



UNITED NATIONS
ECONOMIC AND SOCIAL COUNCIL

64362



Distr.
LIMITED

E/CN.14/TRANS/77
2 October 1972

ENGLISH
Original: FRENCH

ECONOMIC COMMISSION FOR AFRICA

Meeting to determine assistance from
the industrialized countries for the
feasibility studies of the Trans-
African Highway

Addis Ababa, 9-12 October 1972

STATUS OF THE TRANS-AFRICAN HIGHWAY PROJECT
IN THE CENTRAL AFRICAN REPUBLIC
TABLE OF CONTENTS

	<u>Paragraphs</u>	<u>Page</u>
Introduction - - - - -	1 - 2	1
Garoua Boulai - Bossembele Section - - -	3 - 7	1
Bossembele - Bangui Section - - - - -	8 - 10	3
Bangui - Damara Section - - - - -	11	4
Damara - Sibut Section - - - - -	12 - 16	4
Sibut - Bambari Section - - - - -	17 - 26	4
Bambari - Bangassou Section - - - - -	27 - 31	5
Geometric standards used in the construction of the roads - - - - -		7
Status of the Trans-African Highway Project		8 - 9
Road traffic from Bangui to Bangassou and Garoua Boulai - - - - -		10
Road traffic forecast for 1973-74 - - -		11

Introduction

1. This study is based on the documents available to the Economic Commission for Africa and was completed and updated during a mission carried out at the end of August 1972 in the Central African Republic. The information contained in the study, therefore, reflects the present situation and the costs quoted have been updated to August 1972.

2. The different sections of the Trans-African Highway in the Central African Republic have been divided into four categories:

Category A: roads on which feasibility studies, engineering studies and construction work have still to be carried out.

Category B: roads on which engineering studies and construction work have still to be carried out.

Category C: roads on which construction work has still to be carried out.

Category D: roads which have been completed and which require only routine maintenance.

Category A

Garoua Boulai - Bossembele section: 457 km

I. Description of the existing road:

3. This section can be divided into two lengths - from Garoua Boulai to Bouar and from Bouar to Bossembele.

1. Garoua Boulai - Bouar: 159 km. The road is earth, limonite or clay surfaced in places. It varies in width between 3 and 5 metres. The alignment is generally quite good, but in some places does contain rather sharp bends and steep grades of up to 10 per cent. It is considered that this alignment should be diverted in a number of places over a length of about 35 km, 12 km of which would be in the passage through the Baboua escarpment.

2. Bouar - Bossembele: 298 km. The road surface varies in composition from sand on the crests of undulations to lateritic gravel and silty clay in the valley bottoms. River crossings are frequently narrow. The present alignment, although fairly good, calls for some improvements; it will be necessary to make provision for, among other things, various diversions totalling about 30 km in length and to reduce certain grades which in places reach 10 per cent.

Present traffic on the Garoua - Bossembele section rarely seems to exceed about twenty vehicles a day.

II. Studies

4. The Baboua escarpment has been subjected to reconnaissance and feasibility studies. There also exist various surveys and longitudinal profiles of the road between Garoua Boulaï and Bossembele, including a planimetric survey and longitudinal profile on the scale of 1:2,000 of the Yaloke-Bossembele section (70 km).

5. It would be difficult, however, to make use of these studies as they are incomplete and rather outdated, and consequently of little interest for the purposes of this project.

6. It is, therefore, necessary to carry out feasibility and engineering studies.

A. Feasibility or preliminary studies: These should relate to the following aspects:

1. Geometric characteristics of the existing road:
 - large-scale topographical survey including:
 - description of the horizontal alignment;
 - description of the vertical alignment;
 - description of the cross section;
 - study of the passage through the Baboua escarpment.
2. Pedological and geotechnical aspects:
 - pedology of soils encountered;
 - geotechnical aspect: nature of construction materials, of the various base layers and surfaces of the road and the various structures.
3. Rainfall and hydrographical aspects:
 - rainfall data: periods, duration, quantities;
 - hydrographical network and its general effects on the highway;
 - different types of structures and drainage systems encountered and their effectiveness.
4. Economic aspects of the project:
 - economic effects and justifications;
 - economic viability;
 - study and forecast of future traffic.
5. Conclusions: These must relate to the nature and volume of the work required (alteration of the alignment, structures to be rebuilt or improved, type of construction to be adopted, quantities, etc).

It should be possible to complete these studies within 12 months.

The cost should be in the region of 135 million CFA francs.

B. Engineering studies: These should comprise the following:

1. Complete study of the diversions and modifications of the route indicated in the feasibility study report, including the new alignment through the Baboua escarpment.
2. Study of various structures: site plans, plans of proposed structures.
3. Study of adequate drainage system and of drainage facilities.
4. Study of construction materials available locally.
5. Study of proposed type of road construction: type and thickness of the different base layers, type of surfacing proposed, etc.

6. Conclusions: These must include:

- a quantitative evaluation, to be as accurate as possible, of all the construction work required and the time needed;
- an assessment of the cost of the work section by section, taking into consideration the availability or lack of building materials within the area;
- proposals with regard to the optimum date for the execution of the work, taking into account traffic forecasts and the economic effects of the project;
- complete set of tender documents.
- It should be possible to complete the engineering studies in 20 months.
- The cost should be in the region of 230 million CFA francs.

7. Financing outlook: France has expressed willingness to finance all the studies on this length of the Trans-African Highway.

Category C

Bossebele - Bangui section: 150 km

I. Description of the existing road

8. From Bangui to Boali, a distance of 70 km, the road has a laterite surface varying between 8 and 9 metres in width and fairly well maintained. The alignment is generally good except for the approach to a number of bridges where the grades are steep and the bends rather sharp.

9. From Boali to Bossebele, the alignment is much less satisfactory, with many bends and steep grades. The road surface is laterite and sandy clay in places.

10. Traffic on this road amounts to about 50 vehicles a day, about thirty of which are heavy vehicles.

II. Studies: The following studies have been carried out:

- horizontal alignment surveys on a scale of 1/1,000, longitudinal profiles on a scale of 1/1,000 and 1/100 of the road made by the Batignolles construction company between 1950 and 1951;
- preliminary study for the straightening of the approaches to the M'Bali bridge, on the Bossembele side, carried out by the EUROPREDE research organization in 1964;
- preliminary study for the straightening of the Boali gradient by the same organization in 1964;
- field study for the engineering of the whole road from Bangui to Bossembele by the Louis Berger organization of New Jersey, with AID-BIRD financing at a cost of 124,655,285 CFA francs.
- The full documentation of the project, together with the tender documents will be completed in January 1973.

Category D

Bangui - Damara section (50 km)

11. Road constructed entirely according to modern standards.

Category C

Damara - Sibut section 110 km

I. Description of the road

12. The road has recently been constructed to high geometric standards. The alignment is very good. The road surface is laterite, 6 metres in width, on a formation 8 metres wide. The drainage system is adequate and the bridges which have been rebuilt are permanent structures.

13. The road now requires only slight remetalling and recompacting of the existing running surface before laying of the final bitumen surface.

14. The traffic between Damara and Sibut amounts to between 120 and 150 vehicles per day.

II. Studies

15. Additional geotechnical studies have been carried out by the technical services of the Department of Public Works.

16. A set of tender documents was submitted to the EDF for financing purposes in February 1972.

Category C

Sibut - Bambari section: 197 km

I. Description of the existing road

17. The existing road consists of a single layer of lateritic materials of varying quality. This layer rests on the natural surface for most of the road's length. At river crossings, the road passes over embankments

consisting of materials which have had to be brought to the site. The width of the running surface is between 6 and 7 metres.

18. The road alignment is generally good; the vertical alignment consists of a series of up and down grades; it varies very little and is slightly uneven.

19. Analysis of the existing profiles indicates that:

- 99 per cent of the road has a grade of less than 6 per cent. Of this 99 per cent, the alignment need be only slightly modified to allow for the construction of bridges, and other structures, and for crossings of marshy and rocky areas;
- of the remaining 1 per cent, 0.8 per cent has a grade of between 6 per cent and 8 per cent, the other 0.2 per cent consisting of a few short stretches where the grade exceeds 8 per cent.

20. The drainage system is inadequate to ensure removal of water in the rainy season. It, therefore, requires re-examination. A number of underground culverts must also be constructed, or existing ones replaced.

21. On this length, all the bridges have been rebuilt and are permanent structures.

22. At present, traffic amounts to about 30 or 35 vehicles per day.

II. Studies.

23. A study was made of the project in 1969 by "Recherche et Développement" of Brussels and financed by the United Nations Development Programme (UNDP). Field operations were completed.

24. The second phase of the study should comprise only office work such as finalizing the construction plans and preparing the tender documents.

25. According to the estimate in the contract concluded with the research organization, this second phase of the contract was worth 9 million CFA francs in 1969 (36,000 US dollars) which at present rates should be between 10 million and 11 million CFA francs. Since the joint economic study forecast that the project would not become economically viable until 1976-77, the second phase was not financed.

26. The construction plans could be finalized and the tender documents prepared within 10 months.

Category B

Bambari - Bangassou section: 354 km.

I. Description of the road

27. The existing road consists of laterite and silty clay in places. The driving surface is of mediocre quality and rests directly on the natural surface. In many places, the wear is such that the underlying rock is exposed.

28. The existing drainage system is inadequate and, in some places, non-existent, particularly in the last stretch between Kembé and Bangassou.

29. The road is rather narrow, varying in width between 4 and 6 metres. For much of the length, there are no shoulders.

30. The alignment is generally good between Bambari and Kembé in spite of some sharp curves and a number of rather steep grades. It is very circuitous and contains numerous sharp bends between Kembé and Bangassou.

31. At present, traffic on the road amounts to about 25 vehicles per day.

II. Studies

1. Studies carried out: A study of the project including, among other things, a planimetric survey, the various profiles (1:5,000), an air photo mosaic, longitudinal profiles on scales of 1:5,000 and 1:500, cross-sections on a scale of 1:100, schematic plans of the various structures, and a hydrological and geotechnical report (road and structures), was financed by the European Development Fund and carried out by the UNICETEC company in 1971.
2. Studies required before commencement of construction work:
 - (a) Further economic studies pertaining to the economic effects of the road, its economic viability and future traffic growth.
 - (b) Further technical studies consisting mainly of the finalizing of plans of the various structures and the preparation of the draft tender documents.

These studies should take about 12 months.

The overall cost, taking into account the state of advancement of the documents is estimated at 125 million CFA francs.

CENTRAL AFRICAN REPUBLIC
GEOMETRIC STANDARDS USED IN THE CONSTRUCTION OF THE ROADS

Geometric standards	Bitumen-surfaced roads	Earth roads	Regional roads
Minimum horizontal curvature radius (metres)	300	300	300
Stopping-sight distance (metres)	150	150	150
Width of carriageway ^{1/} (metres)	6	6	-
Shoulder width (metres)	1 ^{2/}	1 ^{2/}	-
Total formation width (metres)	8	8	6
Total width of right-of-way (metres)	40	40	-
Grade (per cent)	10	6	-
Cant	-	-	-
Bridge width	-	-	-

- ^{1/} Bitumen surfaced carriage-ways consist of a foundation layer of 10 cm natural laterite, a base-layer of 15 cm in improved laterite (3 per cent cement) 8 metres wide, and a two-layer or three-layer running surface 6 metres wide.
- ^{2/} 0.30 metres of extra width is added to each side on bends, and 0.50 metres for embankments over 1.50 metres in height.

CENTRAL AFRICAN REPUBLIC: Status of the Trans-African Highway Project
SUMMARY TABLE

Sections	Length (km)	Studies carried out	Studies required	Cost (millions CFA)	Time (months) required
Category A					
Garoua Boulai-Bossebele	457	1. Preliminary reconnaissance of Baboua escarpment. 2. Planimetry and vertical alignment 1:200 3. Bossebele-Yaloké, 70 km	1. Feasibility study. 2. Engineering study. 3. Preparation of tender documents.	135 230	12 20
			Total	365	32
Category B					
Bambari-Bangassou	354	1. Complete preliminary study comprising various plans, carried out in 1971 by UNIGETEC with EDF financing.	1. Further economic studies 2. Further engineering studies. 3. Preparation of tender documents.	125	12
Category C					
Bangui-Bossebele	150	1. Feasibility study. 2. Engineering study. 3. Preparation of tender documents by Louis Berger, New Jersey in 1971 with AID/IBRD financing.	None: Preparation of technical and tender documents will be completed in January 1973. Cost paid: PM 124.7	PM 124.7	PM
Damara-Sibut	110	1. Complete geotechnical and topographical studies resulting in construction of road in 1970-71. 2. Geotechnical studies and laboratory tests by Ministry of Public Works in 1971-1972.	None: Tender documents submitted in February 1972 to EDF for financing of bitumen surfacing work.	PM	PM

CENTRAL AFRICAN REPUBLIC : Status of Trans-African Highway Project (cont'd)

SUMMARY TABLE

Sibut-Bambari	197	1. Technical studies by Recherche et Développement financé par l'UNDP.	Preparation of engineering studies and tender documents.	10	10
Category D					
Bangui-Damara	50	Route constructed entirely according to modern standards.		-	-

Trans-African Highway: ROAD TRAFFIC FROM BANGUI TO BANGASSOU AND GAROUA BOULAI
from 1 April 1967 to 31 March 1968

Section	Length	Tonnages	Passengers	Equivalent tonnage (passengers and freight)	Ton/km Equivalent
I. from Bangui to Bangassou					
Bangui - Damara	76	105 391	100 000	138 724	10 543
Damara - Sibut	110	46 711	54 000	64 711	7 111
Sibut - Grimari	120	38 827	30 000	48 827	5 859
Grimari - Bambari	77	34 995	30 000	44 995	3 465
Bambari - Alindao	118	17 446	22 000	24 779	2 924
Alindao - Kongbo	40	14 101	22 000	21 434	857
Kongbo - Kembe	69	12 574	16 000	17 907	1 236
Kembe - Gambo	50	11 786	14 000	15 852	793
Gambo - Bangassou	77	10 880	12 000	14 880	1 145
TOTAL	737	292 711	300 000	392 109	33 933
II. from Bangui to Garoua					
Bangui - Boali	80	107 128	84 000	135 128	10 810
Boali - Bossembele	70	104 805	84 000	132 805	9 296
Bossembele - Yaloke	68	26 490	46 000	41 833	2 844
Yaloke - Bossemtele 2	74	23 770	46 000	39 103	2 894
Bossemtele 2 - Baoro	96	21 456	26 000	30 122	2 892
Baoro - Bouar	60	11 189	32 000	21 765	1 306
Bouar - Baboua	109	7 156	2 000	7 822	853
Baboua - Garoua Boulai	50	7 136	2 000	7 802	390
TOTAL	607	309 130	322 000	416 380	31 285

Trans-African Highway: Central African Republic: ROAD TRAFFIC FORECAST FOR 1973-74

Section	Length	Tonnares (000's)		Passengers (000's)		Equivalent Tonnares		Ton/km equivalents	
		Low Assump- tion	High Assump- tion	Low Assump- tion	High Assump- tion	High Assump- tion	Low Assump- tion	High Assump- tion	Low Assump- tion
I. Bangui to Bangassou									
Bangui-Damara	76	172	199	144	220	247	16 720	18 772	
Damara-Sibut	110	94	112	90	124	142	13 640	15 620	
Sibut-Grimari	120	84	98	47	100	114	12 000	13 680	
Grimari-Bambari	77	77	89	47	93	105	7 161	8 085	
Bambari-Alindao	118	34	42	38	47	55	5 546	6 490	
Alindao-Kongbo	40	27	34	37	39	46	1 560	1 840	
Kongbo-Kembe	69	24	29	26	33	38	2 277	2 622	
Kembe-Gambo	50	18	22	20	25	29	1 250	1 450	
Gambo-Bangassou	77	17	20	16	22	25	1 694	1 925	
TOTAL	737	547	645	465	703	801	61 848	70 484	
II. Bangui to Garoua/Boulai									
Bangui-Boali	80	158	172	112	195	209	15 600	16 720	
Boali-Bossebele	70	154	169	112	191	206	13 370	14 420	
Bossebele-Yaloke	68	41	45	63	62	66	4 216	4 488	
Yaloke-Bossemtele 2	74	38	41	63	59	62	4 366	4 588	
Bossemtele 2-Baoro	96	28	30	32	39	41	3 744	3 936	
Baoro-Bouar	60	20	25	48	36	41	2 160	2 460	
Bouar-Baboua	109	8	10	3	9	11	981	1 199	
Baboua-Garoua Boulai	50	8	9	3	9	10	450	550	
TOTAL	607	455	501	436	600	646	44 887	48 361	