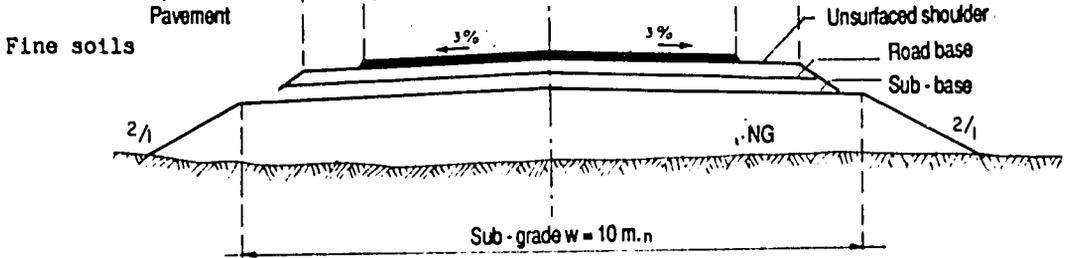
For surfaced roads, distinction is made between rural sections, and the urban sections of national highways.

For unsurfaced roads, standards are based on a certain level of heavy vehicle traffic (DLW exceeding 3 T).

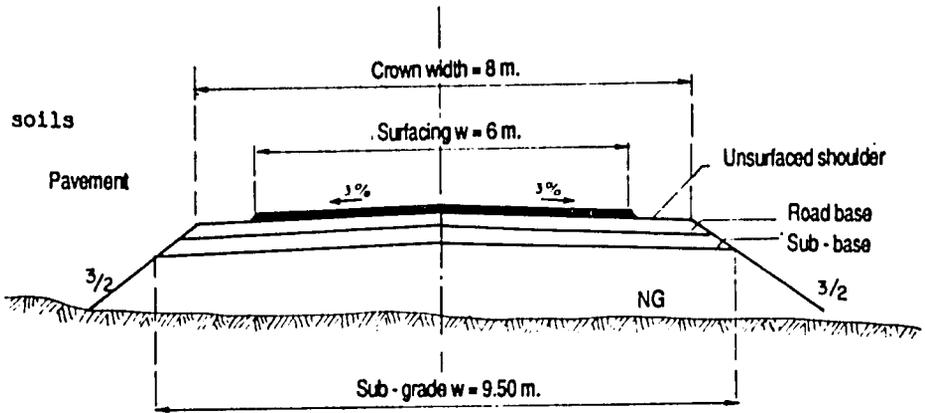
DIAGRAM No. 2/1  
GEOMETRICAL STANDARDS

**SURFACED ROAD**

**A) RURAL**



**Laterite soils**



**B) URBAN SECTION**

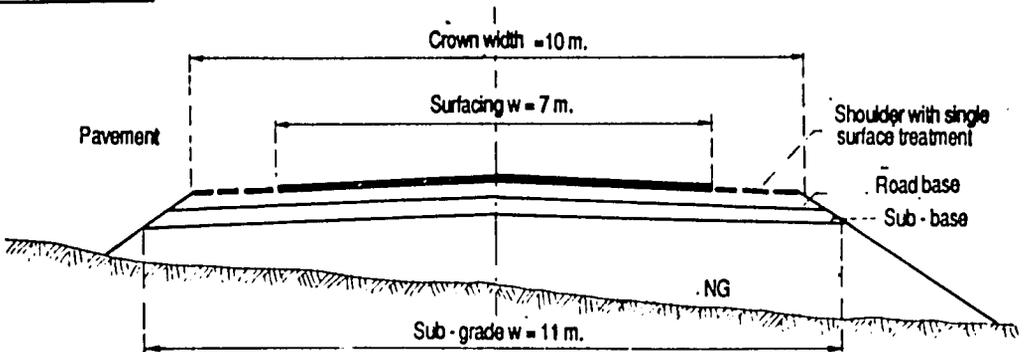
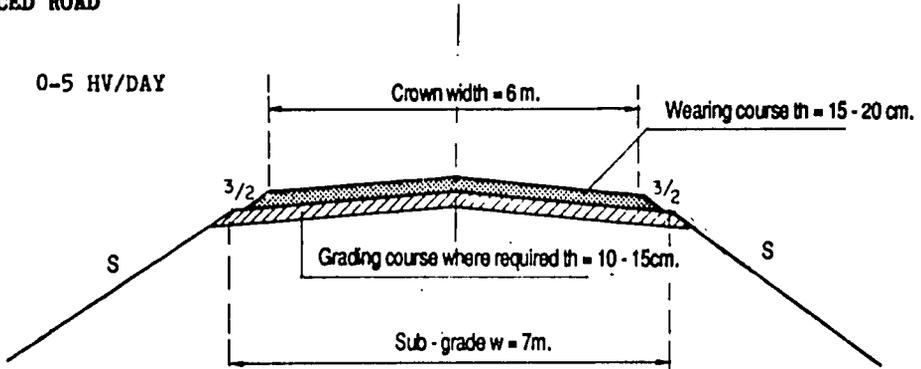


DIAGRAM No. 2/2  
GEOMETRICAL STANDARDS

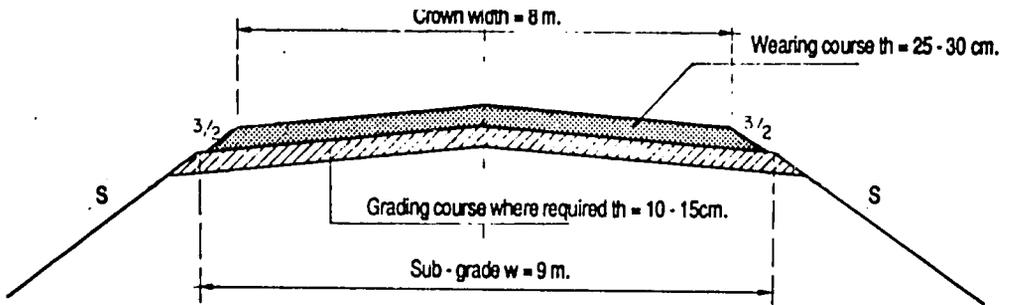
UNSURFACED ROAD

Level 1 0-5 HV/DAY

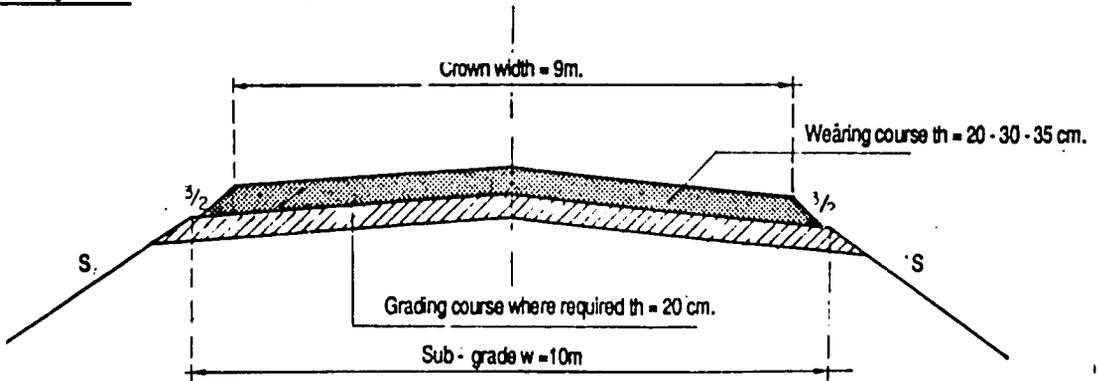


S = 3/2 for laterite formations  
2/1 for other soils

Level 2 5-10 HV/DAY



Levels 3 to 5 over 10 HV/DAY



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## 2.2. TECHNICAL GUIDELINES FOR TYPICAL PAVEMENT STRUCTURES

For surfaced roads, these pavement structures depend on the quality of the underlying soil strata (S 1, S 2, etc.) and traffic level (T 1, T 2, etc.).

Data sheets A to D indicate the typical structures recommended for the main materials used.

For unsurfaced roads, wearing course and grading course structures take account of the quality of underlying soil strata (S 1, S 2, etc.) and the level of service (N 1, N 2, etc.) associated with the traffic carried.

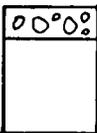
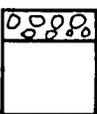
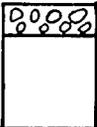
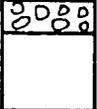
Different structures are proposed (data sheet E) for different regions, and the different materials encountered.

TECHNICAL GUIDELINES FOR SURFACED ROADS

TYPICAL PAVEMENT STRUCTURES

Data sheet A

Road base: crusher-run stone (CRS)  
 Sub-base : clay sand (CS)

		T 1	T 2	T 3
SURFACING		Double surface treatment	Triple surface treatment	
PAVEMENT STRUCTURE	S 1	 <p>15 cm. CRS 45cm. CS</p>	 <p>15 cm. CRS 55cm. CS</p>	SPECIFIC STUDIES
	S 2	 <p>15 cm. CRS 35 cm. CS</p>	 <p>15 cm. CRS 45 cm. CS</p>	
	S 3	 <p>15 cm. CRS 25cm. CS</p>	 <p>15 cm. CRS 35cm. CS<sub>1</sub></p>	
	S 4			

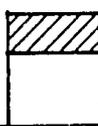
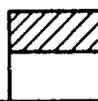
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**TECHNICAL GUIDELINES FOR SURFACED ROADS**

**TYPICAL PAVEMENT STRUCTURES**

**Data sheet B**

Road base: clay sand - cement (CS/C)  
Sub-base : clay sand (CS)

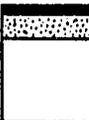
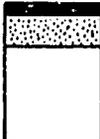
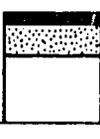
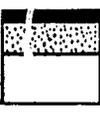
		T 1	T 2	T 3
SURFACING		Double surface treatment	Triple surface treatment	
PAVEMENT STRUCTURE	S 1	 15 cm. CS/C 45 cm. CS	 20 cm. CS/C 45 cm. CS	SPECIFIC STUDIES
	S 2	 15 cm. CS/C 35 cm. CS	 20 cm. CS/C 35 cm. CS	
	S 3	 15 cm. CS/C 25 cm. CS	 20 cm. CS/C 25 cm. CS	
	S 4			

TECHNICAL GUIDELINES FOR SURFACED ROADS

TYPICAL PAVEMENT STRUCTURES

Data sheet C

Road base: bituminous sand (BS)  
Sub-base : clay sand (CS)

		T 1	T 2	T 3
SURFACING		3 cm sand asphalt (SA) + chipping	3 cm sand asphalt (SA) + chipping	
PAVEMENT STRUCTURE	S 1	 <p>3 cm. SA 12 cm. SB 40 cm. CS</p>	 <p>4 cm. SA 15 cm. BS 45 cm. CS</p>	12 cm. BS SPECIFIC STUDIES
	S 2	 <p>3 cm. SA 12 cm. BS 30 cm. CS</p>	 <p>4 cm. SA 15 cm. BS 35 cm. CS</p>	
	S 3	 <p>3 cm. SA 12 cm. BS 20 cm. CS</p>	 <p>4 cm SA 15 cm. BS 25 cm. CS</p>	
	S 4			

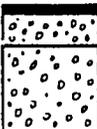
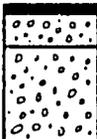
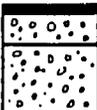
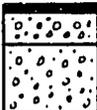
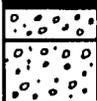
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TECHNICAL GUIDELINES FOR SURFACED ROADS

TYPICAL PAVEMENT STRUCTURES

Data sheet D

Road base: natural gravel (NG)  
 Sub-base : natural gravel (NG)

		T 1	T 2	T 3
SURFACING		8 cm sand asphalt (SA)	4 cm sand asphalt (SA)	
STRUCTURE PAVEMENT	S 1	 <p>3 cm. SA 15 cm. RG 40 cm. NG</p>	 <p>3 cm. SA 15 cm. RG 45 cm. NG</p>	SPECIFIC STUDIES
	S 2	 <p>3 cm. SA 15 cm. RG 35 cm. NG</p>	 <p>3 cm. SA 15 cm. RG 35 cm. NG</p>	
	S 3	 <p>3 cm. SA 15 cm. RG 25 cm. NG</p>	 <p>3 cm. SA 15 cm. RG 30 cm. NG</p>	
	S 4			

10/10

TECHNICAL GUIDELINES FOR UNSURFACED ROADS - TYPICAL WEARING COURSE STRUCTURES

Thickness in cm - GC = grading course

	N 1	Traffic	N 2	Traffic	N 3	Traffic	
		< 5 HV/day		5-10 HV/day		10-15 HV/day	15-20 HV/day
S 1 CBR ≤ 5%	Lateritic (South)	20 + GC=15	Fine soils Sands and fine soils  (North and N-East)	25 + GC=10  Clay	Lateritic (South)	25 +	30 +
	Fine soils Sands and fine soils (North and N-East)	20 +					30 +
	Fine soils and hard soils (East North East, North East, East, Eastern Centre)	20 +	Fine soils (Centre)	30 +	Sands and fine soils (North)	25 +	30 +
S 2 CBR 5 to 10%	Lateritic (South)	20	Fine soils Sands and fine soils  (North and N-East)	25	Lateritic (South)	25	30
	Fine soils Sands and fine soils (North and N-East)	20					30
	Fine soils and hard soils (East North East, North East, East, Eastern Centre)	20	Fine soils (Centre)	30	Sands and fine soils (North)	25	30
S 2 CBR 5 to 10%	Lateritic (South)	20	Fine soils Sands and fine soils  (North and N-East)	20	Lateritic (South)	20	25
	Fine soils Sands and fine soils (North and N-East)	20					25
	Fine soils and hard soils (East North East, North East, East, Eastern Centre)	20	Fine soils (Centre)	25	Sands and fine soils (North)	20	25

## PART 3

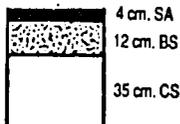
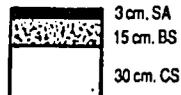
APPLICATION OF STANDARDS TO  
PRINCIPAL ROUTES

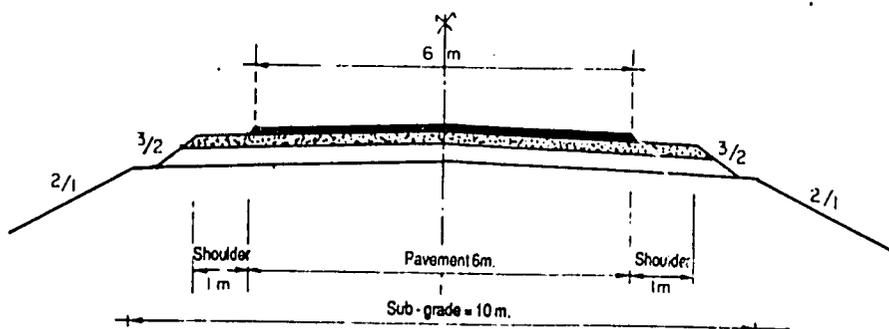
## LIST OF ROUTES EXAMINED

R 1	N'DJAMENA-GUELENGDENG
R 2	N'DJAMENA-MASSAGUET
NR 1	NGUERE-FRONTIERE
NR 2	GUELENGDENG-GORE
NR 3	MASSAGUET-BAGASOLA
NR 4	DJERMAIA-DANDI
NR 5	MASSAGUET-NGOURA
NR 6	GUELENGDENG-SARH
NR 7	SARH-SIDO
NR 8	MAIKOIRO-BEDAUYO
NR 9	NGOURA-AM DJAMENA
NR 10	NGOURA-MONGO
NR 11	MONGO-ATI
NR 12	MONGO-ABECHE
NR 13	ABECHE-ADRE
NR 14	MONGO-AMTIMAN

R = Surfaced road  
NR = Unsurfaced road

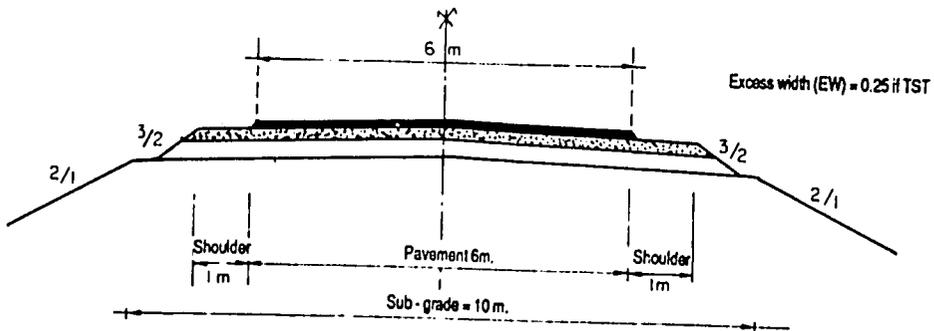
## SURFACED

ROUTE	N'DJAMENA - GUELENGDENG	
SECTION	KOUSSIERI-KOUNDOUL	KOUNDOUL-GUELENGDENG
Length Km	12	134
Crown width m	8	8
Pavement width m	6	6
Width of bituminous layer m	6,50	6
Surface treatment width m - first course - second course - third course		
Priming width m	7	6,50
Chipping width m	7	6,50
Road base width m	8,45	8,36
Sub-base width m	9,50	9,26
Sub-grade width (earthworks) m	10	10
Pavement slope	3/2	3/2
Fill slope	2/1	2/1
PAVEMENT STRUCTURE THICKNESSES	C-T2-S2	C-T1-S2
		



## UNSURFACED

ROUTE		N'DJAMENA - MASSAGUET	
SECTION		N'DJAMENA-DJERMAIA	DJERMAIA-MASSAGUET
Length	Km	32	46.
Crown width	m	8	8
Pavement width	m	6	6
Width of bituminous layer	m	-	-
Surface treatment: width	m	6,50	
- first course		8	
- second course		6,50	
- third course		6,50	
Priming width	m	8	
Chipping width	m	-	-
Road base width	m	8,45	
Sub-base width	m	9,80	9,50
Sub-grade width (earthworks)	m	10	10
Pavement slope		3/2	3/2
Fill slope		2/1	2/1
PAVEMENT STRUCTURE THICKNESSES		 <p style="margin-left: 20px;">Triple ST 15 cm. CRS.  45 cm. CS</p>	



## UNSURFACED

NR 1

ROUTE	N'GUERE - FRONTIERE DU CAMEROUN		
Formation	Latéritiques		
Section	N'GUERE-DOBA	DOBA-MAIKORO	PALA-FRONTIERE
Length	164	89	120
Crown width	9		
Pavement width	7		
Sub-grade width	10		
Traffic level (N)	(3)	15-20	
Soil class	S 2	S 2	S 3
Course thickness - wearing - levelling - grading	30	30	25

## UNSURFACED

NR 2

ROUTE	GUELENGDENG - GORE						
Formation	Sols fins						
Section	GUELENGDENG-BONGOR		BONGOR-LAI		LAI-DOBA		DOBA-GORE
Length	60	23	110	38	80	28	95
Crown width	9				8		6
Pavement width	7				6		4,5
Sub-grade width	10				9		7
Traffic level (N)	(3) 15-20		(3) 10-15		(2) 5-10		(1) 0-5
Soil class	S 2	S 1	S 2	S 1	52	S 1	S 2
Course thickness	35	35	35	35	30	30	30
- wearing							
- levelling							
- grading		20		20		15	

## UNSURFACED

NR 3

ROUTE	MASSAGUET - BAGA SOLA - NORD				
Formation	Sables et sols fins				
Section	MSGT-MSKY	MASSAKORY-NGOURI		NGOURI-BAGASOLA	
Length	66	50	34	100	56
Crown width	9	8		6	
Pavement width	7	6		4,5	
Sub-grade width	10	9		7	
Traffic level (N)	(3) 10-15	(2) 5-10		(1) 0-5	
Soil class	S 2	S 2	S 1	S 2	S 1
Course thickness - wearing - levelling - grading	30	25	25 10	20	20 10

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# UNSURFACED

NR 4

ROUTE	DJERMAIA - DANDI	
Formation	Sables et sols fins	
Section	DJERMINA DANDI	
Length	50	20
Crown width	9	
Pavement width	7	
Sub-grade width	10	
Traffic level (N)	(3)	10-15
Soil class	S 2	S 1
Course thickness - wearing - levelling - grading	30	30  20

# UNSURFACED

NR 5

ROUTE	MASSAGUET - NGOURA	
Formation	Sables et sols fins	
Section	MASSAGUET - NGOURA	
Length	100	25
Crown width	8	
Pavement width	6	
Sub-grade width	9	
Traffic level (N)	(2)	5-10
Soil class	S 2	S 1
Course thickness - wearing - levelling - grading	25	25 10

*124*

## UNSURFACED

NR 6

ROUTE	GUELENGDENG - SARH			
Formation	Sols fins			
Section	GUELENGDENG-BOUSSO		BOSSO-NGUERE	
Length	100	49	200	30
Crown width	8			
Pavement width	6			
Sub-grade width	9			
Traffic level (N)	(2)		5-10	
Soil class	S 2	S 1	S 2	S 1
Course thickness - wearing - levelling - grading	30	30 15	30	30 15

# UNSURFACED

NR 7

ROUTE	SARH - SIDO - SUD	
Formation	Latéritiques	
Section	BAMBARA-DANAMADJI	DANAMADJI-SIDO
Length	22	70
Crown width	6	
Pavement width	4,5	
Sub-grade width	7	
Traffic level (N)	(1)	0-5
Soil class	S 2	
Course thickness - wearing - levelling - grading	20	10

*166*

## UNSURFACED

NR 8

ROUTE	MAIKORO - BEDAOYO - SUD	
Formation	Latéritiques	
Section	MAIKORO-GORE	GORE-BEDAOYO
Length	82	28
Crown width	6	
Pavement width	4,5	
Sub-grade width	7	
Traffic level (N)	(1)	0-5
Soil class	S 2	
Course thickness - wearing - levelling - grading	20	10

# UNSURFACED

NR 9

ROUTE	NGOURA - AM DJAMENA	
Formation	Sols fins	
Section	NGOURA-FALE	FALE-AM DJAMENA
Length	90	28
Crown width	6	
Pavement width	4,5	
Sub-grade width	7	
Traffic level (N)	(1)	0-5
Soil class	S 2	S 1
Course thickness	20	20
- wearing		20
- levelling - grading		10

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## UNSURFACED

NR 10

ROUTE	NGOURA - MONGO - EST			
Formation	Sols fins et résistants			
Section	NGOURA-BOKORO 102		BOKORO-MONGO 201	
Length	50 22 km sans amgt	30	140 21 km sans amgt	30
Crown width	6			
Pavement width	4,5			
Sub-grade width	7			
Traffic level (N)	(1) 0-5			
Soil class	S 2	S 2	S 2	S 1
Course thickness				
- wearing	20	20	20	20
- levelling				
- grading		15		15

## UNSURFACED

NR 11

ROUTE	MONGO - ATI	
Formation	Sables et sols fins	
Section	MONGO-ATI (24 km sans aménagement)	
Length	100	30
Crown width	6	
Pavement width	4,5	
Sub-grade width	7	
Traffic level (N)	(1)	0-5
Soil class	S 2	S 1
Course thickness	20	
- wearing		20
- levelling - grading		15

## UNSURFACED

NR 12

ROUTE	MONGO - ABECHE - ENE		
Formation	Sols fins et résistants		
Section	MONGO-ABECHE (74 km sans aménagement)		
Length	200	20	80
Crown width	6		
Pavement width	4,5		
Sub-grade width	7		
Traffic level (N)	(1)	0-5	
Soil class	S 2	S 1	Régularisation
Course thickness - wearing - levelling - grading	20	20  15	15

# UNSURFACED

NR 13

ROUTE	ABECHE - ADRE - NE		
Formation	Sols fins et résistants		
Section	ABECHE-ADRE (17 km sans aménagement)		
Length	50	10	90
Crown width	6		
Pavement width	4,5		
Sub-grade width	7		
Traffic level (N)	(1)	0-5	
Soil class	S 2	S 1	Régularisation
Course thickness - wearing - levelling - grading	20	20  15	15

## UNSURFACED

NR 14

ROUTE	MONGO - AM TIMAN - E, CE		
Formation	Sols fins et résistants		
Section	MONGO-AMTIMAN (53 km sans aménagement)		
Length	100	20	80
Crown width	6		
Pavement width	4,5		
Sub-grade width	7		
Traffic level (N)	(1)	0-5	
Soil class	S 2	S 1	Régularisation
Course thickness - wearing - levelling - grading	20	20  15	15