Journal Homepage: - www.journalijar.com

INTERNATIONAL JOURNAL OF ADVANCED RESEARCH (IJAR)

Article DOI: 10.21474/IJAR01/13312
DOI URL: http://dx.doi.org/10.21474/IJAR01/13312

RESEARCH ARTICLE

APPLICATION OF THE GUIDE (GTR) TO PLATFORM FLOORS FROM THE TRARZA AND INCHIRI-MAURITANIA REGION M'BLAL-LAHOUVICH AXIS AND AKJOUJT-TASIASIT AXIS

Tourad Mohameden Babiya[1], Djibril Sow[2], Ahmadou Samba Toure[3] and Mor Diop[3]

1. Research Scholar, Polytechnic School of Thies, Senegal.
2. Research Teacher, University Institute of Technology of Iba Der Thiam University in Thies, Senegal.
3. Research Scholar, University Institute of Technology of Iba Der Thiam University in Thies, Senegal.

Manuscript Info

Manuscript History
Received: 25 June 2021
Final Accepted: 28 July 2021
Published: August 2021

Key words:-
Platform; Earthworks; Surveys; Lift; Backfill; Form Layer; Guide; Pavement

Abstract

In the search for an adequate technical document in the field of road earthworks, and in view of the unavailability of national standards in Mauritania which may be the origin of these documents, this article essentially aims to propose methods of execution of the upper platform. Earthworks and subgrade. As a result, a study was made on platform soils in two regions in Mauritania, one is located in the south-west of the country (Trarza) and the other is in the west (Inchiri). Two roads were chosen, one 3.7km long (M'blal-Lahouvich), and the other 5km (Akjoujt-Tasaisit).

Introduction:-

Mauritania is one of the vast countries of the African continent, with an area of 1.3 million. The climate varies depending on the area. It is arid in the north and east, semi-arid in the south, and year-round mild along the coast [1].Km^2.

The road network is of particular importance due to the size of the country. Road transport is the main mode of transport. The strategy pursued by the Government consists of ensuring the maintenance and rapid development of the network and the sector therefore benefits from significant investments. The network has 10,282 kilometers, including 2,100 of paved roads, 982 km of dirt roads and 7,200 km of tracks [2].

In view of the geographical characteristics of Mauritania, its vastness and the hostility of the environment, the development of transport represents a major challenge to be taken up in order to strengthen national competitiveness through the promotion of trade and the reduction of production costs. [3], and to open up rural areas, it is in this sense that we have deemed it interesting to:

Carry out a geotechnical study on the existing platform soils in Mauritania which will make it possible to know the zones in which the materials can be used in sub-layers or in backfill, which will reduce time and investment. It is also an opportunity to make a contribution to strengthen technical studies of this kind.

On the other hand, to establish selection criteria and implementation conditions for the backfill and subgrade that adapt to our environmental and water specifications.

Corresponding Author:- Tourad Mohameden Babiya
Address:- Research Scholar, Polytechnic School of Thies, Senegal.

Indeed, in the absence of a technical reference, the dimensioning of pavements in Mauritania is usually based on specialized works capitalizing on the experiences lived in the countries of the tropical zones. Beyond the summary of the geotechnical conditions and the use of materials represented by these feedbacks, the fact remains that they only very partially take into account the specificities of the Mauritanian road context. The pavement structures to which they end do not always reflect the local conditions of execution work and even less an optimal use of locally available materials.

However, this document reflects studies carried out on platform soils in regions in Mauritania, but cannot give an answer to all the questions raised by road construction.

In addition, in any road construction project, it is essential to know the behavior of the soil during and after the construction of the road, hence the importance of earthworks.

We call earthwork, the different movements of the earth whose purpose is to dig excavations or to modify the configuration of the ground. This modification of the ground levels is carried out by the execution of cuttings and embankments [4].

On the other hand, the application of the road earthmoving guide to platform soils will be done by implementation processes and these to give our roads the geometric characteristics (longitudinal profile, cross profile, layout, etc.) which will allow it to play their role, but also with regard to the materials to be used in earthworks, to make the most appropriate choice according to the type of project, the geographic and environmental sites encountered.

Materials and Methods:-

This geotechnical study was carried out in two regions. Indeed, we have chosen two axes namely: M'Blal-Lahouvich (Laiwij) and Akjoujt-Tasiasit axis. M'Blal is a town located 169 km from Nouakchott, Mauritania and Akjoujt is a town located 260 km from Nouakchott, Mauritania [5-6]. Then, we carried out three manual surveys on each axis and we present below the strategy adopted throughout our samples:

1. A depth of 1m for each manual sounding;
2. 50 m separate the boring and the route of the road
3. 500m between two soundings relative to each other.

This operation made it possible to make a visual description of the soils on site and to take samples in order to be able to identify them from a physical and mechanical point of view in the laboratory. During the operation, we did not notice the presence of a tablecloth.

Axis M'Blal-Lahouvich (Laiwij)

The fig 1 represents the cross-sections of the soundings, N1, N2, N3; we notice the presence respectively of 60cm, 70cm, and 75cm of all coming shell TVC.

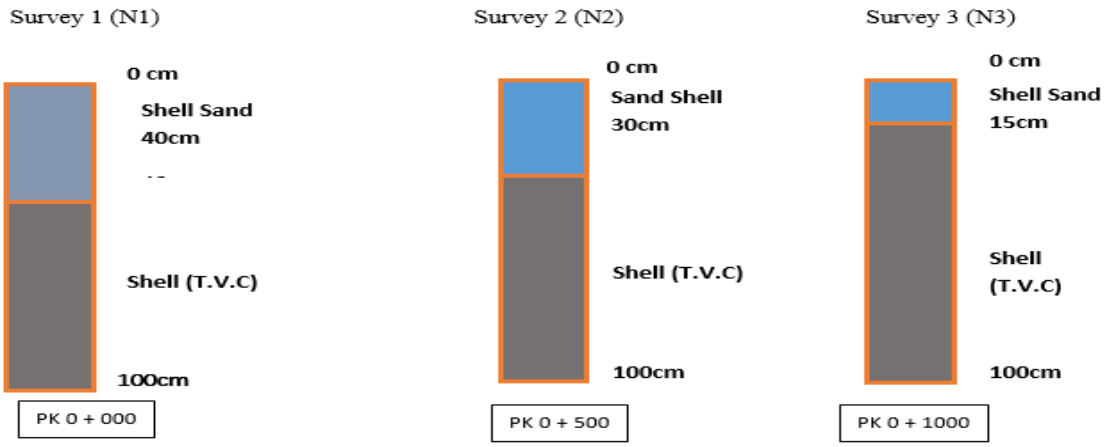

Fig 1:- Cross-section of the boreholes on the M'Blal-Lahouvich axis (Laiwij).

Axis Akjoujt-Tasiasit

The fig 2 represents the cross-sections of the boreholes, labeled by A1, A2, A3; one notices the entire presence of calc-sandstone material.

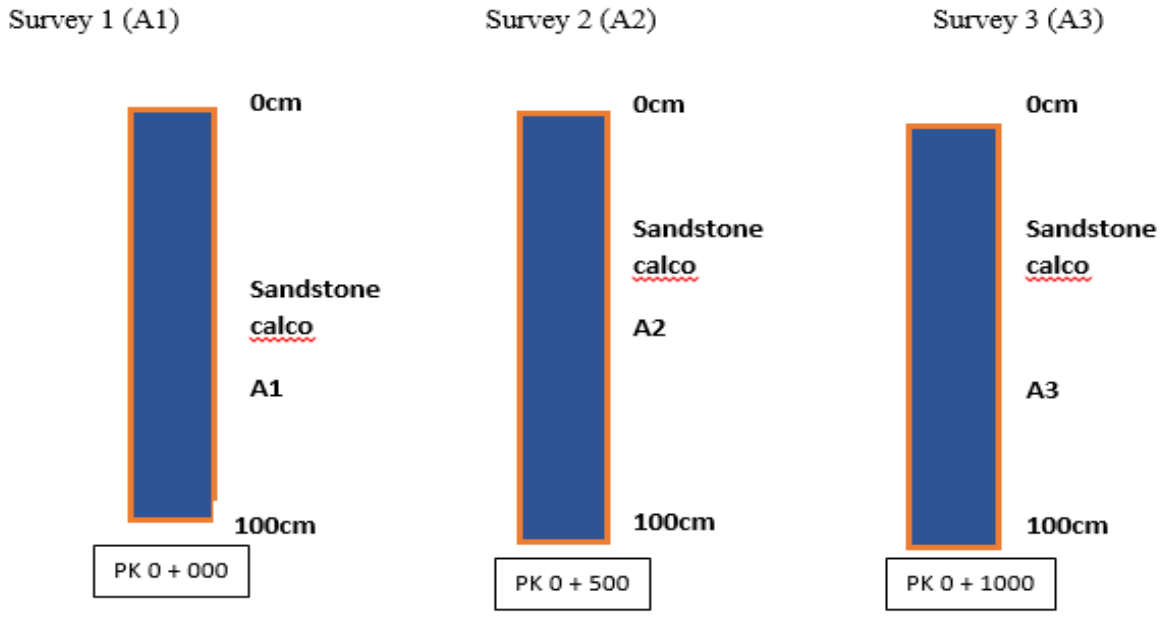

Fig 2:- Cross-section of soundings on the Akjoujt-Tasiasit Axis.

The samples taken, consisting of loose soil, were analyzed according to the following laboratory test program:

The natural water content, the Atterberg limits or the sand equivalent depending on the nature of the soil, the grain size by sieving, the blue value, the Proctor compaction test and the CBR punching test.

Results and Discussion:-

Mechanical Characterization

Results Water Content

The sands taken from the M'balal-Lahouvich (laawij) axis contain a lower quantity of natural water than those from the Akjoujt-Tasiasit axis (Table 1), because the sandstone calo contains more fine than the shell sand.

Table 1:- Results of natural water content.

M'BLAL-LAHOUVICH (LAIWIJ)			
Samples	SN1	SN2	SN3
Wn (%)	2.30	2.70	3.00

AKJOUJT-TASIASIT			
Samples	SA1	SA2	SA3
Wn (%)	3.00	3.00	3.10

Atterberg results

According to the GTR, the results obtained by the two axes (Fig 3, Table 2) showed that the soils are weakly clayey [3].

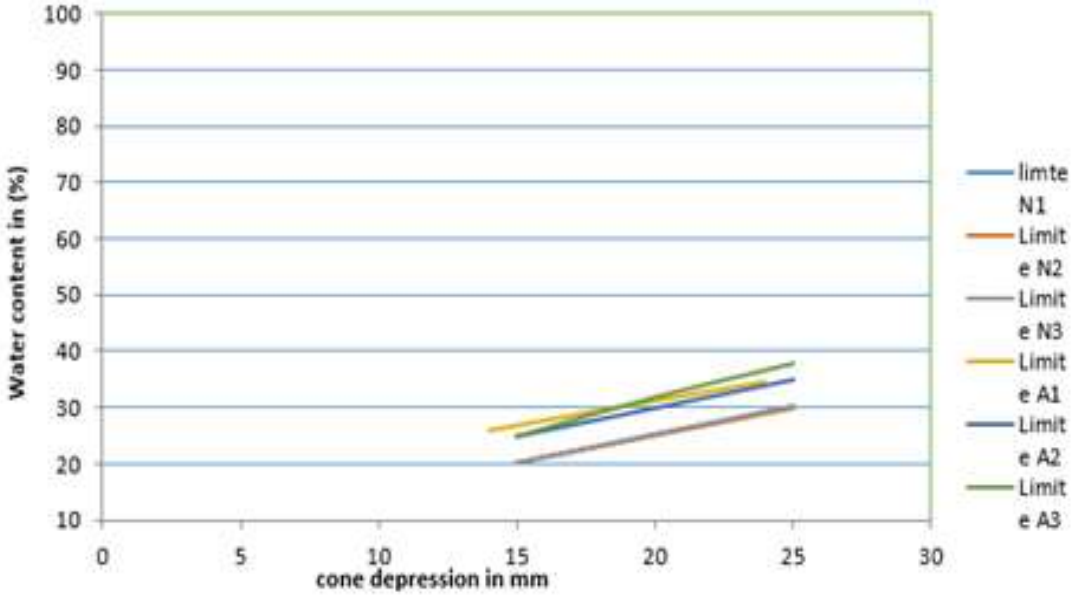

Fig 3:- Liquidity test curves.

Table 2:- Atterberg limit test results.

M'BLAL-LAHOUVICH (LAIWIJ) -AKJOUJT-TASIASIT						
Samples	N1	N2	N3	A1	A2	A3
IP	9.4	8.2	7.9	12.3	11.10	11.2

Methylene Blue Value (VBS) Results [9]

According to the GTR, the results obtained for the soils of the two axes (Table 3), we have a weakly loamy soil (soil not very plastic and sensitive to water) because their values of VBS are between 0.2 and 1.5 [3].

Table 1:- Results of the VBS test.

M'BLAL-LAHOUVICH (LAIWIJ)			
Samples	N1	N2	N3
VBS	0.83	0.81	0.40
AKJOUJT-TASIASIT			
Samples	A1	A2	A3
VBS	0.66	0.63	0.60

Results of particle size distribution [10-11]

The Fig 4 and the Fig 5 respectively show all the curves obtained during the particle size tests of the sands of the M'balal-Lahouvich axis and of calcogreusous soils of the Akjoujt-Tasiasit axis.

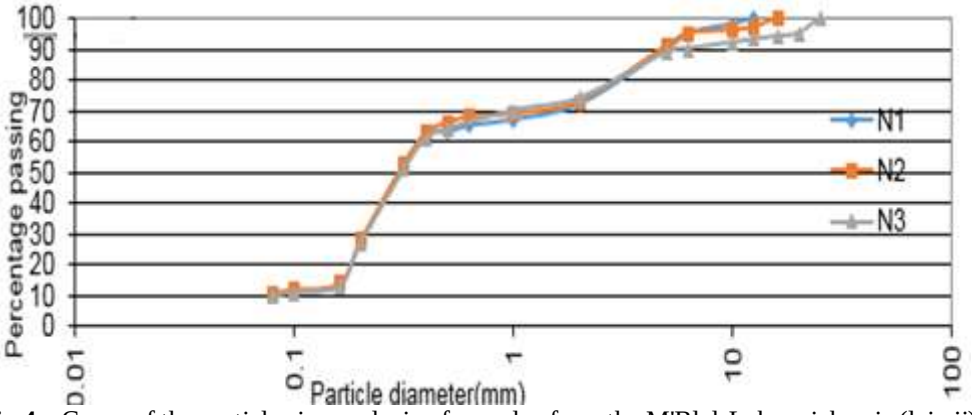

Fig 4:- Curve of the particle size analysis of samples from the M'Blal-Lahouvich axis (laiwij).

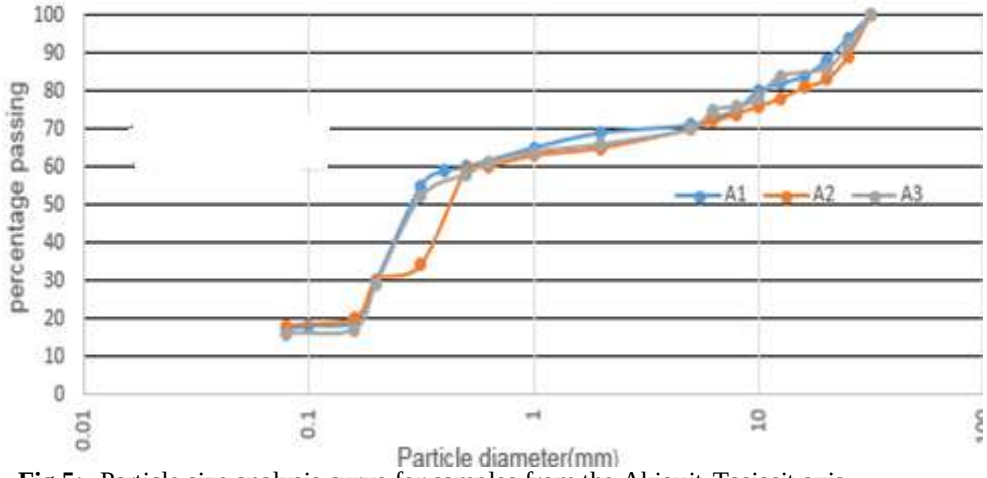

Fig 5:- Particle size analysis curve for samples from the Akjoujt-Tasiasit axis.

Proctor Results

The Fig 6 and the Fig 7 show us the variation of the dry density of the material as a function of the water content.

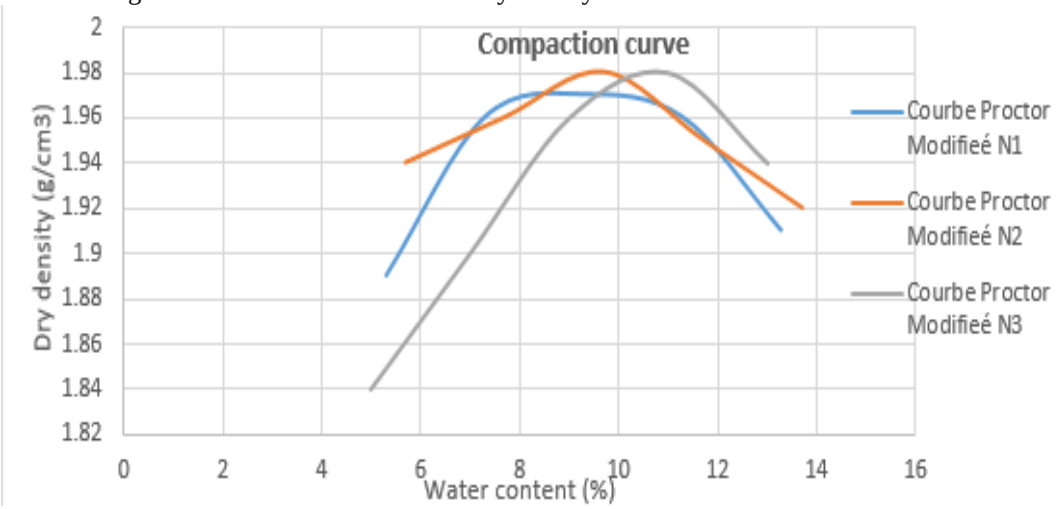

Fig 1:- Proctor compaction curve of the axis (M'Blal-Lahouvich).

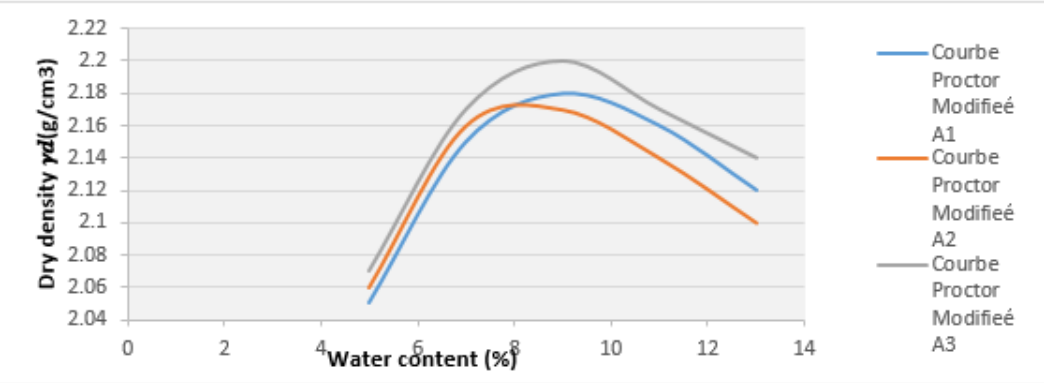

Fig 7:- Proctor compaction curve of the Akjoujt-Tasiasit axis

The optimum Proctor test results are listed in the following table 4:

Table 4:- Proctor Results.

M'BLAL-LAHOUVICH (LAIWIJ)			
Samples	N1	N2	N3
Wopt (%)	8.3	9.4	11
γ_{dmax} (g / cm^3)	1.97	1.98	1.98

AKJOUJT-TASIASIT			
Samples	A1	A2	A3
Wopt (%)	8.30	8.00	9.00
γ_{dmax} (g / cm^3)	2.18	2.17	2.20

CBR Results

The CBR values shown in this table 6 are greater than 5, which justifies that it does not require an earthwork level for our two study areas, which leads us to confirm that the soil in situ will play the role pavement support sub-layer. [14-15].

Table 2:- CBR test results.

M'BLAL-LAHOUVICH (LAIWIJ)			
Samples	N1	N2	N3
I.CBR	37	27	22

AKJOUJT-TASIASIT			
Samples	A1	A2	A3
I.CBR	40	24	38

Conclusion:-

The results of geotechnical studies carried out along the route of each axis are presented and discussed in this document. We note that the CBR lift index at 95% OPM for the M'Blal-Lahouvich (Laiwij) axis is between 22 and 37, that for the Calco-gresous of the Akjoujt-Tasiasit axis the CBR index between 24 and 40, then the classes encountered are S4, S5 [15]. These results allowed us to classify these soils according to the French Guide de Terrassement Routier GTR of 1992 as a first step and then to give their conditions of use in backfill and subgrade as illustrated in this document.

References:-

1. Guide to investing in Mauritania, opportunities and conditions, United Nation, New York and Geneva, 2004, pdf file, page 6
2. Diagonostic study on training and professional integration in road maintenance in Mauritania, authors; Federico Barroeta and Sergio Suarez, International Labor Organization, 2016, pdf file 1st edition, page 40
3. Realization of embankments and sub-layers, technical guide, "SETRA-LCPC (1992))".
4. Practical guide to pavement sizing for tropical countries. By the Experimental Center for Research and Studies of Building and Public Works CEBTP.
5. Mauritanian Information Agency; Minister of Culture and Crafts, Rosso on 06/21/2011
6. Islamic Republic of Mauritania, Economic Analysis of the Transport Sector, September 29, 2004, Africa Transport Sector (AFTTR), World Bank document, pdf file, page 2
7. Standard AFNOR NF P 94-050, September 1995: Determination of the water content by weight of materials.
8. AFNOR Standard NF P 94-051, March 1993: Determination of Atterberg limits.
9. AFNOR Standard NF P 94-068, November 1993, Determination of the methylene blue value
10. AFNOR Standard NF P 94-056, March 1996: Particle size analysis by sieving.
11. Standard AFNOR NF EN933-9, August 1999: Tests to determine the geometric characteristics of aggregates.
12. AFNOR Standard NF P 94-093, October 1999: Determination of the compaction references of a material.
13. AFNOR standard NF P 94-078, May 1997: CBR index after immersion - Immediate CBR index - Immediate load bearing index.
14. Pavement design and sizing guide, LCPC, and SETRA, 1994
15. Soil treatment with lime, hydraulic and pozzolanic binders, technical guide, LCPC- SETRA (1995).