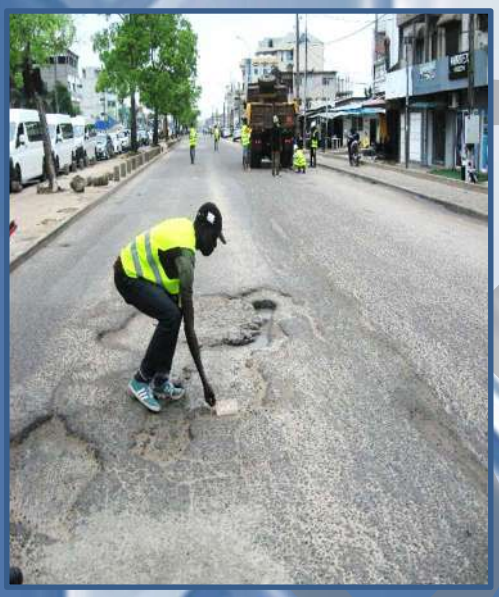
REPUBLIC OF BENIN

SOCIÉTÉ DES INFRASTRUCTURES ROUTIERES ET DE L'AMÉNAGEMENT DU TERRITOIRE (SIRAT SA)

DEVELOPMENT OF ACCESS ROADS AND CROSSINGS OF COTONOU (ATC)

COMPLETE PROJECT MANAGEMENT MISSION
(EIES – APS – APD – DAO – DET)

LOT N° ATC 01



Provisional Detailed Design (DPA – PROVISIONAL)

Interim Road Safety Study Report

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The World Bank has not yet cleared this draft document

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Road Safety, our common concern

01 GENERAL

1 GENERAL

1.1 Presentation and context of the project

With the completion of PAG 1, the city of Cotonou, the economic capital of Benin, has an undeniable and perceptible attraction. The Asphalting project in its phase A, has transformed the city; neighborhoods such as Cocotier, Haie vive have changed their face with the asphalting of all the streets, others such as Fidjrossè, Agla, Ganhi, Akpapka have all been impacted with the road developments and the improvement of the living environment of the populations. The PAPC program currently being implemented will also have a positive impact on formerly flood-prone and flooded neighborhoods in Cotonou. The Waste Management and Sanitation Company of Greater Nokoué (SGDS -GN) through its actions maintains the healthy and pleasant living environment for our populations.

All these combined actions implemented by the Government of the Republic of Benin have made it possible to increase and also facilitate mobility in the city of Cotonou. Notwithstanding this glowing picture, there remains a problem that has not yet been addressed concerning the major roads to and from the city of Cotonou. Indeed, Cotonou, Benin's main city since independence, has an urban road network in a state of advanced degradation making it difficult to move people and goods. Potholes, ruts, flashes, cracks can be observed; This does not ensure a good flow of traffic, with the consequence of extending the travel time of users and the increase in vehicle maintenance costs. The rehabilitation of the urban roads and crossings of Cotonou then became a necessity in view of the road development works undertaken by the Beninese State in the main cities of Benin.

It is in this context that the Government, through the Société des Infrastructures Routières et de l'Aménagement du Territoire (SIRAT-SA) initiated the project for the resurfacing/reinforcement/rehabilitation of roads and crossings in Cotonou.

The streets concerned by this project are grouped into two lots, including lot 1, the subject of this report, which totals a total length of 14.736 km with a set of 7 streets located in the eastern and southern sectors of the city of Cotonou. These are the streets: - Old bridge – SOBEBRA crossroads – OPT PK3 crossroads – Le Bélier crossroads;

- Third Bridge – SOBEBRA Crossroads;
- Place du Souvenir – Carrefour 3 Banques;
- Carrefour Marché Saint Michel – Carrefour NASUBA – Echangeur Steinmetz – Carrefour Notre Dame;
- Carrefour 3 Banques – Carrefour Air Afrique;
- Carrefour Air Afrique – Old bridge;
- Carrefour Cheminot – Steinmetz overpass

1.2 Road Safety Context

In Benin, the road is the preferred means of transporting goods and people. Land transport provides more than 90% of the trips. As a result, road users remain the most exposed to accidents among all users of the various modes of transport available. And as in many African and developing countries, road safety issues take on a singular character.

Indeed, road traffic is influenced by the geographical location of the country and the quality of its car fleet. In addition to the role of transit country that it plays for the benefit of other States, especially those of the

The inland situation is characterized by a rapidly increasing number of cars due to the massive importation of used vehicles with an average age of 10 years. The highly individualized mode of transport is characterized by a very large number of two-wheeled vehicles in most large cities, including Cotonou where bicycle paths are rather rare. In such a context, where public transport is heavily fuelled by the use of two wheels, it is motorcyclists and their passengers who are the main victims of accidents in our major cities.

The resulting problems of prevention and road safety are essentially defined in terms of traffic accidents, bodily injury, material, economic and financial damage. This situation impresses the observer both by the importance of the victims - 02 killed every day - and by the extent of their consequences on the national economy, about one hundred and ten billion (110 billion) CFA francs of economic loss per year. The fight against road accidents is therefore now a public health issue, a cause of national interest. The well-being of communities and therefore the reduction of poverty are now subject to the success of the prevention and road safety policies that we have managed to put in place.

This is the meaning and the primary challenge of the reforms initiated. Faced with the reality of the economic and environmental disaster caused by traffic accidents in Benin, it is important that road safety be integrated into the heart of national concerns such as sustainable development, health for all, quality of life, etc.

This approach to the issue, which permeates all the initiatives currently taken by the authorities at various levels, including SIRAT-SA, must be shared by all, so that from the top of the hierarchy to the bottom of the social ladder, everyone feels responsible for the success of actions to combat this unacceptable scourge of road violence.

This commitment must be reflected in an active participation in the financing of road safety. Poverty reduction in Benin is highly dependent on it. If we want to reduce road traffic accidents in the context of the expansion of the car fleet and motorised traffic that we have, we need to introduce adequate prevention measures at a sufficient pace to compensate for the potential increase in accidents caused by the increase in road traffic. Such a system requires a political priority, financial resources and the expansion of the public-private partnership for road safety. The affirmation and strengthening of political will in the field of road safety is a fundamental condition for the success of actions in this field. Today, the State, local authorities and economic actors must face multiple pressing needs on the part of the population, namely sustainable development, education, health, etc.

The need for road safety awareness was echoed in the "Moscow Declaration" issued at the end of the first Global Ministerial Conference on Road Safety held under the auspices of the Government of the Russian Federation in November 2009. The Decade of Action for Road Safety 2011-2020, officially proclaimed by the United Nations General Assembly in March 2010, began on 11 May 2011.

Five components have been identified and broken down into strategies to fight against this scourge.

- Stream 1: Road Safety Management
- Stream 2: Road Safety and Mobility
- Stream 3: Vehicle Safety
- Component 4: Road user safety
- Stream 5: Post-Accident Care

The ROAD SAFETY AND MOBILITY section focuses on improving the level of safety of the

national road network for all users in general and, in particular, for the most vulnerable users (pedestrians, cyclists and motorcyclists).

The aim will be to assess the safety deficiencies of existing infrastructure by providing the required solutions and to place particular emphasis on road safety in the planning, design, execution and operation of road projects.

The urban and interurban road network is continuously developing in Benin with a gradual improvement in the level of service. This development of the network, while lagging slightly behind the rapid evolution of traffic in certain areas, is much more influenced by the issues of insufficient funding than by the real needs of users. This situation can be seen in the inadequacy of safety facilities and equipment in relation to the safety specificities of the areas crossed and is at the origin of the occurrence and aggravation of a significant proportion of the traffic accidents recorded. Cotonou is particularly concerned by this issue because it is located at the confluence of two particularly busy international roads, the RNIE 1 and 2.

This is edifying and the infernal traffic that the city of Cotonou is experiencing is an illustration of the bottleneck that the city's road network has become for the economy and the ordeal it represents for the population.

The design of the roads must now meet the requirements of the road safety audit of all new road projects from the design phase to the commissioning phase which will be carried out in order to verify the safety of the road network and its real adaptation to the mobility needs of the population. This is perfectly in line with the objective of WAEMU, which adopted Directive No. 13/2009/CM/UEMOA of 25 September 2009 on the establishment of road safety audits in WAEMU member States.

To comply with this directive, the new national road safety policy in the Republic of Benin therefore requires any road work programming to take into account the impacts on the safety of users in general and that of local residents in particular.

Thus, all maintenance work (routine or periodic), rehabilitation, development and construction work must systematically be subject to a road safety assessment. The results will have to be systematically integrated into the corresponding technical studies as well as into the works and control contracts.

This means that a road safety study is necessary during the preliminary design study phase.

In this report, the general aspects of road safety management, the corrections to be made to the infrastructure, the temporary developments to be carried out during the works phase and those to be made for the subsequent operation of the infrastructures will be addressed, with a summary estimate of the costs involved.

1.3 Objective of the study

The "ROAD SAFETY" study of the roads being planned therefore responds to the Beninese Government's concern to build infrastructure that complies with international standards in this area.

It must therefore guarantee the safe operation of the network and compliance with the three principles of the project design, namely:

1) The Quality Principle, which is based on:

- Visibility and legibility of the road
- Adaptation of the infrastructure to the dynamic constraints of the vehicles
- The possibilities of avoidance and recovery,
- Limiting the severity of impacts.

2) The Principle of coherence in space, which presupposes:
   - The full coherence of all elements of the road with their environment
   - The consistency of the characteristics of the road throughout its route.
3) The principle of coherence over time, which is based on the planning of routes.

Road safety has become an important part of a road project and it must be taken into account at all stages of the project:

- design (taking into account statistics and causes of accidents)
- implementation (during the construction phase)
- Commissioning (raising awareness among road users)

1.4 Client Requirements

Road safety is of paramount importance for road users; to this end, the consultant will: Walk through all the streets under study and make a critical and objective analysis of the road safety elements and black spots specifically; To trace the history of road accidents over the last ten years in order to identify the improvements to be made; Analyze the characteristics of the road to minimize or avoid the risks of dynamic failure (skidding, rollover, etc.); Describe the rigid obstacles located at the edge of the streets and which may contribute to the aggravation of the consequences of an accident; Generally identify the various missing signs to be installed according to the environment crossed; Make an inventory of road safety equipment (signs, metal barriers, DBA type barriers) vandalized or damaged and propose their repair or replacement; Propose, if necessary, specific developments aimed at reducing the speed of traffic for street users, particularly in accident-prone areas; Define the measures and measures to be taken in collaboration with the CNSR for good traffic management.

1.5 Purpose of the Study

The study focuses on the following aspects:

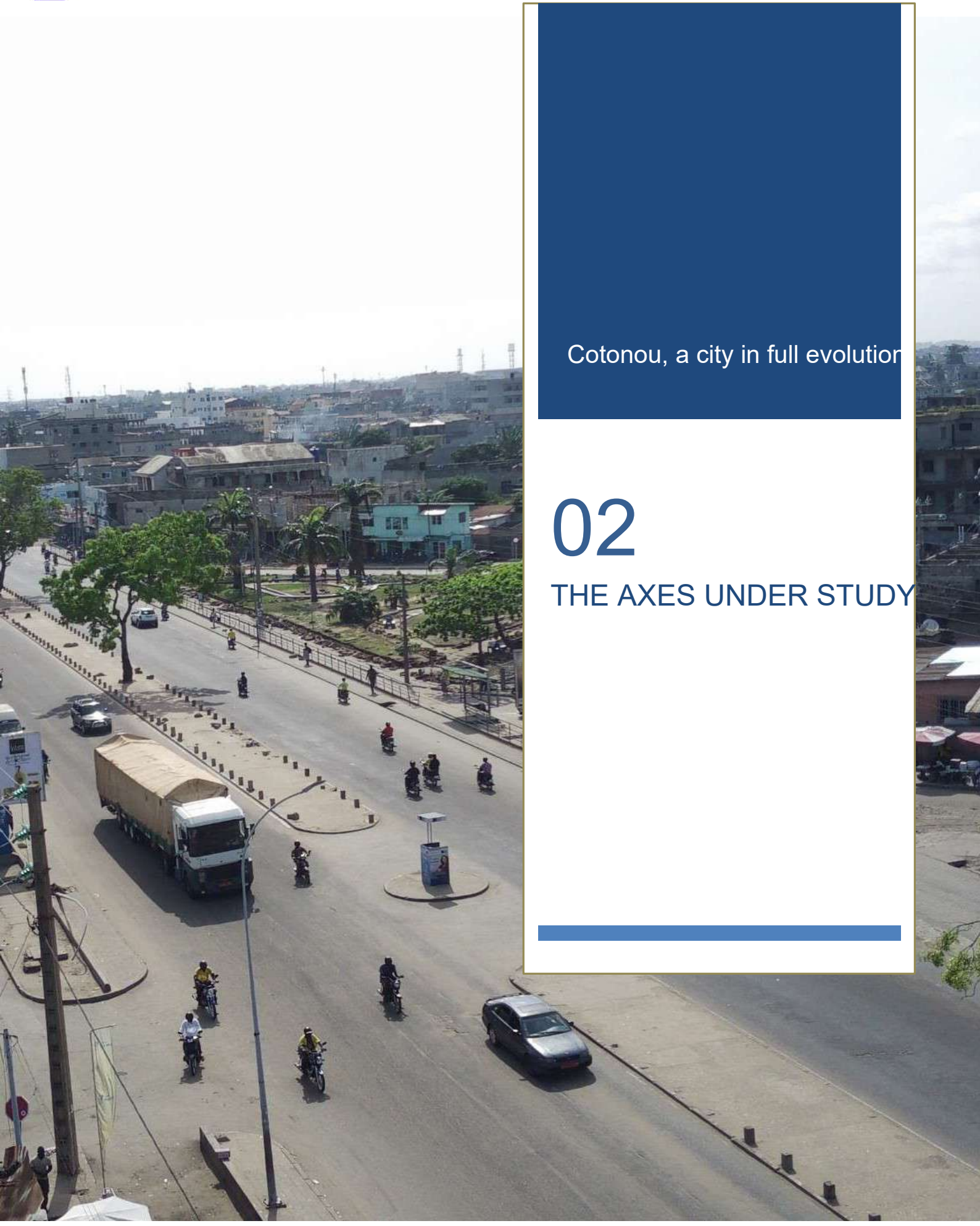
> Describe the existing infrastructure
- Describe the layout of the streets in the project and their main characteristics (choice of types of intersection and safety equipment, width of the roads, etc.)
- Describe the main visual information present in the road environment that helps to facilitate the driving of the vehicle;
- Analyze the perception of visual information in time according to the speeds practiced to allow vulnerable users to adapt their behavior to the situations experienced

- Analyze the easy understanding of the road and its surroundings so that the user can determine where he is, what is the direction to follow and plan what awaits him (maneuvering vehicles and pedestrians, changes in the characteristics of the infrastructure, etc.) in order to be able to adapt his behavior accordingly.
- Analyze the characteristics of the road to minimize or avoid the risk of dynamic failure (skidding, rollover, etc.).
- Describe the rigid obstacles located at the edge of the road that can contribute to the aggravation of the consequences of an accident.
- Describe the slopes of embankments (ditches, dikes, etc.) that can lead to collisions or cause a rollover;
- Describe hazardous situations such as roads that have characteristics conducive to high speeds while retaining some elements that are incompatible with such speeds (private driveways, narrow shoulders, etc.) or residential streets that are not suitable for users and the presence of pedestrians and other non-motorized users.

> Carry out the security diagnosis
  - Collect and manage accident data and traffic volumes by category of users, by period and by reason.
  - Observe the behaviour of road users: speed measurement, police statistics on offences, possible video surveillance.
  - Carry out a quantitative analysis of statistics: accident indices and rates, comparison with reference values.
  - Conduct a detailed and sequential qualitative analysis of accidents.

> Present specific prevention or corrective measures

> Evaluate the cost of recommended measures and accommodations



Cotonou, a city in full evolution

02

THE AXES UNDER STUDY

2 THE AXES UNDER STUDY

2.1 The axes of the study

The ATC project is the rehabilitation/reinforcement and or reconstruction of 13 sections of road totalling 31.28 km and divided into two lots. Lot 1, located mainly to the east of the city of Cotonou, includes the following streets:

Table 1: List and linear of streets under study

LINEAR AXIS DESIGNATIONS (KM)		
1	Old bridge – SOBEBRA crossroads – OPT PK3 crossroads – Bélier	crossroads 5,766
2	Third Bridge – SOBEBRA Crossroads 1,576	
9	Place du Souvenir – Carrefour 3 Banks 2,409	
11	Carrefour Marché Saint Michel – Carrefour NASUBA – Echangeur Steinmetz – Carrefour Notre Dame 1,917	
14	Carrefour 3 Banques – Carrefour Air Afrique 0.683	
15	Carrefour Air Afrique – Ancien Pont 0.931	
17	Carrefour Cheminot – Steinmetz Overpass 1,454	
	Total 14,736	

2.2 Urban, socio-economic and ecological considerations of the study area

Although Porto-Novo is the official administrative capital of this country, Cotonou, due to its demographic importance and its major role in the economy of Benin, is the economic capital, but also the political capital.

Located on a strip of land between Lake Nokoué to the north and the Atlantic Ocean to the south, Cotonou has an area of 79 km². The site occupied by Cotonou is essentially made up of barrier beaches (sandy accumulations of elongated shape and parallel to the sea shore) 4 to 6 km wide. The relief of the barrier has two main characteristics: slight longitudinal depressions parallel to the coast and shallows eroded by the flow of rainwater that communicates with the lake. The site is cut in two by the channel called "Cotonou Lagoon", a direct communication between the lake and the sea, dug in 1894. The connection between the two parts of the city is currently provided by three bridges: the Old Bridge, the Martin Luther King Bridge and the Konrad Adenauer Bridge. The average altitude of the cordons in relation to the sea is around 4 metres.

The city is bordered to the north by Lake Nokoué, to the south by the Atlantic Ocean, to the west by the commune of Abomey-calavi and to the east, by that of Sèmè-Kpodji. Cotonou is less than 100km from Togo, about 50km from Nigeria and nearly 800km from the Burkinabe and Nigerien borders

Cotonou belongs to the coastal plain which extends over 125 km long, 4 km wide and reaches no more than 10 m in altitude. It is a low, sandy, marshy plain dotted with lakes and lagoons whose

Lake Nokoué which delimits the city to the north.

In addition to its administrative and political buildings such as embassies and large banking groups, the city of Cotonou is endowed with very important infrastructures with regard to the economic life of the country. There is the largest market in West Africa, the Dantokpa market, which covers nearly 20 hectares. This market serves both as a place of trade between Beninese people, but also as a place of exchange with other African countries. In addition, the city has a port, a real lung of the national economy, which offers an opening to neighboring countries: 90% of the country's trade with the outside world is carried out from the city of Cotonou. It is a flagship element of the city, both for its economic and commercial importance and for its size: nearly
18 hectares of land and 40 hectares of shops and warehouses. Fishing occupies a predominant place in the local economy thanks to the abundance of fish (Tilapia in particular) in the ocean but also in the lake and lagoon; Thus, along the coast and the regional banks, there are many households living from fish farming. Finally, another major element of the city: its airport. The only international airport in the country is in Cotonou and concentrates all air traffic.

Cotonou has experienced very rapid, not to say brutal, growth. In 1945, there were only 18,000 souls in what was only a town. Ten years later, there were nearly 57,000 inhabitants, three times as many. The 1960s marked the increase in the influx of people into what would become the 'capital' of Benin. Indeed, migrants come from all over the world: from neighbouring villages, from more distant communes, but also from border countries such as Togo. This explains the impressive growth rate of the city until the end of the 1980s: nearly 8% (today, this rate has stabilized at about 4%). Currently, the city is home to 680595 people (RGHP 4), but welcomes more than a million every day: the major role played by the agglomeration in the country's economy brings in many traders and many vendors from neighbouring towns who come to work in Cotonou.

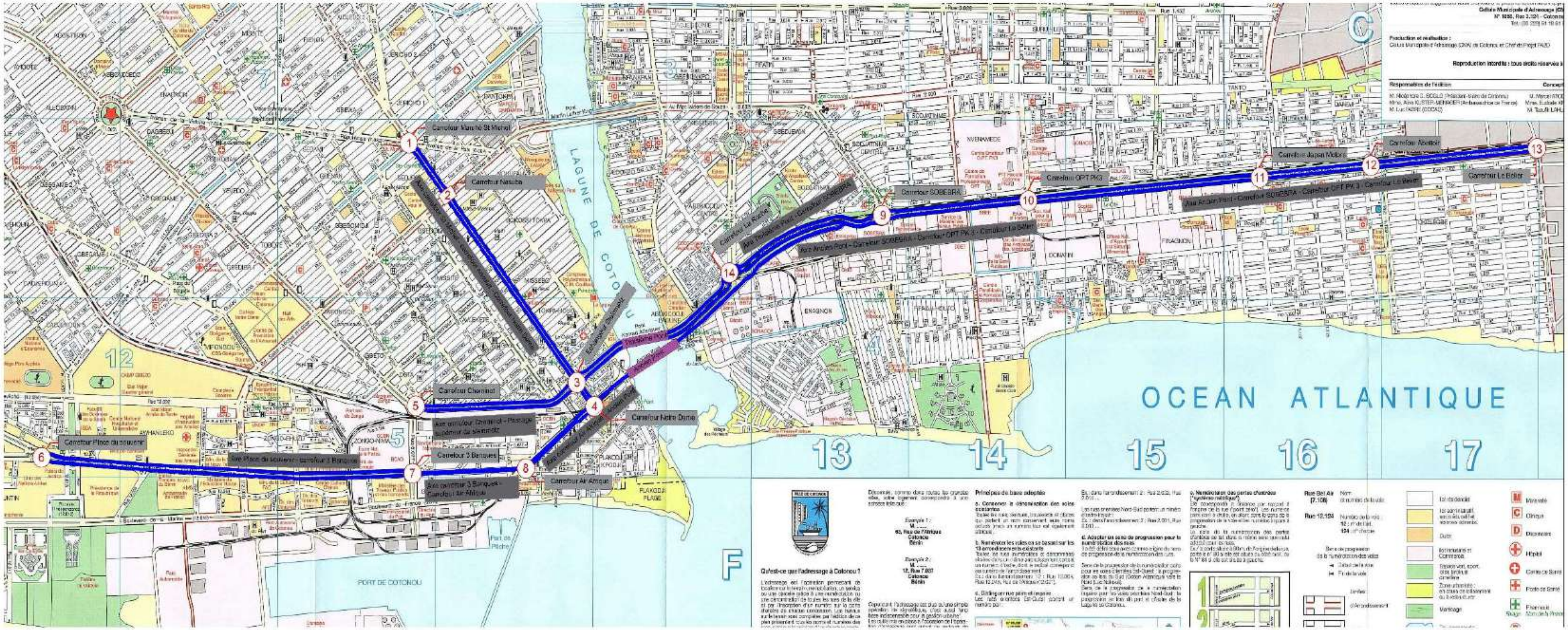
Most of the economic activities carried out in the vicinity of the roads under study are informal but contribute to the employability of more than 60% of the working population.

It is noted that there are several official buildings: banks, administrations, hospitals, schools, general trade, services, sports facilities, public markets, business centers. In addition to these public and private infrastructures directly adjacent to the tracks, account will also be taken of the so-called second-line commercial activities whose accessibility passes through the planned roads.

The presence of these activities generates a lot of travel, both for customers, vendors and for the supply of equipment. This will have to be taken into account in the context of the study insofar as these trips, when made by car, require crossing one or more traffic lanes.

Insofar as the work will involve the expropriation of certain activities, the project may therefore be an opportunity to re-naturalize abandoned and poorly exploited public spaces, by clearing the vegetated platform currently observable in the asphalting project, outside the road project right-of-way.

2.3 Street Maps Under Study


OCEAN ATLANTIQUE
LAGUNE DE COTONOU
PORT DE COTONOU
13
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Most accidents can
to be avoided

03
DATA ON LES ACCIDENTS

3 ACCIDENT DATA

3.1 Data Collection - The Current Stream

3.1.1 Operation and Effectiveness

In 1987, the Government of Benin created the National Road Safety Centre (CNSR), a structure with financial autonomy whose mission is to research and implement actions aimed at increasing the safety of road users.

Under the coordination of the CNSR, Benin has implemented since 2000, a traffic accident data management system called the " Bulletin d'Analyse des Accidents Trouvés " (BAAC);

The two primary sources of information on traffic accidents are the thirteen district police stations of the central police station of the city of Cotonou which intervene for uniformed personnel and referral hospitals. The fire brigade companies of the National Fire Brigade Group also intervene in accidents.

The police officers make reports on material and bodily accidents 24 hours a day. Their objective is to establish responsibilities for the purposes of justice and to settle compensation by the insurance companies that contribute financially to the collection of data. The fire brigade intervenes 24 hours a day for personal accidents. Many traffic accidents, sometimes including personal accidents, are settled amicably between the parties without the intervention of the police and/or the fire brigade.

The BAAC form (Bulletin d'Analyse des Accidents Trouvés) is a double sheet of A4 format, light green in colour, printed on both sides and containing the variables to be filled in after a traffic accident report. These variables are organised on the form in such a way as to facilitate their coding, once the required data have been collected. These forms are filled in by officers of the Republican Police, one of whose sovereign missions is to conduct traffic accident reporting procedures at the national level. During these procedures, data are systematically collected by means of a form, the Bulletin d'Analyse des Accidents Constats (BAAC), which is sent to the National Road Safety Centre following a rigorously controlled procedure.

The units of the Republican Police have received the necessary training for its filling.

The hospital data collection sheet is a table with 13 columns. It is completed by the CNSR services after examining the registers of the emergency departments of the reference hospitals. Work continues to improve hospital data collection

The BAAC form and the hospital data collection form are provided by the National Road Safety Centre.

The forms collected by the CNSR are checked and corrected before data entry. Data entry and processing are done using software programmed under Access. The causes of accidents are determined from the circumstances, the condition of the premises, the sketch reference, etc. This work is reserved for the services of the CNSR. A list of causes exists in the BAAC-Benin software in three groups: human causes, causes related to rolling stock and causes related to the road environment.

The database can be queried on all the variables present on the BAAC form and also on several calculated variables, which offers a wide range of exploitation criteria.

Statistics are compiled regularly based on the use of the data, such as:

- Improvement of road safety policy by designing more effective action programmes;
- Evaluation of road safety actions and calculation of the various road safety indicators;
- Studies and research work (students at the end of their training, researchers, design offices etc.) ;
- Identification and analysis of black spots on the road network;
- Road safety audits in road projects;
- Feedback to law enforcement units for motivation and decision support

3.1.2 Accident statistics in the city of Cotonou

3.1.2.1 Overall statistics of accidents, severities and vehicles involved over the last 10 years.

Extracts from the 2011-2020 statistics of the National Road Safety Center

In the city of Cotonou, the average of the last ten years on the number of accidents is 2774 cases, including 680 cases of serious bodily injury and 76 deaths per year. On average

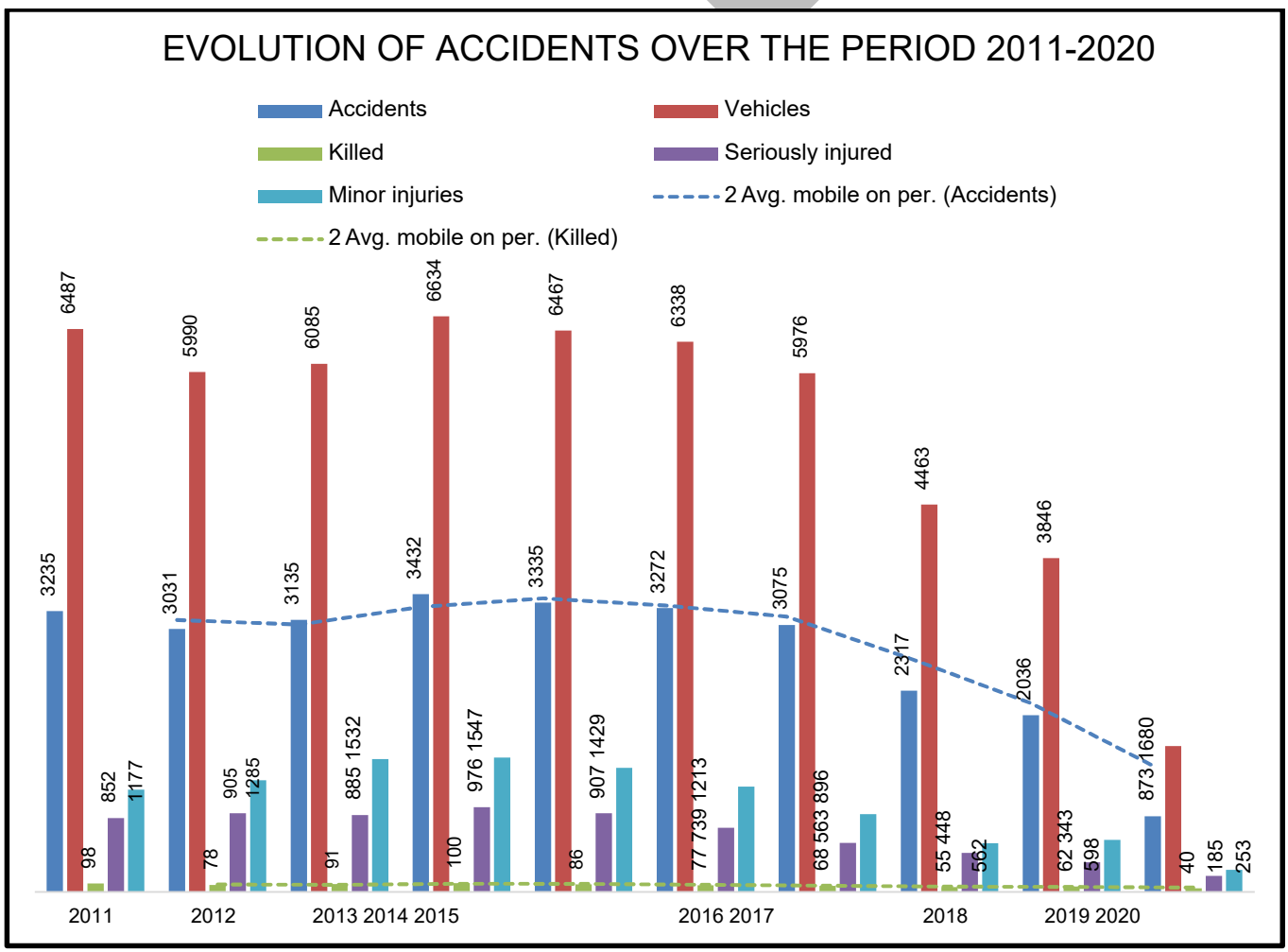
- road fatalities represent 3% of cases of bodily injury;
- 25% for serious injuries;
- and 38% for mild cases.

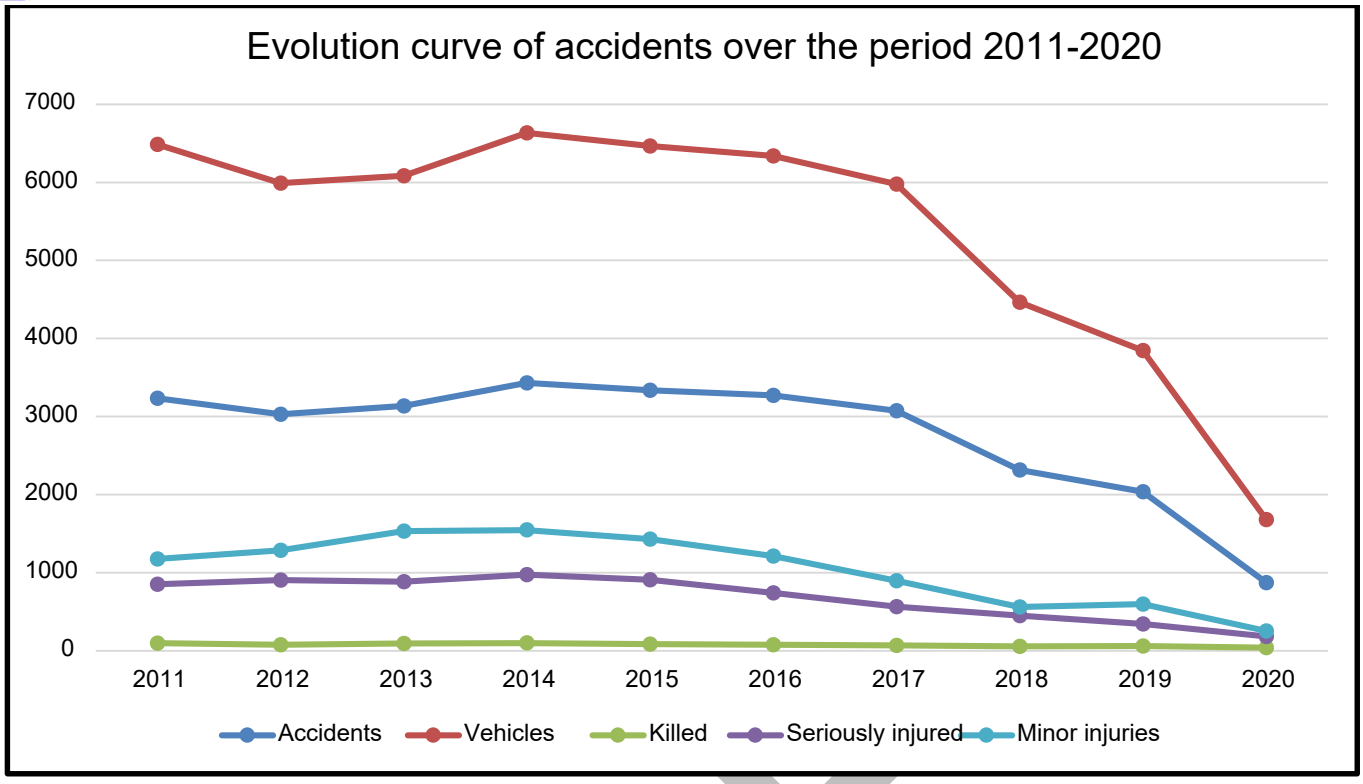
A downward trend is noted in the number of accident cases. Indeed, from 3235 cases in 2011, this number has dropped to 873 cases in 2020, certainly the result of numerous awareness sessions, the positive evolution of the quality of roads in Cotonou (implementation of various road development programs) and also the improvement of the car fleet in Benin. This decrease is also observed in the number of killed, serious cases, mild cases on the roads of Cotonou.

Table 2: Overall statistics of accidents, vehicles involved, types of bodily injury during the years 2011 to 2020

Year	Accidents	Vehicles	Killed	Injured	Injured

				Serious	Light
2011	3235	6487	98	852	1177
2012	3031	5990	78	905	1285
2013	3135	6085	91	885	1532
2014	3432	6634	100	976	1547
2015	3335	6467	86	907	1429
2016	3272	6338	77	739	1213
2017	3075 5976		68	563	896
2018	2317 4463		55	448	562
2019	2036 3846		62	343	598
2020	873 1680		40	185	253
Average over ten Last 1049 years	2774 5397		76	680	
Percentage of killed, seriously injured and slightly injured 3%				25%	38%





3.1.2.2 Vehicle representativeness

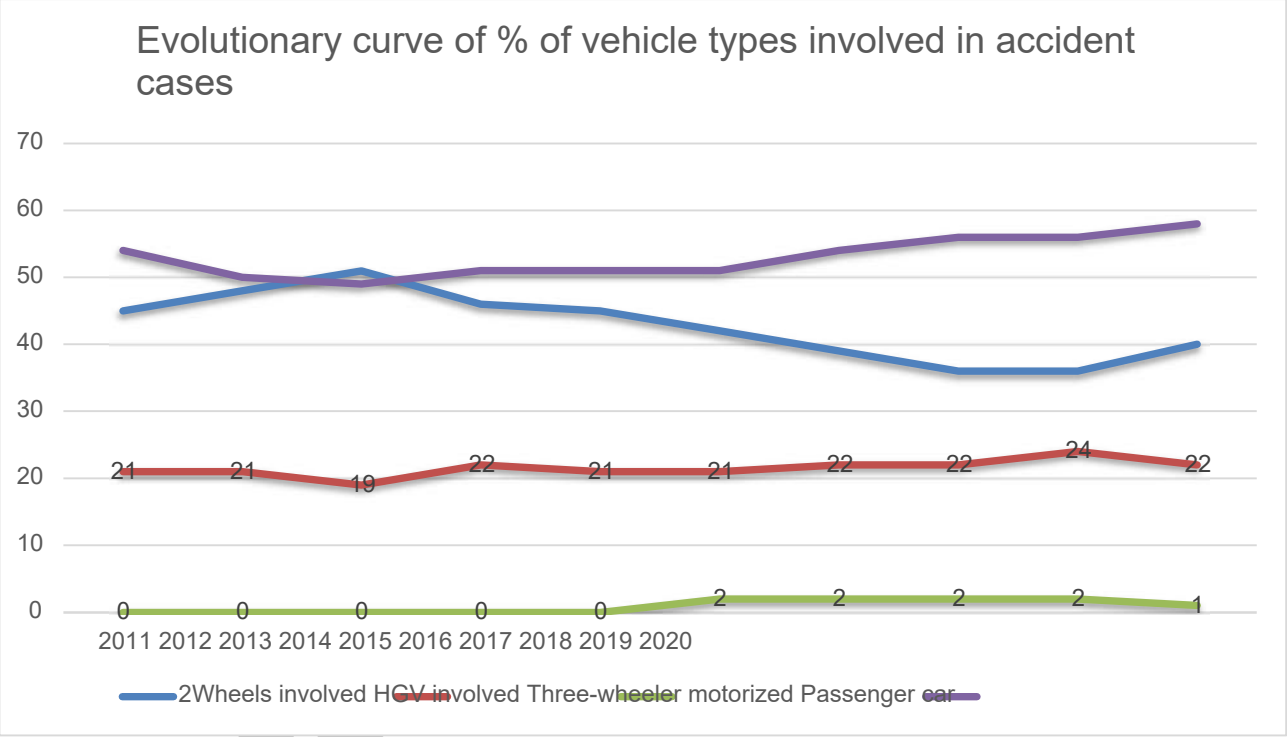
The analysis of the table below shows us that on average 43% of accident cases involve 2WD, 22% HGVs, 2% 3WD and 53% LCVs of all categories.

Other main findings, we have: 2WD vehicles are involved in almost one in 2 accidents;

- 3WD vehicles start by being involved in accidents;
- Passenger vehicles constitute the bulk of vehicles involved in accidents in the city of Cotonou;
- There is a downward trend in the involvement of 2WD vehicles in the event of accidents, except in 2020, with an increase of one point compared to the previous year (2019). It can be said that the introduction of traffic lanes and the compulsory wearing of helmets have produced positive results;
- On the other hand, an increase in the involvement of light vehicles is noticeable. This trend demonstrates the lack of awareness among LCV drivers, which may be due to:
  - At the age of the drivers,
  - Increasing the number of vehicles,
  - Improving the quality of traffic on road infrastructure (roads without potholes, ruts, alopecia areata and others),
  - Drivers' perception of danger
- the share of involvement of HGV vehicles in the event of accidents remains high. This demonstrates the need for development in the absence of traffic corridors, the delimitation of traffic routes.

Table 3: % of vehicle types involved in crashes

Years	2Wheels involved (%)	HGVs involved (%)	Motorized three-wheeler (%)	Passenger car (%)
2011	45	21	-	54
2012	48	21	-	50
2013	51	19	-	49
2014	46	22	-	51
2015	45	21	-	51
2016	42	21	2	51
2017	39	22	2	54
2018	36	22	2	56
2019	36	24	2	56
2020	40	22	1	58
Annual average (%)	43	22 2 53		



3.1.2.3 Percentage of minor or serious bodily injury, killed and property damage by type of conflict

The conflicts generating the most fatalities in Cotonou are the conflicts between the LCVs and the 2WD (rate of 20% on average per year over the last ten years). However, the rates of the following conflicts are equally high:

- 2WD alone: 10%;
- HGV/2WD: 16%;
- Passenger cars/pedestrians: 17%;
- 2WD/Pedestrian:

10% For other types of bodily injury, LCV/2Wheel conflicts are by far the most representative.

It should be noted that these rates only take into account those killed on the spot in accidents. The current collection system does not allow for the inclusion of deaths in hospital or during the transfer of the wounded to hospitals.

Notwithstanding the obligation to wear helmets and the establishment of traffic corridors for 2-wheelers, the rates are still high; This shows either a failure to comply with these obligations, or an ineffectiveness of these solutions. In his mission, the consultant noticed the constant tendency of 2Roues users to violate the two rules obliging the police forces to be constantly vigilant, preventing them from carrying out other tasks. The reasons given are as fallacious as each other, proof of ignorance and a lack of consideration for their own lives. These are:

- The helmet ruffles the hair (especially in women),
- The headset prevents hearing (priority argument among motorcycle taxis),
- The helmet is bulky,
- Traffic corridors are in poor condition and/or paved

Although it is in no way enforceable against the loss of human life or other bodily injury from accidents, it is nevertheless true that some 2Wheeler traffic corridors are very poorly developed (width of lanes, road surface, accessibility, etc.) or are very inappropriate, encouraging users to use roads reserved for 4Wheelers.

To reduce conflicts between light vehicles/pedestrians and 2R/pedestrians, the construction of pedestrian crossing corridors is necessary, especially at the level of socio-community infrastructures such as stadiums, primary and secondary schools. The development of a 30 zone is also a solution unless the security measures put in place for their boundaries are really restrictive.

Table 4: % of minor or serious bodily injury, killed and material damage by type of conflict

Conflicts Accidents Vehicles Killed Serious injuries Minor injuries PL only 3% 2% 1% 0% 0% VL only 6%					
3% 3% 3% 3% 2R only 2% 1% 10% 4% 1%					
PL/PL	1%	1%	1%	0%	0%
PL/VL	12%	14%	4%	2%	3%
PL/2R	4%	4%	16%	5%	4%
HGV/Pedestrian	1%	1%	5%	1%	1%
VL/VL	29%	33%	7%	5%	10%
VL/2R	30%	32%	20%	45%	52%
Passenger car/Pedestrian	4%	3%	17%	11%	7%
2R/2R	5%	5%	6%	13%	13%
2R/Pedestrian	3%	1%	10%	10%	6%
Other	1%	1%	1%	1%	1%

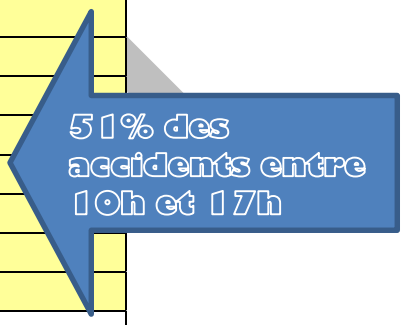
3.1.2.4 Conflict Hours

Still based on the data received from the CNSR, 50% of accidents take place between 10 a.m. and 5 p.m. With an extension to 8 p.m., the rate of recorded accidents rises to 68%. These data confirm that

one of the causes of accidents is traffic.

Table 5: % of accidents recorded per hour and over 24 hours

Hours	Accidents	Vehicles	Killed	Seriously injured	Minor injuries
0	1%	1%	3%	2%	2%
1	1%	1%	3%	2%	2%
2	1%	1%	2%	1%	1%
3	1%	1%	2%	1%	1%
4	1% 1% 3%			1%	1%
5	1% 1% 3%			2%	1%
6	2% 2% 3%			3%	2%
7	4% 4% 3%			5%	5%
8	5% 5% 3%			5%	6%
9	5% 5% 4%			5%	5%
10	6% 6% 4%			6%	6%
11	7% 7% 5%			6%	6%
12	7% 7% 5%			6%	6%
13	6% 6% 5%			5%	6%
14	6% 6% 6%			5%	5%
15	6% 6% 5%			5%	5%
16	7% 7% 4%			5%	6%
17	7% 7% 8%			6%	6%
18	5% 5% 5%			5%	5%
19	6% 6% 5%			6%	5%
20	6% 6% 5%			6%	6%
21	4% 4% 4%			4%	4%
22	3% 3% 6%			5%	4%
23	3% 2% 5%			4%	3%



3.1.2.5 Distributions of accidents by road type

The streets of the ATC project are all located in the city of Cotonou and are considered to be urban roads, although they are, for some sections, part of the RNIE 1 in its former or current configuration.

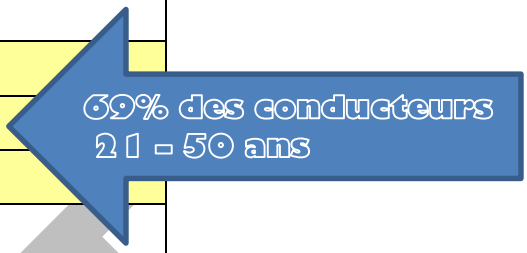
By adopting this concept, 80% of accidents are on sections of urban roads. This means that the streets under project alone concentrate the majority of accident cases in the city of Cotonou. The review of the road safety of these already developed streets, some of which have been in place for more than twenty years, is necessary.

3.1.2.6 Age of the drivers concerned

The age range of drivers involved in accidents is between 21 and 50 years old.

Table 6: Age range of drivers involved in accidents

Age groups	Drivers involved [ten-year average]	% represented
Not indicated	1048	19%
11 to 20 years	86	2%
21 to 30 years	1251	23%
31 to 40 years	1562	29%
41 to 50 years	910	17%
51 to 60 years old	406	8%
61 to 70 years old	116	2%
71 to 80 years old	16	0%
81 to 90 years old	2	0%



3.2 Data Collection – Proposal for Location-Based Accident Monitoring

One of the main difficulties that the consultant faces is the identification of the axes of the accidents, the data received from the CNSR do not show the places of accidents. This difficulty did not allow the consultant to draw up a spatial map of the accidents.

As a complementary source of information on accidents, we proposed a road accident monitoring platform previously implemented in Burkina Faso by the IRD (Institute for Research on Development). This platform, called "Resilience", was developed with Ushahidi, an open source tool that uses the concept of crowdsourcing for mapping and geographic information. Ushahidi (witness in Swahili), uses SwiftRiver, a free and open source platform that allows information to be extracted in a very short period of time and to render it by filtering and verifying it. The sources come from various channels such as Twitter, SMS, email or RSS. A smartphone application has been developed to allow the officers to enter a statement of information relating to the accident. This application automatically records the date, time and geolocation of the accident. At the end of the data entry, the data is sent in real time to the Ushahidi server and mapped.

3.3 Preliminary recommendations for data collection and dissemination

In terms of accident data, the priority is to have a web platform on traffic accidents in Cotonou accessible to all stakeholders and the public. It would give a spatio-temporal picture of the distribution of accidents according to their type. It would be backed by a database on accidents of the BAAC type. The information would be processed by CNSR agents from BAAC files obtained from police stations and hospital investigation sheets, all coupled with smartphone geolocation information recorded by police officers going to the scene of the accident. It goes without saying that the CNSR will ensure the exhaustiveness of the physical accidents in Cotonou entered into this database.

To do this, we propose the following actions:

- Strengthen the collection capacity of police stations on personal accidents to the detriment of

material accidents, unless additional human resources are allocated through insurance funding;

- Improve the location of accidents using a smartphone application used by the police force that provides the GPS coordinates of the accident;
- Create a platform to gather the information coded via the BAAC on accidents with geolocation managed by the CNSR and in collaboration with the Republican Police;
- Update the content of the BAAC sheet and the data structure of the accident database with the Police forces under the aegis of the CNSR. Expand the ability to capture information on accidents via the smartphone application. Test this technique and disseminate it to eventually abandon the paper coding of BAAC sheets;
- Strengthen the capacity of police stations and fire brigades to monitor the injured in hospitals and health centres to produce homogeneous and reliable statistics on deaths, serious and minor injuries;
- Set up an information system on traffic accident victims in Cotonou's hospitals. Then to couple the two information systems on personal accidents and victims, or to produce statistics on the severity of injuries via conversion tables of the cause of trauma codes.

Urban Road Safety, more than a matter of standards and regulations

04

AXIS SAFETY INSPECTION

4 SAFETY INSPECTION OF AXES

4.1 Urban Road Safety Principles and Standards

Road safety in urban areas obeys different rules than safety on interurban roads or motorways. While safety standards can be defined for open country road infrastructure with regard to the characteristics of the infrastructure such as the cross-section, the longitudinal profile, the uniformity of the surface, the width of the lanes and shoulders, taking into account the constraints of visibility, vehicle handling by means of kinematic equations, The situation is more complicated in urban areas where considerations other than those of vehicle kinematics and driver behaviour must be taken into account, and especially the behaviour of vulnerable road users: pedestrians, cyclists and motorcyclists.

Road safety management in urban areas is practiced less by applying a set of standards than by using a body of good practices such as those governing traffic calming (translated into English as 'appeasement of traffic'). These best practices and recommendations can be found in many engineering documents for engineers and urban planners. The important point is that safety is often in opposition to fluidity and that the civil engineer must make a trade-off between risks, for example favouring motorised traffic by adding a right-turn lane, which will in return increase the crossing distance of pedestrians on the axis and generate conflicts with pedestrians crossing the secondary axis.

Similarly, the fixing of cycles and their durations does not obey a system of standards, but is the result of a compromise in the management of the flows of all users in a traffic light intersection. On the other hand, we will find systems of standards from the open country infrastructure for the surface of the roads (plain, grip), vertical signage, lane markings, protection against obstacles, etc., adapted to the fact that speed in urban areas is much lower than in open country. These standards are to be considered at the level of the overpasses in Cotonou. Other standards may be found for arrangements aimed at speed moderation using baffles, blackcurrants and others, the shapes of which must meet specifications of height, angle, etc.

The relevance of the two possible strategies should be compared in order to achieve a good level of safety, taking into account the environments, the available investments and the users.

1) The segregation of flows according to modes with reserved and protected lanes and spaces and speed limits for each type of user,
2) The mix of flows with a limited low speed common to users.

On the other hand, in urban areas there is a particular requirement in the treatment of vulnerable populations such as children and the elderly. Education is not enough, it is through arrangements that take into account the limited capacities of these two populations that we can achieve security for all. This applies, for example, to a pedestrian green phase duration adapted to the crossing time of a senior. Similarly, motorized two-wheelers require special treatment for markings (slipperiness), and side protection (rails and posts).

Finally, road safety in urban areas can only be systemic. Speed management at the level of a district or a municipality is first and foremost based on an observatory of speeding behaviour and in the event of speeding, the actions can be of a different nature, either user awareness, police surveillance, or speed moderation adjustments. The choice of a type or combination of action is based on an analysis in terms of cost/effectiveness, but also of acceptance, and must take into account the nature of the road:

arteries, collectors, local streets. The other consequence is that the developments must be treated with a global vision to ensure homogeneity on all the roads according to the nature and function of the urban roads. This is what we will try to implement in this study on the main roads or arteries of the city of Cotonou.

The problem of road safety interventions on the roads penetrating large agglomerations consists in ensuring the flow of a very large flow of vehicles, often at more than 20000 vehicles/day from the periphery to the center (and vice versa) in environments that are becoming more and more dense in industrial, commercial and urban activities and correlatively in population, when we go from rural, to semi-rural, then commercial, and finally to urban.

The function of the main traffic axis remains, but the conditions of the flow must be adapted to the non-rural environments crossed by the flows of vehicles. In particular, speed limits must be in line with the nature of conflicts with vulnerable road users, with speeds from 90 km/h to 70, then to 50 and 30 km/h.

The segregation of flows according to modes of transport and/or their mix must be thought of according to the type of urban development envisaged (sustainable). The effects of outages in densely populated urban areas due to the high volume of traffic require the full attention of the planner and urban planner with the enlargement, maintenance or narrowing of road widths. The difficulty is to find a compromise between fluidity and safety in current traffic conditions but also in future conditions with expected or unexpected changes to public transport systems and urban operations relating to housing or economic activities.

4.2 Inspection Principles and Conduct

Since these are existing roads in the city of Cotonou, the approach will follow that of the proactive approaches defined in the manual developed by the African Development Bank (AfDB) "Existing Roads: Proactive Approaches". In particular, we will adapt the tools of proactive inspection and evaluation methods to the axes under study in Cotonou. The checklist for the inspection proposed in the AfDB document will be reviewed in the light of the urban inspection tool developed by Geetam Tiwari and Kalaga Ramachandra Rao (TRIPP, IIT Delhi) in their Urban road safety audit (2013). The method of analysis and collection is particularly suitable for cities in developing countries with a large proportion of vulnerable users: pedestrians, cyclists, motorized two-wheelers, motorized three-wheelers and public transport vehicles (rickshaws, minibuses and buses). Special attention is paid to schools, markets, bus stations and stadiums.

In developing the inspection file, the forms provided by the two above-mentioned books were examined with the understanding that, as stated in the AfDB document, "the use of often lengthy checklists is problematic" and that it is preferable to capture the main characteristics of axes, sections and intersections with the help of checklists consisting of high-level questions relating to the three dimensions already mentioned for the division: roads, circulatory and urban roads.

This resulted in an inspection file that was handed over to the inspection team to be initially tested on street n°1 "Ancien Pont – Carrefour SOBEBRA – Carrefour Pk3 – Carrefour le Bélier". It has two parts, one relating to the axis and sections, the other relating to the crossroads. The first consists of nine sets of questions relating to

a) the function of the road and context;

b) the provision of services for all road users (the cross-section), a tool for the composition of the road by targeting the development offer for all users of the axis;

c) the surroundings and framework of the road, structuring of the neighbouring districts;
d) Bus stops;
e) crossroads and pedestrian crossings;
f) motorised and non-motorised traffic;
g) the management of vehicle speeds;
h) the coherence and legibility of the road;
i) the state of the road, whether or not the road is illuminated;

The second consists of three sets of questions on:

a) the structure of the junction or roundabout;
b) the regulation and legibility of the intersection or roundabout;
c) motorised and non-motorised traffic.

The model type-approval certificate designed for this purpose is annexed to this report (see Annex 5).

This work was carried out from May 5 to May 9, 2022 by a team of experts (civil engineer, urban planner, environmentalist, landscape architect, traffic specialist). Pairs of investigators have been trained for traffic and speed observations. Field surveys were carried out to complete and update existing digitized maps of the axes by a team of surveyors. The visits to the roads were carried out by the head of mission and the civil engineer on several occasions (as many times as it seemed necessary) in both directions of traffic during the day for each axis. A few visits took place at night.

4.3 Collection and observation methodologies

4.3.1 Infrastructure and Planning

For the functional and contextual analysis, the consultant kept the sections made for the axes by the Client. Indeed, the different axes in project (section 2.3, map of the axes under study) are very homogeneous and cross environments whose activities also seem to be completely in line with each other. The sectioning proved to be adequate for the inspections that were subsequently carried out on these axes.

For the cross-section, field surveys were conducted to confirm the topographic data obtained. At the level of the longitudinal profile and the surroundings, a main source was used consisting of digitized maps of the axes made available after the topographic studies and with parallel visualizations via Google Maps.

For lighting, we have collected the synthesis of the lighting studies conducted as part of the project.

4.3.2 Motorized traffic, bicycles and pedestrians

Traffic observation consisted of field visits at different times to appreciate the flow in its aspects. In addition, a traffic survey was organised as part of these studies for the period from 21 April to 27 April 2022. The results were used as a basis for the evaluation of motorized traffic, bicycles. As far as pedestrian traffic is concerned, an observation plan based on the traffic survey plan has been put in place. The observation by the pair of investigators is done by video lasting 5 minutes per direction at the required points on the axes.

4.3.3 Inventory of existing safety equipment – and preliminary recommendations

As the streets under study are existing streets, it is necessary to make an inventory of the equipment still in good condition on the roads (signs, devices, barriers, footbridges, etc.). The consultant has put together pairs of specialists to collect information on existing safety equipment. The results should make it possible to identify the degree to which road safety has been taken into account in the implementation of projects in the past.

4.4 Overall Axle Inspection Result

The road safety expert and his teams covered the seven axes that make up Lot 1 of the ATC project. The observations are generally the same on each axis.

4.4.1 Faulty information (Vertical and Horizontal signage)

In general, information is poorly perceived, or completely absent. The planned roads are not sufficiently equipped with road signs; Several existing signs have been vandalised and are no longer in line with almost non-existent horizontal signage.

Vertical signage: in general, the absence / or inadequacy of police and directional signs are a real problem observed on the axes of the ATC project. Speed limit signs, parking and stop signs, school signs, and signs prohibiting manoeuvres such as U-turns are insufficient. These billboards have been damaged, not only because of accidents, but also because of the population who take them for advertising or election campaign billboards, in total ignorance of the usefulness of signage for moving vehicles. It is not uncommon to see on our TPCs and in the sidewalks, the supports without the signs. Worse, these media are used by the population for various advertising posters. Damaged signs are not replaced and, gradually, the network is stripped of vertical signage, which considerably reduces its legibility over time. However, directional signage remains visible, especially at roundabouts. Of course some of them are vandalized, as was the case below with police road signs.

The other problem with vertical signage is the inappropriate location of certain police signs. The latter are found on narrow TPCs such that clearance around the panels is not observed.

Horizontal signage : The project's roads have not been able to benefit from the refreshment of horizontal signage since their rehabilitation or reconstruction. It is no longer visible on roads that seriously limit the understanding of the road (width and number of lanes, lane reserved for two-wheelers) and does not allow pedestrians to find the crossings dedicated to them. Admittedly, there are still some road markings on sections such as "Third Bridge – SOBEBRA Crossroads" (see photo below, pedestrian crossing in front of IRGIB AFRICA) where the markings for pedestrian crossings are present, but the overall remark is the erasure of the horizontal signage. The visual analysis of the residual road markings informs us that it is road paint. Doubts remain about the quality of these paintings, especially at the level of reflection. An inspection carried out at night revealed the failure of this property that the paint should have.

The table below shows the inventory of police and directional signage present on the different axes of lot ATC 01.

Number and type of panels	Number and panels	Number and panels	Number and panels	Number and panels	Number and panels	Number and Panels	Number and Panel	Number and Panels	Number and Panel	Type of panels	Total by B1	B6d	B2a	B2b	B8	B10a B21a1 panel
	AB4	C1a	C20a	AB3a	AB4	D21b	D42a	D42b	A13b	J5	B16	G1	A17			
Souv Square - Carr 3 banks	Good	Defect	Good	Defect	Good	Defect	Good	Defect	Good	Defects	Good	Defects	Good	Killer defect		
	1	1	2	2	5	3	1	4								1
																4
					1	0							5	25		31
					1	1										2
																1
					0	1										1
							3	6	5							5
																3
					4	1	1	4	3	5	2					2
Carr 3 banks - Car Air Afrique										14	4	1	9			40
										9	3	1		2		21
Carr Air Afrique - Old Bridge										0	4		14	16		41
													3			9
							3		2				1			4
3rd bridge - SOBEBRA crossroads											5	2	3			12
																2
Anc bridge-SOBEBRA-PK3-Ram																1
																1
											8					15
Railway-Steinmetz bus											5					5
A14											3					3
B21-1										3	10					13
B21c1											3					3
B22a											5					5
AB25												1				1
Saint Michel - Notre Dame																
Total by axis and panel status	20	0	4	0	20	4	12	7	26	50	4	1	35	43		
Total by axis	20		4		24		19		76		5		78			226
Percentage of defective panels																46%

4.4.2 Risks associated with sanitation works

The roads under study are existing and developed in their entirety with longitudinal drainage structures. These structures are either located in the axis of the double carriageways and in this case serve at the same time as TPC, or border the outside of the carriageways and in these cases make it possible to delimit the pavements of the carriageways. They can be raised or lowered. Whatever their position, these structures as a whole are doing well and continue to perform their primary function, that of keeping the roads out of water, and/or the transit of rainwater. The structures are either covered with slabs or buffer grids with side drains.

During the inspection, defects, potential sources of insecurity for users, were noted. These include:

- openings in the gutters due to missing slabs: in fact, during maintenance work, the procedure requires the removal of the roof slabs and their reinstallation once the work is completed; During this handling, the slabs break or crumble for the luckiest ones. Those that are broken are not immediately replaced, for those that are crumbled, their reuse sometimes causes slippage inside the gutters. In addition to the risks of maintenance, the population also damages the structures by removing the slabs to find an object that has inadvertently fallen into the gutters.

- openings in buried gutters caused by the theft of buffers and other ferrous devices.

In short, these accidental openings of the gutters represent situations of risk for pedestrians, especially in areas of lack of lighting. Until recently, the closing tiles of the gutters are rarely repaired or replaced when they are damaged.

4.4.3 Road Hazards

The genesis of the ATC project is also the result of the state of deterioration of the roads under study. The geotechnical inspection visit made it possible to identify the various existing deteriorations that increase the risk of accidents for users. Damage such as potholes, alopecia areata, cracks, ruts and earthenware require urgent interventions to reduce the risk of accidents. Indeed, it is not uncommon to see victims blame the state of the road in the occurrence of the collision. Roads are being planned, a classification of the level of service related to the deterioration has been made. Thus, going to a crescendo, we have:

"Carrefour 3 Banques – Carrefour Air Afrique" "Carrefour Marché Saint Michel – Carrefour Notre Dame" "Carrefour Place du Souvenir – Carrefour 3 Banques" "Carrefour Air Afrique – Ancien pont" "Carrefour Cheminot – Carrefour Steinmetz" "Carrefour Steinmetz – Third bridge–

Carrefour SOBEBRA" "Old bridge – SOBEBRA crossroads – Le Bélier crossroads".

The side lanes are also affected by these degradations, their condition being the main argument for the change of lane operated by 2WD drivers.

It has been observed that network relocation work causes subsidence which, as a result of growth, becomes a risk to the safety of users.

Deformations, holes and poor pavement arrangements are also risks for pedestrians who can fall heavily and worse on the road. Geotechnical studies
will have to identify the causes of these deformations and cracks and propose corrective solutions.

4.4.4 Pedestrian Safety

Pedestrian safety must be analysed from several angles. These are the users most likely to road safety risks. As much as their safety is linked to the signs, it is also linked to the perception made by drivers of compliance with these signs. Crossing the tracks is the time when the risk is highest. Openings in gutters and holes in sidewalks are also sources of insecurity for pedestrians.

More specifically, in collisions between pedestrians (4WD, 2WD) and pedestrians, pedestrians are the most exposed, and the severity of bodily injury is twice as high for pedestrians. In the majority of cases, pedestrians are hit when crossing the road at an intersection and especially in a section of the road. Observations on the ground have shown that pedestrian safety is at a very low level. Most pedestrian crossings have disappeared and, even where they still exist, they are not systematically used by pedestrians, who are not aware of the importance of these markings.

Very few of the streets under study have real paths dedicated to pedestrians, either the reserved lane is not developed or it is occupied by other uses (parked vehicles due to the absence of parking lots, billboards, informal activity, etc.). While the measures to free up the right-of-way have made it possible to clear the paths on the sidewalks, there are still the billboards that are installed even on narrow sidewalks; the dimensions of these posters leave pedestrians no option but to go around them by passing on the road; and therefore expose themselves to more risk of accidents.

The same applies to the tree plantations observed here and there, the purpose of which should not obscure the annoyance they cause on narrow sidewalks.

In addition, the path of pedestrians on the pavements sometimes has pitfalls due to the absence of the gutters' closing slabs, which are damaged or not closed after cleaning operations. The risk of accidents represented by open gutters is very real for pedestrians, but accidents related to them are absent from the statistics because they are not recorded by the Police. The reason for this is that these accidents are not classified as road accidents.

None of the axes of Lot 1 of the ATC project has a pedestrian bridge. On the other hand, at the level of lot 2, there is a footbridge built in Cadjèhoun in front of the EPP of the same name. The analysis of this provision informs us about their usefulness and the safety it brings to pedestrians, especially schoolchildren. However, it has been observed that these same pedestrians are trying to bypass the footbridge and the best way to force them to use them is to erect impassable barriers along the way they are being crossed. They are also sometimes sources of insecurity if public lighting is lacking.

4.4.5 Intersection Management

An intersection or road intersection is defined by the Highway Code as a place where two or more carriageways are at the junction or crossing, regardless of the angle or angles of the axes of these carriageways.

Intersections are the source of much of the congestion in the road network. Right-of-way is, by default, the general rule of traffic management at conventional road intersections, in the absence of signage or any other form of regulation.

In terms of their shape, roundabouts and roundabouts are identical. The difference between a roundabout and a roundabout is the right of way. Roundabout: priority on the right applies. In this case, there are no road markings or signs. As far as the roundabout is concerned, users who travel on the ring have priority over motorists coming from outside. This is why "Give way" signs are located at the entrances to the intersection. The main difference between a roundabout and a roundabout is the presence of "give way" signs.

The axes under study have several types of intersections. During the road safety inspection, several types of intersections are noted:

- Ordinary flat crossroads such as the Nasuba crossroads, on the "Marché Saint Michel – Carrefour Notre Dame" axis,
- Roundabouts such as the emblematic Etoile Rouge roundabout;
- Normal gauge overpass intersections: one (01) was identified. These are the uneven passage of Avenue Steinmetz;
- Roundabouts such as the Carrefour Marché Saint Michel;
- Traffic light intersections, which are mostly ordinary flat intersections or roundabouts equipped with traffic lights.

Axis designations, Feature types & configuration recommendations	
Old bridge – crossroads 5 Crossroads in SOBEBRA – Roundabout crossroads OPT PK3 – Crossroads with traffic lights. No traffic lights are functional	The presence of traffic lights on the exit roads was noted. The presence of these lights, apparently set up for pedestrian crossings, is contrary to the norms. Their presence will cause possible congestion of the roundabout if the phases are not well studied. It is then recommended that these lights be removed. In addition, the presence of the Yield-The-Way signs are not necessary since the roundabout operates with traffic lights, which changes the rules of priority and becomes a roundabout. We need to review the pedestrian paths at the roundabouts. They are not clearly visible.
	
Third Bridge – 1 one-way intersection SOBEBRA roundabout without traffic lights	There are no traffic lights, nor signs for Yield-The-Way, it is then an off-centre roundabout. There is congestion between the different branches of the intersection. The integration of vehicles is happening in a somewhat anarchic way. The Roche crossroads has the particularity of being off-centre at the point where the left-hand turn movement is carried out by the right-hand lane. There is congestion at the level of the southern exit lane with the western entrance lane. It is recommended to convert the southern entrance road to an exit road only to limit a little conflicts in the roundabout. The implementation of traffic lights would be also an asset for road safety
	

Axis designations, Feature types & configuration recommendations	
Place du Souvenir – 4 crossroads Carrefour 3 Ordinary banks managed by traffic lights, two (02) of which are non-functional	The traffic lights on this axis have TAG for the main road. A few directional signs are still present. The SONEB and 3 Banques crossroads have a police presence. The presence of TAG on the main axis is a positive point, but the narrow width of the gutter makes it difficult to make the – scheduled tour on the TAG. Of course, the lowering of the gutters well before the crossroads is also another positive point that always goes in the direction of facilitating the U-turn on the main branches. Reposition the passages pedestrians, vertical and horizontal signage
	
Marché Saint 1 roundabout with Michel – Traffic light junction outside NASUBA – Usage interchange; 4 Steinmetz – Carrefour carrefours plans Notre Dame ordinaire à feux 1 single elevation junction	This axis has a PSGN crossing that spans the Steinmetz roundabout. The Marché St Michel crossroads works like a roundabout. To drain the flow, the police had the idea of prohibiting the complete tour of the roundabout with the help of mobile chicanes. Note at this level that the lights are out of order. It would be interesting in view of the movement of the flow to increase the diameter of the roundabout or at least make the lights functional. At other junctions on an ordinary plan, the presence of traffic lights reduces conflicts and promotes safety. Obeying traffic lights is therefore the key to safety at these intersections. Reposition pedestrian crossings, vertical and horizontal signage
	

Axis designations	Types of configurations	Features & recommendations
Carrefour 3 Banques – Carrefour Air Afrique	1 X-junction at the final Pk of the axis	It is a crossroads without any development at the moment. It is of 'X' configuration. Given the low flow drained by this axis and the lack of space, it is recommended to maintain the X junction but with directional islands that comply with CEREMA's X junction sizing standards
		
Air Afrique Junction – Ordinary Bridge 'T' with Lights	1 Junction Former Functional Traffic	This 'T' intersection is currently managed by traffic lights and a multitude of directional islands adding more confusion to users. In the development to be planned, it would be wise to remove all these islands and maintain the lights, thus returning to a simple ordinary flat intersection or, as far as possible (right-of-way constraint), a mini roundabout with traffic lights.
		

Axis designations	Types of configurations	Features & recommendations
Carrefour Cheminot – Steinmetz overpass	1 roundabout intersection with vertical signage	The constraints of the right-of-way do not allow the current configuration to be modified. The possibility of adding traffic lights will be considered after analysing the road flow.

As described above, the ATC project arteries are crossed by several traffic light junctions. Confusion in the sense of the names between roundabouts and roundabouts is often made by users and also by the technical services in charge of the road network.

In short, there are a total of 19 flat crossroads and one uneven crossroads; 16 intersections are managed by more or less functional traffic lights; 9 roundabouts or roundabouts and 10 ordinary flat intersections.

Details on the operations and information of each hub are attached as an appendix to this document.

It is observed that several intersections suffer from congestion during the morning and evening rush hours; in the absence of a specific study of intersection traffic, the consultant will base himself on the study of the traffic of the roads in project in order to judge the capacities of the intersections. However, it will be necessary to take into account a certain harmonization of intersections on the same axis. (The results of this assessment are taken from the Topographic Studies and Cross Sections report, and are presented in the Appendix to the document)

The installation of traffic lights in roundabouts is already a good indication of the undercapacity of these roundabouts, which suddenly become roundabouts; therefore, 'CLP' signs are no longer allowed.

Many existing traffic lights do not work or only partially, i.e. with phases and/or branches out of order, forcing manual regulation by the police. Most fires are 2-phase. Some lights have a timer. As much as the timer is a source of safety, it is also a marker of insecurity for users. Indeed, it is not uncommon to observe stormy starts just when the red light goes out, worse just before the end of the countdown. The debate is still ongoing at the level of road safety experts to judge the usefulness of this system.

Another problem concerns the Turn-A-Left movements of users of the side alleys for whom the illuminated signs do not currently provide for anything. This movement is a source of insecurity,

especially for 2WD drivers.

To sum up, the observations made in the field showed that:

♦ Many light control systems are inoperative, and are therefore subject to manual regulation by the police. The lack of road signs and traffic lights at certain intersections is often the cause of accidents, so that some intersections have become black spots.

♦ When it is functional, the regulation is not programmed to effectively manage the large traffic of peak hours. Each intersection is individually regulated according to fixed phases, and there is no mechanism to ensure coordination or dynamic management in order to regulate road traffic. However, a study is currently underway to study the possibility of setting up centralized traffic management in the city of Cotonou.

♦ In addition, connected to the conventional power grid, the light control naturally stops in the event of a power cut.

♦ Rather respected on major intersections, the rate of compliance with red lights tends to decrease on less frequented intersections, especially by two-wheelers. Roundabouts work quite well in Cotonou even if the signage is absent or poorly installed. The Police watch over certain roundabouts during rush hour and intervene if necessary to regulate traffic.

♦ More specifically, roundabouts and roundabouts have impassable islands; branches with single carriageways do not have a directional island. No pedestrian crossings, no TAG lanes. The Notre Dame crossroads has many islands that make it difficult for users to understand.

4.4.6 The environment of the axes under study – Mobility emitters and collectors

The road arteries under study, beyond serving the cities of Greater Nokoué and many others, allow users to meet their obligations both of work and leisure, not to mention those of health and other natural obligations.

The environment of the roads is composed of services, hospitals, entertainment venues, administrations, shops, schools and places of pleasure, but also private dwellings In the area of the "Carrefour Japan Motors – Carrefour le Bélier" section, the houses are on the front line on both sides of the road while all the axes under study allow access, in the second line, to private homes.

4.4.7 Safety of 2WD

A quick glance at the results of the traffic study easily proves the claims about Benin's preferred means of transport. 62% of the traffic counted is related to 2WD. The same applies to collisions. To compensate for the damage, those responsible for road safety management have instituted the use of local traffic for the purpose of reserved lanes for the traffic of
2WD.

This measure, which has recently been applied, must be generalized. Currently, the axes of lot ATC 01 do not have local traffic, nor counter-alley with the exception of a few sections of the axis "Third bridge – SOBEBRA crossroads"

The hazardous and irresponsible behaviour of 2WD drivers also contributes to their endangerment in traffic. (Refer to Section 6 for a study of user behaviour).

4.4.8 Existing Road Restraint Systems and Obstacles

A road restraint system (RRD) is a piece of road equipment designed to prevent pedestrians and vehicles from falling into distress and hitting side obstacles. It has two main functions: retain and redirect.

The restraint systems encountered on the planned axes are:

- the guardrails,
- DBA and GBA separators at the TPC level,
- DBS type wheel flush kerbs for TPC,
- raised central collectors,
- barriers,
- T2 curbs for sidewalks, and raised side gutters.

From various interviews with certain actors in road safety management, it is noted that the obstacles most frequently hit in fatal accidents are walls, poles, trees and kerbs. Conversely, many objects (signage, street furniture) considered not to be obstacles for light vehicles are so for the 2WD user: we can mention curbs or police sign supports.

While the former can benefit from the protection provided by restraint systems or weakened supports, the latter can only rely on the minimization of the number of obstacles and on innovative devices such as protective cushions, flexible panel supports, etc.

For 2WD, equipment or objects on the shoulder, even if harmless to light vehicles, must be considered dangerous.

The inventory of road restraint systems by axis is as follows:

NB: The quantities of the structures to be changed or corrected are developed in the Quantitative and Estimative Specifications (DQE) drawn up for the work carried out as part of the study.

Old bridge – SOBEBRA crossroads – OPT PK3 crossroads – Le Bélier crossroads

Findings	Recommendations State of play	
• Pavement separated by a	Refresh the DBAs by sanding a DBA slide in good condition, and painting,	
• Presence of barrier railway track.	Reinstall destroyed metal barrier areas to isolate the degraded and /or aging DBA barrier from the In case of raising the entire barrier is at red line due to change, resurfacing, provide as	
• The sidewalks are raised, separation from the sidewalks by means of T2 curbs or T2 curbs, side gutters, Renewal of the barrier		
• Presence of an anti-metal wall by a mixed concrete crossing wall (metal + concrete) reinforced at the level of the island positioned on both sides of the central roundabout. the railway track, Structure in good condition; just	Repair the degraded areas some degradation of the protective wall at the	
• In the section with counter-level of the central island of the alleys, there is a TPL roundabouts vegetated with trees,	Renew the green spaces	
• Presence of street lights serving as TPL in the TPC.		

Third bridge – SOBEBRA crossroads

Findings	Recommendations State of play	
• Pavement separated by a	Refresh the GBAs by sanding a GBA slide in good condition, and painting,	
• Pavements are raised	Reposition areas using T2 curbs or degraded DBA barriers, side gutters, In the event of raising the	
• Presence of an anti-red line wall due to concrete crossing, resurfacing, provide as reinforced at the level of the island separation of the sidewalks from the central of the roundabouts. curbs T2, Structure in good condition; just	Renewal of the barrier some metal damage by a mixed wall	
• In the section with counter- (metal + concrete) driveway, it is noticed a TPL positioned on both sides of the track,		
	• Repair the degraded areas of the protective wall at the level of the central island of the roundabouts	
	• Renew green spaces used as TPL	

Place du Souvenir – Carrefour 3 Banques

Findings	Recommendations	State of play
• Pavement separated by a raised central gutter,	Refresh the central gutter, by sanding and painting,	
• Presence of barriers for protection of the red line due to pedestrians at the level of the resurfacing, provide 3 banks as a crossroads, separation of the sidewalks from the Raised gutter acting as a TPC using T2 curbs,	In the event of raising the metal line Demolition of bollards	
• The sidewalks are raised at T2 curbs,		
• Presence of existing bollards from sidewalks to sidewalks at the level of the sidewalk, BCEAO, French Institute, German Embassy. only in places where the width of the pavement reaches 3m,	Set up other France Embassy, bollards for aesthetics	

Carrefour Marché Saint Michel – Carrefour NASUBA – Echangeur Steinmetz – Carrefour Notre Dame

Findings	Recommendations	State of play
• Carriageway separated by a double line of DBS curbs need replace the curbs topped with DBS barrier with GSS2, metal in good condition, Correct the barriers	Keep the TPC intact, if	
• The sidewalks are raised metal vandalized using T2 curbs or TPC level, side gutters,	Shot blasting of the barriers	
• Presence of existing anti-metal wall in concrete crossing, provision of a layer of reinforced and topped with paint, metal barrier at the Marché St roundabout resurfacing, plan like Michel. Work in good separation from the sidewalks of the states; T2 curbs,	In the event of raising the level of the central island of the red line due to	
• Presence of street lights in the TPC		

Carrefour Air Afrique - Old bridge

Findings	Recommendations	State of play
• Carriageway separated by the DBS curb islands with a cross-section, favour the Notre Dame crossroads with GSS2 curbs,	As part of the review of	
• Sidewalks are raised curbs, degraded GBA barrier,	Reposition areas using T2	
• GBA type barriers positioned at the limit retained throughout this South of the crossroads Our lane while integrating the Dame. Some of these GBA options retained in the framework are vandalized from the rehabilitation of the market	Better think of the devices of are	
• Presence of Ganhi street lights in the TPC		

Carrefour Cheminot – Steinmetz overpass

Findings	Recommendations	State of play
• Pavement separated by a raised central gutter, • Presence of GBA after the the pavement, red line due to • Sidewalks are raised, resurfacing, provide as with T2 curbs, separation of sidewalks from • Presence of T2 curb street lamps, in the TPC	Refresh the central gutter, by sanding and painting, In the event of a raising of	

4.4.9 Blackheads

Generally speaking, a road black spot generally refers to a place where road traffic is made difficult by the configuration of the place. Some black spots can be particularly accident-prone. In France, a black spot is the usual term for a zone of accumulation of bodily accidents (ZAAC); i.e. road sections where a greater number of physical accidents are recorded over a given period of time, on a given linear and which have caused a certain number of serious victims (serious injuries or deaths). A black section is sometimes referred to as a black dot that extends beyond a defined road line.

Defined in this way, there must be a threshold to speak of a black dot. Currently, no threshold is yet required by the services in charge of road safety management in Benin; A global approach by axis is then adopted in the accumulation of bodily accidents. This approach is also adopted because of the lack of spatial data that can provide information on the exact locations of personal accidents.

Following this approach, the consultant approached stakeholders such as the police, the fire brigade, and local elected officials in order to have a hierarchy of accident-prone roads but also to identify the possible ZAAC of the planned axes. A visit to the indicated places made it possible to observe, analyse and confirm or refute in situ the factors mentioned by the stakeholders.

Despite the inadequacies of this approach compared to a systematic geolocation determination of all bodily accidents, it nevertheless has the advantage of providing useful information on areas likely to represent the black spots of the ATC project's arteries.

The risk factors linked to these identified black spots should make it possible to define the physical corrections to be made in the identified areas and also to take measures to improve user behaviour with regard to the human factors impacting the frequency and severity of accidents. In this sense, the consultant endorsed the recommendations of the
"Mobility study in Greater Nokoué" for the axes analysed by this study.

Each black spot was analysed in relation to factors related to the road infrastructure and its environment, factors related to users, factors related to vehicles and also in relation to traffic management, especially in intersections.

It was noted that for Lot 1 of the ATC project, the black spots identified are six (6) in number and are all intersections.

Table 7: Summary of the black spots identified on the axes of lot ATC 01

No.	BLACKHEADS	RISK FACTORS
1	SOBEBRA Junction	Failure to respect the priority at the roundabout; Lack of signage.
2	Carrefour La Roche /GASTON NEGRE	Failure to respect the right of way; Signalling fault
3	OPT/ PK3 Hub	Directional islands of the main branches incorrectly made Failure to respect the right of way
4	Carrefour le Bélier	Fatigue at the wheel, Reckless driving Difficulty understanding
5	Carrefour Notre Dame	the crossroads Multitude of traffic islands Lack of visibility for the
6	Carrefour FITHEB	arrival road of the Steinmetz roundabout Difficulties in entering the main branch

4.4.10 Summary of Arterial Inspection Results

Table 8: Synoptic table of the security problems identified on the different axes under study

Axes	Findings	
General comments		
All axes	Horizontal signage absent or almost erased	Difficult to understand the roads / non-identification of lanes and traffic corridors / possible collision between vehicles moving in the same direction / non-identification of pedestrian crossings.
	Vertical, vandalized, destroyed, insufficient and inadequate signage	Difficult to understand the axes/ non-identification of pedestrian crossings/ increase in speed/ endangerment of pedestrians and other 2WD road users. Theft of panels by
	Permanent signs made of ferrous materials Permanent	the population for recycling and recovery for the wind tunnel and welding.
	vertical signs	Use for display advertising purposes
	Light signalling under conventional energy	Risk of congestion at intersections at the time of outages / early deterioration of equipment due to power surges Congestion of intersections / increase in nuisance time /
	Non-functional light signalling	anarchic circulation of users Stop of road flow / no fluidity even without traffic saturation / constantly recurrent
	No traffic light synchronization	congestion of the axes in current sections.
	Falls of drainage slabs	Insecurity for pedestrian and 2WD users / Risk of falls with more or less serious bodily injury Theft of ferrous material buffers, leaving openings, potential areas for pedestrians
	Sanitation manhole covers made of ferrous materials No lanes reserved for 2WD No	and 2WD drivers to fall
	traffic light phase taking into account reserved lanes Illegal	Increased risk of collision/uncontrolled driving
	occupation of sidewalks by billboards and large trees	Increased risk of personal injury accidents
	Problems	Pedestrian path diverted on the roadway / risk of collision

Axes	Findings	Trouble
General comments		
	Potholes and bulges on some roads	Collision following evasive manoeuvres
All axes	No visibility of restraint systems / risk of defective street lights in collision / dangerousness of pedestrian crossings of certain sections of the TAG movement axes in these areas Presence of 'CLP' signs Problem of understanding the signs / conflict of traffic lights in roundabouts despite the priority rules presence of traffic lights	
	Mixed uses Conflict of occupancy between users Use of lanes for parking purposes / Lack of space Reduction in the fluidity of traffic flow / Parking, more or less lasting congestion No pedestrian crossing at the Anarchic crossing of the road / endangerment of life Rights of regular pedestrian crossing Points Need for 2WD to move to 4WD lanes during overtaking manoeuvres / General slowdown of the flow of the road flow 2WD drivers Lack of visibility to the front and rear (through the mirrors) Oversized loading Visibility problems / risk of collision tricycles Anarchic changes of traffic lanes by the Risk of collision with other 2WD users Observations Problems	

Roads		
Specific observations		
Old bridge – SOBEBRA crossroads – OPT PK3 crossroads – Le	Bélier crossroads Crossing at any Faulty separation between the road location of the two roads / non-road and the railway one Respect for pedestrian crossings Construction of the Tokplegbé Market with high pedestrian traffic / risk of	
	crossroads Japan Motors increased collision during crossings Marking pedestrian crossing erased in Anarchic pedestrian crossings current section and at	
	crossroads Opening for direct access Increase in commercial conflicts towards the main carriageway Anarchic driving / increased risk No reserved collision lanes	
	Overflow of the geometry of the islands Narrowing of the ring / directional risk of the main collision branches in the roundabout ring	
Third bridge – SOBEBRA crossroads	Several conflicts at the La Roche crossroads	Risk of collision due to intoxication and misperception
	No traffic lights at the La Roche crossroads	Congestion problem
	No pedestrian crossing at the La Roche crossroads	Pedestrian crossing difficulties
Place du Souvenir – Carrefour 3 Banques	Lack of parking space	Occupancy of the roadway as a parking area
	Mixed uses	Risk of collision

Axes Observations Problems		
Specific observations		
Carrefour Marché Obstruction of a lane of the Saint Michel – Parking at the exit of the Carrefour NASUBA – parking Steinmetz interchange Traffic congestion by the – Carrefour Notre No traffic lights TAD users turning to the right Lady Occupation of the road as Lack of parking space parking zone Carrefour Air Afrique -		
Carrefour Notre Dame – too many islands Incomprehension of the intersection / socket Old directional bridge of the wrong traffic corridor / non-expressive signs Carrefour Cheminot – Increase in pedestrian traffic Opening of entrances to the carriageway Overpass High risk of collision for the main Steinmetz pedestrians		

4.5 Preliminary Recommendations (All Areas)

Understanding the state of the road safety situation, in order to make possible improvements, is the objective of the safety inspection for existing roads. In the case of this study, this chapter on this activity has traced the results of the inspection carried out by the consultant's teams. The general observation is the non-existence, or at best the inadequacy, of permanent police signage and horizontal signage. Without signage, the user's understanding of the road is more complicated.

The inventory of signs reveals that 46% of existing signs are vandalized or destroyed, generally by users.

Road restraint systems are present on the axes at various levels, TPC, external approaches to the road, sidewalk edges, central island of roundabouts. Their condition is more glamorous except for the vandalized metal barriers. It is recommended to keep the central dividers, to change the bollards in the sidewalks, and finally to change the current metal barriers.

Urban Road Safety, an involvement of all

05

ROAD SAFETY MANAGEMENT IN BENIN

5 ROAD SAFETY MANAGEMENT IN BENIN

The aim is to take stock of the management of road safety in the city of Cotonou. This inventory covers the institutional framework, the legislative and regulatory framework, the strategy and actions, and finally, financing.

5.1 The institutional framework

The Beninese State is concerned with Road Safety through the following institutions:

- The National Road Safety Centre (CNSR), the national body in charge of road safety issues;
- The National Land Transport Agency (ANaTT) in charge of driving licences, vehicle registration, etc.;
- The Directorate of Land Transport (DTT) at the Ministry of Infrastructure and Transport (MIT) in charge, among other things, of the regulation of road transport;
- The Directorate General of Infrastructure (DGI) in charge of road infrastructure at the expense of the central State;
- The Road Fund Directorate in charge of financing maintenance programs for classified roads;
- The Republican Police, in charge, among other things, of the enforcement of road regulations, the education and awareness of road users, the collection of data on traffic accidents and the repression of road crime;
- The Fire Brigade responsible, among other missions, for rescuing road accident victims;
- Hospitals, including emergency departments that receive and care for victims of road accidents;
- Insurance companies that manage the care of victims and the various repairs of damage caused by road accidents;
- Judicial bodies, which deal with the implementation of laws;
- The private sector (design offices and companies) that operate in road projects;
- Non-Governmental Organizations working in the field of road safety;
- Municipal services;
- Driving schools in charge of driver training;
- The Network of Parliamentarians for Road Safety
- Etc.

All these structures that make up the institutional framework of road safety are strongly present in the city of Cotonou, which houses their headquarters and their supervisory ministries. Several of these

institutions were visited during the period of these studies.

5.2 The legislative and regulatory framework

The legislative and regulatory framework is one of the links in the road safety chain which is based on legal texts, decrees, orders and supranational texts such as conventions and various treaties oriented towards the movement of goods and people in adequate safety conditions.

The texts in force, some of which are currently being updated, represent necessary tools for road safety management. New texts are needed to deal with new phenomena and to incorporate into national legislation the directives and recommendations of the international institutions of which Benin is a member.

The law on the Beninese Highway Code is being finalized and should be validated in the short term, as is Benin's road safety policy document.

Specifically, heavy vehicle traffic is regulated in the city of Cotonou, in particular for access to the Port of Cotonou. Traffic times have been set to avoid morning and evening rush hours in order to reduce congestion.

The legislative and regulatory framework is supported by international road safety conventions (Vienna Convention and others), road safety standards, community provisions in this area (ECOWAS, UEMOA), etc. The following list (non-exhaustive) presents some of these texts applicable in Benin for the management of road safety: the Vienna Convention on Road Signs and Signals (1968);

- the Vienna Convention on Road Traffic (1968);
- the Declaration (Moscow Declaration on Road Safety, etc.) of November 2009;
- the African Charter on Road Safety, adopted in Addis Ababa (Ethiopia) on 31 January 2016;
- Directive 12/2009 on the establishment of a harmonized road safety management plan in WAEMU member states;
- Directive 13/2009 on the institution of road safety audits in WAEMU member states;
- Directive 14/2009 on the establishment and organization of an information system on road traffic accidents in WAEMU member States;
- Directive 15/2009 on the organization of the training system for obtaining a driving license in WAEMU member states;
- Directive 16/2009 on roadworthiness tests in the Member States of WAEMU.

In the construction of road infrastructure, road signs and road traffic, French standards are widely used in Benin, constituting references for the many aspects for which Benin does not have specific standards.

5.3 Strategy and actions

Benin does not yet have a road safety strategy document validated and adopted by the Government. Its development is included in the action plan for the Decade of Action 2011-2020

In fact, the document to be drawn up will include a strategy for combating road accidents that has been implemented for years and based on concomitant actions on the three main factors that constitute: people, rolling stock and road infrastructure.

Actions on humans

Actions on people consist of improving the behaviour of road users and their perception of road risk through information, education, training, awareness-raising and coercion.

In accordance with its missions, the National Road Safety Centre implements an annual programme of actions in collaboration with other institutions and non-governmental organisations operating in the sector. This programme includes, among other things, awareness campaigns, training and education actions, roadside control actions (speeding and drinking and driving) in collaboration with the Police, work in committees for administrative sanctions against drivers involved in traffic accidents.

The National Road Safety Centre, apart from its main base located in Ekpè (East Exit of the city of Cotonou), has several decentralised services in the country's departments. The action programmes are relayed by these decentralised services.

On the other hand, the National Agency for Land Transport is responsible for the issuance of driving licenses by organizing theoretical and practical exams for candidates trained and presented by driving schools. The consistency of training programmes in driving schools and the effectiveness of the methods of evaluating candidates contribute to the improvement of behaviour on the roads. All candidates for the driving licence examination are assessed using a software program (the EXAMATIQUE software) which has the ability to automatically produce audiovisual subjects in French and seven (7) national languages. The particularity here is that non-literate candidates compose in writing, in the same way as literate candidates, according to a color code

Figure 1: Screens of the software for evaluating candidates for the driving licence test

The ANaTT headquarters are located in Cotonou as well as one of its decentralized services in Cotonou East.

The Republican Police is strongly involved in improving the behaviour of road users by regularly carrying out control, deterrence, awareness-raising and repression operations. The actions of the Police have made it possible for drivers of motorized two-wheelers to wear helmets, particularly in the city of Cotonou, as well as to respect the use of the few lanes dedicated to two-wheelers.

Actions on rolling stock

The actions on rolling stock aim to monitor the condition of the vehicles in the fleet on the road and are of two kinds:

- Periodic technical inspections, the frequency of which depends on the category of the vehicle;
- Roadside checks to check the condition of vehicles on the road, in collaboration with the Police.

In addition to these actions, the Government has issued a decree to limit the age of vehicles for importation and a draft text is being prepared for the removal and destruction of rickety vehicles from circulation.

Most of the vehicles put on the road come from the second-hand vehicle sector, of which Benin is one of the import hubs in West Africa. Apart from a few large companies in the area, the State is almost the only customer of new vehicle dealers.

The CNSR has a monopoly on technical inspection operations at the national level. These operations are carried out every day by its competent services both at its headquarters and in its decentralised services (except for the Special Annex of Cotonou).

However, these actions on rolling stock are almost non-existent for motorized two-wheelers that are not subject to technical inspection, although they are massively present in Benin's car fleet and also massively present in traffic accident statistics.

Actions on road infrastructure

Road infrastructure is now the subject of particular attention in terms of road safety in Benin:

- Road construction projects are controlled against road safety standards, whether for the route, the signage and the various equipment. The National Road Safety Centre regularly participates in these inspections and gives its opinion on the content of the various study reports;

- The National Road Safety Centre carries out safety inspections of existing roads in order to identify anomalies that may constitute major risks to traffic and propose their correction;

In addition, Benin is in the final phase of the implementation of the road safety audit of road projects:

- The audit manual has been developed and validated as well as the application guides;
- Administration executives, companies and design offices have been trained in the use of these tools;

- The National Road Safety Centre has set up a Road Safety Audit Unit to not only continue the inspections of road construction sites and inspections, but also to effectively coordinate the audits as soon as they start.

5.4 Capacity building for Republican Police officers

The information system on traffic accidents has been the subject of a trainer's manual published and made available to the Republican Police for the knowledge to be acquired by each officer working within the units in charge of traffic accident reports. In addition, a group of trainers has been trained within the executives of the Republican Police and the National Road Safety Centre. These trainers are responsible for disseminating the necessary knowledge within the Republican Police in order to increase the capacity of officers to effectively collect data on traffic accidents.

Based on the data collection bulletins transmitted by the Police, the CNSR regularly updates the database of road accidents and produces statistics that allow, among other things, the analysis of road accidents.

The data are verified, corrected, updated and validated annually to be made available to the public through statistical yearbooks and to meet requests for statistics from various national operators and international agencies.

The data for the year 2021 were not yet validated at the time of the studies, so the last ten years of the studies were selected from 2011 to 2020, a year that had already been validated and published.

5.5 Road Safety Funding

Like many African countries, Benin also has problems with road safety financing, as the national road safety financing fund is not yet in place.

However, a self-financing mechanism has been set up to ensure a minimum of stable and sustainable resources for the national body in charge of road safety (operation, activities, investments). These resources come mainly from vehicle technical inspections and go directly into the organisation's budget.

When the National Road Safety Centre was created in 1987, the Beninese State decided to entrust it with the monopoly of vehicle technical inspection, understood as an activity to prevent road accidents

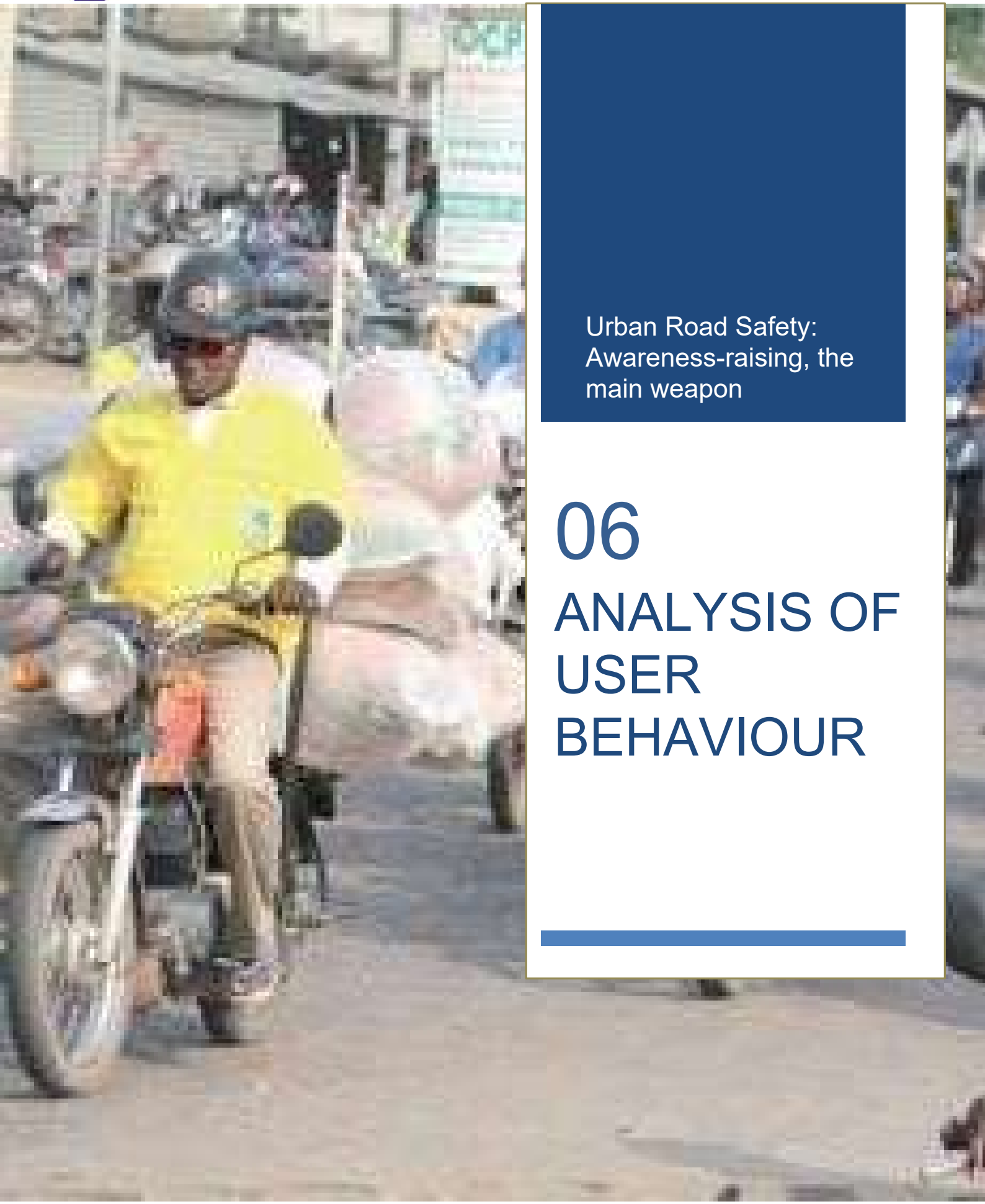
The resources from the Vehicle Technical Inspection allow the National Road Safety Centre to:

- To finance information, education and awareness-raising campaigns for road users;
- Organize regular awareness-raising or coercive roadside checks in collaboration with law enforcement;
- Manage the accident database (data collection and processing);
- Acquire equipment such as speed control radars, vehicle technical inspection equipment, breathalyzers, GPS for the geographical location of road accidents, etc
- Support NGOs working in the field of road safety at the national level;

- Participate in various works and forums on road safety in Africa and elsewhere in the world;
- Carry out capacity building of its staff;
- Etc.

It is clear that the financing of road safety must go far beyond the means available to the National Road Safety Centre because it is necessary to ensure greater investment in order to make real progress towards achieving the objectives.

The mobilization of the 10% of the cost of road projects and the 5% of the cost of road maintenance could mitigate the deficit.



Urban Road Safety: Awareness-raising, the main weapon

06 ANALYSIS OF USER BEHAVIOUR

6 ANALYSIS OF USER BEHAVIOUR

6.1 User behaviour

Whether it is mixed or built according to the principle of segregation, the road in an urban environment remains a space shared by several users, necessarily generating interactions between them. The themes relating to user behaviour in traffic relate to:

- Compliance with speed limits in the city,
- The use of the motorcycle and the wearing of a helmet,
- Wearing seat belts in cars in the front/rear seats in the city,
- Drinking and driving,
- The use of motorcycle tracks,
- Respecting red lights in the city with/without police officers,
- Respect for priorities in intersections,
- Respect for pedestrian crossings,
- Track occupancy and the hierarchical relationships between motorized and non-motorized users

User behaviour depends on the type chosen

1) Pedestrians:

The vast majority of users are pedestrians, they are made up of:

- Traders whose activities take place near the markets located along the road
- Students who attend schools located along the road and in the area of influence of the project

2) Motorcyclists:

- Individuals
- Professional drivers known as "zémidjans"

3) Drivers of light vehicles:

- Individuals
- Professional drivers known as "taximen"

4) Truck drivers
5) People with reduced mobility

With variations, deviance and dangerous behaviour are essentially based on:

- Failure to comply with the highway code
- Failure to respect traffic corridors
- Recklessness in built-up areas

- Lack of signage or lighting
- Misuse of lighting devices
- Defective or unsafe parking
- Out-of-gauge loading
- Hazardous road crossings
- Refusal of priority
- Drunk driving
- Speeding
- The non-wearing of helmets for motorcycle drivers
- Ignorance of the rights of individual or weak users, including people with reduced mobility

Reckless Conduct

- "Forcing" in overtaking and crossroads/crossings
- Various imprudences
- Failure to respect rest periods

The age of the drivers, the age of the driving licences, the weather conditions, the decrease in vigilance of the drivers, the condition of the vehicles, overloading etc... are other risk factors to be taken into account as well.

6.2 The problem of motorcycle use

The motorcycle is the most popular means of transport in Cotonou, especially because of the simplicity and ease of escaping traffic jams. However, this mode of transport creates enormous problems in the implementation of adequate road safety.

Access, obtaining and withdrawing a driving licence for motorcyclists is not taken into account in traffic, neither by users nor by the police. These measures are not applied in Benin. As a result, the vast majority of motorcycle drivers do not have a driver's license or training in the highway code.

The road safety aspect and learning has been completely lost. In addition, no law enforcement measures have been put in place by the police to allow the application of the motorcycle license.

Learning to drive two-wheelers is usually done with the help of a friend or family member who guides the learner in the rudimentary handling of the machine. The widespread lack of knowledge of the rules of the road and signs is largely the reason for most accidents.

The police are not mandated to check whether the motorcycle driver is in possession of a license, but only whether the motorcycle has the sticker. In addition, few traffic violations are really punished, with the exception of traffic lights, the forbidden direction, hitchhiking and not wearing a helmet.

Speed, overtaking, the licence, the age of the motorcycle driver (more and more motorcyclists are under 15 years old) and many other aspects related to road safety are not subject to police control when it comes to motorcycles.

Motorcycle users are not very receptive to the various awareness campaigns that the State and NGOs have been able to carry out in Benin.

It should also be noted that there has been a recent proliferation of motorcycle tricycles, mainly for the transport of goods (but also increasingly for the transport of people), for which no legal measures are provided for in the texts (although this aspect is in the pipeline), nor are any police control measures put in place, apart from roads that are forbidden to their circulation.

The drivers of these motorcycle tricycles do not receive appropriate training, or even an introduction to the highway code or the machine. Their behaviour in traffic represents a growing danger, especially for vulnerable road users such as pedestrians. Vehicle overturns, collisions, sudden stops (because of their overload) are very frequent on public roads.

Benin has instituted traffic corridors by transforming the side alleys for the roads that have them into traffic lanes for motorcyclists. But the latter do not always respect them. The desire to reach their destination quickly pushes some 2-wheeler motorcycle drivers to leave their traffic lanes, which are often congested during rush hour, to weave through cars

The repression undertaken by the Republican Police against "the non-wearing of helmets" has ensured at least a 90% admissibility rate for drivers; but practically 0% for the person towed on a motorcycle. The problem mentioned here is related to cleanliness and hygiene. Indeed, it is recommended in view of pathogenic viruses that the helmet be considered as an intimate object. This means that each passenger on the motorcycles must travel with their helmet.

In traffic, people make calls and take the risk of holding the mobile phone with one hand, and the handlebars or steering wheel with the other, at the risk of causing serious road accidents.

6.3 Perception of accidents by users

Traffic accidents are experienced as a fatality among the population. Compliance with traffic and safety rules is not an element mentioned by users as a way to avoid accidents or their consequences.

6.4 Lack of courtesy of users

It is common to witness derogatory behaviour by some unscrupulous users. You are ready to physically fight with your counterpart. Despite the various reminders from the police, it is non-compliance with the highway code and bad driving that prevail, because some have no notion of the highway code. Even those who seem to control him, rape him without any concern.

Many people do not know, for example, that the green light gives the right of way, that the red light forces the passenger to stop, and that the orange light asks the user to prepare to stop. When the red light is lit, many users, to save their fuel, turn off their engines altogether. Once the green is lit, they try to turn it back on; As a result, they prevent others behind from passing and this creates frustration.

Many young 2WD drivers enjoy weaving between vehicles, a way for them to demonstrate their driving strength, and show that they are the best drivers. However, it is a dangerous game that causes serious accidents, which usually result in the loss of human lives.

Courtesy, tolerance and patience do not exist in the vocabulary of some road users. The latter do not miss any opportunity to hurl insults or insults at their counterpart, and we sometimes witness arguments increasing the risk of accidents for the latter but also for other road users.

6.5 The anarchic driving of 2WD

In the city of Cotonou and on certain arteries, it is not uncommon to observe 4WD drivers but especially 2WD drivers crossing the TPCs when possible in order to pass from one road to another in order to shorten distances or avoid congested lanes. This habit, which in no way corresponds to compliance with the highway code, sometimes causes accidents and contributes to the destruction of infrastructure.

6.6 Out-of-Gauge Loads Observed on 2WD

Oversized loads on 2WD vehicles are a risk of accidents. They are the cause of non-compliance with traffic corridors and congestion in lanes reserved for 2WD traffic.

6.7 Preliminary Recommendations

Passing through a minimum training in the highway code should be made compulsory for all motorcyclists in Benin.

The age of the motorcycle driver should be set and controlled, especially for children under 15 years old, who are obviously too young. The transport of more than 2 people on a motorcycle should be prohibited and subject to controls and sanctions.

Similarly, drivers of motorcycle tricycles should be subject to legal measures concerning obtaining a permit to drive, load and unload, concerning the driving licence, as well as overloading the vehicle.

The transport of people by motorcycle tricycles presents a huge danger and should be strictly prohibited, with strict enforcement in traffic. As these machines were initially intended to transport small quantities of goods, their stability and safety are not guaranteed for people and these motorcycles are not the subject of any expertise at the level of the National Agency for Land Transport.

The police forces should check whether the motorcycle driver is in possession of a license or a certificate of training.

Providing the wounded with quality

07

RESCUE AND CARE TO THE WOUNDED

7 RELIEF AND CARE OF THE WOUNDED

7.1 Early warning systems

Warning systems make it possible to prevent accidents or limit their consequences. An accidental event (road accident, fall of a tree or electricity pole, failure of a structure, serious erosion of the platform, etc.) can in certain circumstances constitute risks of accidents.

The proper functioning of alert systems depends on the speed of transmission of information, the efficiency of the means of communication and the responsiveness of the responders.

Warning systems involve the population, decentralized state technical services and local administrations. These are the populations of the city districts and districts, the public security forces and the public works, justice and health services.

7.2 Assistance systems

The assistance is the result of the responsiveness of the speakers. It is technical (targeted intervention to find a rapid solution, even temporary, in the event of accidental damage to the infrastructure, for example), health (assistance to the injured) or legal (rapid evacuation of disputes). At this level too, many problems arise both at the national level and in the city of Cotonou. These problems are caused by the same sources: Low involvement at the individual and collective levels;

- Insufficient material, financial and human resources;
- Weak political will.

The Healthcare Offer

The care of victims of road accidents remains a thorny problem in the management of road safety in Benin. The open health offer concerns public hospitals in the city of Cotonou. Private health centres are mostly excluded from the system of assistance and assistance to the injured.

The technical platforms of public health centres still need to be strengthened for a quality healthcare offer.

In most cases of accidents, the victims are not taken care of. They are abandoned to their fate because these vehicles, especially 2WDs, often do not have third-party car liability insurance or the perpetrators flee. The Benin Motor Guarantee Fund (FGA-BENIN), created by the Beninese State and the insurance companies operating in the automotive sector, acts as a palliative in this regard. Faced with the difficulties experienced by victims of road traffic accidents in pre-financing their care, the FGA-BENIN, in collaboration with insurance companies, has set up a traffic accident declaration office within the Hubert Hospital and University Center Koutoukou MAGA for rapid and systematic management of these accidents. However, the FGA remains unknown to the majority of accident victims.

Improving the road safety offer

08

PROPOSALS FOR IMPROVEMENT AND MEASURES ACCOMPANYING

8 PROPOSALS FOR IMPROVEMENT AND ACCOMPANYING MEASURES

The objective of this road safety mission is to practice SRI and SRE to provide structures that offer a greater guarantee of safety to users.

In view of the chapters developed above, the areas for improvement are diverse and multiple. These range from practical and directly related infrastructure improvements to structural and institutional improvements.

8.1 Infrastructure Improvements

Understanding the road is based on clear principles set out in the documents such as:

- the interministerial instruction on road signs and signals (IISR);
- the Highway Code,
- CEREMA's standards and regulations concerning urban roads and arteries.

8.1.1 Road signs

Road signs are made up of signs, road markings and lights. It informs users of the rules in force and guides them in their travels. Well designed and executed, it reduces the causes of accidents and facilitates traffic.

Signs and signals do not and cannot have the character of a guarantee provided by the public authorities to road users against the hazards and dangers of traffic. These users always travel at their own risk.

The purpose of road signs is:

- make road traffic safer.
- to facilitate this circulation.
- to indicate or remind people of various special police requirements.
- to provide information on the use of the road.

One of the basic principles set out in the Interministerial Instruction on Road Signs and Signals (IISR) is the principle of recycling: " The inflation of signs is detrimental to their effectiveness. They should only be placed if they are deemed useful."

To be useful, signage must be effective, which implies compliance with the following five principles:

- Valuation principle: the inflation of signals is detrimental to their effectiveness. They should therefore only be placed if they are deemed useful.
- Principle of concentration : when it is essential that several signals be seen at the same time or approximately at the same time, they must be implanted in such a way that the user can perceive them at a glance, night and day. It is advantageous to group two signs on the same medium when the two indications relating to the same point complement each other (e.g. level crossing and blackcurrant, or traffic lights and pedestrian crossing).
- Principle of readability: the motorist should not be asked to make an excessive effort to read or remember. The indications must therefore be reduced and simplified as much as possible and, if necessary, the signals must be distributed over several staggered media. Experiments have shown that the average observer cannot perceive and understand more than two symbols at a glance. For registration, indications are given below.

• Principles of adaptation: temporary or dynamic signage must be adapted to the circumstances for which it is implemented, in order to ensure the safety of users and staff.

• Principle of coherence: temporary or dynamic signage may give different indications than permanent signage already in place. Except in special cases, the permanent traffic signs concerned must then be temporarily masked, to avoid a contradiction likely to create a traffic disturbance.

In the consultant: the framework of this project, the following ranges, types and forms of signage are proposed by

- Vertical signage: the signs will be in the Normal range, with a clear height under the panel of 2.30 m. The signs will be installed on the sidewalks at a safe distance from the edge of the road. In accordance with the CEREMA standard, the signs will be installed 1 m from the edges of the road for sidewalks with a minimum width of 3 m. At the level of sidewalks of less than 3 m, a safety distance of 0.5 m will be respected;
- Horizontal signage: the unit of width chosen is u = 6cm. For broken lines, and types of horizontal markings, it is recommended in view of the planned arteries to comply with the relevant IISR regulations. However, for the delimitation between the pavement and the road, no markings are retained. Several products are currently used in road signs, all with advantages and disadvantages. The Beninese context, which does not ensure a regular refreshment of horizontal signage, forces us to move towards products of great durability. Hot curtain plasters meet these criteria perfectly and will therefore be used for floor markings.
- Light signalling: all the traffic lights selected after analysis of the intersections crossed must comply with the conclusions of the studies of the Central Traffic Regulation Post (PCRT) on the traffic light network carried out by SIRAT SA.
- Temporary signage: road works, regardless of their size, must be subject to temporary signage. For enforcement, temporary signs will be put in place in accordance with the regulations in force

8.1.2 Speed Moderation Devices

A paradoxical effect of the quality of a new or refurbished road is speed. Among the conflicts between road users, the implementation of speed calming devices is necessary. However, and as far as possible, the choice of development must lead the user to adopt a speed adapted to the environment without feeling unfairly constrained in an excessive way.

• Speed limits : to be accepted and respected, a speed limit must be consistent with the characteristics of the road and its uses, as well as with the user's reading of the road.

• restrictive physical arrangements: these are speed moderation devices, namely: speed bumps and differences in height (speed bumps, trapezoidal speed bumps, bearings, raised platforms),

chicanes and locks and warning devices (rumble strips, warning lights

As the roads under study are major arteries, it must be understood that any slowing down of traffic by restrictive physical devices is to be avoided at the risk of generating huge traffic jams and by ricochet discontent. The safety of users will be achieved by downgrading to zone 30 and improvements to the current cross-section.

In such a context, the consultant recommends the installation of speed limit signs with reminders.

However, the boundaries of the 30 zones will be done using raised platforms as alarms and speed bumps. On some streets, devices such as Berlin cushions that slow down light vehicle traffic without disrupting 2WD traffic will be recommended.

8.1.3 Socio-community infrastructure – a sensitive point for road safety

Appropriate signage will be put in place at the level of the socio-community infrastructure. These are essentially the A13a and A13b signs; AB4 panels at the beginnings. At the level of the Tokplégbé market, a separate study is underway and takes into account possible security problems with regard to access and operation of the market.

8.1.4 Infrastructure Kinematics

The development of urban roads meets very strict standards both in terms of the design of the cross-sections and the combined route. The basic speed considered depends on the street and its environment. It is generally between 50 km/h and 70 km/h.

The review of the geometric characteristics of the arteries was carried out in accordance with the recommendations of the Centre for Studies and Expertise on Risks, the Environment, Mobility and Planning (CEREMA) entitled "Urban roads - development guide".

8.1.5 Infrastructure Cross-Section and Dedicated Lanes

Urban roads cannot be designed, developed or operated in a mono-functionalist logic of transport infrastructures. It is a major element of urban richness and diversity and necessarily involves multiple approaches. The axes under study are designed as "all-automotive" with 4WD and 2WD using the same road without physical separation.

Two-wheelers are now widespread on the main arteries of Cotonou (lot 1), where they represent more than 62% of traffic. The diagnosis made from statistical data confirmed their strong involvement in traffic accidents, being found in 72% of the physical accidents recorded in the city of Cotonou with more than 62% of deaths over the last ten (10) years.

Since the experimentation with convincing results of the conversion of the existing side lane into reserved 2WD lanes and local traffic, it has become necessary in order to offer more safety to users to redevelop side alleys on the arteries under study within the limits of the administrative right-of-way.

However, the mix of 4WD driving to local access and secondary and tertiary roads, and 2WD does not always go well, especially in the event of congestion. And this is all the more so since there is no device regulating traffic on the side alleys. The other difficulty observed concerns the Turn-to-left movement of users of the side alleys. All this leads to a more intensive reflection on this "Beninese style" solution.

The implementation of a cycle path reserved only for 2WD dissociated from the side alleys is a possible solution. It will be located between the main road and local traffic. However, further studies will be needed to standardize:

- the definition of a 2WD in the Beninese context,
- the minimum width of a 2WD lane,
- the hourly throughput of a 2WD lane.

All this data is necessary for the design of a path that is not cyclable but rather motorized.

In view of this missing information, the consultant then recommends the installation of side alleys to be used for the purposes of local access, and connection with secondary and tertiary roads, but also for the transit of the flow of 2WD.

The new cross-sections projected at the end of the studies take into account safety recommendations and the primary function of the arteries. Reserved lanes are integrated into sections of sufficient right-of-way.

More specifically, the following intersections must: 8.1.6 Intersections

Intersections are congestion and safety points on highways. The complete flow of traffic depends on that observed at intersections.

In general, the following improvements will be required at the intersections inspected:

- geometric improvements,
- the installation of functional traffic lights at intersections that do not have them; make those that are out of use functional;
- the synchronization of the traffic lights to create a green wave and maintain the fluidity of the flow of traffic,
- better phasing of traffic lights. In this sense, the results of the study on Traffic Regulation should be taken into consideration,
- the installation of vertical and horizontal signs,
- the installation of pedestrian crossings

(i) La Roche / Gaston Nègre crossroads: removal of the southern entrance road. It will be converted to an exit lane only. In this direction, a more direct ramp will have to be planned to directly connect the lane leaving the old bridge and the one passing in front of the CNSS,

(ii) Carrefour Notre Dame: removal of the directional islands,

(iii) Junctions Pk3, Japan Motors, Abattoir, and Le Bélier: redesign of the directional island of the main branches in order to eliminate the narrowing of the ring

(iv) Marché Saint Michel crossroads: reorganisation of the crossroads to take into account the fluidity problems

generated by the rehabilitation of the Marché Saint Michel.

(v) Carrefour ex FITEB: closure of the interruption of the TPC in order to respond to integration problems and convincing conflicts of TAG.

8.1.7 Road Restraint Systems (RRDs) and Physical Separations

It is noted that there is a railway line on some axes. Although not functional at the current stage, and in the absence of decommissioning, a retaining structure will be put in place between the road and the railways on both the main and the side of the roadway.

The other restraint devices consist of DBA and GBA separators, separation pads, wire mesh walls, etc.; all of which fit perfectly into the proposed landscaping plan.

According to the amended RNER (National Regulation of Road Equipment) order (French standard), the minimum restraint levels imposed on the shoulder and in TPC are summarized as follows:

Table 9: Minimum restraint levels imposed on the shoulder by the amended RNER order

On the shoulder		
Maximum speed allowed	70 km/h ≤ T < 90 km/h	T ≥ 90 km/h
Minimum Restraint Level	N1	N2

Table 10: Minimum Restraint Levels Imposed in TPC by the Amended NRER Order

In TPC					
Maximum speed allowed	70 km/h ≤ T < 90 km/h			T ≥ 90 km/h	
		TPC Width			
		TPC ≥ 5 m		TPC < 5 m	
			Number of Channels		
			2 +1 or 2 x 1	2 x 2	2 x 3 and more
Minimum Restraint Level	N2	N2	N2	H1	H2

In the event of the installation of a GS4 type barrier, it will be lined with a motorcycle screen which prevents motorcyclists, in the event of a fall, from going under the barrier and hitting the supports. It therefore reduces the severity of injuries.

It would have been wiser to abolish the lateral DRRs in particular by recommending safety zones as in the case of interurban roads; In this case, two major constraints stand in our way. These are:

- the available footprint, which is small compared to the developments expected in an urban environment,
- the use of this recovery area for traffic purposes, especially during rush hour.

These two constraints force us not to consider the establishment of recovery areas but rather of DRR if necessary.

In the present project, the consultant recommends the use of DRR for TPC in order to effectively prohibit its crossing by 2WD; The level of restraint will depend on the cross-section of each artery. More specifically, the vandalized barrier at the level of the "Carrefour SOBEBRA – Carrefour OPT PK3 – Carrefour le Bélier" axis will be completely replaced by a mesh fence put in place to prevent its anarchic crossing by pedestrians. GSS2 wheel drive kerbs will be preferred in the event of reconstruction of the divided road. For streets with existing DBA and GBA barriers, these DRRs will be maintained, but made more visible with adequate lighting and road paint on the structure. The gutter edges will be reinforced with T2 curbs. At the level of the central island of the roundabouts, repairs to the damaged sections are recommended.

As far as possible, a left and right shaved band of 0.50m in relation to the edge markings will be observed.

8.1.8 Bridges

The protection of pedestrians is a priority for road safety. This concern for safety has already led decision-makers to adopt footbridges at important pedestrian crossing points such as markets and schools. The use made by pedestrians of these footbridges is diverse: - Non-use of the footbridge: it is not uncommon to see pedestrians crossing the road directly at the bottom when the footbridge is a few meters away,

- Unsanitary conditions on the footbridge: at night, the socially divorced use the bridge deck as a toilet to relieve themselves,
- Insecurity: some of our walkways are not equipped with wire mesh fences high enough to annihilate the feeling of fear generally observed at height; In addition, ill-intentioned individuals use the gateways for the purpose of racketeering the population.

Although they protect pedestrians, footbridges are also a source of insecurity for users, and therefore require the following measures to be taken:

- the construction of high-rise wire mesh fences,
- the lighting of all the walkways,
- The best way to force pedestrians to use the footbridges is to erect impassable barriers along the path crossed by the footbridge to force pedestrians to use it.

In this project, a footbridge is suggested at the Japan Motors crossroads ("Old bridge – SOBEBRA crossroads – OPT PK3 crossroads – Carrefour le Bélier" axis), to facilitate pedestrian passage to the market under construction near the crossroads. However, the consultant will endorse the conclusions of the specific study of the ground developments counting for the construction of the Tokplégbé market.

8.1.9 Public lighting

The lack of lighting is a source of road safety, it makes driving at night particularly dangerous. The roads under study are covered with public lighting with conventional street lights. The maintenance of this lighting network under the responsibility of the municipality was practically non-existent until the recent past. Several public lighting projects are being developed or implemented in several localities such as Cotonou.

The roads under study are gradually returning to a minimum level of lighting with these projects. However, the studies include a technical review of the lighting on these roads which will propose the appropriate solution.

8.1.10 Public Signs and Road Safety

Law No. 84-007 of 15 March 1984 on the regulation of public posters constitutes the legal basis for roadside advertising in Benin. A code on advertising in general has been under development since 2021.

It is not uncommon to see sidewalks and public transport sites taken over by billboards of all sizes. Those with low clearance heights do not encourage pedestrian traffic, to which they reduce the right-of-way reserved for pedestrian traffic, sometimes forcing them to walk on the road. In addition, their positioning for the most part does not allow users to be informed of the risks of traffic.

In short, these billboards are sources of road safety and must be systematically banned from TPCs. For sidewalks, their minimum clearance height must be 2.30m as for police signage and located 1.5 m from the edge of the road.

8.1.11 Summary of Proposed Improvements to the Inspected Highway Network

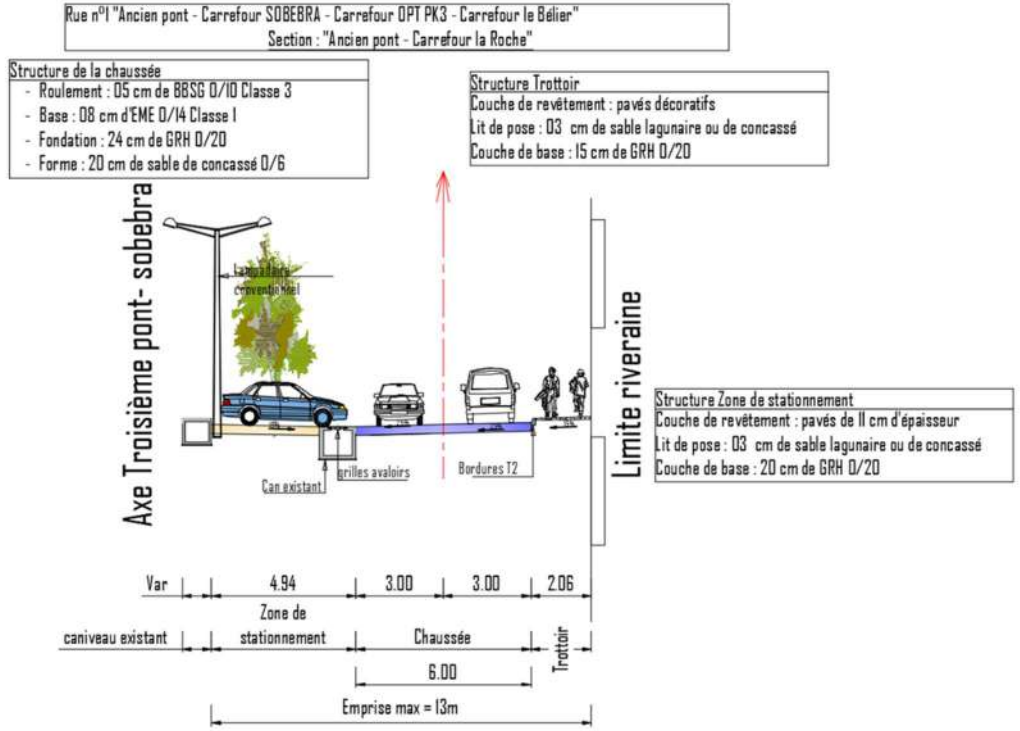
The summary table below lists all the planned improvements to the infrastructure.

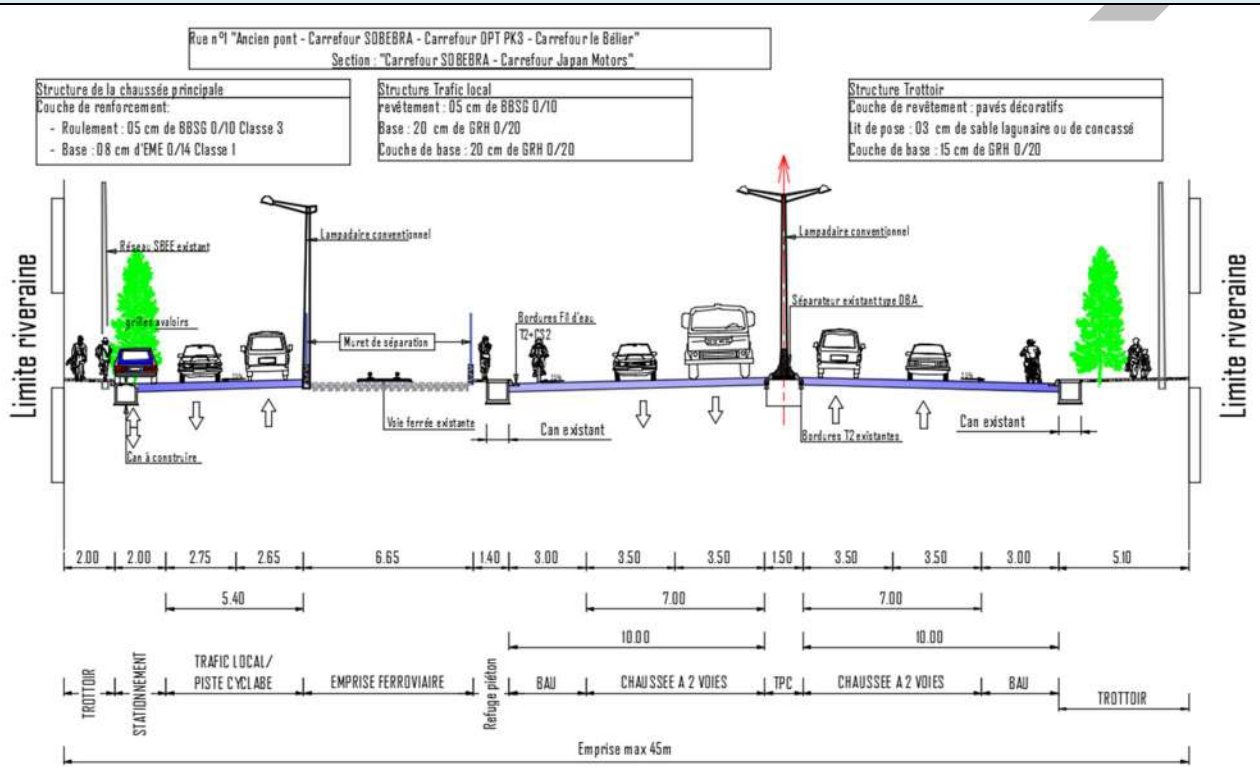
Table 11: Summary of Infrastructure Enhancements

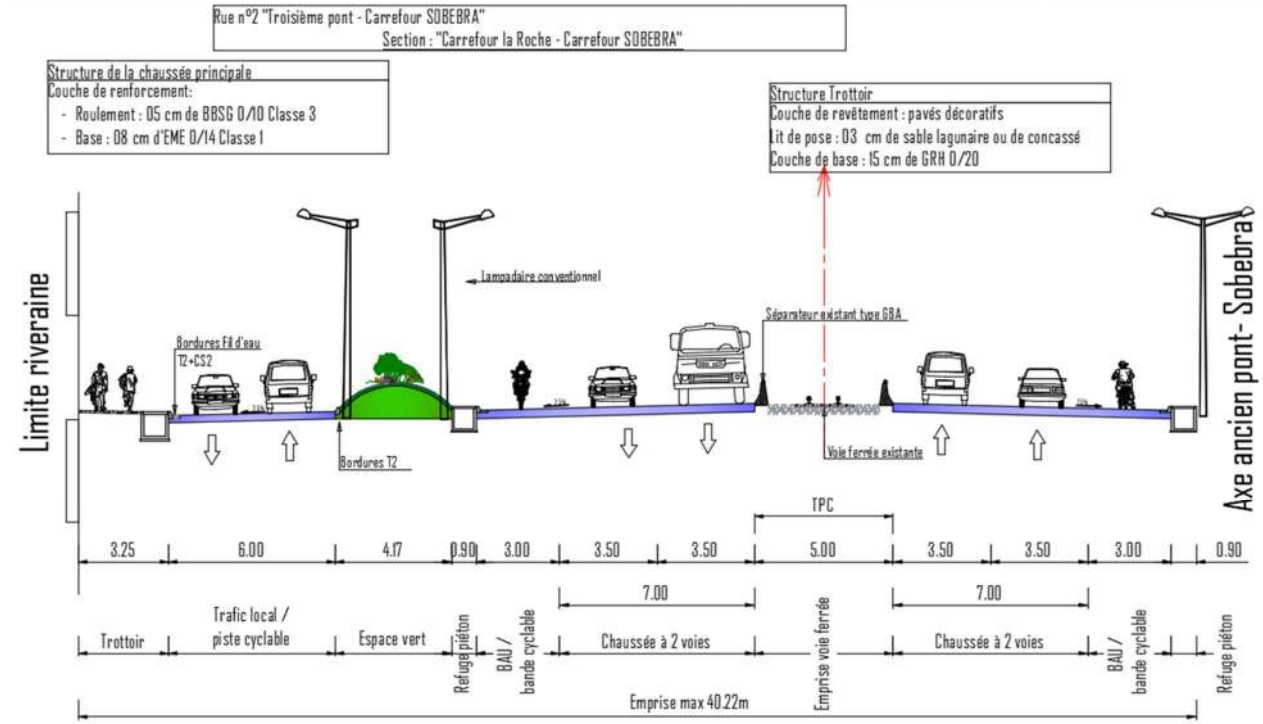
Axes	Findings	Trouble	Planned improvements
General comments			
All axes	Horizontal signage absent or almost erased	Difficult to understand the axes / non-identification of lanes and traffic corridors / possible collision between vehicles moving in the same direction / non-identification of pedestrian crossings Difficulty understanding of the axes / non-identification of pedestrian crossings / increase in speed / endangerment of pedestrians and other 2WD road users Theft of signs by the population for recycling and recovery purposes for the wind tunnel and welding Use at Advertising display purposes	Horizontal signage is reworked in hot-coating, which is stronger and more durable.
	Vertical, vandalized, destroyed, insufficient and inadequate signage		Resumption of police and directional signage / awareness and penalization of perpetrators
	Permanent signalling made of ferrous materials		Proposal for the use of composite panels
	Permanent Vertical Signalling Conventional		Resumption of police and directional signage / awareness and penalization of perpetrators Take into account the results of the PCRT study on intersections in greater Nokoué
	Energy Light Signalling Non-Functional Light Signalling	Risk of congestion at intersections at the time of outages / early deterioration of equipment due to power surges Congestion of intersections / increase in nuisance time / anarchic circulation of users Stoppage of road flow / no fluidity even without traffic saturation / constantly recurrent congestion of the axes in the current section. Insecurity for pedestrian and 2WD users / Risk of falls with more or less serious bodily injury	
			Proposal for the restoration of traffic lights
	No traffic light synchronization		Taking into account the results of the PCRT study on crossroads in Greater Nokoué
	Falls of drainage slabs		Removal of most of the slabs and their replacement by cast-in-place slabs. For maintenance openings, installation of buffer grids in place of slabs Replacement of stolen, vandalized or destroyed grids. Use of non-ferrous material grids such as fiberglass composites
	Sanitation manhole covers made of ferrous materials	Theft of ferrous buffers, leaving openings, potential areas for pedestrians and 2WD drivers to fall	

Axes	Findings	Trouble	Planned improvements
General comments			
	No lanes reserved for 2WD	Increased risk of collision/uncontrolled driving	Development of local traffic to be used as lanes reserved for 2WD traffic / local traffic will be paved with bituminous concrete. Recommendations made by the PCRT studies
All axes	No traffic light phase taking into account reserved lanes Illegal occupation of sidewalks by advertising billboards and large trees Presence of potholes and bulges on some roads Defective street lights in some sections of the roads	Increased risk of personal injury accidents	
		Pedestrian path diverted on the roadway / risk of collision	Demolition of all non-regulatory panels
		Collision following evasive manoeuvres	Carrying out the reinforcement/rehabilitation works recommended by the geotechnical studies
		No visibility of restraint systems / risk of collision / dangerousness of pedestrian crossings of TAG movements in these areas Problem of understanding the signs / conflict of priority rules	Carrying out lighting works recommended by public lighting studies
	Presence of 'CLP' signs in roundabouts despite the presence of traffic lights Mixed use		Removal of signs/compliance with traffic lights as a priority
		Occupancy conflict between users	Appropriate Signage - Awareness
	Lack of parking space	Use of lanes for parking purposes / reduction in the fluidity of the flow of traffic / more or less lasting congestion Anarchic crossing of the road / endangering the lives of pedestrians	Review of the existing cross-sections with the introduction of parking spaces on each axis In front of the schools, the stadium and the hospitals, a pedestrian crossing with all the appropriate signage is planned
	No pedestrian crossing at regular crossing points Oversized loading of 2WD drivers		
		Awareness and penalization of 4WD lanes during overtaking maneuvers / General slowing down of the flow of road traffic	

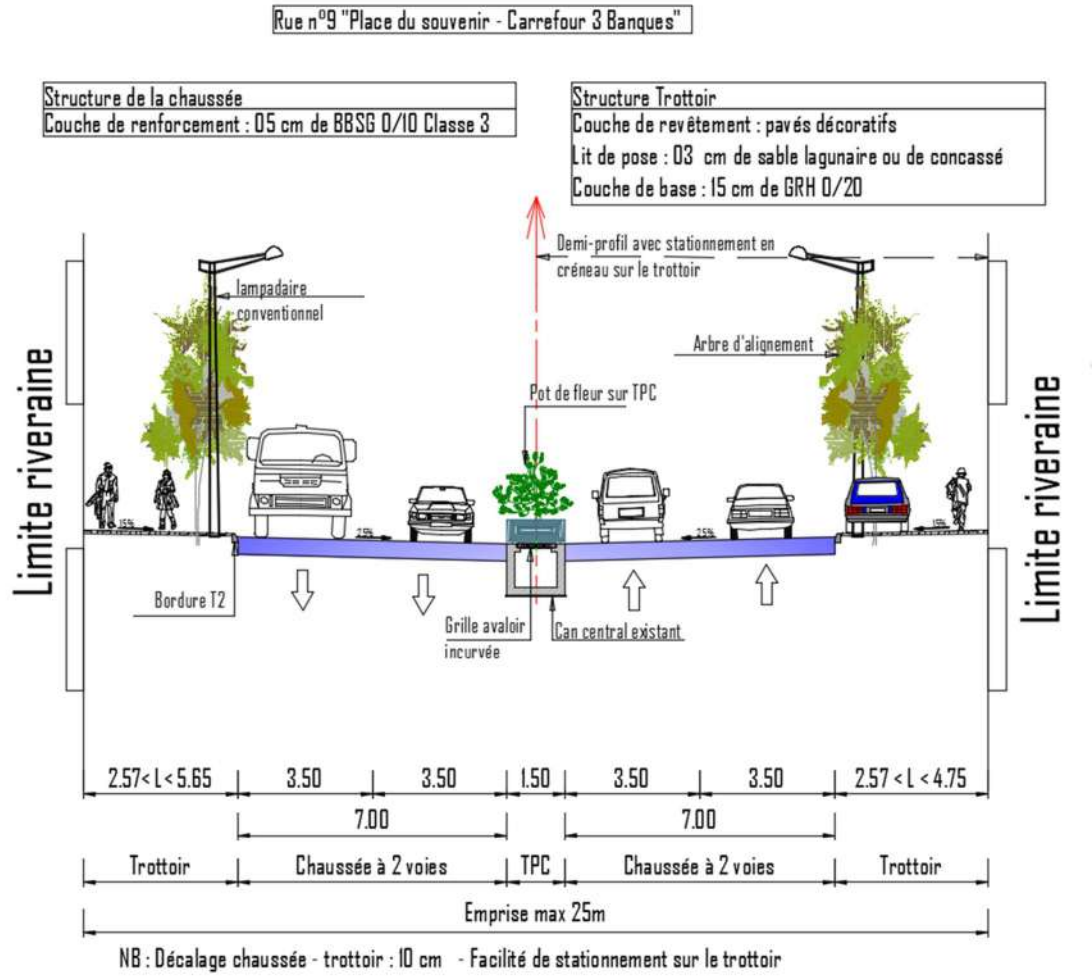
Axes Observations		Trouble	Planned improvements
General comments			
		Lack of visibility to the front and rear (through mirrors) Visibility problems / risk of collision	
	Oversized loading of tricycles Anarchic changes of traffic		Awareness and penalization
	lanes by 2WD	Risk of collision with other road users	Separation of users as soon as the administrative footprint allows it

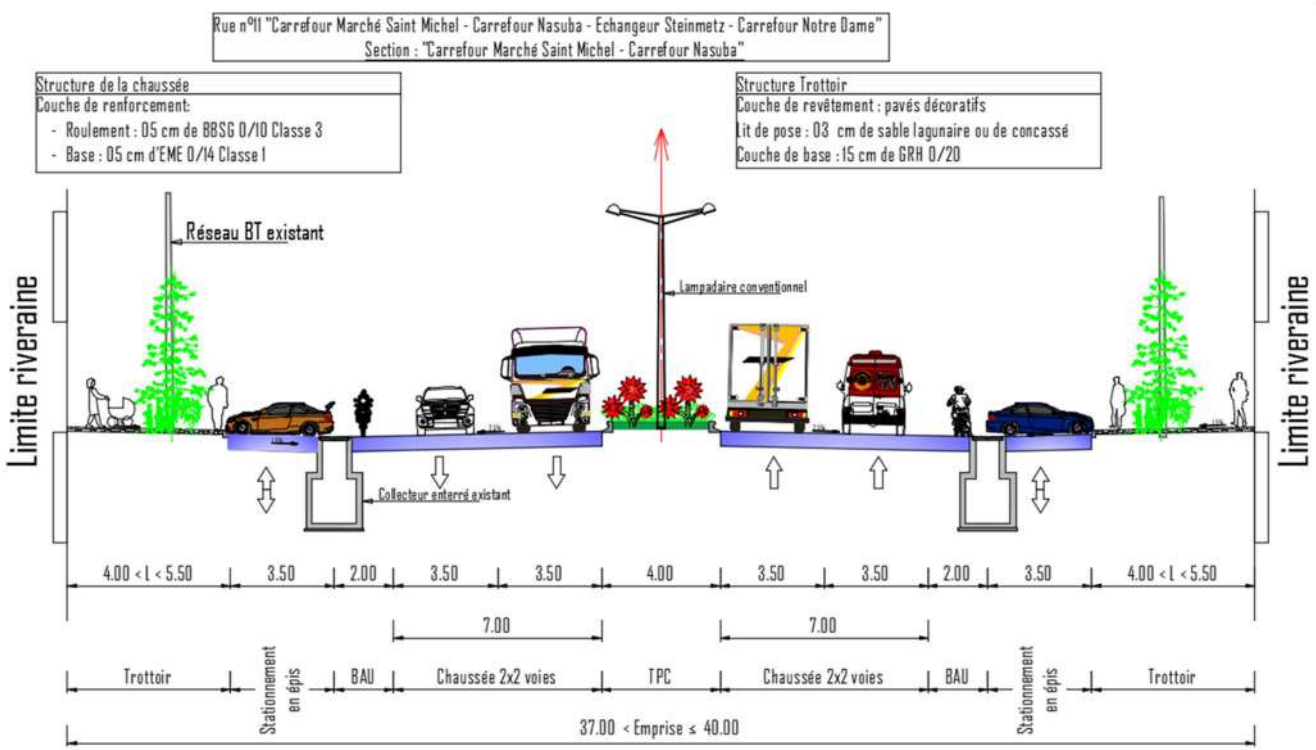
Axes	Findings	Trouble	Planned improvements
Specific observations			
Old bridge – SOBEBRA crossroads – OPT PK3 crossroads – Le Bélier crossroads	Faulty separation between road and rail roads Construction of the Tokplégbé Market at the Japan Motors crossroads Marking of the pedestrian crossing erased in the current section and at crossroads Opening for direct access from shops to the main road	Crossing at any point on both roads / non-compliance with pedestrian crossings High pedestrian traffic / increased risk of collision during crossings Anarchic pedestrian crossings	Resumption of the partitions in the mesh fence wall / see detailed plans of the partitions Review of the intersection on the ground / Study project in progress on this observation Reinstallation of pedestrian crossings
		Increase in conflicts	Closure of all unauthorized accesses/installation of asphalt concrete side alleys. (See cross-section) Removing overflow / (see Plan plot)
	Overflow of the geometry of the directional islands of the main branches in the roundabout ring	Ring Shrinkage / Risk of Collision	
			Projected cross-section Section: Old bridge – SOBEBRA crossroads • A two-lane two-lane two-way carriageway 3m wide, • A 5m wide parking area • A 2m wide sidewalk made of decorative paving stones Section: SOBEBRA Junction – Japan Motors Junction • The characteristics of the cross-section of the existing main carriageways are maintained, (2x 2 lanes of 3.5m wide each, a 3m wide BAU, a 1.5m wide DBA TPC). • A bidirectional local traffic of 5.40m wide. It makes it possible to contain 2WD traffic and at the same time allow access to the neighbouring houses. • Local traffic is bordered by a 2m wide parallel parking area. • The railway right-of-way is maintained at 6.65m. It is separated from the road roads by wire mesh walls.

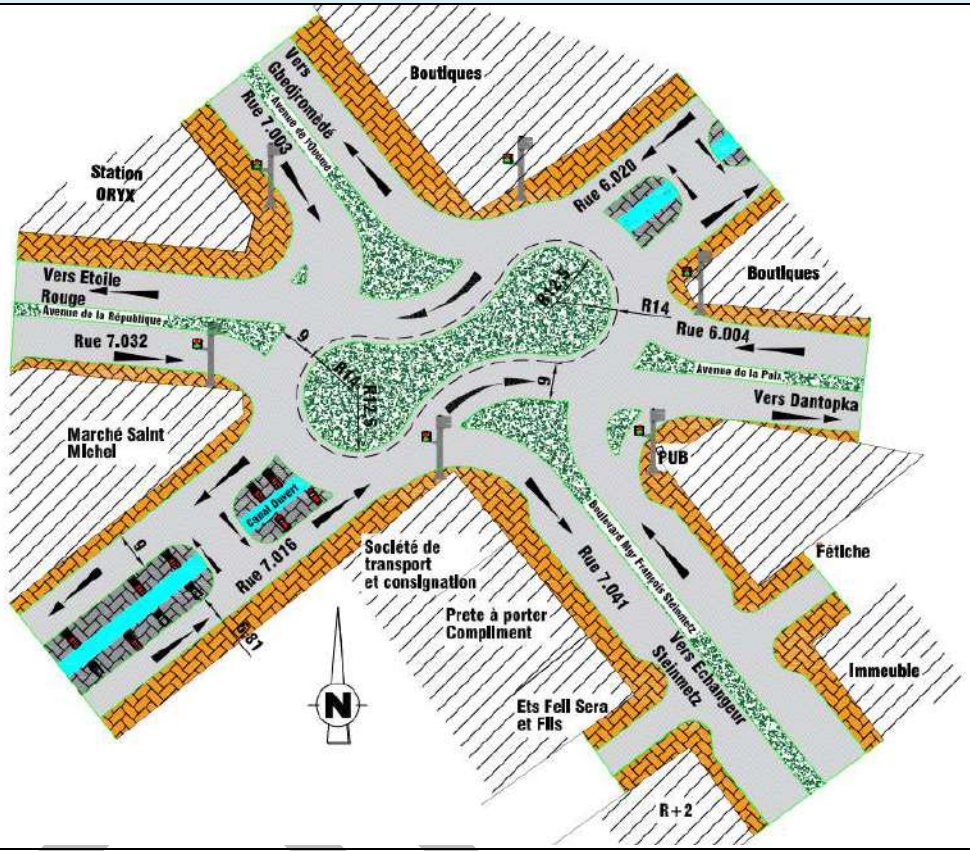
Axes	Findings	Trouble	Planned improvements
Specific observations			
			• Local traffic lighting will be provided by solar street lights Section: Carrefour Japan Motors- Carrefour Le Bélier • The characteristics of the cross-section of the existing main carriageways are maintained, (2x 2 lanes of 3.5m wide each, a 3m wide BAU, a 1.5m wide DBA TPC) • 5.50m wide bidirectional local traffic on the left. It makes it possible to contain 2WD traffic and at the same time allow access to the neighbouring houses. Local traffic is bordered by a 2m wide parallel parking area. • The redevelopment of local right-hand traffic, which is 6.5 m wide, with two parking areas, with the resumption of these sanitation works, and a more elaborate green space, • The railway right-of-way is maintained at 6.65m. It is separated from the road roads by wire mesh walls. • Local traffic lighting will be provided by solar street lights

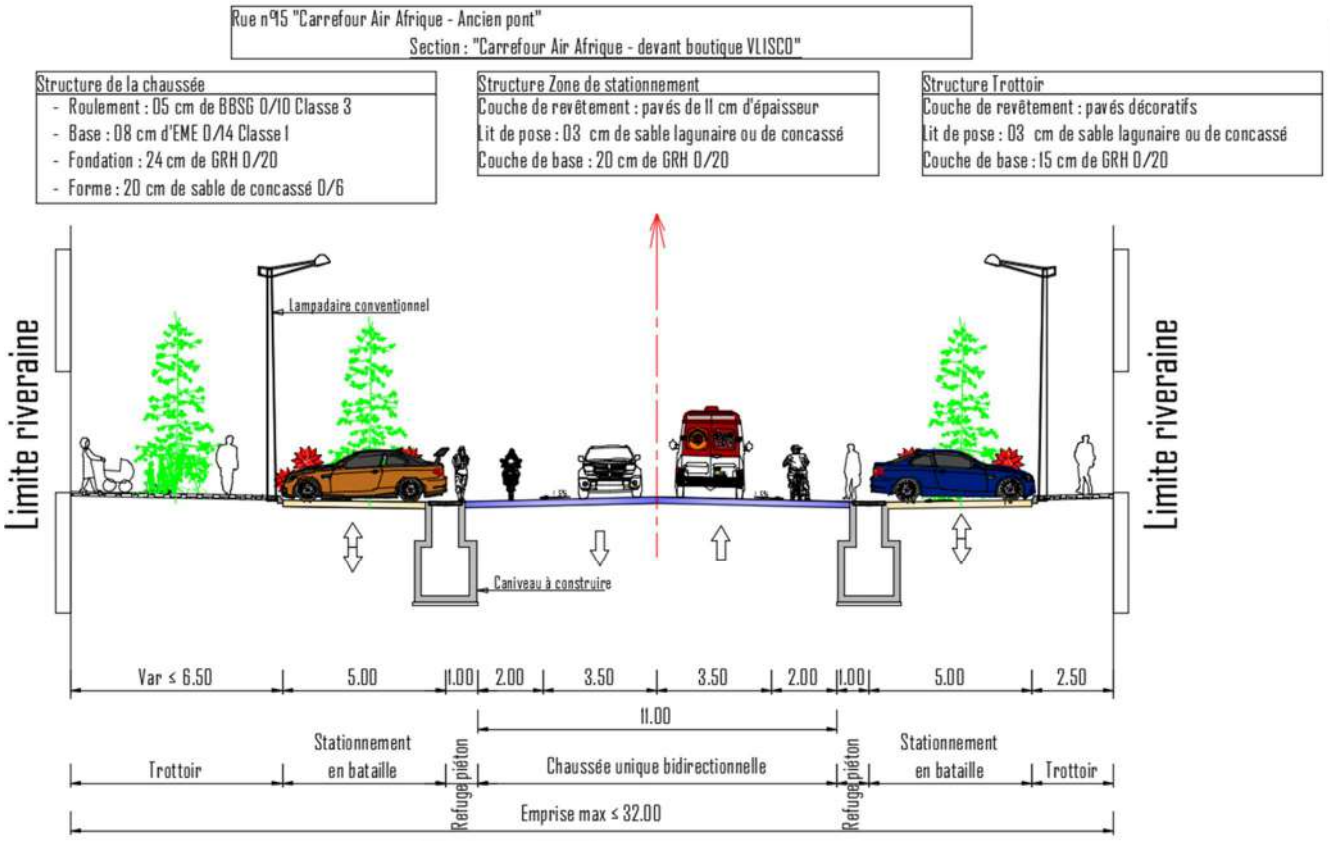
Axes	Findings	Trouble	Planned improvements
Specific observations			
Third bridge – SOBEBRA crossroads	Several conflicts at the La Roche crossroads No traffic lights at the La Roche crossroads	Risk of collision due to drunkenness and poor perception Congestion problem	Reconfiguration of the traffic plan around this intersection (see intersection management plan)
	No pedestrian crossing at the La Roche crossroads	Pedestrian crossing difficulties	Positioning of pedestrian crossings (see map layout)
	Traffic on the sidewalk of the third bridge on the left side	Anarchic 2WD traffic on the sidewalk / pedestrian traffic sometimes on the road to escape the 2WD / recklessness and increased risk of collision	Installation of GBA-shaped barriers just at the entrance and descent of the 3rd bridge. However, maintenance of the pedestrian crossing. Closure of this access to improvised 2WD traffic. (see plan plot) Projected cross-section
		• The characteristics of the cross-section of the existing main carriageways are maintained, (2x 2 lanes of 3.5m wide each, a 3m wide BAU, a 5m wide DBA TPC) • Two-way local traffic is also maintained in its current state.

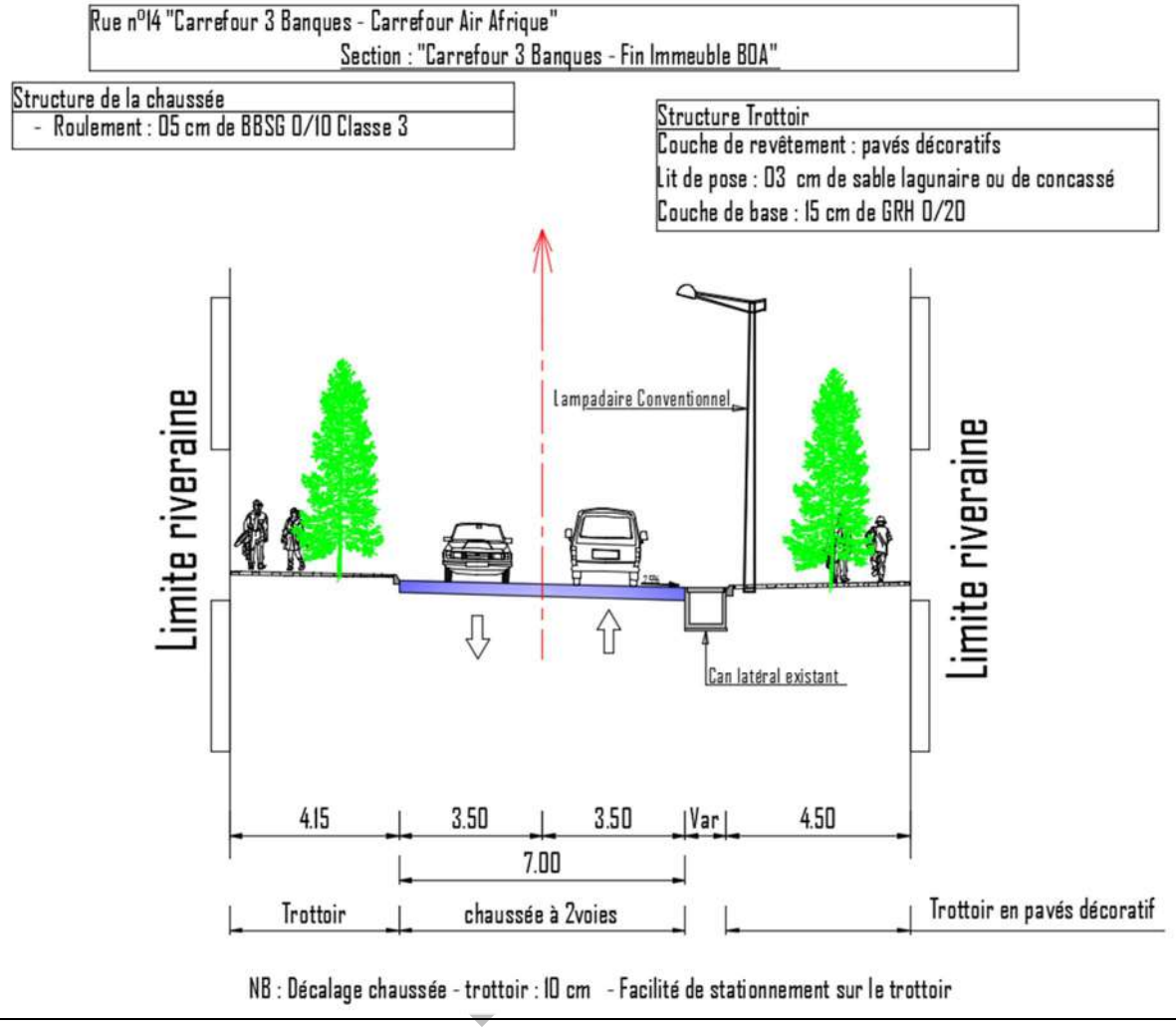
Axes	Findings	Trouble	Planned improvements
Specific observations			
			New traffic at the 'La Roche' junction • Neutralize the "South Entrance" movement at the southern branch of the intersection, • Allow only at the level of this southern branch, the only "Exit" movement, • Make part of rue 4.060 (section "CONCERTO – MEUBLE N°1") unidirectional in the direction of the "Meuble N°1" shop • Make street unidirectional 4.058 In the practical phase, these modifications, which do not physically affect the existing infrastructure, in addition to the installation of vertical signs, will concretely oblige: • Users departing from the old bridge for example the CEG "AKPAKPA CENTRE" to go through the SOBEBRA crossroads, the route passing through the "La Roche" crossroads will no longer be possible; • Users departing from the company "BENIN EQUIPEMENT" towards the old bridge or the crossroads "La Roche" are obliged, once at the level of the company "MEUBLE N°1" to turn either right in the direction of SOBEBRA, or left in the direction of the petroleum products depot; • A southern bypass has also been identified to allow users, for example from the company "BENIN EQUIPEMENT", to be able to reach the old bridge without going through the SOBEBRA crossroads. This is the route through streets 4.039 – 4.038 – 4.026 – Corniche or 4.055 – 4.053 – Corniche.

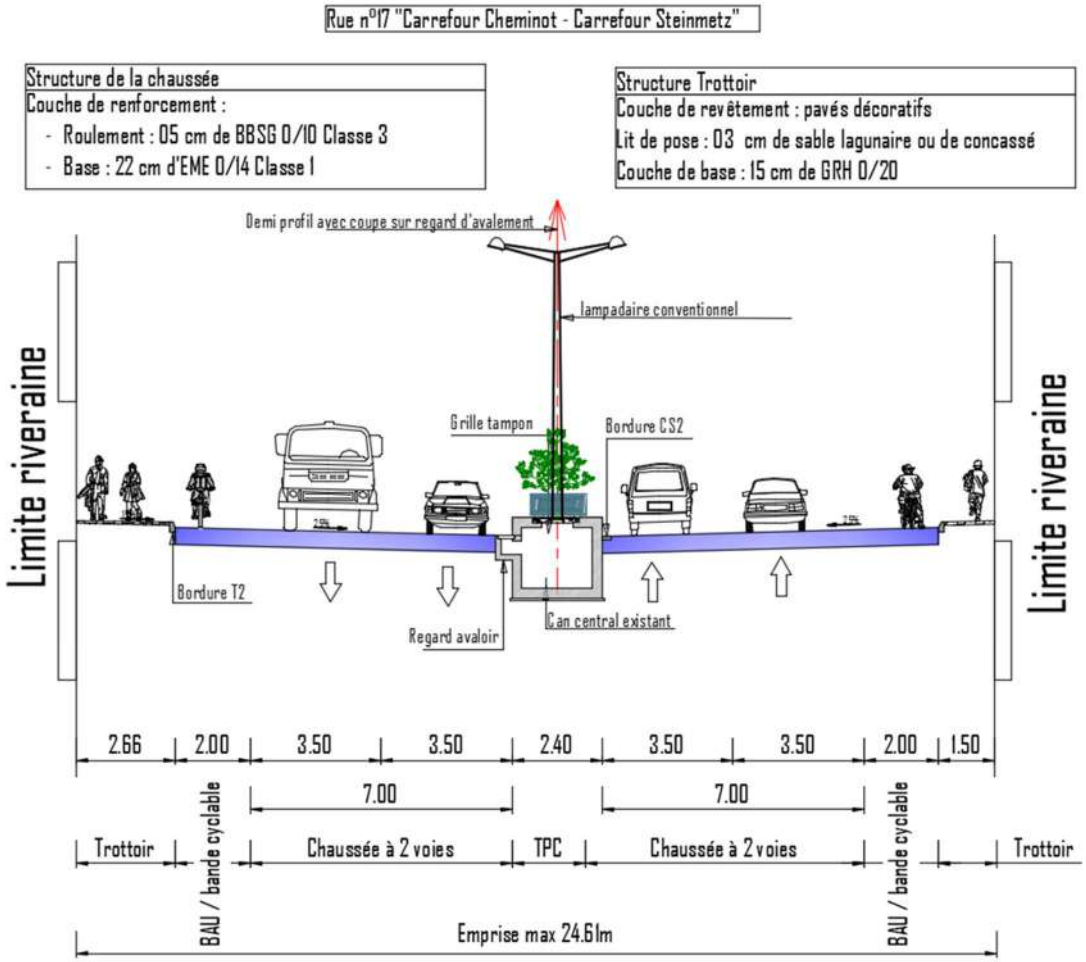
Axis	Report	Problem	Planned improvements
Specific observations			
Place du Souvenir – Carrefour 3 Banques	Lack of parking space	Occupancy of the roadway as a parking area	Lowering of curbs on sidewalks / authorisation of parking on the pavement
			Projected cross-section • Maintenance of the existing cross-section (2x2 lanes of 3.5m wide each, a central collector raised by 30cm and serving as a TPC with a width of 1.5m, • Revegetation of the TPC using flower boxes • Lowering of the central gutter to the pavement level.

Axis	Report	Problem	Planned improvements
Specific observations			
Carrefour Marché Saint Michel – Carrefour NASUBA – Echangeur Steinmetz – Carrefour Notre Dame	Mixed uses	Risk of collision	Installation of appropriate vertical and horizontal signage Review of the 'Marché Saint Michel' intersection
	Herringbone parking	Obstruction of a lane of the road at the exit of the parking lot Traffic congestion by right-turning users	
	No DRT lights		
			Projected cross-section • 2 unidirectional carriageways of 9m composed of 2 lanes of light vehicle traffic and a lane of 2WD traffic, • The two carriageways are separated by a 4m wide TPC covered with greenery and low plants, • A herringbone parking area directly at the outer boundary of each roadway. The width of the parking area is 3.5m on average, • A side pavement with variable width on each side, • alignment planting in the sidewalk as well

Axis	Report	Problem	Planned improvements
Specific observations			
			Redevelopment of the Marché Saint Michel intersection

Axis	Report	Problem	Planned improvements
Specific observations			
Carrefour Air Afrique - Old bridge	Lack of parking space Carrefour Notre Dame – too many directional islands	Occupation of the road as a parking area Misunderstanding of the intersection / taking the wrong traffic lane / non-expressive signs	Complete overhaul of this axis / integration of the developments planned as part of the rehabilitation of the market / Removal of the blocks at the Notre Dame crossroads – installation of an Ordinary Plan intersection with traffic lights (See Plot plan)
			Projected cross-section Section in front of the market car park • Single bidirectional carriageway 11m wide. It is composed of two lanes of 3.5m width each, two cycle lanes of 2m each. • A 1m wide pedestrian refuge strip for crossing and bordering each end of the road • Two parking zones in battle, • Two wide pavements planted with trees in alignments, • The parking areas will receive mini gardens at 30m intervals • Reorganization of the Notre Dame crossroads by removing all existing blocks.

Axis	Report	Problem	Planned improvements
Specific observations			
Carrefour 3 banks – Carrefour Air Afrique	Lack of parking space	Occupancy of the roadway as a parking area	Lowering of the gutter and curbs in places not yet done in order to use the sidewalk as a parking area Projected cross-section
			• The existing cross-section is maintained (a single two-way 1x2 lane carriageway of 3.5m wide each, and two bilateral pavements of variable widths, max of 4.50m; • Planting of alignment trees in selected places and species carefully selected so as not to damage the sidewalks and the roadway; • The solar lighting installed will be maintained;

Axis	Report	Problem	Planned improvements
Specific observations			
Carrefour Cheminot – Steinmetz overpass	Opening of entrances to the main roadway	Increased pedestrian traffic High risk of collision for pedestrians	Prohibition of commercial activity along this road as planned / reduction of pedestrian traffic / installation of GBA barrier in front of all entrances. Projected cross-section
			• The existing cross-section has been maintained (two unidirectional carriageways with 2x2 lanes at 3.5m width for each lane, a 2m BAU also serving as a cycle lane, a straight pavement with a maximum width of 1m, and a wider left pavement. A central gutter acting as a TPC separating the two carriageways. • Vandalized flower pots will be repaired for some, or replaced when the damage is significant, • Maintaining the GBA separators currently used to close intersections between the primers and the main road.

8.2 Structural and Institutional Improvements

The first recommendations that have been made with a view to improving road safety on the arteries being planned in the city of Cotonou are aimed at:

- Adopt a clear and precise legislative and regulatory framework on road safety such as the National Road Safety Policy Document, the Law on the Highway Code in Benin, the Framework Law for Road Safety;
- To develop and validate a National Road Safety Strategy Document for the next decade (2021 – 2030);
- Strengthen the system for collecting and analysing data on personal accidents with their location;
- Adopt the need for driving licenses for drivers of 2WD and tricycles;
- Coordinate actions between actors;
- Implement video surveillance of the axes;
- Create a traffic police force and re-establish permanent police checks for all violations of the Highway Code and the regulations in force. In particular, the wearing of helmets for motorcycle passengers, speeding in built-up areas;
- Integrate vulnerable modes (ensuring the safety of vulnerable users such as pedestrians, bicycles, 2WD) into the technical review of structures;
- Raise awareness (meetings, campaigns, billboards, etc.) of the need to respect user traffic corridors;
- Establish a maintenance and upkeep program for road infrastructure and equipment;
- Design an integrated policy for the care of the wounded;
- Prohibit and repress parking at intersections, roundabouts and in the immediate vicinity of intersections and roundabouts on major arteries;
- Incorporate into legislation the offence of deteriorating road signs (vandalism, affixing posters, scraping paint, etc.) with consequent penalties in order to reduce the deliberate alteration of vertical and horizontal signs by the population;
- Make effective the systematic road safety audit for all road projects (design audit, pre-commissioning audit and post-commissioning audit) as provided for in the national road safety action plan for the decade 2011-2020 (Second pillar);
- To set and require quality standards for paints for both horizontal and road markings and to acquire reflectometers for the quality control of said paints.
- Reinforcement of the technical inspection of vehicles but unannounced, in particular for the following aspects: the general condition of the vehicle (bodywork, windscreen, tyre wear, checking the proper functioning of lights and indicators, braking by carrying out a test

The table below lists these different recommendations, the institutions responsible and the expected effects and costs.

Table 12: Summary of structural and institutional measures to be carried out and cost estimates

Findings / malfunctions Recommendations Responsible entity			Expected effects	Costs of measures (million CFA francs)
0 / COMMUNICATION				
1 / DATA ON ACCIDENTS The action on security is scattered by NGOs. The State's action is visible at the decentralised services, more visibility awareness-raising blows / Strengthen need to organise working sessions in the accident courts, and visibility public	communication on the State's actions, the national level and also in the on information sessions for the general	CNSR	To raise awareness among users in particular and the population in general, but also to make themselves known to the TFPs (Financial Technical Partners), to give more visibility to the State's action	100
Inability to carry out an Establish an analysis collection and analysis of traffic accidents with their the nature of the networks due to location. inadequacies in the spatial location of accidents	effective system of comprehensive risk accident data according to on personal	CNSR	Better identify accident-prone roads for better consideration in Road Safety Inspections and Road Safety Audits	180
2 / BEHAVIOUR / AWARENESS AND REPRESSION				
Widespread absence of the wearing of helmets by users of both motorcyclists police force and re-establish	helmets Adopt the wearing of helmets for wheels in traffic especially Create a traffic	CNSR	Reduction in cases of serious and/or fatal bodily accidents	25
non-compliance with permanent police of the code and the need to respect user traffic lanes and traffic speeds in built-up areas	controls in traffic corridors, excessive for all	MISP (Ministry from violations from Public Security) speed in built-up roads and the regulations in force. In particular, the wearing of helmets, respect for traffic lanes, speeding Raise awareness (meetings, campaigns, billboards, etc.) of	Repression, awareness 250 passengers, of users	
		CNSR	Raising awareness among the 40 users, reducing the risk of accidents	

Findings / dysfunctions Recommendations		Responsible entity	Expected effects	Costs of measures (million CFA francs)
Anarchic occupation of the roads (parking, parking, etc.).	roundabouts, roundabouts and immediate vicinity of intersections and roundabouts on major arteries	for repression and the CNSR trade) for Awareness	Increased visibility for users, early perception of the risk of collision, Reduction of the risk of collateral damage in the event of an accident. Safeguarding of safety equipment to promote a better understanding of road developments.	25
Damage to equipment in the vertical and MISP by the populations (affixing posters, vandalism, scraping paint, etc.) The inadequacy of the road police forces leads to the persistence of bad road traffic behaviour	Raising awareness, changing the framework towards a repression by fines for these harmful behaviours, and finally to punish offenders (local residents, the population, users).	Beninese State, CNSR and the		25
(changing lanes, speeding, non-compliance with light signals) It is possible to notice several vehicles moving very badly to the point continue to circulate on the roads under study. However, these 4WDs no longer meet the road safety offer in force today.	Establish video surveillance of the main roads.	MISP	Deterrence of deviant behaviour from the Highway Code; Crackdown on offenders	To be added to the video surveillance security project
	Reinforcement of the technical inspection of vehicles but unannounced, in particular for the following aspects: the general condition of the vehicle (bodywork, windscreen, tyre wear, Checking the proper functioning of lights and indicators, Braking by carrying out a test 3 / INSTITUTIONS AND REGULATIONS	CNRS	Safer vehicles	50
Legislative arsenal and regulatory CNSR almost absent; several measures implemented without a road safety legal framework.	Adopt the laws and regulations of the Formalize and update the few existing texts, Ratify texts and declarations	Beninese state,	Have a legal and regulatory framework Identify and inform road safety stakeholders Act with full knowledge of the facts	200

Findings / dysfunctions Recommendations		Responsible entity	Expected effects	Costs of measures (million CFA francs)
			and under the protection of the law	
Little coordination between health sector actors and other international actors signed by Benin	Coordinate actions between state and community actors in the field of road safety on the basis of risk analysis	CNSR	Better coordination of the actions of the various Road Safety actors	40
4 / INFRASTRUCTURE / TRAFFIC / URBAN PLANNING				
Current system of Vulnerable user account shows its limits: unused footbridges, unprotected pedestrian crossings	Integrating vulnerable modes into does not correct the infrastructure by means of motorcycle tracks or lanes and protected pedestrian crossings. Redevelopment of the footbridges with access ramps	SIRAT, DGI, DGDU	Compile a directory of good practices (and standards) in terms of infrastructure and traffic to ensure the safety of vulnerable users in urban areas (pedestrians, bicycles, 2WD), Develop/redevelop footbridges. Traffic flow and safety for vulnerable modes	Projected studies
Crossroads formed by two structuring axes: "turn left" very difficult Crossroads with multiple conflicts	Construction or redevelopment of a two-level crossing, tunnel or viaduct at certain intersections Development or redevelopment of roundabouts Implement a program	SIRAT		Taken into account
		SIRAT		Taken into account Studies
The maintenance of the infrastructure does not comply with the recommendations of the studies. Decrease in the level of service offered to users.	maintenance of road infrastructure and equipment	MIT, MCVDD, SIRAT	Road infrastructure monitoring, Best level of service of the road network	Road Maintenance
Safety equipment for the upkeep and deteriorate faster than Guarantees Offered by Manufacturers. well-equipped laboratory for the control of safety equipment such as paints, coatings and panels acquire reflectometers for the quality control of said paints of the	Setting and requiring standards of Quality for paints as well for horizontal signage as well as for road markings and metrology	CNERTP, ANM (National Agency for and Quality Control Lack of a	Durability of safety equipment, better quality of road equipment, Reinforcement of the CNERTP's technical platform	50

Findings / malfunctions	Recommendations	Responsible entity	Expected effects	Costs of measures (million CFA francs)
5 / RESCUE AND CARE				
Lack of coordination between the rescue and health care systems, as well as a lack of equipment and trained personnel	Design and implement an MS (Ministry of Integrated Health Care Policy) for traffic injuries by the emergency and care services		Study on the current management of traffic injuries to better understand the demand and the efficiency of the offer, Define the emergency coordination plan, strengthen the resources of the emergency services (medical ambulances) and the emergency services of the public hospitals and health centers of the city of Cotonou	300 (for studies and reinforcement of the technical platform)

8.3 The safety of users and the population during the work

The temporary traffic arrangements put in place during the construction period tend to lead to a high number of accidents; This is for the following reasons:

- Drivers do not see or understand temporary accommodations, especially at night
- There is still confusion about which route to take to avoid the construction zone – conflicting messages
- There is insufficient traffic control (signage, barriers, warnings, etc.), or it is of poor quality
- There are few or no provisions made for pedestrians and other vulnerable users (two-wheelers)
- The traffic lanes are narrow and other dangers are present (lack of maintenance of the diversion, dust, etc.)
- The protection of construction workers is insufficient

During the works phase, the Control Mission, through its safety manager, will have to be vigilant and focus on:

- The implementation of an Information, Education and Communication (IEC) campaign aimed at the population and users. This campaign must be followed by other campaigns for a change in behaviour;
- Remote warning of road users and the clarity of the trajectory they must follow;
- Clear guidance by means of traffic signs and other devices;
- Speed management;
- Clear and effective traffic control devices;
- The safety of access and exit of vehicles from the site;
- Marking of excavations;
- The assurance that access to the riverside houses is maintained at all times;
- The marking of work areas by plastic DBAs for example;
- The maintenance of any diversions;
- The wearing of PPE by workers and other site personnel.

09

OVERALL CONCLUSION

9 GENERAL CONCLUSION

The safety issue of road users has become a priority in any road project. This road safety study is actually composed of an ISR (Road Safety Inspection) and an ESR (Road Safety Assessment). An SRI concerning the road safety equipment that still exists, the description of the environment of the axes, the urban planning of the axes, the identification of mobility transmitters and collectors, an inspection of the geometry of the structure; and a more global higher education and research with the analysis of accident data, road safety management, user behaviour, mobility issues on the roads, rescue and care for the injured.

This comprehensive road safety study has allowed us to identify in each of the above-mentioned areas, where the strengths and weaknesses in terms of road safety are located in the city of Cotonou and specifically on the axes under study. With regard to the issue of accident data, despite the efforts of the CNSR to collect, enter and analyse accident data, it is not possible to carry out a complete analysis of the risks of traffic accidents on the axes under study because of the inadequacies in the spatial location of accidents. The use of the "Resilience" application, developed with Ushahidi for the collection of data with location, will make it possible to solve this spatial information deficit. However, a period of experimentation is necessary in order to adapt it to the context and regulations in Benin.

The in-depth study of the existing equipment revealed inconsistencies in the priorities at certain traffic light roundabouts, inadequacies in vertical signage, the virtual disappearance of horizontal signage, poorly maintained and vandalized retention systems, missing sanitation manhole covers, missing paving stones on the visible gutters; so many sources of insecurity for road users.

In addition to the above observations, the traffic data confirm the place occupied by 2WD in the mode of transport today in Benin, whereas until now the problem posed by 2WD traffic has only been partially addressed with the transfer, on roads in Cotonou, of 2WD traffic to local traffic. This study allowed us to further deepen the subject, by proposing in the short term the establishment and use of local traffic for 2WD traffic, and more in the long term a national basis in order to define the parameters for the sizing of motorcycling paths in the Republic of Benin.

From the point of view of safety equipment, it is recommended to use equipment made of non-ferrous materials, such as fiberglass composites, whenever possible to compensate for theft. The horizontal signage will be hot-plastered, which is more durable but also a little more expensive. The DBS curbs will be replaced by GSS2 type curbs that are more in line with Beninese practices. The traffic lights will have to be synchronised in order to generate a green wave capable of smoothing traffic flow by decongesting the intersections. In this sense, the conclusions of the PRCT study will be taken into account. The socio-community infrastructures in the direct vicinity and on the second line were inventoried and analysed to better determine the positioning of pedestrian crossings on the axes. The priority regime has been re-established at roundabouts by the removal of superfluous signs.

We cannot end this study without recommendations for improving security management in Benin in general and in the city of Cotonou in particular. These various recommended measures range from capacity building of actors to raising awareness among users.

10 ANNEXES

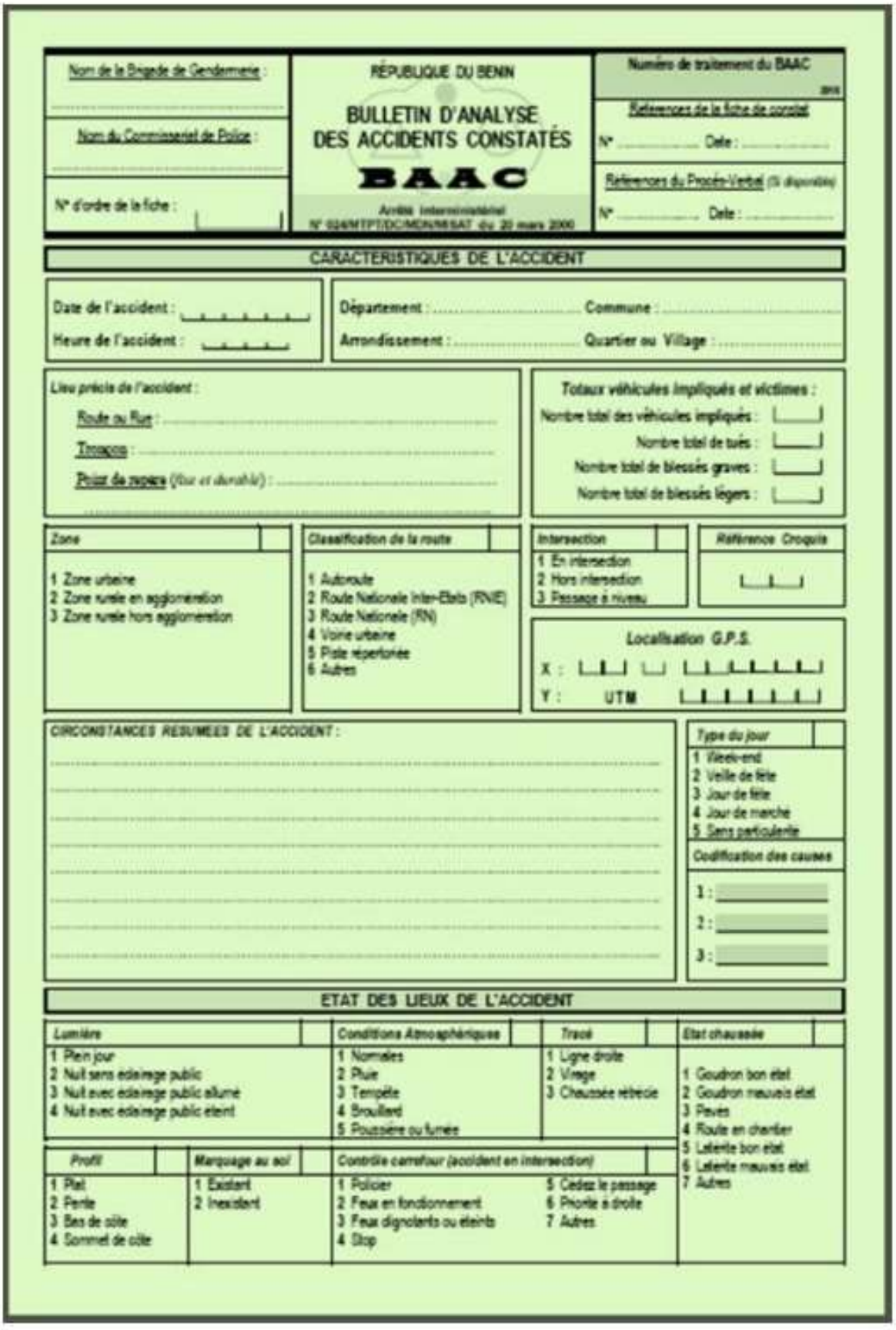
10 APPENDICES

Appendix 1: Persons met

The Consultant, as part of the drafting of this report on road safety of the ATC project, approached the CNSR of Ekpé and the National Agency for Civil Protection. He thus met

- CBA ETCHIHA Casimir: Deputy Director of the National Civil Protection Agency (ANPC),
- The CNRS through the following persons:
    - Mrs. TEDJI MYEHOUENOU Huguette: Head of the Computer Science and Statistics, Studies and Documentation Department at the CNSR;
    - KPATOUKPA Nestor: Head of the Road Safety Audit Unit (Head CASeR) at the CNSR and its collaborators;
    - SEWA Alexandre: Head of the Development and Cooperation Unit at the CNSR and his collaborators;
    - As well as representatives of the other administrative and technical services of the CNSR.

Appendix 2: Sample BAAC Sheet



Nom de la Brigade de Gendarmerie :

Nom du Commissariat de Police :

N° d'ordre de la fiche :

RÉPUBLIQUE DU BENIN

BULLETIN D'ANALYSE DES ACCIDENTS CONSTATÉS

BAAC

Arrêté interministériel N° 024/MTPT/DC/MDN/MISAT du 20 mars 2000

Numéro de traitement du BAAC

Références de la fiche de constat

N° ..... Date : .....

Références du Procès-Verbal (Si disponible)

N° ..... Date : .....

CARACTERISTIQUES DE L'ACCIDENT

Date de l'accident : _ _ / _ _ / _ _ _ _

Heure de l'accident : _ _ H _ _

Département : ..... Commune : .....

Arrondissement : ..... Quartier ou Village : .....

Lieu précis de l'accident :

Route ou Rue : .....

Tronçon : .....

Point de repère (Bar et durable) : .....

.....

Totaux véhicules impliqués et victimes :

Nombre total des véhicules impliqués : _ _

Nombre total de tués : _ _

Nombre total de blessés graves : _ _

Nombre total de blessés légers : _ _

Zone

1 Zone urbaine
2 Zone rurale en agglomération
3 Zone rurale hors agglomération

Classification de la route

1 Autoroute
2 Route Nationale Inter-Etats (RNIE)
3 Route Nationale (RN)
4 Voirie urbaine
5 Piste répertoriée
6 Autres

Intersection

1 En intersection
2 Hors intersection
3 Passage à niveau

Référence Croquis

_ _

Localisation G.P.S.

X : _ _ _ _ _ _ _

Y : UTM _ _ _ _ _ _ _

CIRCONSTANCES RESUMEES DE L'ACCIDENT :

.....

.....

.....

.....

.....

.....

.....

.....

Type du jour

1 Week-end
2 Veille de fête
3 Jour de fête
4 Jour de marche
5 Sans particularité

Codification des causes

1 : _____

2 : _____

3 : _____

ETAT DES LIEUX DE L'ACCIDENT

Lumière

1 Plein jour
2 Nuit sans éclairage public
3 Nuit avec éclairage public allumé
4 Nuit avec éclairage public éteint

Conditions Atmosphériques

1 Normales
2 Pluie
3 Tempête
4 Brouillard
5 Poussière ou fumée

Tracé

1 Ligne droite
2 Virage
3 Chaussée rétrécie

Etat chaussée

1 Goudron bon état
2 Goudron mauvais état
3 Pavés
4 Route en chantier
5 Latérite bon état
6 Latérite mauvais état
7 Autres

Profil

1 Plat
2 Pente
3 Bas de côte
4 Sommet de côte

Marquage au sol

1 Existant
2 Inexistant

Contrôle carrefour (accident en intersection)

1 Policier
2 Feux en fonctionnement
3 Feux clignotants ou éteints
4 Stop
5 Cédez le passage
6 Priorité à droite
7 Autres

Appendix 3: Statistics of accident data for the city of Cotonou

Distribution of material and personal accidents

- Year 2011

Total	3235	6487	98	852	1177
Month	Accidents	Vehicles	Killed	Seriously injured	Minor injuries
January	247	496	14	63	96
February	245	492	5	62	90
March April	268	533	12	60	128
May June	264	518	5	65	76
July August	288	588	4	89	90
September	247	505	4	44	68
October	267	523	12	62	104
November	262	531	7	73	110
December	278	544	5	73	112
	289	583	6	82	101
	254	512	10	80	93
	326	662	14	99	109

- Year 2012

Total	3031	5990	78	905	1285
Month	Accidents	Vehicles	Killed	Serious injuries	Minor injuries
January	208	410	3	54	69
February	213	432	7	58	86
March April	226	441	7	76	80
May June	233	471	8	73	93
July August	237	474	1	65	84
September	264	533	9	92	93
October	265	535	3	70	121
November	258	495	9	82 120 107 144	
December	270	526	4		
	304	576	8	80	144
	253	506	3	71	135
	300	591	16	77	116

- Year 2013

Total	3135	6085	91	885	1532
Month	Accidents	Vehicles	Killed	Seriously injured	Minor injuries
January	248	484	7	91	131
February	249	516	7	74	129
March	256	517	10	86	122
April	241	463	8	55	122
May	267	494	6	73	120
June	255	480	11	75	108
July August	222	439	3	69	104
September	277	519	10	86	124
October	268	519	7	72	152
November	296	582	10	78	162
December	228	437	2	54	109
	328	635	10	72	149

- Year 2014

Total	3432	6634	100	976	1547
Month	Vehicle accidents	Killed 516,449,535,636,646,500 510,564,522,511,570,675		Seriously injured	Minor injuries 107
January	270		4	69	114
February	239		15	75	143
March April	274		5	96	151
May June	335		12	85	178
July August	321		8	92	
September	259		9	87	99
October	275		6	82	124
November	285		5	75	124
December	269		3	69	115
	268		13	81	108
	289		7	100	140
	348		13	65	144

- Year 2015

Total	3335	6467	86	907	1429
Month Accidents Vehicles killed Serious injuries Minor injuries January 272 272 519 519 9 9 78 78 114					
114 February 230 230 230 442 442 442 6 6 64 64 64 99 99 99 March 318 318 318 599 599 599 4 4					
88 88 88 148 148 148 April 278 278 532 532 532 11 72 72 72 125 125 125					
May	266	517	13	79	96
June	268	530	5	87	101
July	250	475	10	72	106
August	270	522	9	80	127
September	307	596	4	80	158
October	303	593	6	80	131
November	276	542	8	62	113
December	297	600	1	65	111

- Year 2016

Total	3272	6338	77	739	1213
Month	Accidents	Vehicles	Killed	Seriously injured	Minor injuries
January	255	497	9	54	140
February	310	603	7	73	137
March	289	557	8	60	96
April	263	506	7	63	92
May	279	538	7	76	93
June	270	536	7	61	123
July August	267	516	8	71	99
September	273	528	6	56	99
October	260	484	6	55	91
November	243	482	4	50	75
December	234	452	3	59	64
	329	639	5	61	104

- Year 2017

Total	3335	6467	86	907	1429
Month	Vehicle accidents	Killed 415,468,513,546,581,451,441,456,516,516,510,563		Seriously injured	Minor injuries
January	210		7	35	58
February	250		10	41	76
March April	269		2	55	69
May June	282		9	60	79
July August	295		4	78	81
September	232		7	48	82
October	219		3	39	63
November	242		5	45	81
December	261		7	40	60
	266		7	40	88
	259		5	30	84
	290		2	52	75

- Year 2018

Total	2317	4463	55	448	562
Month Accidents Vehicles killed Serious injuries Minor injuries January 202 202 202 396 396 5 5 23 23 64 64 February 218 218 218 420 420 420 5 5 5 36 36 36 53 53 53 March 217 217 217 432 432 432 6 6 6 39 39 39 36 36 April 208 208 208 372 372 372 6 6 6 46 46 46 36 36 36					
May	205	418	6	43	56
June	167	318	6	45	33
July	162	318	4	44	45
August	187	360	3	40	46
September	154	299	2	31	39
October	196	373	3	41	52
November	198	368	3	28	44
December	203	389	6	32	58

- Year 2019

Total	2036	3846	62	343	598
Month	Accidents	Vehicles	Killed	Seriously injured	Minor injuries
January	199	380	10	34	50
February	177	330	8	28	45
March	204	375	1	39	79
April	213	399	1	33	53
May June	189	365	10	27	56
July August	175	331	6	24	58
September	192	341	6	47	54
October	176	340	10	32	48
November	160	315	4	19	68
December	175	339	1	27	57
	87	166	1	12	18
	89	165	4	21	12

- Year 2020

Total	873	1680	40	185	253
Month	Accidents	Vehicles	Killed	Seriously injured	Minor injuries
January	69	131	1	9	18
February	48	92	1	10	20
March April	62	114	6	12	18
May June	63	117	2	25	20
July August	88	175	4	17	21
September	80	160	1	17	17
October	87	163	7	17	26
November	69	126	3	24	9
December	81	156	4	13	31
	72	142	2	15	21
	74	141	6	14	18
	80	163	3	12	34

Breakdown by severity

- 2011

Total	3235	6487	98	852	1177
Degree of severity of accidents	Accidents	Vehicles	Killed	Seriously injured	Minor injuries
Materials	1798	3563	0	0	0
Lightweight Body	682	1437	0	0	956
Serious non-fatal	662	1307	0	825	190
Fatalities	93	180	98	27	31

- 2012

Total	3031	5990	78	905	1285
Degree of severity	Vehicle Accidents	Equipment Killed	Minor injuries	Serious non-fatal	Fatalities
Serious injuries Minor injuries					
	1528	2980	0	0	0
	720	1509	0	0	1002
	717	1391	0	885	267
	66	110	78	20	16

- 2013

Total	3135	6085	91	885	1532
Degree of severity	Accidents	Vehicles	Killed	Seriously injured	Minor injuries
Accidents Accidents Equipment Minor Serious non-fatal Fatal					
	1499	2886	0	0	0
	843	1689	0	0	1194
	706	1361	0	859	314
	87	149	91	26	24

- 2014

Total	3432	6634	100	976	1547
Degree of severity of accidents	Accidents	Vehicles	Killed	Seriously injured	Minor injuries
Light Body Material	1789	3466	0	0	0
Serious Non-Fatal	830	1673	0	0	1241
Fatal	724	1335	0	942	278
	89	160	100	34	28

- 2015

Total	3335	6467	86	907	1429
Degree of severity of accidents	Accidents	Vehicles	Killed	Seriously injured	Minor injuries
Materials	1747	3468	0	0	0
Lightweight Body	787	1580	0	0	1144
Serious non-fatal	720	1283	0	883	268
Mortals	81	136	86	24	17

- 2016

Total	3272	6338	77	739	1213
Degree of severity of accidents	Accidents	Vehicles	Killed	Seriously injured	Minor injuries
Materials	1856	3655	0	0	0
Lightweight Body	760	1507	0	0	1022
Serious non-fatal	583	1056	0	709	174
Mortals	73	120	77	30	17

- 2017

Total	3075	5976	68	563	896
Degree of severity of accidents	Vehicle Accidents		Killed	Serious injuries	Minor injuries
Light Body Material	1916	3737	0	0	0
Serious Non-Fatal	623	1249	0	0	766
Fatal	473	882	0	551	115
	63	108	68	12	15

- 2018

Total	2317	4463	55	448	562
Degree of severity of accidents	Vehicle Accidents		Killed	Serious injuries	Minor injuries
Light Body Material	1496	2871	0	0	0
Serious Non-Fatal	398	797	0	0	490
Fatal	369	700	0	432	63
	54	95	55	16	9

- 2019

Total	2036	3846	62	343	598
Degree of severity of accidents	Vehicle Accidents		Killed	Serious injuries	Minor injuries
Light Body Material	1243	2340	0	0	0
Serious Non-Fatal	432	846	0	0	547
Fatal	304	568	0	333	45
	57	92	62	10	6

- 2020

Total	873	1680	40	185	253
Degree of severity of accidents	Accidents	Vehicles	Killed	Seriously injured	Minor injuries
Materials	507	978	0	0	0
Lightweight Body	174	343	0	0	201
Serious non-fatal	156	297	0	176	41
Mortals	36	62	40	9	11

Type of vehicles

- 2011

Total	3235	6487	98	852	1177
Strife	Accidents	Vehicles	Killed	Seriously injured	Minor injuries
HGV only	97	97	0	1	8
VL only	142	142	1	19	27
2R alone	16	16	3	11	4
PL/PL	39	85	1	4	7
PL/VL	395	839	6	17	37
PL/2R	106	221	15	53	39
HGV/Pedestrian	20	27	5	16	5
VL/VL	1026	2242	9	43	131
VL/2R	1054	2252	31	453	669
VL/VBH	11	24	0	2	8
Passenger car/Pedestrian	134	172	12	113	74
2R/2R	126	264	8	73	125
2R/VBH	6	12	0	3	4
2R/Pedestrian	39	43	7	39	29
Other	24	51	0	5	10

- 2012

Total	3031	5990	78	905	1285
Strife	Vehicle Accidents		Killed	Seriously injured	Minor injuries
HGV alone 1 VL only 942 2R alone 94 VBH alone 1 0				4	
	142	142	1	23	
	46	47	16	26	
	1	1 102 798 176	0	0	
PL/PL 0 PL/VL 354 PL/2R 38 PL/VBH PL/VBH 0 0 0				1	
	372		4	18	
	84		7	42	
	2	4		0	
HG/Pedestrian HGV/Pedestrian 14 14 17 17 4 11 11 1 VL /VL VL/VL VL/VL 890 890 890 1962 1962					
1962 8 45 45 131 131 VL/2R VL/2R VL/2R VL/2R VL/2R 939 939 939 939 1991 1991 1991 1991 16					
441 441 699 699 699 699 VL/VBH VL/VBH VL/VBH 10 10 10 10 10 25 25 25 25 0 0 1 5 5 5 5					
VL/Pedestrian VL/Pedestrian VL/Pedestrian VL/Pedestrian 126 126 126 177 177 177 177 8 8 8 97 83					
					83 83 83
2R/2R	157	320	3	113	181
2R/HBV	3	6	0	2	1
2R/Pedestrian	86	91	10	75	63
Other	20	37	0	6	7

- 2013

Total	3135	6085	91	885	1532
Strife	Accidents	Vehicles	Killed	Seriously injured	Minor injuries
HGV only	105	105	0	1	5
VL only	152	152	3	22	29
2R alone	82	82	12	43	31
HGV/HGV	29	72	2	2	8
HGV/VL	343	735	4	27	17
PL/2R	102	222	11	40	66
HGV/Pedestrian	11	12	4	3	4
VL/VL	878	1938	8	43	152
VL/2R	922	1938	14	347	769
VL/VBH	5	10	0	1	0
Passenger car/Pedestrian	117	152	11	81	76
2R/2R	216	447	9	148	242
2R/VBH	7	14	0	5	4
2R/Pedestrian	133	137	9	112	112
VBH/Pedestrian	1	1	0	1	0
Other	32	68	4	9	17

- 2014

Total	3432	6634	100	976	1547
Strife	Vehicle Accidents		Killed	Seriously injured	Minor injuries
HGV	115	115	0	1	2
only 2R	189	189	7	40	40
only	77	77	11	51	19
PL/PL	40	86	1	2	2
PL/VL	472	1025	6	27	60
PL/2R	93	199	13	56	54
HGV/Pedestrian	17	31	7	6	10
VL/VL	971	2092	3	31 118 373 727	
VL/2R	923	1933	20		
VL/VBH	5	10	0	0	1
Passenger car/Pedestrian	122	157	14	70 85 154 297	
2R/2R	219	460	8		
2R/VBH	13	30	0	10 12 144 98	
2R/Pedestrian	127	133	9		
Other	49	97	1	11	22

- 2015

Total	3335	6467	86	907	1429
Strife	Accidents	Vehicles	Killed	Seriously injured	Minor injuries
HGV only	94	94	2	1	4
VL only	179	179	1	38	59
2R alone	72	72	9	55	22
HGV/HGV	33	80	0	2	3
HGV/VL	427	907	2	8	34
PL/2R	112	261	21	52	57
PL/VBH	2	4	0	0	1
HGV/Pedestrian	6	8	0	4	3
VL/VL	1027	2235	8	31	129
VL/2R	897	1885	15	362	705
VL/VBH	5	10	0	1	0
Passenger car/Pedestrian	124	148	16	84	66
2R/2R	173	354	1	125	196
2R/VBH	11	22	1	6	12
2R/Pedestrian	134	137	8	132	122
Other	39	71	2	6	16

- 2016

Total	3272	6338	77	739	1213
Strife	Vehicle Accidents		Killed	Seriously injured	Minor injuries
HGV only 0 VL only 7544 2R alone 725 VB only 1				0	
	179	179	3	20	
	63	63	11	31	
	1	1	0	1	
HGV/PL 55 3 HGV/VL 936 43 HGV/2R 236 480				0	
	447		4	9	
	110		17	39	
HGV/Pedestrian 15 3 VL/VL VL/VL 1010 2179 28 104 104 VL/2R VL/2R VL/2R 856 1776 15 278 578					
578 578 VL/VH VL/VH VL/VH VL/VH 1 2 0 0 0 0 0 0 0 VL /VB VL/VB VL/VB VL/VB VL/VB 29 29 29					
61 61 61 1 1 7 7 19 19 19 19 19 19 19 VL /Pedestrian VL/Pedestrian VL/Pedestrian Passenger					
car/Pedestrian Passenger car 125 125 125 163 163 163 13 75 75 79 79 79 79 79 79 79 2R/2R 2R/2R					
	2R/2R 2R/2R 2R/2R 182 182 182 380 380 380 2 114 114 166 166 166 166 166				
2R/VB	26	55	0	13	18
2R/Pedestrian	107	115	9	109	73
VH/VH	3	6	0	4	2
Other	22	41	0	3	7

- 2017

Total	3075	5976	68	563	896
Strife	Accidents	Vehicles	Killed	Seriously injured	Minor injuries
HGV only	88	88	1	0	2
VL only	168	168	0	12	26
2R alone	33	33	5	20	7
HGV/HGV	44	95	1	1	6
HGV/VL	445	936	4	11	31
PL/2R	79	163	10	34	31
PL/VB	3	6	0	0	3
HGV/Pedestrian	9	10	4	7	0
VL/VL	1006	2155	6	22	71
VL/2R	906	1867	11	285	521
VL/VH	1	2	0	0	0
VL/VB	10	20	2	1	0
Passenger car/Pedestrian	96	110	9	49	70
2R/2R	103	218	5	66	78
2R/VB	1	2	0	0	1
2R/Pedestrian	59	60	9	49	45
Other	24	43	1	6	4

- 2018

Total	2317	4463	55	448	562
Conflicts	Accidents	Vehicles	Killed	Serious injuries	Minor injuries
HGV only 0 VL only	80	14 2R only	20	0	1
	168	168	1	13	
	15	15	2	9	
HGV/HGV 1 HGV/VL	33	6 PL/2R	66 PL/VB 0	0	0
	304	647	1	8	
	61	127	16	29	
	2	4	0	1	
HGV/Pedestrian 11	20	6	3 VL/VL 785	1683 3	21 61 VL/2R 674 1391 8
					252 356 VL/Pedestrian 95 108
					11 53 57 2R/2R 51 103 4 40 34
2R/Pedestrian	25	25	2	16	12
Other	13	24	1	1	0

- 2019

Total	2036	3846	62	343	598
Strife	Accidents	Vehicles	Killed	Seriously injured	Minor injuries
HGV only	83	83	1	0	2
VL only	157	157	4	7	29
2R alone	15	15	4	6	6
VH only	1	1	0	0	0
HGV/HGV	24	50	0	0	5
PL/VL	300	612	2	2	13
PL/2R	62	131	8	26	27
HGV/Pedestrian	8	8	1	5	2
VL/VL	597	1281	5	16	42
VL/2R	608	1259	10	196	377
VL/VH	3	6	0	0	0
VL/VB	1	2	0	0	0
Passenger car/Pedestrian	112	129	18	58	58
2R/2R	29	59	6	17	20
2R/VB	2	4	0	1	1
2R/Pedestrian	17	17	3	8	13
Other	17	32	0	1	3

- 2020

Total	873	1680	40	185	253
Strife	Vehicle Accidents		Killed	Seriously injured	Minor injuries
HGV	27	27	0	2	2
only 2R	57	57	1	3	7
only	3	3	0	1	2
PL/PL	16	35	0	2	1
PL/VL	119	260	2	7	13
PL/2R	24	50	6	8	9
HGV/Pedestrian	5	5	1	3	1
VL/VL	264	562	2	8 22	100 151
VL/2R	274	561	10		
Passenger car/Pedestrian	47	58	11	29	20
2R/2R	14	29	1	12	10
2R/Pedestrian	14	15	5	7	11
Other	9	18	1	3	4

Breakdown by road type

- 2011

Total	3235	6487	98	852	1177
Classification of the road	Accidents	Vehicles	Killed	Seriously injured	Minor injuries
EIDR	446	921	16	134	177
Urban roads	2733	5461	81	711	991
Other	56	105	1	7	9

- 2012

Total	3031	5990		78	905	1285
Road Classification	Accidents	Vehicles	Killed		Serious injuries	Minor injuries
16 EIDR 202 Other	851			25	280	389
Urban roads	2128			51	614	885
	52	90		2	11	11

- 2013

Total	3135	6085		91	885	1532
Road Classification	Accidents	Vehicles	Killed		Serious injuries	Minor injuries
19 EIDR 880 Other	999			41	283	479
Urban roads	2002			46	573	1014
	134	238		4	29	39

- 2014

Total	3432	6634		100	976	1547
Road Classification	Accidents	Vehicles	Killed		Serious injuries	Minor injuries
18 EIDR 067 Other	964			31	276	432
Urban roads	2103			58	573	995
	365	683		11	127	120

- 2015

Total	3335	6467		86	907	1429
Road Classification	Accidents	Vehicles	Killed		Serious injuries	Minor injuries
1557 RN Urban EIDR Road Listed track	794			25	210	338
	117	234		2	25	65
	2120	4116		50	575	901
11 Others	7			1	0	1
	297	549		8	97	124

- 2016

Total	3272	6338	77	739	1213
Classification of the road	Accidents	Vehicles	Killed	Seriously injured	Minor injuries
Motorway	2	4	0	0	1
National Interstate Highway (RNIE)	1313	2545	32	246	468
National road (RN)	1	2	0	0	0
Urban roads	1956	3787	45	493	744

- 2017

Total	3075	5976	68	563	896
Classification of the road	Accidents	Vehicles	Killed	Seriously injured	Minor injuries
Motorway	457	890	8	81	131
National Interstate Highway (RNIE)	726	1402	17	107	194
National road (RN)	105	208	1	20	23
Urban roads	1677	3281	40	337	526
Listed track	20	37	1	4	4
Other	90	158	1	14	18

- 2018

Total	2317	4463	55	448	562
Injured Injured Road classification	Accidents	Vehicles	Killed	Minor Gravel	Not
Indicated	3	6	0	0	1
Highway	237	500	3	37	70
Interstate National Highway (RNIE)	348	686	11	53	82
National road (RN)	74	147	0	13	31
Urban roads Listed	1542	2937	38	338	361
track Other	18	29	2	2	2
	95	158	1	5	15

- 2019

Total	2036	3846	62	343	598
Injured Injured Road classification	Accidents	Vehicles	Killed	Minor Gravel	Not
Indicated	2	4	0	0	1
Highway	36 315	68	623 188 1	3	12
Interstate National Highway (RNIE)			2780 15	46	105
National road (RN)	94		7	19	37
Urban roads Listed	1473		38	270	436
track Other	6	9	1	1	0
	110	174	0	4	7

- 2020

Total	873	1680	40	185	253
Injured Injured Road classification Accidents Vehicles Fatalities Serious minor fatalities Inter-State National Highway (RNIE) 248 503 13 43 80 National Road (RN) 16 32 1 3 4					
Urban roads	551	1044	26	128	166
Listed track	8	13	0	5	1
Other	50	88	0	6	2

Age distribution of drivers

- 2011

Total	6487	98	852	1177
Driving age range	Vehicles or drivers	Killed	Seriously injured	Minor injuries
Uncoded	1728	35	329	291
< 10 years	1	0	0	0
10 to 20 years	77	4	21	49
20 to 30 years	1511	35	219	366
30 to 40 years	1697	9	165	295
40 to 50 years	930	5	86	131
50 to 60 years old	431	8	27	32
60 to 70 years old	98	1	5	10
70 to 80 years old	13	1	0	3
80 to 90 years old	1	0	0	0

- 2012

Total	5990	78	905	1285
Age range Driver Not coded	Vehicles or Drivers	Killed	Injured Serious	Minor injuries
	1212	19	229	190
10 to 20 years	90	0	26	60
20 to 30 years	1438	25	243	414
30 to 40 years	1776	14	255	380
40 to 50 years	949	14	100	175
50 to 60 years old	388	5	33	55
60 to 70 years old	121	1	18	9
70 to 80 years old	13	0	1	2
80 to 90 years old	3	0	0	0

- 2013

Total	6085	91	885	1532
Age Range:	Vehicles or drivers with light serious drivers	Killed	Wounded,	Wounded,
Uncoded	1448	35	295	312
10 to 20 years	94	0	34	56
20 to 30 years	1322	15	229	465
30 to 40 years	1687	30	180	391
40 to 50 years	986	6	92	200
50 to 60 years old	425	4	44	79
60 to 70 years old	104	1	8	19
70 to 80 years old	17	0	3	9
80 to 90 years old	2	0	0	1

- 2014

Total	6634	100	976	1547
Driving age range	Vehicles or drivers	Killed	Seriously injured	Minor injuries
Uncoded	1536	34	322	337
10 to 20 years	67	1	18	52
20 to 30 years	1539	30	247	495
30 to 40 years	1808	23	231	368
40 to 50 years	1017	7	108	186
50 to 60 years old	503	4	35	83
60 to 70 years old	140	1	14	21
70 to 80 years old	21	0	1	5
80 to 90 years old	3	0	0	0

- 2015

Total	6467	86	907	1429
Driver age range Uncoded	Vehicles or drivers	Killed	Seriously injured	Minor injuries
	1356	29	256	314
10 to 20 years	95	2	33	66
20 to 30 years	1439	19	218	439
30 to 40 years	1834	19	233	360
40 to 50 years	1073	12	113	156
50 to 60 years old	482	3	36	66
60 to 70 years old	164	1	15	25
70 to 80 years old	19	1	3	2
80 to 90 years old	5	0	0	1

- 2016

Total	6338	77	739	1213
Driving age range Not indicated	Vehicles or drivers	Killed	Seriously injured	Minor injuries
	1122	24	130	195
11 to 20 years	146	2	33	25
21 to 30 years	1495	22	185	288
31 to 40 years	1866	14	216	362
41 to 50 years	1101	9	123	218
51 to 60 years old	460	4	40	87
61 to 70 years old	125	0	11	31
71 to 80 years old	18	1	1	5
81 to 90 years old	4	0	0	1
91 to 100 years	1	1	0	1

- 2017

Total	5976	68	562	896
Driving age range	Vehicles or drivers	Killed	Seriously injured	Minor injuries
Not indicated	1037	16	91	117
11 to 20 years	114	3	15	24
21 to 30 years	1438	20	136	221
31 to 40 years	1748	22	153	275
41 to 50 years	1006	3	99	165
51 to 60 years old	474	3	52	70
61 to 70 years old	135	1	14	24
71 to 80 years old	24	0	2	0

- 2018

Total	4463	55	448	562
Driving age range Not indicated	Vehicles or drivers	Killed	Injured Serious	Injured Light
	508	6	35	44
11 to 20 years	92	0	9	3
21 to 30 years	1073	21	108	118
31 to 40 years	1501	18	155	227
41 to 50 years	818	4	86	107
51 to 60 years old	360	5	38	42
61 to 70 years old	99	1	13	18
71 to 80 years old	11	0	4	3
81 to 90 years old	1	0	0	0

- 2019

Total	3846	62	343	598
Driving age range Not indicated	Vehicles or drivers	Killed	Seriously injured	Minor injuries
	392	6	36	32
11 to 20 years	62 896	0	5	7
21 to 30 years	136 1183	22	91	
31 to 40 years	20 833 355	115	99	207
41 to 50 years		9	69	130
51 to 60 years old		4	36	58
61 to 70 years old		1	6	25
71 to 80 years old	8	0	0	2
81 to 90 years old	2	0	1	1

- 2020

Total	1680	40	185	253
Driving age range	Vehicles or drivers	Killed	Seriously injured	Minor injuries
Not indicated	140	0	5	14
11 to 20 years	24	0	4	6
21 to 30 years	363	9	43	49
31 to 40 years	522	19	65	85
41 to 50 years	385	8	39	64
51 to 60 years old	178	3	14	23
61 to 70 years old	56	1	13	9
71 to 80 years old	11	0	2	3
81 to 90 years old	1	0	0	0

Breakdown by vehicle type

- 2011

Total	6487	98	852	1177
Vehicle type	Vehicles or drivers	Killed	Seriously injured	Minor injuries
Bicycle	5	0	5	0
Veh. hand-drawn or horse-drawn	25	1	3	11
2 Motorized Wheels	1566	57	584	778
Passenger Car	3404	24	138	201
Motorcycle Taxi City	187	6	73	133
Taxi Intercity Taxi	52	0	7	6
City Minibus Intercity	31	0	1	3
Minibus	85	2	6	6
	40	0	5	6
City bus or bus	4	0	0	1
Intercity bus Van Truck Articulated	11	0	0	0
assembly Other	345	2	8	8
	339	4	9	13
	369	2	12	6
	24	0	1	5

- 2012

Total	5990	78	905	1285
Kind of vehicle	Vehicles or drivers	Killed	Seriously injured	Minor injuries
Bicycle Veh.	4	0	1	3
hand-drawn or horse-drawn	18	0	1	3
2-wheeled motorized	1555 49 615 931 Passenger car Passenger car 2896 2896 14 132 132 178 178			
Motorcycle taxi Motorcycle taxi 195 195 6 109 109 122 122 City taxi City taxi 55 55 0 1 1 4 4 Intercity				
taxi Intercity taxi 30 30 1 4 4 3 3 City minibus City minibus 114 114 1 6 6 13 13 Intercity minibus				
Intercity minibus 47 47 0 10 10 4 4 Bus or city bus Bus or city coach 14 14 0 1 1 0 0				
Intercity bus or coach	14	0	0	2
Pickup Truck	378	3	7	13
	277	2	9	3
Articulated assembly	371	2	7	2
Other	22	0	2	4

- 2013

Total	6085	91	885	1532
Vehicle type	Vehicles or drivers	Killed	Seriously injured	Minor injuries
Bicycle	2	0	0	1
Veh. hand-drawn or horse-drawn	19	0	4	3
2 motorized wheels	1814	62	692	1163
Passenger car	2875	16	99	182
Motorcycle taxi City	128	2	54	102
taxi Intercity taxi City	38	0	0	4
minibus Intercity	38	1	10	12
minibus City bus or	74	0	6	12
bus Bus or intercity	57	0	8	8
bus Van Truck	9	0	0	1
Articulated assembly	16	0	0	0
Other	371	5	7	22
	206	2	2	3
	402	3	2	8
	36	0	1	11

- 2014

Total	6634	100	976	1547
Kind of vehicle Bicycle	Vehicles or drivers	Killed	Seriously injured	Minor injuries
Veh. hand-drawn or	2	0	1	0
horse-drawn	20	0	3	4
2-wheeled motorized	1815	63	775	1179
Passenger car	3285	23	122	217
Motorcycle taxi City	106	4	34	78
taxi Intercity taxi City	29	1	1	5
minibus Intercity	19	0	0	1
minibus City bus or	87	0	1	5
coach Bus or coach	75	0	16	22
	20	0	2	0
intercity 9 9 0 0 0 0 0 0 0 0 Pickup truck 357 357 0 0 8 8 9 9 Truck 311 4 9 5				
Articulated assembly	448	4	3	7
Other	51	1	1	15

- 2015

Total	6467	86	907	1429
Vehicle type	Vehicles or drivers	Killed	Seriously injured	Minor injuries
Bicycle	4	0	2	0
Veh. hand-drawn or horse-drawn	25	0	3	7
2 motorized wheels	1678	51	718	1056
Passenger car	3225	23	106	198
Motorcycle taxi	130	4	37	108
City taxi Intercity taxi	29	0	2	1
City minibus Intercity	20	0	5	5
minibus City bus or	92	0	1	9
bus Intercity bus or	67	0	8	6
bus Van Truck	26	0	0	0
Articulated assembly	15	0	0	0
Other	431	2	14	19
	300	2	4	6
	386	2	3	5
	39	2	4	9

- 2016

Total	6338	77	739	1213
Vehicle Type Other	Vehicles or drivers	Killed	Seriously injured	Minor injuries
	24	0	1	5
Bicycle Horse-drawn	6	1	5	0
vehicle Hand-drawn vehicle	1	0	0	0
	71	0	5	5
2 -wheeled motorized (other than motorcycle	1452	21	234	244
taxi) Three-wheeler motorized Motorcycle	93	0	11	16
taxi Passenger car	164	0	27	37
(other than taxi)	3141	30	331	668
City taxi	25	0	2	5
Intercity Taxi City	41	0	6	17
Minibus Intercity	136	1	17	39
Minibus City Bus or	75	0	16	22
Coach	18	0	0	1
Intercity bus or coach	47	0	2	4
Van	393	2	29	66
Truck	310	12	27	41
Articulated assembly	341	10	26	43

- 2017

Total	5976	68	562	896
Vehicle type	Vehicles or drivers	Killed	Seriously injured	Minor injuries
Other	27	1	2	2
Bicycle	7	0	1	3
Horse-drawn vehicle	1	0	0	0
Handheld vehicle	16	0	0	0
Motorized 2-wheeler (other than motorcycle taxi)	1217	17	125	134
Motorized three-wheeler	87	0	5	15
Motorcycle taxi	113	2	11	2
Passenger car (other than taxi) Urban taxi	3165	21	319	558
Intercity taxi Urban minibus Intercity	27	1	1	3
minibus City bus or	18	1	0	5
bus Intercity bus or	89	4	13	24
bus Van Truck	65	1	11	12
Articulated assembly	4	0	0	0
	25	0	1	1
	410	2	27	73
	279	12	18	24
	426	6	28	40

- 2018

Total	4463	55	448	562
Vehicle Type Other	Vehicles or drivers	Killed	Seriously injured	Minor injuries
Bicycle Horse-drawn	16	1	1	0
vehicle Hand-drawn	3	0	1	0
vehicle	3	0	0	0
	795	7	58	35
2-wheeled motorized (other than motorcycle taxi)	64	1	5	11
Motorized three-wheeler 123 123 0 4 4 4 4 Motorcycle taxi Motorcycle taxi 2465 2465 20 300 300 431 431 Passenger car Passenger car (other than taxi) (other than taxi) (other than taxi) 16 0 2 6 City taxi City taxi City taxi 14 1 3 4 Intercity taxi Intercity taxi Intercity taxi 70 1 9 12				
Urban minibus	41	0	6	5
Intercity minibus	6	0	1	1
Bus or city bus	19	2	4	1
Intercity bus or coach	319	1	18	33
Van	191	12	16	10
Truck	318	9	20	9

- 2019

Total	3846	62	343	598

Vehicle type	Vehicles or drivers	Killed	Seriously injured	Minor injuries
Other	18	0	1	2
Bicycle	3	0	0	0
Horse-drawn vehicle	4	0	0	0
Handheld vehicle	3	0	0	0
2-wheeled motorized (other than motorcycle taxi)	598	10	29	23
Motorized three-wheelers	60	0	3	9
Motorcycle taxi	195	3	7	12
Passenger car (other than taxi) City taxi	2044	33	233	449
Intercity taxi City	7	0	0	1
minibus Intercity	4	0	0	1
~~minibus City bus or~~ bus Intercity bus or	80	1	13	15
bus Van Truck	13	0	2	4
Articulated assembly	6	0	1	1
	13	0	2	1
	305	5	25	44
	207	5	14	17
	286	5	13	19

- 2020

Total	1680	40	185	253
Vehicle Type Other	Vehicles or drivers	Killed	Seriously injured	Minor injuries
Bicycle	10	0	1	2
	2	0	0	0
2 -wheeled motorized (other than motorcycle	300	6	18	25
taxi) Three-wheeler motorized Motorcycle	17	0	3	1
taxi Passenger car	74	1	5	7
(other than taxi)	942	21	120	167
City Taxi Intercity	12	0	2	3
Taxi City Minibus	17	1	2	9
	21	1	5	6
Intercity minibus Bus	7	0	2	1
or city coach	2	0	0	1
Intercity bus or coach	2	0	3	2
Van	65	3	8	11
Truck	78	2	8	12
Articulated assembly	131	5	8	6

Appendix 4: Capability analysis of the planned axes

	AXIS NO.	PREVISON UVP/h Cerema suggestion	UVP/h Current	Current Utilization Rate 35%	UVP/J Projected	Projected Utilization Rate	Recommendation
1	Old bridge - SOBEBRA crossroads - OPT pk3 crossroads - Carrefour le Bélier	5000	1744.669223		5162.262251	103%	With a current utilization rate of 35%, no congestion expected except on the project horizon
2	Third Bridge - Crossroads SOBEBRA	5000	1694.481573	34%	5013.763151	100%	RAS
9	Place du souvenir - Carrefour 3 banks	1500	1116.831351	74%	2547.306143	170%	Carry out a specific study of the 3 banks crossroads to solve congestion on the project horizon
11	Carrefour Marché Saint Michel - Carrefour Nasuba - Echangeur Steinmetz - Carrefour Notre Dame	1500	1251.754392	83%	3703.787721	247%	Do a specific study of the Marché Saint Michel and Nasuba crossroads to solve congestion on the project horizon / plan a slope
14	Carrefour 3 banks - Carrefour Air Afrique		316.0517886	26%	935.1584795	78%	RAS
15	Carrefour Air Afrique - Old Bridge	1200	929.3255883	77%	2749.760437	229%	Carry out a specific study of the Notre Dame crossroads to solve the congestion on the project horizon / plan a slope
17	Carrefour cheminot - Passage Supérieur de Steinmetz 1200	5000	1366.84949	27%	4044.340001	81%	RAS

Appendix 5: Road Safety Inspection (RSI) Template

Road Safety Inspection Sheet Template

Route / Inspection Area/Axis					
Segment inspected					
Linear		Starting point		End point	
Date		Start time		End time	

A / Segment Type	

B / Description of the cross-section		
	Positives	Negatives
Type of pavement		
Coating		
Pavement width		
Number of lanes per direction of traffic		
Presence or absence of a cycle path		
Presence or absence of TPC		
Presence or absence of sidewalks		
Counter-alley		
Parking area		
Bus stop area		
Parking		
Lighting		

C / The main crossroads			
Name of the hub Number	of branches	Positives	Negatives
Positioning and operation of the lights			
Positioning of pedestrian crossings			
Island Positioning			
Sidewalk Positioning			
Guidance of Trajectories and Conflicts			

D / The surroundings and characteristics of the sections				
	Habitat	Activities	Mobility Issuers and Collectors	Adequacy of current and urban functions
Section				

E/ Existing safety equipment			
	Type	Defective state	Number / Linear
Panels			
Speed Reducers			
Speed limit signs			
Slides			
Horizontal signage			
Barriers			
Gateways			
Traffic lights			

F / Cycle paths and/or local traffic					Observations / 2Roues Traffic
	Yes / No	Coating	width	State	

Appendix 6: Road Safety Inspection Results by Axis

Appendix 7: Paint ranges – Criteria and choice

Product ranges for floor marking

There are four main families of marking products: ♦ Paints ♦ Hot or thermoplastic ♦ coatings Cold ♦ coatings Prefabricated tapes Each family corresponds to different needs such as durability, cost, ease of application, drying time, nature of the substrate, etc.

1- Paints are the most common marking products in Benin - They dry by evaporation of solvents Paints are the most widely used road and urban road marking products in France. They are easy to apply and rather inexpensive compared to other floor marking products. They are not always suitable for high-traffic areas or high-slip areas because the risk of premature wear is high. There are three main families of paints:

> Solvent-based paints: after application of the product, the solvent contained in the paint evaporates, drying is achieved in a few minutes (generally between 5 and 15 minutes depending on the climatic conditions and the products used). Most of the paints on the market are toluene-free, which is not harmful to humans and the environment.

> Water-based paints: after application of the product, drying is achieved by evaporating the water contained in the paint. These paints are very popular with local authorities wishing to highlight ecological products that respect the environment. The marking equipment used for the application of these paints must be subject to regular and regular maintenance to avoid any risk of seizure or clogging.

> Reactive paints: two- or three-component paints whose drying depends on a chemical reaction called polymerization, triggered by a catalyst (peroxide). The drying time of these products is longer (15 to 20 minutes) but less dependent on the climatic conditions. These paints have a higher resistance than solvent-based paints and water-based paints.

Pros and Cons

- Their ease of application: from manual application with a roller to a high-performance applicator truck
- Their excellent quality/price ratio due to their low application dosage (less than 0.5 kg/m²)
- Their duration in use
- Their versatility in the maintenance of existing markings It is the universal product, whether as a solvent or water-based product.

2- Hot or thermoplastic coatings - They dry by cooling Also called thermoplastic coatings, these products are in powder form, packaged in hot melt bags. They must be melted in a kettle between 180°C and 200°C and then applied on the road using a suitable marking device. Drying is done by cooling on contact with the ground. There are 3 families of hot plaster:

> Extruded hot coatings: these coatings are applied using shoes mounted on manual plotting devices. The performance of these coatings is lower than other marking products. They are used more for urban markings: lines, pedestrian crossings, stop lanes, etc.

> Hot curtain coatings: these coatings, which are more fluid, are applied by extrusion for greater performance. The application is done with ride-on plotters, perfectly adapted to large shelves.

> Sprayed hot coatings: these coatings are sprayed by applicator trucks or ride-on machines for high-performance application. These products are mainly used on major roads.

Pros and Cons

- Require specific application equipment: melters and thermotracers
- Almost immediate recirculation by rapid cooling of the product
- High durability due to application dosages (approx. 3 to 4 Kg/m²)
- Self-regenerating product whose performance is renewed by progressive abrasion of the product

These products are well adapted to the constraints of large cities: inconvenience to the user reduced thanks to the rapid return to circulation.

3- Cold coatings - They dry by chemical setting The application of these products is generally done manually with a spatula, with a comb or with the help of a special marking machine. These are very resistant products over time and excellent value for money.

> Cold coatings with hardener: they are widely used in urban areas for the marking of pedestrian crossings, stop strips and squares of give way. They provide durable floor markings with minimal application equipment. Drying is achieved after mixing a hardener (peroxide) with the product.

> Water-based cold coatings: water-based cold coatings are single-component and do not need a catalyst to obtain a reaction for drying. The drying time is longer than for a coating with hardener and is also dependent on the climatic conditions.

Pros and Cons

- Excellent durability as they are extremely mechanically resistant products
- Expensive products
- High application dosages (between 2 and 3 Kg/m²)

They are extremely resistant products particularly suitable for areas subject to heavy traffic

4- Prefabricated tapes - There are two types Prefabricated tapes and acronyms are very resistant and high-performance products, recommended for long-term marking. The application is easy and fast. There are two product families:

> Hot-bonded tapes: these are pre-formed, iron-on marking products. These products are applied to the road using a blowtorch. Drying is fast. There are many shapes and acronyms to cover a wide range of applications: pedestrian crossings, stop signs, lines, pictograms, texts, games for schoolyards, etc.

> Cold-glued strips: these are presented in the form of rolls of different widths. They are self-adhesive, so the application is very quick and can be done either manually or with the help of a special strip applicator. They are particularly suitable for long linear roads, on major roads. The use of these lanes allows for an almost immediate opening of traffic. These lanes can also be used in urban areas for the construction of pedestrian crossings, stop strips, zig-zag bus lines, etc.

Pros and Cons

- Heat-bonded tapes, which are hot-dip coatings and have the same qualities

- Cold-bonded tapes, which are extremely resistant products over time, with very high retro-reflection performance

These are products adapted to specific uses: logos, folding arrows, etc. on new coatings for a very long life in use (coating life)

Selection criteria

The choice of a marking product depends on several criteria ♦ : Constraints related to climatic conditions: rain, snow, cold, etc.

♦ Constraints related to the density of road traffic and the level of wear and tear related to the presence of intense areas of sliding or cross-traffic.

♦ The impact on the health and safety of enforcement personnel.

♦ The drying time of the product for faster recirculation. ♦ The lifespan of the product to limit the frequency of re-marking ♦ The budget available at the time of the work.

♦ The policy implemented in terms of sustainable development. ♦ The nature of the marking, permanent or temporary.

♦ The need for retroreflective marking.

♦ The need to have a VNTP (Visible at Night and in Rainy Weather) product.

Table 13: Traffic Marking Products Comparison Table

Produit		Nature du marquage	Conditions d'applications : peu adapté (- -) à sans incidence (++)			Temps de séchage	Fort trafic	Durabilité	Rendement Application	Balisage
		Permanent et/ou Temporaire	Chaleur	Humidité	Froid	En minutes	Faible (•) à bien adapté (••••)	En années	Faible (+) à très rapide (+++)	Fixe ou Mobile
Peinture	Solvantée	P et T	-	-	+	3 à 15	•	1 à 2	+ + +	M
	A l'eau	P et T	+ +	- -	- -	1 à 10	••	1 à 3	+ + +	M
	Réactive	P et T	+ +	+	-	10 à 20	••	2 à 4	+ + +	F
Enduit à chaud	Extrudé	P	-	+	+	1 à 2	•••	3 à 5	+	M
	Rideau	P	-	+	+	1 à 2	•••	4 à 6	+ +	M
	Projeté	P	-	+	+	1 à 2	••	2 à 4	+ + +	M
Enduit à froid	A l'eau	P	+ +	- -	- -	30 à 60	••••	5 à 7	+	F
	A durcisseur	P	+	+ +	+ +	8 à 20	••••	5 à 7	+	F
Bande préfabriquée	Thermocollée	P	-	+ +	+ +	2 à 4	•••	4 à 6	+	F
	Collée à froid	P et T	+ +	-	+ +	0 à 15 s.	••••	8 à 10	+ +	F

Conclusion: To create a pedestrian crossing or a stop lane in an urban environment, on a road with heavy traffic, you can use a white cold coating with hardener. Manual application with a spatula is simple but not necessarily fast. The product will have a long lifespan. The drying time of the product is short, thus avoiding blocking traffic for too long because the site markings must be fixed.

• To create long-lasting urban floor logos, you can use prefabricated iron-on marking products. The product is very durable, the durability is excellent. Installation is quick even for complex shapes.

• To create large linear lines in durable marking, we will turn to hot coatings, which offer excellent value for money. The drying time is very short. The site markings are mobile. The opening of traffic is done in a few minutes.

• For the tracing of parking spaces, we will use solvent or water-based paint. Easy to apply, economical and with quick drying. The durability will be correct and generally sufficient for this type of application.

• For temporary marking on a construction site, you can use yellow prefabricated adhesive strips for quick application. At the end of the work, the strips are peeled off by simple pull, without residual traces.

In the context of the CTA project, the following conditions are identified:

- Large marking lines: (several streets totalling 16.125 km),
- Urban roads, which therefore require rapid opening to traffic,
- Urban roads, therefore the need for a quick opening and therefore a short drying time,

- Desired durability: at least 5 years,
- Urban roads: need to have mobile markings to quickly clear traffic,

In view of all the above, the following is retained:

• Hot plaster curtains: for the marking of longitudinal strips, pedestrian crossings, stop strips and squares of give way.

Annex 8: Horizontal signage – parameter for choosing the width of the U-band

The width of the lines is defined in relation to a "u" unit

- u = 7.5 cm motorways, divided roads, 4-lane roads in RC
- u = 6 cm major roads (CGR)
- u = 5 cm remains of roads
- u = 3 cm cycle paths

Appendix 9: The different ranges of panels

Gamme	Triangle	Disques	Octogone	Carrés	Principaux modes d'emploi
Très grande	1 500 mm	1 250 mm	1 200 mm	1 050 mm	Sur autoroute
Grande	1 250 mm	1 050 mm	1 000mm	900 mm	Sur routes à chaussées séparées
Normale	1 000 mm	850 mm	800 mm	700 mm	Sur autres routes
Petite	700 mm	650 mm	600 mm	500 mm	Si difficulté d'implantation gamme normale
Miniature	500 mm	450 mm	400 mm	350 mm	Exclusivement en ville si difficultés d'implantation

Annex 10: Signage application – from module and domain Horizontal

DÉSIGNATION DES MARQUES	MODULATION	LARGEUR
A. - Lignes longitudinales axiales		
1. - Lignes continues (cas général) :		
Ligne axiale ou de délimitation des voies	continue	2u (1)
Ligne axiale sur chaussée à 4 voies (article 114-2 et 114-5)…	continue	5u
Ligne séparant les sens de circulation opposés sur les routes à trois voies situées hors agglomération, avec deux voies affectées à un sens de circulation (article 114-1) et ligne oblique marquant un rétrécissement de route de trois à deux voies (article 116-2)	continue	3u
2. - Lignes discontinues de type T1 :		
Ligne axiale ou de délimitation de voie en rase campagne (articles 114, 114-1 et 114-2)	T1	2u
Ligne axiale ou de délimitation de voie en agglomération (article 114-5) ou de piste cyclable (article 118-1.B)	T1, T'1ou T3	2u
3. - Lignes discontinues de type T3 :		
Ligne d'annonce d'une ligne continue (article 115.3)	T3	2u
Ligne de dissuasion en remplacement d'une ligne continue (art. 116.A.4)	T3	2u
Ligne d'annonce d'une ligne continue sur les routes à trois voies situées hors agglomération, avec deux voies affectées à un sens de circulation (art. 114-1)	T3	3u
4. - Lignes mixtes :		
La ligne mixte est constituée par une ligne continue doublée par une ligne discontinue de type T1 ou T3 (2)	T1 ou T3	2u (3)
5. - Interruption d'une ligne continue pour permettre l'accès direct aux propriétés riveraines. (art. 114-3 et 114-5)	T'2	2u – 3u

(1) A porter à 3u à l'approche d'un îlot (article 115-4)

(2) Cela se produit par exemple aux abords d'un point d'inflexion ou d'un point bas entre deux dos-d'âne rapprochés (schémas A1 et A2 en annexe).

(3) Chacune (espacement entre les lignes : 2u).

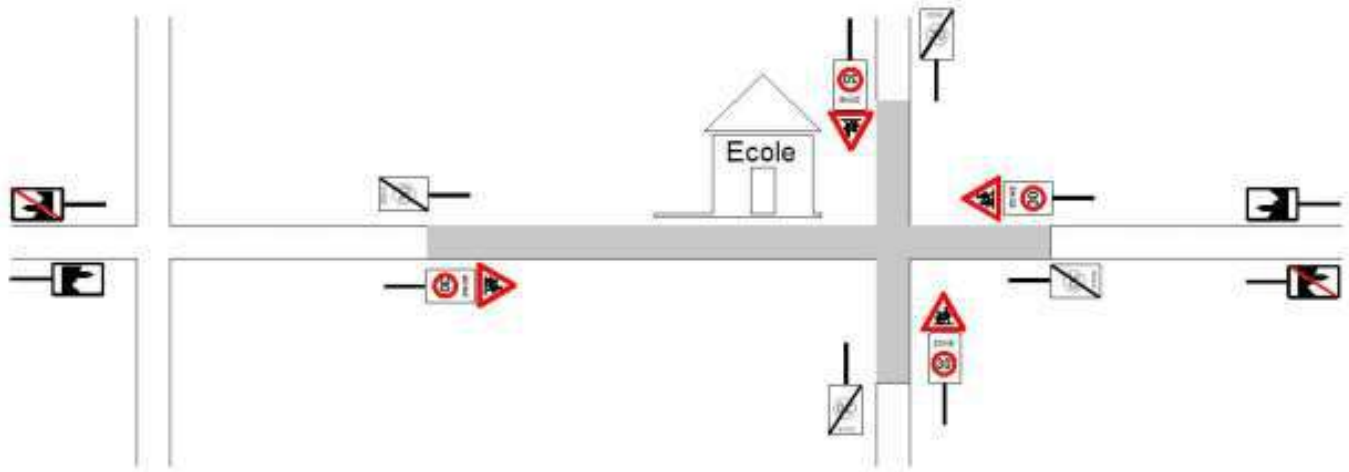
DÉSIGNATION DES MARQUES	MODULATION	LARGEUR
B. - Lignes longitudinales de rives ou de délimitation de certaines voies		
1. - Lignes discontinues de type T2		
Ligne de rive de chaussée (art. 114-4.A)	T2	3u
Ligne de délimitation des voies de décélération, d'insertion ou d'entrecroisement (art. 117-3)	T2	5u
Ligne d'entrée et de sortie des voies pour véhicules lents (art. 114-3)	T2	5u
2. - Lignes discontinues de type T3 :		
Ligne de délimitation de voies pour véhicules lents (art. 114-3)	T3	5u
Ligne de délimitation dans certains cas d'un couloir réservé aux autobus (art. 114-3)	T3	5u
Ligne de délimitation de bandes cyclables (art. 114-3)	T3	5u
Ligne de rive aux approches de certains carrefours et dans les bretelles de raccordement (art. 114-4)	T'3	3u
3. - Lignes discontinues de type T4 :		
Ligne délimitant une bande d'arrêt d'urgence, en section courante (hors bretelles de raccordement) sur autoroutes et routes à chaussées séparées et à carrefours dénivelés (art. 114-4.B)	T4	3u
C. - Lignes transversales		
1. Ligne « STOP » (art. 117-4)	continue	50 cm
2. Ligne « CÉDEZ LE PASSAGE » (art. 117-4)	T'2	50 cm
3. Ligne « CÉDEZ LE PASSAGE » pour les pistes cyclables (art. 118-1.C)	25cm	25 cm
4. Ligne d'effet des feux (article 117-4)	T'2	15 cm
5. Ligne de guidage en intersection Tourne à gauche à l'indonésienne – Carrefour en baïonnette (art. 117-1)	T'2	10 cm
D. - Lignes continues délimitant le T.P.C., les îlots ou certains couloirs réservés		
1. Ligne de délimitation de terre-plein central (art. 114-4 et 114-2)	continue	3u
2. Ligne de délimitation du contour des îlots (art. 117-2.B)	continue	3u
3. Ligne de délimitation de certains couloirs réservés (art. 114-3)	continue	5u ou 3u
4. Interruption d'une ligne continue pour permettre l'accès direct aux propriétés riveraines. (article 114-3 et 114-5)	T'2	2u – 3u
E. - Marques relatives au stationnement		
1. Ligne délimitant les places de stationnement (blanche ou bleue, art 118-2)	T'2 ou continue	2u
2. Ligne confirmant ou indiquant l'interdiction de stationner (jaune, art. 118-2)	T'2	2u
3. Ligne confirmant ou indiquant l'interdiction de s'arrêter (jaune, art. 118-2)	continue	2u
4. Ligne marquant l'emplacement d'un arrêt d'autobus (jaune, art. 118-3)	continue zigzag	2u
5. Ligne marquant l'emplacement réservé pour les véhicules effectuant un chargement ou déchargement de marchandises (jaune, art. 118-2.C)	T'2 ou continue	2u

Appendix 11: standard plan for the positioning of signs, pedestrian crossings and other measures in front of socio-community infrastructures.

Implantation de la signalisation *(Code du Gestionnaire)*

La délimitation de la zone abords d'école à signaler est déterminée au cas par cas en fonction de l'influence de l'école sur la circulation. A défaut d'indication claire, la zone d'abords d'école est signalée à 75 m de part et d'autre de l'accès de l'école.

Le placement des signaux est à déterminer avec attention afin que les signaux soient bien visibles.



Le A23 est toujours au-dessus du F4a. Les signaux A23 et F4a sont "collés" l'un à l'autre. Leur association indique le début de la zone d'abords d'école.

Jusqu'à présent, un signal de danger est normalement placé à une distance approximative de 150 m de l'endroit dangereux. Ce terme "approximative" est à prendre au sens très large surtout pour les abords d'écoles. L'association des signaux A23 et F4a délimite le début de la zone d'abords d'école, le début de la zone fréquentée par les enfants. Dès lors, la signalisation A23+F4a correspond plutôt à une signalisation de "position" que d'une signalisation "avancée" destinée à prévenir l'usager de la route de l'approche de l'obstacle ou du point dangereux. L'endroit fréquenté par des enfants ne se restreint pas à l'accès ou la porte de l'école. L'additionnel indiquant la distance par rapport à l'accès de l'école n'est donc généralement pas nécessaire. Le cas échéant, il est à placer sous le A23.

Hors agglomération, le signal F4a est annoncé par un signal C43 complété par un panneau additionnel de distance lorsque la différence entre la vitesse maximale autorisée en approche et la limitation de vitesse instaurée dans la zone d'abords d'école est supérieure à 20 km/h.

Appendix 12: Safety measures during the execution phase of the work

Table 14: Mandatory work and safety signage on the site and the remote and technical sites

Types Description		Colour Features: Red/Yellow; Packaging: Single Dim. : Δ
	The AK5 foldable construction tripod warns users of a possible danger. This makes the site safe for both road users and workers on the site. Its large size and fluorescent yellow color allow the tripod to be visible to everyone. Stores in a plastic cover to protect it when folded.	700 mm; Fixing: To be installed; Fluorescent: Yes Shape: Triangle; ISO 7010: No; Material: Plastic Weight: 4 kg; Text / Symbol: Symbol; Type: AK5 Version: Standard; Area of use: Indoor and Outdoor
	This triangular-shaped sign has a pictogram representing an agent carrying out work. It ensures the safety of officers by informing road users that a construction site is underway.	• Ak5 panel in galvanized steel, sheet metal face set in a 25 mm thick steel profile with riveted reinforcements. • Quality of the retroreflective film: - Class 1: low-intensity retroreflective film for use in the city, on car parks and private roads. - Class 2: high-intensity retroreflective film to be used in the open countryside when the sign is placed at a height of more than 2 m or on motorways and busy roads. • Available sizes: - Base 700 mm - Base 1000 mm • Rigid panel sold with its galvanized steel tripod support to be placed on the ground. • Safe handling thanks to the non-sharp edges. • NF TSI 03 certification. • Ascquer NF certification.

	Galvanised steel panel, sheet metal face set in a 25 mm thick steel profile Dimensions: 800 x 600 mm. Sign with black writing on a yellow background indicating a closed street.	• Types of panels: - Panel sold alone to attach to a pole (sold separately) or - Panel sold with support to be placed on the ground of the attached foot type. • Quality of the retroreflective film: - Class 1: low-intensity retroreflective film for use in cities, car parks and private roads or - Class 2: high-intensity retroreflective film to be used in the open countryside when the sign is placed at a height of more than 2 m or on motorways and busy roads. • Rigid and lightweight panel • Safe handling thanks to non-sharp edges • NF TSI 03 (with integral foot) and NF TP 06 (panel only) certification
	Galvanized steel panel, sheet metal face set in a 25 mm thick steel profile. Dimensions: 800 x 600 mm. Sign with a yellow background indicating a road that is closed.	• Types of panels: - Panel sold alone to attach to a pole (sold separately) or - Panel sold with support to be placed on the ground of the attached foot type. • Quality of the retroreflective film: - Class 1: low-intensity retroreflective film for use in cities, car parks and private roads or - Class 2: high-intensity retroreflective film to be used in the open countryside when the sign is placed at a height of more than 2 m or on motorways and busy roads. • Rigid and lightweight panel • Safe handling thanks to non-sharp edges • NF TSI 03 (with attached foot) and NF TP 06 (panel only) certification.

	Galvanized steel panel, sheet metal face set in a 25 mm thick steel profile. Dimensions: 800 x 600 mm. Sign with black writing on a yellow background indicating a closed street.	Types of panels: - Panel sold alone to attach to a pole (sold separately) or - Panel sold with support to be placed on the ground of the attached foot type. • Quality of the retroreflective film: - Class 1: low-intensity retroreflective film for use in cities, car parks and private roads or - Class 2: high-intensity retroreflective film to be used in the open countryside when the sign is placed at a height of more than 2 m or on motorways and busy roads. • Rigid and lightweight panel • Safe handling thanks to non-sharp edges • NF TSI 03 (with attached foot) and NF TP 06 (panel only) certification.
	Temporary panel with text, in galvanized steel, sheet metal face set in a 25 mm thick steel profile. Dimensions: 800 x 600 mm. Sign with a yellow background indicating a truck exit.	• Types of panels: - Panel sold alone to attach to a pole (sold separately) or - Panel sold with support to be placed on the ground of the attached foot type. • Quality of the retroreflective film: - Class 1: low-intensity retroreflective film for use in cities, car parks and private roads or - Class 2: high-intensity retroreflective film to be used in the open countryside when the sign is placed at a height of more than 2 m or on motorways and busy roads. • Rigid and lightweight panel • Safe handling thanks to non-sharp edges • NF certified by ASCQUER • NF TSI 03 (with integral foot) and NF TP 06 (panel only) certification • Sold alone to screw directly to a post or with its galvanized steel support to install in any place.

	• Temporary panel with text, in galvanized steel, sheet metal face set in a 25 mm thick steel profile. • Dimensions: 800 x 600 mm • Sign with a yellow background indicating a truck exit.	• Types of panels: - Panel sold alone to attach to a pole (sold separately) or - Panel sold with support to be placed on the ground of the attached foot type. • Quality of the retroreflective film: - Class 1: low-intensity retroreflective film for use in cities, car parks and private roads or - Class 2: high-intensity retroreflective film to be used in the open countryside when the sign is placed at a height of more than 2 m or on motorways and busy roads. • Rigid and lightweight panel • Safe handling thanks to non-sharp edges • NF certified by ASCQUER • NF TSI 03 (with integral foot) and NF TP 06 (panel only) certification • Sold alone to screw directly to a post or with its galvanized steel support to install in any place.
	Fold-down pedestal sign prescribing the speed limit. Choose the speed to write on the panel when ordering. Limitation to 50, 30, 20, ... Miles.	• Bk14 panel in galvanised steel, sheet metal face set in a 25 mm thick steel profile with riveted reinforcements. • Retroreflective coating: - Class 1: Small intensity to be used, - In the open countryside and built-up areas when class 2 is not compulsory. - In the city when the speed limit is less than 70km/h. - For private use: Parking signage, condominiums, companies. - Retroreflection performance 50 cd/lux/m². Durability 7 years. - Class 2: High intensity to be used, - For all AB type panels - In the open countryside when the sign is placed more than 2 meters high - On highways and busy roads. - In the city when the speed limit is 70 km/h or more.

		- 180 cd/lux/m² retroreflection performance. 10 year durability. • Available sizes: - Ø 650 mm - Ø 850 mm • Lightweight, rigid and economical construction site panel. • Panel sold with its galvanized steel tripod support to be placed on the ground. • Safe handling thanks to non-sharp edges • NF TSI 03 certification • NF certified by ASCQUER.
	K8 barrier on a movable stand to signal a deviation or temporary narrowing of the roadway.	- K8 traffic sign with white background with red chevrons mounted on a galvanized steel bracket - Galvanised steel panel with sheet metal face set in a 25 mm thick steel profile. - NF TSI 03 certified panel.
	KD22a panel in galvanized steel, sheet metal face set in a 25 mm thick steel profile with riveted reinforcements.	Retroreflective coating: - Class 1: Small intensity to be used, - In the open countryside and built-up areas when class 2 is not compulsory. - In the city when the speed limit is less than 70km/h. - For private use: Parking signage, condominiums, companies. - Retroreflection performance 50 cd/lux/m². Durability 7 years. - Class 2: High intensity to be used, - For all AB type panels - In the open countryside when the sign is placed more than 2 meters high - On highways and busy roads. - In the city when the speed limit is 70 km/h or more. - 180 cd/lux/m² retroreflection performance. 10 year durability. • Available size: H 300 x W 1300 mm.

		• Lightweight, rigid and economical construction site panel. • Panel sold without its galvanized steel support. • Safe handling thanks to the non-sharp edges. • Comes with cover to hide arrows on either side of the sign to indicate the right direction. • Non-standard NF panel.
		- Deflection panel made of 15/10° thick steel with a 25 mm thick surround profile. - Sold with screw cover on the panel for blackout on one side of the boom. - Crimped edges so not sharp for more safety in handling. - Fixing on a classic pole or on a temporary bipod support ref. ER47PIK2 (sold separately). - Exists: Class 1 (low-intensity reflectorized for private roads) Class 2 (high-intensity reflectorized for public roads). Panel sold alone. Plan to order the bipod mount ER47PIK2 separately.
		• Materials: Rigid PVC or adhesive vinyl. • Dimensions: Ø 80 mm, Ø 180 mm, Ø 300 mm • Colors: white and blue with fluorescent yellow edging around the panel. • Complies with ISO 7010 standard. • - Self-adhesive with vinyl material. - Pre-punch holes to facilitate the installation of the rigid plastic panel. You can also glue it if you want. • An informative safety sign that plays an essential role in protecting all people entering your establishment. • The inks used are UV resistant. • Adhesive vinyl is flexible and easy to install on any flat, clean and dust-free surface.

		• PVC is lightweight, economical and 100% recyclable. • The fluorescent yellow border accentuates the visibility of the information. • Ideal for industries, communities, administrations, traders and individuals. • To be installed on a construction site, to be used for the marking of a warehouse, a factory, a car park or private traffic roads. • Advice: for a perfect visibility of the information, we advise you: - A Ø 80 mm panel for a range of use from 1 to 2 meters. - A Ø 180 mm panel for a distance of use ranging from 6 to 7 meters. - A Ø 300 mm panel for a distance of use ranging from 12 to 13 meters.
		• Materials: Rigid PVC or adhesive vinyl. • Dimensions: 330 x 200 mm. • Colors: white and red with fluorescent yellow edging around the panel. • - Self-adhesive with vinyl material. - Pre-punch holes to facilitate the installation of the rigid plastic panel. You can also glue it if you want. • An informative safety sign that plays an essential role in protecting all people entering your establishment. • The inks used are UV resistant. • Adhesive vinyl is flexible and easy to install on any flat, clean and dust-free surface. • PVC is lightweight, economical and 100% recyclable. • The fluorescent yellow border accentuates the visibility of the information. • Ideal for industries, communities, administrations, traders and individuals. • To be installed on a construction site, to be used for the marking of a warehouse, a factory, a car park or private traffic roads.

 Technical remote sites, quarries and borrowing sites Hazard safety	signage in accordance with the ISO 7010 standard for safety signs in companies - W017	- Available in: PVC: rigid panel sensitive to different chemicals. Resistant to medium temperatures (-14°C to +65°C). Indoor use only. Adhesive vinyl: self-adhesive that is highly resistant to atmospheric agents. Excellent UV resistance. Stick on a smooth, clean wall. Indoor and outdoor use. High quality adhesive polyester: self-adhesive printed by thermal transfer and covered with a polyester lamination allowing resistance to solvents and chemicals, high temperatures (-40°C to +120°C), rain, UV, scratches and abrasion. Heavy-duty acrylic-based adhesive for adhesion to even the most challenging surfaces. Indoor and outdoor use. Polypropylene: flexible panel that is highly resistant to impacts, UV rays and high temperatures. Resists solvents better than PVC. Thickness 1.5 mm. Fastening with screws, rivets, nails or glue (not supplied). Indoor and outdoor use. Laminated vinyl for flooring: adhesive vinyl covered with a non-slip and water-resistant lamination. Specially developed for installation on a clean, smooth and dry floor indoors. Withstands the passage of pallet trucks and vehicles. 20 µ m surface roughness provides anti-slip protection on wet surfaces. Resistant to solvent and most chemical agents (alcohol, dilute acids, oils). Withstands temperatures between -40°C and +90°C.

 Technical base camps, quarries and loan sites	signage hot surface in accordance with ISO 7010 on safety signs in companies - W017	High quality adhesive polyester: flexible sticker printed by thermal transfer and covered with a polyester lamination allowing resistance to solvents and chemicals, high temperatures (-40°C to +120°C), rain, UV, scratches and abrasion. Heavy-duty acrylic-based adhesive for adhesion to even the most challenging surfaces. Indoor and outdoor use. Polypropylene: plastic panel that is highly resistant to impacts, UV rays and high temperatures. Resists solvents better than PVC. Withstands high temperatures between -80°C and +120°C. Thickness 1.5 mm. Fastening with screws, rivets, nails or glue (not supplied). Indoor and outdoor use. PVC: rigid panel sensitive to various chemicals. Resistant to medium temperatures (-14°C to +65°C). Indoor use only. Adhesive vinyl: self-adhesive that is highly resistant to atmospheric agents. Excellent UV resistance. Stick on a smooth, clean wall. Indoor and outdoor use.
 Remote site, quarries and borrowing sites Hazard safety	Drowning hazard sign - Available in:	- Rigid or self-adhesive road signs. - Hanging poster to improve safety in factories, industries, storage areas. - Available in: PVC: rigid panel sensitive to different chemicals. Resistant to medium temperatures (-14°C to +65°C). Indoor use only. Adhesive vinyl: self-adhesive that is highly resistant to atmospheric agents. Excellent UV resistance. Stick on a smooth, clean wall. Indoor and outdoor use.

 Technical base camps, quarries and loan sites	Signal pictogram risk of fingers getting caught in the gear	- Safety signage in the form of rigid signs or stickers. - Signage to be hung to promote the safety of personnel in workshops, industries and near machines. - Available in: PVC: rigid panel sensitive to different chemicals. Resistant to medium temperatures (-14°C to +65°C). Indoor use only. Adhesive vinyl: self-adhesive that is highly resistant to atmospheric agents. Excellent UV resistance. Stick on a smooth, clean wall. Indoor and outdoor use.
	Safety sign Warning when exiting trucks	- PVC or self-adhesive material. - Text in yellow on a black background - Hang-up sign to improve safety. - Signage to be placed at the exit of factories, industries, storage areas. - Available in: PVC: rigid panel sensitive to different chemicals. Resistant to medium temperatures (-14°C to +65°C). Indoor use only. Adhesive vinyl: self-adhesive that is highly resistant to atmospheric agents. Excellent UV resistance. Stick on a smooth, clean wall. Indoor and outdoor use.
	Warning at the end of the construction site - STF 3527S Warning sign for the exit from construction sites	- Traffic sign made of PVC or sticker. - Hanging sign to improve safety on construction sites. - Available in: PVC: rigid panel sensitive to different chemicals. Resistant to medium temperatures (-14°C to +65°C). Indoor use only. Adhesive vinyl: self-adhesive that is highly resistant to atmospheric agents. Excellent UV resistance. Stick on a smooth, clean wall. Indoor and outdoor use.

	Danger warning sign: Before any work, make sure that all measures have been taken to avoid commissioning, - Safety sign in accordance with European standards for safety and health signage in the workplace. - These road signs are intended for use in factories, construction sites, or car parks.	- Available in: PVC: rigid panel sensitive to different chemicals. Resistant to medium temperatures (-14°C to +65°C). Indoor use only. Adhesive vinyl: self-adhesive that is highly resistant to atmospheric agents. Excellent UV resistance. Stick on a smooth, clean wall. Indoor and outdoor use.
	Danger warning sign no clean while running - Safety sign in accordance with European standards for safety and health signage in the workplace. - These road signs are intended for use in factories, construction sites, or car parks.	- Available in: PVC: rigid panel sensitive to different chemicals. Resistant to medium temperatures (-14°C to +65°C). Indoor use only. Adhesive vinyl: self-adhesive that is highly resistant to atmospheric agents. Excellent UV resistance. Stick on a smooth, clean wall. Indoor and outdoor use.
	Toxic materials hazard sign in accordance with ISO 7010 for safety signs in companies - W016. - Skull pictogram symbol of toxic danger	- Available in: High quality adhesive polyester: flexible self-adhesive printed by thermal transfer and covered with a polyester lamination allowing resistance to solvents and chemicals, high temperatures (-40°C to +120°C), rain, UV, scratches and abrasion. Heavy-duty acrylic-based adhesive for adhesion to even the most challenging surfaces. Indoor and outdoor use. Polypropylene: plastic panel that is highly resistant to impacts, UV rays and high temperatures. Resists solvents better than PVC. Withstands high temperatures between -80°C and +120°C. Thickness 1.5 mm. Fastening with screws, rivets, nails or glue (not supplied). Indoor and outdoor use. PVC: rigid panel sensitive to various chemicals. Resistant to medium temperatures (-14°C to +65°C). Indoor use only.

		Adhesive vinyl: self-adhesive that is highly resistant to atmospheric agents. Excellent UV resistance. Stick on a smooth, clean wall. Indoor and outdoor use.
	Flammable material hazard sign in accordance with ISO 7010 for safety signs in companies - W016. - Flamed material pictogram, symbol of danger of flammable products.	Available in: High quality adhesive polyester: flexible self-adhesive printed by thermal transfer and covered with a polyester lamination allowing resistance to solvents and chemicals, high temperatures (-40°C to +120°C), rain, UV, scratches and abrasion. Heavy-duty acrylic-based adhesive for adhesion to even the most challenging surfaces. Indoor and outdoor use. Polypropylene: plastic panel that is highly resistant to impacts, UV rays and high temperatures. Resists solvents better than PVC. Withstands high temperatures between -80°C and +120°C. Thickness 1.5 mm. Fastening with screws, rivets, nails or glue (not supplied). Indoor and outdoor use.
	Evacuation assembly point signage in accordance with ISO 7010 on safety signs in companies. - E007 - International signage in accordance with the ISO 7010 law. - Pictogram symbolized by a group of people framed by 4 arrows going in their direction. - Allows you to indicate where to meet in the event of an evacuation. - Easy-to-read sign, with white pictograms on a green background.	- Available in: PVC: rigid panel sensitive to different chemicals. Resistant to medium temperatures (-14°C to +65°C). To be screwed or glued by you (fixing not included). Indoor use only. Adhesive vinyl: self-adhesive that is highly resistant to atmospheric agents. Excellent UV resistance. Stick on a smooth, clean wall. Indoor and outdoor use.

	Evacuation assembly sign. Clearly indicate your meeting point with this 4-sided retroreflective sign. This high-quality signage will allow light reflectorization for greater visibility	Characteristics • Material: 2 mm aluminium • Dimension of one side 400 x 400 mm • Class 1 retroreflective: Reflectorization of low-intensity light. • Cleans easily. • Supplied with a 3 metre galvanised post with a diameter of 60 mm, cap and flanges for a Ø 60 mm post. Can be installed outdoors.
	No smoking sign P002 Would you like to create a non-smoking area in your establishment? We offer you our ISO 7010 standards no smoking sign.	Characteristics: • Materials: Rigid PVC or adhesive vinyl. • Dimensions: Ø 80 mm, Ø 180 mm, Ø 300 mm. • Colors: white and blue with fluorescent yellow edging around the panel. • Complies with ISO 7010 standard. • - Self-adhesive with vinyl material. - Pre-punch holes to facilitate the installation of the rigid plastic panel. You can also glue it if you want. • An informative safety sign that plays an essential role in protecting all people entering your establishment. • The inks used are UV resistant. • Adhesive vinyl is flexible and easy to install on any flat, clean and dust-free surface. • PVC is lightweight, economical and 100% recyclable. • The fluorescent yellow border accentuates the visibility of the information. • Ideal for industries, communities, administrations, traders and individuals. • To be installed on a construction site, to be used for the marking of a warehouse,

		roads. • Advice: for a perfect visibility of the information, we advise you: - A Ø 80 mm panel for a range of use from 1 to 2 meters. - A Ø 180 mm panel for a distance of use ranging from 6 to 7 meters. - A Ø 300 mm panel for a distance of use ranging from 12 to 13 meters. Terms of use: Indoor and outdoor use.
	Pictogram Prohibited lights relating to the ISO 7010 standard on safety signage in companies. - P003 - Round prohibition signage, in accordance with international standards for safety and health signage in the workplace. - Pictogram of a match crossed out in red. - Signage in accordance with the international EN NF ISO 7010 standard.	- Panel available in: High quality adhesive polyester: flexible self-adhesive printed by thermal transfer and covered with a polyester lamination allowing resistance to solvents and chemicals, high temperatures (-40°C to +120°C), rain, UV, scratches and abrasion. Heavy-duty acrylic-based adhesive for adhesion to even the most challenging surfaces. Indoor and outdoor use. PVC: rigid panel sensitive to various chemicals. Resistant to medium temperatures (-14°C to +65°C). Indoor use only. Adhesive vinyl: self-adhesive that is highly resistant to atmospheric agents. Excellent UV resistance. Stick on a smooth, clean wall. Indoor and outdoor use. Flat aluminium: extremely resistant rigid panel. Withstands the worst fouling conditions. Resistant to high temperatures (-80°C to +120°C). Unlimited indoor and outdoor use. Highly visible red sign to signal a
	Access is prohibited to any unauthorized person - STF 3228S from a factory, a car park or private	ban. - Simple and effective prohibition signage. - Available in: PVC: rigid panel sensitive to different chemicals. Resistant to medium temperatures (-14°C to +65°C). Indoor use only. Adhesive vinyl: self-adhesive that is highly resistant to atmospheric agents. Excellent UV resistance. Stick on a smooth, clean wall. Use

		Interior and exterior.
	In order to limit the risk of accidents caused by non-compliance with the basic safety rules, display this M008 compulsory safety footwear sign. You have therefore secured your construction site, warehouse or factory.	Characteristics: • Materials: Rigid PVC or adhesive vinyl. • Dimensions: Ø 80 mm, Ø 180 mm, Ø 300 mm. • Colors: white and blue with fluorescent yellow edging around the panel. • Complies with ISO 7010 standard. • - Self-adhesive with vinyl material. - Pre-punch holes to facilitate the installation of the rigid plastic panel. You can also glue it if you want. • An informative safety sign that plays an essential role in protecting all people entering your establishment. • The inks used are UV resistant. • Adhesive vinyl is flexible and easy to install on any flat, clean and dust-free surface. • PVC is lightweight, economical and 100% recyclable. • The fluorescent yellow border accentuates the visibility of the information. • Ideal for industries, communities, administrations, traders and individuals. • To be installed on a construction site, to be used for the marking of a warehouse, a factory, a car park or private traffic roads. • Advice: for a perfect visibility of the information, we advise you: - A Ø 80 mm panel for a range of use from 1 to 2 meters. - A Ø 180 mm panel for a distance of use ranging from 6 to 7 meters. - A Ø 300 mm panel for a distance of use ranging from 12 to 13 meters. Indoor and outdoor use.

	Mandatory mask obligation sign M016.	Characteristics: • Materials: Rigid PVC or adhesive vinyl. • Dimensions: Ø 80 mm, Ø 180 mm, Ø 300 mm. • Colors: white and blue with fluorescent yellow edging around the panel. • Complies with ISO 7010 standard. • - Self-adhesive with vinyl material. - Pre-punch holes to facilitate the installation of the rigid plastic panel. You can also glue it if you want. • An informative safety sign that plays an essential role in protecting all people entering your establishment. • The inks used are UV resistant. • Adhesive vinyl is flexible and easy to install on any flat, clean and dust-free surface. • PVC is lightweight, economical and 100% recyclable. • The fluorescent yellow border accentuates the visibility of the information. • Ideal for industries, communities, administrations, traders and individuals. • To be installed on a construction site, to be used for the marking of a warehouse, a factory, a car park or private traffic roads. • Advice: for a perfect visibility of the information, we advise you: - A Ø 80 mm panel for a range of use from 1 to 2 meters. - A Ø 180 mm panel for a distance of use ranging from 6 to 7 meters. - A Ø 300 mm panel for a distance of use ranging from 12 to 13 meters. Indoor and outdoor use

	Mandatory sign: Wearing a visor is mandatory	Characteristics: • Materials: Rigid PVC or adhesive vinyl. • Dimensions: Ø 80 mm, Ø 180 mm, Ø 300 mm. • Colors: white and blue with fluorescent yellow edging around the panel. • Complies with ISO 7010 standard. • - Self-adhesive with vinyl material. - Pre-punch holes to facilitate the installation of the rigid plastic panel. You can also glue it if you want. • An informative safety sign that plays an essential role in protecting all people entering your establishment. • The inks used are UV resistant. • Adhesive vinyl is flexible and easy to install on any flat, clean and dust-free surface. • PVC is lightweight, economical and 100% recyclable. • The fluorescent yellow border accentuates the visibility of the information. • Ideal for industries, communities, administrations, traders and individuals. • To be installed on a construction site, to be used for the marking of a warehouse, a factory, a car park or private traffic roads. • Advice: for a perfect visibility of the information, we advise you: - A Ø 80 mm panel for a range of use from 1 to 2 meters. - A Ø 180 mm panel for a distance of use ranging from 6 to 7 meters. - A Ø 300 mm panel for a distance of use ranging from 12 to 13 meters. Indoor and outdoor use.

	Mandatory gloves obligation protection sign NF ISO 7010 of	Characteristics: • Materials: Rigid PVC or adhesive vinyl. • Dimensions: Ø 80 mm, Ø 180 mm, Ø 300 mm. • Colors: white and blue with fluorescent yellow edging around the panel. • Complies with the NF ISO 7010 standard. • - Self-adhesive with vinyl material. - Pre-punch holes to facilitate the installation of the rigid plastic panel. You can also glue it if you want. • An informative safety sign that plays an essential role in protecting all people entering your establishment. • The inks used are UV resistant. • Adhesive vinyl is flexible and easy to install on any flat, clean and dust-free surface. • PVC is lightweight, economical and 100% recyclable. • The fluorescent yellow border accentuates the visibility of the information. • Ideal for industries, communities, administrations, traders and individuals. • To be installed on a construction site, to be used for the marking of a warehouse, a factory, a car park or private traffic roads. • Advice: for a perfect visibility of the information, we advise you: - A Ø 80 mm panel for a range of use from 1 to 2 meters. - A Ø 180 mm panel for a distance of use ranging from 6 to 7 meters. - A Ø 300 mm panel for a distance of use ranging from 12 to 13 meters. Indoor and outdoor use.

	Mandatory high-visibility goggles sign Features:	• Materials: Rigid PVC or adhesive vinyl. • Dimensions: Ø 80 mm, Ø 180 mm, Ø 300 mm. • Colors: white and blue with fluorescent yellow edging around the panel. • Complies with ISO 7010 standard. • - Self-adhesive with vinyl material. - Pre-punch holes to facilitate the installation of the rigid plastic panel. You can also glue it if you want. • An informative safety sign that plays an essential role in protecting all people entering your establishment. • The inks used are UV resistant. • Adhesive vinyl is flexible and easy to install on any flat, clean and dust-free surface. • PVC is lightweight, economical and 100% recyclable. • The fluorescent yellow border accentuates the visibility of the information. • Ideal for industries, communities, administrations, traders and individuals. • To be installed on a construction site, to be used for the marking of a warehouse, a factory, a car park or private traffic roads. • Advice: for a perfect visibility of the information, we advise you: - A Ø 80 mm panel for a range of use from 1 to 2 meters. - A Ø 180 mm panel for a distance of use ranging from 6 to 7 meters. - A Ø 300 mm panel for a distance of use ranging from 12 to 13 meters. Indoor and outdoor use.

	Mandatory Panel Noise Barrier M003	Characteristics: • Materials: Rigid PVC or adhesive vinyl. • Dimensions: Ø 80 mm, Ø 180 mm, Ø 300 mm. • Colors: white and blue with fluorescent yellow edging around the panel. • Complies with ISO 7010 standard. • - Self-adhesive with vinyl material. - Pre-punch holes to facilitate the installation of the rigid plastic panel. You can also glue it if you want. • An informative safety sign that plays an essential role in protecting all people entering your establishment. • The inks used are UV resistant. • Adhesive vinyl is flexible and easy to install on any flat, clean and dust-free surface. • PVC is lightweight, economical and 100% recyclable. • The fluorescent yellow border accentuates the visibility of the information. • Ideal for industries, communities, administrations, traders and individuals. • To be installed on a construction site, to be used for the marking of a warehouse, a factory, a car park or private traffic roads. • Advice: for a perfect visibility of the information, we advise you: - A Ø 80 mm panel for a range of use from 1 to 2 meters. - A Ø 180 mm panel for a distance of use ranging from 6 to 7 meters. - A Ø 300 mm panel for a distance of use ranging from 12 to 13 meters. Indoor and outdoor use.

	ISO 7010 Mandatory Hard Hat Panel Features:	• Materials: Rigid PVC or adhesive vinyl. • Dimensions: Ø 80 mm, Ø 180 mm, Ø 300 mm. • Colors: white and blue with fluorescent yellow edging around the panel. • Complies with ISO 7010 standard. • - Self-adhesive with vinyl material. - Pre-punch holes to facilitate the installation of the rigid plastic panel. You can also glue it if you want. • An informative safety sign that plays an essential role in protecting all people entering your establishment. • The inks used are UV resistant. • Adhesive vinyl is flexible and easy to install on any flat, clean and dust-free surface. • PVC is lightweight, economical and 100% recyclable. • The fluorescent yellow border accentuates the visibility of the information. • Ideal for industries, communities, administrations, traders and individuals. • To be installed on a construction site, to be used for the marking of a warehouse, a factory, a car park or private traffic roads. • Advice: for a perfect visibility of the information, we advise you: - A Ø 80 mm panel for a range of use from 1 to 2 meters. - A Ø 180 mm panel for a distance of use ranging from 6 to 7 meters. - A Ø 300 mm panel for a distance of use ranging from 12 to 13 meters. Indoor and outdoor use.

	Pictogram A mandatory high-visibility safety vest relating to ISO 7010 standards indicating the safety signs to be used in the company. - M0015 - Mandatory round sign, in accordance	with the international standard EN ISO 7010 for safety and health signs in the workplace. This obligatory pictogram is available as a sticker or rigid panel: PVC: rigid panel sensitive to various chemicals. Resistant to medium temperatures (-14°C to +65°C). Indoor use only. Adhesive vinyl: self-adhesive that is highly resistant to atmospheric agents. Excellent UV resistance. Stick on a smooth, clean wall. Indoor and outdoor use. High quality adhesive polyester: flexible sticker printed by thermal transfer and covered with a polyester lamination allowing resistance to solvents and chemicals, high temperatures (-40°C to +120°C), rain, UV, scratches and abrasion. Heavy-duty acrylic-based adhesive for adhesion to even the most challenging surfaces. Indoor and outdoor use. Flat aluminium: extremely resistant rigid panel. Withstands the worst fouling conditions. Resistant to high temperatures (-80°C to +120°C). Unlimited indoor and outdoor use.

Protection and signage markers Any construction site on the road domain, or its immediate surroundings, must be subject to temporary signage, including markings, in order to:

- warn and guide the user,
- to ensure the safety of the user,
- ensure the safety of officers working on the roadway.

It is therefore necessary to inform and guide the user by trying to encourage him to change his behaviour in the face of an unexpected situation, throughout the phases of the work, from its installation, its progress to its dismantling. Hence the role of the use of markings.

Table 15: Important and mandatory markers on the construction site

Types	Description PVC posts with	Characteristics
	concrete foot	- Ø 40 mm pole and height: 900 mm. - Plastic bases weighted with concrete: 3.5 kg. Dimensions of the base: 29 cm on each side and 9 cm high. - Can be used indoors or outdoors. - Insertion of the pole from the underside of the base. - Pole head with 4 loops to accommodate a carabiner, quick link or split ring (sold separately) and then a chain. Buckle hole diameter: 11 mm. - Sold in sets of 4 poles.
	Four PVC posts with weighted base.	- Base to be weighted with 3.7 liters of water, sand or gravel. - Post Ø 40 mm, height: 900 mm. - Base with a diameter of 25 cm on each side and 6 cm high. - Can be used indoors or outdoors. - Insertion of the pole from the underside of the base. -Pole head with 4 loops to accommodate a carabiner, quick link or split ring (sold separately) and a chain. Buckle hole diameter: 11 mm. - Sold in sets of 4 poles.
	PVC poles on soft rubber base. Sold in sets of 4. Posts for provisional industrial delimitation.	- Poles with 1.6 kg rubber bases. - PVC poles Ø 40 mm, height: 900 mm. - Rubber base 27 cm on each side and 5 cm high. - Can be used indoors or outdoors. - Insertion of the pole from the underside of the base. - Pole head with 4 loops to accommodate a carabiner, quick link or split ring (sold separately) and then a chain. Buckle hole diameter: 11 mm. - Sold in sets of 4 poles.

	Foldable PVC pole for indoor or outdoor use ideal for mobile construction sites and for transport.	- Foldable pole on a 4kg base. - Equipped with a clever drop-down system for functional storage and space saving. - Locking system of the pole in the 2 positions. - Post dimensions: Ø 50 mm. Height: 900 mm. - 4 kg black PE weighted base: 280 x 280 x 70 mm. - Very stable, ideal for a construction site. - Tubes available in 4 colours: Red/White, Yellow/Black, White or Black. • Provide 1 post for every 2 to 5 meters of chains.
	Fluorescent textile signage tape - Length 50 m x width 50 mm	- High-strength fluorescent textile tape. - Reusable ribbon as desired. - To be used on public works sites. - Ribbon composed of a red fluorescent side and a yellow fluorescent side. - 50-metre-long ribbon. - Width 50 mm. - Extreme strength and exceptional visualization. - The textile material allows the tape to be reused from one site to another.
	Rubble construction site warning tape	Red/white polyethylene ribbon roll. Double-sided printing. The marking tape (or ribbonise) is printed with water-based inks that are not harmful to the environment. Tape roll length: 100 m. Ribbon width: 50 mm. Good resistance to tension and stretch before breakage. This type of tape is ideal for quickly seeing and delimiting dangerous or prohibited areas (road works, construction zones, etc.). Can be used outdoors and indoors. The ribbons can be personalised by screen printing

	Titan Plastic Safety Gate Ref. 19593-01	The Titan plastic barrier is a simple and innovative product that provides solutions in terms of urban safety. This barrier offers many advantages: it is robust and resistant, easy to handle, highly visible, customisable (via a central panel) and absolutely safe for pedestrians and cyclists in the event of an impact. The barriers are easily assembled using connectors. This barrier has been subjected to numerous control tests to guarantee quality: wind stability tests, resistance to cold and cold U.V... The weighted legs are foldable to stack barriers to optimize storage and ease of transport. Length: 2 m - Height: 1 m - Weight: 14.5 kg. Color: red - Reflective film. Other colours and customisation: please contact us. Dividers in
 	Pyraneo lane separators	accordance with XP P98-453 and XP P98-454 standards, Integrated connection visible day and night (90cm2 retro film), Material: polypropylene, Dimensions (mm): length: 1,355 / width: 420 / height: 505 / pitch: 1.20 m (833 separators per km), Weight: empty: 5,650 kg / Wetted with water: 43 kg / Weighted with sand: 60 kg, Connection: T2 class film, Option: polypropylene lid, 40×40 tube slot for adaptation with 75 lid. Receives all types of weights: water, sand, gravel, recycled material... Easy to set up, 50 separators on 1 pallet, or 1,000 in a semi-trailer. USAGE Construction sites, events (sports, commercial, etc.), security, traffic separation, traffic tests, traffic plans.

		
 	Interlocking lane separator	Complies with NF XP P98453 and XP P98454 standards, Single-piece injected separator, stackable in the open position, Material: solution-dyed polyproylene, Dimensions (mm): 1000 x 510 x 750, Weight: empty: 8kg / Water weighted: max. 100 kg / Sand-weighted: max. 150 kg. EASIER TO TRANSPORT AND STORE 25 separators on a pallet, + 600 in a semi-trailer, The connections are also interlocking and can be stored in the bins More economical, Attractive price: 110m marked for 100 separators purchased, Use + frequent due to its ease of ballasting, storage and handling, No panel support to add. Easier to weigh down and install (with water, sand or any other material), Quick filling by design, emptying is also easier.

	Big foot class 2 temporary traffic cone with a recycled rubber base and the conical part in polyethylene covered with a retro-reflective film. Available in 3 heights.	* Base: Recycled rubber * Cone: polyethylene covered with a class 2 retro-reflective film. Honeycomb effect perfectly reflects the light of the headlights even in rainy weather. • 3 heights: 500 mm (2.35 kg) / 750 mm (4.62 kg) / 1000 mm (8.1 kg). Outdoor and indoor use. High impact resistance. No loss of reflection in the rain. Very stable. Recyclable.
	Weighted traffic cone class 2 - Eco range Weighted construction site cone with rubber base and polyethylene cone with class 2 retro-reflective film.	- Cone: polyethylene covered with 2 collars of class 2 retro-reflective film. - Base: recycled rubber. - Dimensions: Height 750 mm and 4.4 kilos. Height 1000 mm for 7.5 kilos. - Class 2 retro-reflective film so no loss of reflection even in the rain. • Compatible with various accessories: fixed beams, rollable, reels. • Extremely stable weighted cone. • Easy to store, the cones stack on top of each other very easily. Indoor and outdoor use. Recyclable cone. High impact resistance.

	Yellow Traffic Cone - Class 2 - 750 mm Temporary Traffic Cone Class 2 with a black base and yellow polyethylene cone covered with a retro-reflective film.	- Black base, Yellow polyethylene cone covered with a class 2 retro-reflective film - Height: 750 mm, Weight: 4.40 kg. Outdoor and indoor use. • High impact resistance • • No loss of reflection in the rain • Very stable
 	Plastic construction site net Plastic mesh for cost-effective construction site marking	- Orange net. - Density: 100 g/m². - Anti-UV treated for perfect visibility over time. - Height: 1 m. - Length: 50 m. - Setting up and holding thanks to the steel stake sold separately.

Source: http://www.nadia-europ.com/signalisation-signaletique/balisage-chantier/#separateur-de-voies-pyraneo; https://www.direct-signaletique.com/CT-7-securite.aspx (site for the sale of signage and safety marking accessories for construction sites).

Shoreline access

Noise and visual pollution, safety problems, traffic difficulties, etc., a construction site is often experienced as an ordeal, especially for local residents. To reduce these nuisances, make construction sites more acceptable and facilitate access to their homes for local residents as a priority, it is necessary whenever and whenever necessary, to ensure safe access to residences (footbridge, fall arrest system) thanks to safe, rigid and resistant guardrails integrated or fixed. The movement of users (local residents) must be carried out safely without creating a risk of falls when passing over the means of access, platforms, floors or footbridges.

Plate 1: Walkways with guardrails recommended.

Portable stepladders are tools used exclusively to access houses in height in the absence of stairs; they are above all a means of access. Only occasionally can portable stepladders and steps be used to facilitate access for local residents. In all cases, special safety measures must be taken: the stepladders must rest on stable and resistant supports, their rungs or steps must be horizontal and solid. To prevent them from slipping or tipping over, stepladders must either be fixed in the ground directly or held in place by means of any anti-slip device.

Plate 2: Examples of recommended stepladders.

Handling aids and devices Construction work, especially prefabrication, involves many heavy loads handling which entail obvious risks of musculoskeletal disorders in the back and joints, which can be reduced by the use of rolling trolleys, pallet trucks, wheelbarrows, hand trucks, grippers, etc., and above all by the systematic use of assisted handling: cranes mounted on vans that help raise and lower prefabricated elements and other loads, material lifting platforms (scissor or mast), material lifts, jib cranes, adapted tools (hydraulic clamping, etc.). Lifting accessories must be suitable for the packaging of materials and equipment (net fork, handling basket, etc.). The use of lifting accessories also involves risks in itself: it is necessary to respect the maximum loads they can support, and not to remain within the range of action of the lifting equipment to avoid the risk of accidents in the event of a wrong manoeuvre with the site personnel colliding with the load.

The proper securing of the loads and their guidance during lifting, slings and accessories regularly checked and maintained are essential actions for safety, as well as taking into account the resistance of the lifting device's support surface to avoid overturning. In addition, it is advisable to avoid repeated manual carrying of heavy loads by choosing tools and packaging with reduced weights (waterproofing rolls with a smaller surface area, small packages of tiles or slates, etc.).

Personal protection and personal protective equipment (PPE) It starts with respecting the rules of personal hygiene: do not smoke, wash your hands frequently so as not to have dirty hands so as not to inadvertently ingest a toxic product, do not eat in the workplace, separate street clothes and work clothes and stored separately, Drink water regularly and abundantly in hot weather, use hand creams and sunscreens, do not work with your bare chest and arms and legs uncovered.

The working conditions on construction sites make it impossible to eliminate all risks by implementing collective protection. It is therefore imperative to use the following personal protective equipment, depending on the case: Construction helmet to protect against falling objects, which must be replaced regularly, and in any case, if there has been an impact; Safety shoes or boots; Protective glasses (especially when using grinders, grinders, etc.) and anti-UV glasses; Waterproof nitrile or neoprene gloves, with an inner lining and cuffs that go up high on the forearms, for handling chemicals.

Thick, reinforced gloves for handling.
Thick cut-resistant gloves for cutting.
Noise protection (moulded earplugs, etc.) when using noisy tools.
FFP2 dust masks during demolition work, cutting of materials or any type of work that may generate dust.

Knee pads or "hygrovet" type knee pants for kneeling work on the floor. High-visibility signal clothing or vest.

A kit containing non-expired first aid equipment (antiseptic solutions, dressings, etc.), easily and quickly accessible, allows you to immediately disinfect and dress any skin wound or to wash your eyes in the event of dust in the eye.

Table 16: Personal Protective Equipment (PPE)

Types	Description QUARTZ 1 Hard Hat with Zipper	Features High-end safety helmet made of high-strength polypropylene
	Tightening - Delta+	(PP) with anti-UV treatment. Head protection equipment with BD polyethylene cap with star for optimal support thanks to its 8 secure attachment points. Fastener further reinforced by an adjustable tightening zipper allowing the helmet to adapt to all types of head. Ultra comfortable, it is equipped with a sponge strapping for a safe fit and an adjustable ventilation system for optimal ventilation of the head in extreme heat. Helmet with 2 headband positioning options, including up and down to better meet the demands of tough jobsites. Ideal for protecting against the risk of falling objects or against violent head impacts, it is developed in accordance with the specifications of the European standards 89/686 concerning safety, ergonomics, ventilation, comfort and safety. Also, meeting EN397:1995/A1:2000, it has a high resistance to high temperatures of up to 50°C.
	KARA construction helmet with vents Order no.: KARAL00/072VVC0G	Standardised EN 397 and EN 166, the KARA d'Auboueix is highly recommended in all construction activities. Lightweight (total weight around 340g) and resistant, it consists of an ABS die-cast shell and a harness with a textile cap with 4 attachment points + low-density polyethylene headband with self-locking rack and pinion neckband (removable and adjustable from 53 to 63cm, mounted with a 32cm comfort pad). Available colours: white, blue, yellow, orange, red, green. Article to be changed of course in case of shocks, or otherwise after 48 months. Note that this Auboueix KARA helmet also meets the requirements of low temperature resistance down to -30°C.

	NEON T2S High Visibility Vest. T2S High Visibility Vest. EN 20471 standard. Ref: GILETNEON02JFTU	The cheap signal vest to make you visible! One size fits all. Gender: Mixed, Fabric: Polyester, Closure: Hidden hook-and-loop fasteners, Standard: EN 20471, Class: High Visibility Class 2.
	VEGA Portwest LED High Visibility Vest Ref: L470ORRXX/3X	This Portwest VEGA high-visibility vest will be ideal in low-light professional environments as it has an integrated LED light ensuring maximum visibility. This high-visibility LED vest, compliant with the EN 20471 standard (class 2) will provide professionals with enhanced safety. Gender: Mixed, Features: Bright, Fabric: Polyester, Closure: Hidden hook-and-loop fastener, Standard: EN 20471, Class: High Visibility Class 2
	Pairs of Anti-Cut Gloves 5 - VENICUT	Pairs of level 5 cut-resistant gloves, ECONOCUT© high-performance polyethylene fiber. Polyurethane coating on palm and fingertips. 6 cm elastic cuff, 13 gauge.

		
 	Crepe latex handling gloves	Protective gloves for light handling, ventilated back, good grip.

 	Leather safety gloves	A classic, this "chauffeur" glove is made of lambskin, one of the softest and most resistant leathers available on the market. This breathable leather glove is ideal for use in mild and warm climates, it reduces the feeling of heat in the hands.
	PVC gloves - 40 cm	PVC gloves with cotton jersey backing, protection against chemicals. Length: 40 cm. Thickness: 1.30 mm. 100% vulcanized tempered PVC. Colour: Red. One size: 10/XL Standard: EN 388: 3.1.2.1 - EN 347-2 and EN 347 - 3

		
	MaxiDry Plus 56-530 Gloves – ATG	Description: Ultra-light knitted nylon glove coated with nitrile and neoprene, Impermeable to liquids, Optimal grip in oily and humid environments, Excellent dexterity thanks to the strategically applied coating, The closing wrist prevents the glove from slipping and its elastic support ensures a close and adapted fit, Length 30 cm approximately, Sizes: from 07 to 11 Strengths: Optimal dexterity and tactile sensations, Impermeable to liquids, Coating resistant to chemical splashes, Intense grip even in wet and oily environments, Exceptional flexibility and fineness, Controlled sweating, Excellent durability, Guaranteed safe for the skin. Applications: Work with a risk of chemical splashes, handling of paint or hydrocarbons, assembly in chemical plants, maintenance in greasy environments, assembly of objects and materials coated with grease and oil, etc. Standards: Standard: NF EN 374-2, Standard: OEKO-TEX® Standard 100, Standard: NF EN 388, Standard: NF EN 374-3, Standard: NF EN 420+A1.

	Moldex Rockets Ear Plugs Cord 30dB	Moldex Rocket 30dB Reusable Earplug with Cord Washable Earplugs made of Kraton, soft and durable material. The most suitable reusable cap to protect against lower noise levels. Uses: These plugs are a cost-effective alternative, even for tight budgets. You can get the comfort and protection you need without breaking the bank. Characteristics: NR =30dBConforme to the European standard EN352-2 Use: The air pocket at the end and the soft material provide a pleasant seal. Best suited to protect against lower noise levels. The air pocket at the end and the curved bezels provide maximum comfort. The soft material used provides a pleasant seal in the ear canal. They can be washed for repeated use (warm water + soap or assepto wipes) Contents: 1 box of 1 pair Brand: FOXNOVO. - 10 pairs of protected cord earplugs.
	FOXNOVO Pairs of Reusable Soft Silicone Cord Earplugs Pairs of hearing protection earplugs, which are made of durable and comfortable silicone for noise reduction and better hearing protection, and suitable for use while you work and sleep. With a reusable and easy-to-use design.	Cord Color: Mostly Blue. Material: Durable soft silicone. - Cable length: about 60cm. - NRR (Noise Reduction Rating): about 25dB. - 100% Brand New and High Quality Soft Silicone Ear Loops and Cord Protecting Reusable Hearing Protectors. Made of soft and comfortable silicone to reduce noise and give you better hearing protection. Noise reduction for work, home, sleep, and safety. Washable and reusable design, and easy to use.

	Moldex Spark Plugs 35 dB	Moldex Spark Plugs 35 dB Disposable earplugs, with a loud sound attenuation of 35 decibels! These earplugs ensure a high level of hearing protection. Spark Plugs are made of ultra-flexible and comfortable foam for a perfect fit to the ear canal. They are packed in pairs and are therefore easily stored.
	Goggles-Set of 12 Clear Safety Glasses-Goggles with Plastic Lenses-Nose Deck & Rubber Temple Tips for Comfort.	Fantastic safety glasses bundle with 12 pieces of stylish goggles suitable for most sizes adults, men or women, and children. Our glasses have nose bridges and temple tips padded in orange rubber for more comfort and safety. Exceptional protective glasses made of clear, solid acrylic plastic with non-tinted lenses. Can be used indoors or outdoors without disturbing color perception. In both cases, they will protect you from chips and splashes and keep your eyes safe from debris, dust or other objects that can get in the way of your eyes while you work. Our goggles are comfortable and painless, since they are made of lightweight plastic and do not have heavy or uncomfortable metal temples. Their smooth design allows for easy wearing and support while bringing style and elegance. Their lightness allows you to wear them for long periods of activity. Unlike other thick or square models, our high-quality glasses provide comfort and style. Perfect for DIY, Cleaning, Car or Computer Repair, Gardening, Science Classes, Painting, Sports, Welding or Carpentry - They offer the best protection, are comfortable to wear and can be attached to a cord to keep them around your neck when not in use.

	Silverline 868628 Safety Glasses	Safety glasses Scratch-resistant polycarbonate lens Comprehensive design for maximum field of vision and eye protection Molded bridge at the nose for comfort Complies with EN166 standard.
	Dust masks - foldable - with FFP3 valve	This dust mask is a disposable respiratory protection. It is foldable and equipped with an adjustable nose clip and exhalation valve to facilitate breathing effort. Standard: EN 149 FFP3 NR: Protects against aerosols and/or liquids listed as solid toxic. This respiratory protection is ideal for your sanding or treatment work on wood with copper, chromium or arsenic-based products, paint stripping, cement sanding, etc. Site work in general.
	COVERHEAD NECK MUFFLER HAT	Color: Blue, Khaki, Red, Black. Outer material: 300g/m2 polyester. Tightening: Drawstring with cord lock for a secure fit. One size fits all.

  	SAFETY JOGGER Model KRONOS S1P Ref. Prod. Kronos Certification : EN20345 :2011 S1P SRC Sizes : 36-47 Weight (Pt. 41) : 620 gr.	Model description: Nubuck leather shoe, blue color, nylon mesh lining, anti-static, non-slip, steel anti-puncture sole, shockproof, S1P, steel toecap, PU/PU sole. Areas of use: Industries. Precautions and shoe care: To prolong the life of your shoes, we advise you to clean them regularly and protect them with suitable products. Do not dry your shoes on a radiator or too close to a heat source.
	HIGH SAFETY SHOES - S3 - SAFETREK ROMA	USE: construction safety shoes, gardeners, landscapers, construction workers, etc. DESCRIPTION: Comfortable and lightweight safety shoe. Quality of materials and workmanship. Soft textile anti-perforation sole. Composite protective toe cap. TYPE(S) OF APPLICATION: Warehousing, Storage, Transport, Construction, Construction, Industry. STANDARDS: EN ISO20345 Certified S3 Symbol: fundamental properties (safety toe cap intended to provide protection against impacts of a maximum energy level equivalent to 200 Joules and against a crushing of 15kN) + closed back, antistatic properties, heel energy absorption, water repellent, anti-puncture sole, studded sole. Symbol "SRC" (= SRA +SRB): Slip resistance on

		ceramic tiles coated with a solution of Sodium Lauryl Sulfate and on a steel floor coated with glycerol. COLORS: Black and orange; SIZE: 39-47 Sizes: 38 – 48 Leather/Waterproof Nubuck leather, Thermally
	ELTEN BRUNO ESD S2 SAFETY SHOES – 72685	regulated textile lining, Closed and padded tongue, Entire ESD PRO black insole, ESD-compatible soft fleece insole, NEW CLASSICS PU/PU sole, Steel toecap, EN ISO 20345 S2 SRC, type A.
	DELTA PLUS LEATHER LOW SHOES - JET S3 PIGMENTED RUMP	Description: Classic Industry Series shoes. Upper: Pigmented rumpen leather. Lining: Absorbent polyester. Insole: Fixed - Polyamide top over EVA. Outsole: Injected, dual-density polyurethane Anti-puncture sole and protective toe: stainless steel Sizes: 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47 Colors: Black
	Caterpillar Holton S3	Building on its success, Caterpillar decided to develop an S3 version of its famous Holton for those who work in heavier environments and who liked this design. Given the number of user feedbacks, it is clear that this is a model that works very well. Made of high-quality nubuck and full-grain leather, we also notice that all the main seams are triple and have an antibacterial coating to eliminate moisture. To protect the toes, there is a steel toe cap at the end of the shoe, as well as an anti-puncture plate ensuring the protection of the feet if you have to step on

		a sharp object. S3 standard, it is also non-slip, antistatic, absorbs shocks in the heel area and is water-repellent. It is very comfortable to wear and after using it for a few months, we have no doubt about its robustness. The Holton S3 is available in 4 colors: dark brown, light brown, yellow and black. And of course, like most safety shoes, it fits large, so plan to size down from what you usually take for civilian shoes. It is available in sizes 40 to 46. First aid kit specially designed for professionals in the building and public works sector (building
	Aesculapius first aid kit BTP 5 to 10	tradesmen, mobile maintenance teams), ideal for 5 to 10 people. Robust red polypro enclosure also suitable for construction vehicles. Content: - 1 survival blanket - 2 bags of 5 sterile compresses 20 x 20 cm - 3 stretchy bands in 3 m x 7 cm - 1 roll of plaster 5 m x 2 cm - 6 adhesive plasters 2 x 6 cm - 6 adhesive plasters 4 x 6 cm - 6 adhesive bandages 10 x 6 cm - 1 sterile pressure bandage 2.5 m x 6 cm - 1 sterile pressure bandage 2.5 m x 10 cm - 1 spray bottle 50 ml alcohol 70 ° - 1 x 50 ml antiseptic chlorhexidine spray - 2 x 5 ml single doses for eye washes - 1 pair of scissors - 1 splinter tweezers - 6 safety pins - 1 leather finger cot - 3 pairs of vinyl gloves - 1 first aid guide in 6 languages.

	CORFIL 4-point safety harness	Safety harness with 02 dorsal and sternal mooring points. Wide work positioning belt equipped with 2 side anchor points. Work positioning buckles. Great flexibility of adjustment (sternum and thighs). Gluteal sub. Occasional use: metal structures, cleaning. Number of stitches: 4 points, Standards: EN 358 and EN 361 Closure system: Standard buckles, Harness size: M to XL Weight: 1600 g
	Harness from Safety 2 points CORFIL with Automatic Buckles	Sternal and dorsal mooring. This harness combines comfort and quick donning. Adjustable to all body types. Gluteal sub. Fully adjustable, the quick buckles at the thighs allow you to keep the adjustment to your size between each procedure. Number of stitches: 2 points, Standards: EN 361, Closure system: Automatic buckles, Harness size: M to XL, Weight: 1100 g.

Source: https://www.vpa-industrie.com/epi/casques-de-protection/casques-de-chantier. https://www.vetementpro.com/259-gilets-haute-visibilite. https://www.equipement-chantier.fr/116-gants-de-travail. https://www.cdiscount.com/bricolage/equipement-de-protection/1-paire-de-bouchons-d-ears-with-cords-3m. https://www.amazon.fr/Protection-Des-Yeux/b?ie=UTF8&node=1854992031. https://www.safetyjogger.com/fr/catalog?search=kronos. https://www.bati-avenue.com/basses-cuir-delta-plus-jet-s3-chaussures-croupon-pigmente-s3-src-jet2s3no0.html. https://universpro.fr/blog/meilleures-chaussures-securite-caterpillar. https://www.distrimed.com/product_info.php?products_id=7421. https://www.carlstahl-epi.fr/harnais-de-securite,fr,3,8.cfm.