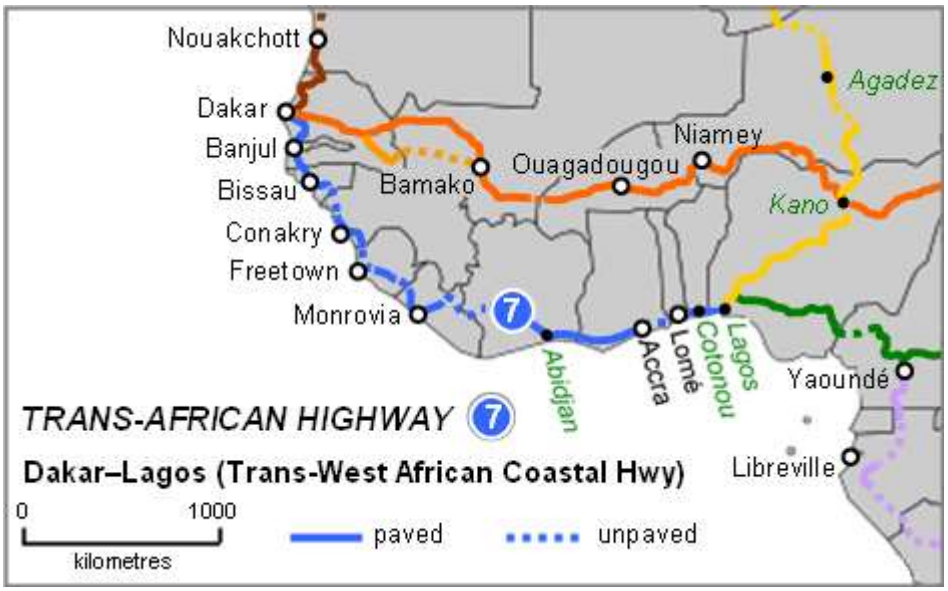
# Economic Community of West African States (ECOWAS)

## PROJECT PREPARATION AND DEVELOPMENT UNIT

# PPDU

# PREFEASIBILITY STUDY OF THE DAKAR-LAGOS CORRIDOR

# FINAL REPORT

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**March 2017**

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# ABBREVIATIONS :

| | |
|---|---|
| CEDEAO | Communauté Économique des États de l'Afrique de l'Ouest |
| DCP | Dynamic Cone Penetrometer |
| IRI | Indice de Rugosité International |
| HDM-4 | Highway Design and Maintenance Model, version 4 |
| PPDU | ECOWASS Project Preparation and Development Unit (Unité de Préparation et de Développement des Projets d'Infrastructure de la CEDEAO) |
| GAIC | Groupe Africain d'Ingénierie Conseils |
| CECO- BTP | Consortium des Entreprises de Construction en Bâtiment et Travaux Publics |
| DJMA | Débit Journalier Moyen Annuel |
| AADT | Average Annual Daily Traffic |
| AASHTO | American Association of State Highway and Transportation Officials |
| CEREEQ SA | Centre Expérimental de Recherches et d'Études pour l'Équipement. |
| LERGC-SA | Laboratoire d'Essais et de Recherches en Génie Civil |
| BTP | Bâtiment et Travaux Publics |
| PPP | Public Private Partnership |
| EU | European Union |
| FED | Fonds Européens de Développement |
| BAD | Banque Africaine de Développement |
| AIBD | Aéroport International Blaise Diagne (Nouveau aéroport de Dakar - Sénégal) |
| RGPHAE | Recensement Général de la Population et de l'Habitat, de l'Agriculture et de l'Elevage |
| FAAN | Federal Airport Authority of Nigeria |
| NAMA | Nigerian Airspace Management Agency |
| NCAA | National Civil Aviation Authority |
| AIGE | Aéroport International Gnassingbé Eyadema |
| ANAM | Agence nationale de l'aviation civile et de la météorologie |
| ASECNA | Agence pour la sécurité de la navigation aérienne en Afrique et à Madagascar. |
| AGEROUTE | Agence de Gestion des Routes |

| | |
|---|---|
| OACI | Organisation de l'Aviation Civile Internationale |
| A.R.P. | Aménagement des Routes Principales |
| B.A.U. | Bande d'arrêt d'urgence |
| B.D.D. | Bande dérasée de droite |
| B.D.G. | Bande dérasée de gauche |
| dms | Distance de manœuvre en sortie |
| I.C.T.A.A.L. | Instruction sur les Conditions Techniques d'Aménagement des Autoroutes de Liaison |
| I.C.T.A.V.R.U. Rapides | Instruction sur les Conditions Techniques d'Aménagement des Carriageways Urbaines |
| I.T.P.C. | Interruption du Central reserve |
| P.A.U. | Poste d'appel d'urgence |
| P.M.V. | Panneau à message variable |
| T.M.J.A. | Trafic moyen journalier annuel (deux sens confondus) |
| T.P.C. | Central reserve |
| u.v.p. | Unité de véhicule particulier |
| V.S.V.L. | Voie spécialisée pour véhicules lents |

# *Executive summary*

The "Corridor DAKAR-LAGOS", also called Trans Africa Highway No. 7 (TAH 7), as identified in the Intergovernmental Agreement on Trans-African Highways Network, adopted by the Executive Committee of the African Union in January 2012 was undergoing the pre-feasibility studies, entrusted by ECOWAS to the Consortium of Consultants AFRIC CONSULT / GAIC / CECO-BTP, under the supervision of PPDU (Preparation and Development Unit of ECOWAS projects). This is the first step towards the commissioning of a vital road infrastructure project, long of approximately 4 000 km and whose objective is to achieve economic integration within the Union by facilitating the free movement of people and goods between 11 Member States crossed by the Corridor Dakar-Lagos.

The key issue of this pre-feasibility study is to determine the missing links in this Corridor: that is to say all the objects that prevent it from being fully functional to offer a quality of service related to this type of infrastructure and meeting the standards as adopted by the African Union and ECOWAS.

Analysis of existing reports and studies, as well as surveys conducted on the ground, were used by the Consultant's to identify the Corridor route as described in TAH 7[1] and to characterize missing links.

There are still some gaps along the Corridor route associated with rivers without suitable bridges to ensure its continuity. However, crossing the Gambia River between Barra and Banjul (over 5 km), should be considered as a special case; therefore, it will not be considered as a missing link in this study.

## Main features of the Dakar-Lagos Corridor

The zone of influence of the Corridor covers eleven countries in West Africa: Senegal, The Gambia, Guinea Bissau, Guinea, Sierra Leone, Liberia, Côte d'Ivoire, Ghana, Togo, Benin and Nigeria..

All these countries are located in the Gulf of Guinea and have a coastline on the Atlantic Ocean. Their topography and hydrographic systems are derived from the Fouta Djallon mountain whose peak is Tamgue (1 280 m). Their territories consist of plains near Ocean shore while towards the interior they consist of terraces and mountainous peaks.

The Corridor crosses these countries at altitudes from zero (0 m) to30 m but in countries such as Guinea, Sierra Leone, Liberia and Ivory Coast, it leaves the coast to climb inland where it may be located at altitudes between 40 m and 480 m.

Along the Corridor, existing roads are mainly paved in most countries; However, in some countries there are still unpaved roads. These lateritic sections are identified as missing links of Class 1. In Class 2, one may recognize paved roads in a very bad condition [IRI> 5 and Is (surface index) higher than 7.

[1] Dakar- Diamniadio – Mbour – Kaolack – Sokone – Karang – Karang –Barra – Banjul – Séléti – Diouloulou – Bignona – Ziguinchor – Mpack – Bula –Safim – Bissau – Safim – Nhacra – Jugudul – Bambadinca – Quebo – Dabiss – Boké – Boffa – Dubreka - Conakry – Coyah – Forécariah – Pamelap - Port Loko – Masiaka – Freetown – Masiaka – Taiama – Bo – Bandajuma – Mano River Union Bridge – Klay – Monrovia – Kakata – Totota – Gbarnga – Ganta – Tappita – Tobli – Blay – Toulepleu – Blolékin – Guiglo - Duekoué – Daloa – Yamoussoukro – Toumodi – Abidjan - Grand Bassam – Aboisso – Elubo – Axim – Sekondi Takoradi - Accra – Dawa – Sogakofe – Denu – Lomé – Hilakondji – Cotonou – Seme krake– Badagry – Lagos

## Missing links inventory

This inventory does not include roads under construction in Sierra Leone and Côte d'Ivoire.

| Country | Starting site | Arrival site | Length (Km) |
|---|---|---|---|
| **Guinea Bissau** | Quebo | Guinea Border | 29.4 |
| **Guinea** | Guinea Bissau Border | Boké | 82.3 |
| **Sierra Leone** | Bo | Mano River Bridge (Liberia Border) | 103 |
| **Liberia** | Ganta | Côte d'Ivoire Border (via Tappita and Toetown) | 150,3 |
| **Côte d'Ivoire** | Liberia Border | Bléloquin (via Toulépleu) | 65 |
| **Total** | | | 430 km |

The estimates investment required is about F CFA 129 billion, slightly more than USD215 million of which 40% are already founded to finance the construction works under progress.

The rehabilitation costs of the sections of Corridor in Class 2 are estimated at F CFA 252 billion, or USD 420 million, in order to maintain the quality of service

## Estimating the unit cost for roads construction and rehabilitation

The Consultant has capitalized on several sources to estimate the average cost per km to construct a kilometer of a 7 m wide carriageway, two (2) lanes 7, suitable for a traffic threshold greater than 400 vehicles / day, the coating being the concrete asphalt(BB).

1. Coûts unitaires des projets d'infrastructures en Afrique subsaharienne, AFRICON, Banque Mondiale, juin 2008
2. Study on Road Infrastructure Costs: Analysis of Unit Costs and Cost Overruns of Road Infrastructure Projects in Africa, AfDB, Statistics Department (ESTA), May 2014
3. Actualisation des prix unitaires et calculs des rendements standards des travaux d'entretien routier par DJONABAYE Israël, AGEROUTE (Sénégal), janvier 2014
4. Cost of works in recent contracts for new/rehabilitation roads construction road or unit costs as handed by officials in charge of roads construction in Côte d'Ivoire and Ghana:
   - Sierra Leone: Rehabilitation of the Road from the Border with Liberia to Bandajuma (103.6 km): +/- F CFA 310 million/km
   - Côte d'Ivoire : F CFA 350 million/km (+/- 20%) ;
   - Ghana sections, including, various structures, F CFA 400 million per km

For the purposes of economic analysis, the Consultant has used a unit cost of F CFA 300 million / km to construct a new paved (Concrete Asphalt) route km. A sensitivity analysis has been developed to scale up unit cost to F CFA 420 million CFA / km.

The price includes the following costs: site installation; clearing rights of way; earthworks; subbase and base layer and a wearing and BB 5 cm thick, and drainage facilities; signs; environmental services and related facilities; miscellaneous.

Considering the rehabilitation of paved roads based on HDM-4 standards, the Consultant has used a unit cost of FCFA 270 million excluding VAT and F CFA 320 million, all taxes included, as documented by AGEROUTE Senegal.

This price includes the purges, the base layer; reloading shoulder 2x2 m; BB 7cm, mono shoulder; drainage; refurbishment works; pavement markings; vertical signage.

## Environmental and social issues

Environmental and social challenges of the project were discussed within a standard a strategic environmental and social assessment (SESA) and has addressed the impacts and the potential mitigation measures including:

- Water ;
- Land degradation, vegetation cover, habitat and wildlife;
- Landscape degradation ;
- Quality of the air ;
- Major social issues (land insecurities, health issues, coexistence and relations between social groups, opportunities for occasional jobs during construction and permanent jobs during operation of infrastructure Dakar-Lagos).

Within the SESA analysis, the identified potential impacts and mitigation measures need to be reassessed in the Environmental and Social Impact Assessment (ESIA) which will be performed as a key component of the Project Feasibility Study.

To that purpose, the Consultant has recommended additional or specific studies to be completed in the Feasibility Study, such as the land issue, related gender issues, and Involuntary Resettlement Policy Framework (IRPF), to name a few.

## Economic analysis

The economic analysis focuses on socio-economic variables that will drive the project for each crossed country crossed.

The presentation of the direct and extended area of influence was made for each section of the Corridor to define the exact role of the Dakar-Lagos highway and to assess the project impact on the economic and social development at the various levels: local, national and regional.

It comes out that a lot of benefits are expected from the Project. For example, we mention the creation of jobs during the construction; the strengthening of integration within ECOWAS Member States by facilitating the free movement of people and goods as well as increased trade and economic performance of Member States. In different areas of influence of the Project, improved access to production areas will result in an increase in agricultural production, facilitating access to socio-educational facilities (schools, centers and medical centers, etc.), the creation of new economic activities such as tourism, in particular.

To exhibit the economic return of the project, the Consultant has run a project economic analysis using the HDM 4 model, based on cost-benefit analysis and on the comparison of scenarios "without project" and "with project "over a period of 20 years.

The economic analysis was performed using a 12% discount rate and a residual value of 25% of project cost. Three reference options were examined :

**Missing links :**

- ✓ Option 1 « Construction a new BB road, 1 Carriageway x 2 lanes »
- ✓ Option 2 « Construction of a new BB road in 2 carriageways x 2 lanes »;
- ✓ Option 3 « Construction of a new BB road in 2 carriageways x 3 lanes»

**Paved roads in a very bad condition**

- ✓ Option « Maintenance » based on the IRI value: concrete overlay, 3 ≤ IRI ≤ 5, rehabilitation IRI≥5;
- ✓ Option « Upgrading adding two more lanes »
- ✓ Option « Construction of 2 new lanes and analysis by project »

In the overall, the profitability is good for both types of roads under three suggested options with **24.8%,**15.9% et12.0%, respectively, for the missing links and **17.8%,** 14.5% and 10.9% for paved roads.

The sensitivity analysis performed for both types of roads and different management options shows a significant sensitivity of the Project to changes, when operated separately in costs and benefits; variations are stronger when costs and benefits are combined.

Hence, it is important to ensure compliance with the timelines of the project and to avoid delays which could lead to higher costs for capital costs.

To increase the quality of service, it will be required to implement measures to facilitate the traffic flow along the Dakar-Lagos Corridor.