

Japan International Cooperation Agency (JICA)

Ministry of Construction, Housing, Sanitation and Urban Development (MCLAU)

The Project for the Development of the Urban Master Plan in Greater Abidjan in the Republic of Côte d'Ivoire (SDUGA)

Final Report

March 2015

Volume III Urban Transport Master Plan

Appendices

Appendix A

(Page A-1 to A-27)

Zoning System for Transport Surveys

4 digit (2digit +2digit)

Region/CQUARTIER

Alphabetical Sequence

Zone Code	COMMUNE	QUARTIER/Ville	Ville/landmark
01 01	1.ABOBO	ABOBO-BAOULE	
01 02	(Commune)	ABOBO-CENTRE	
01 03		ABOBO-DOKUI	
01 04		ABOBO-NORD SETU	
01 05		ABOBO-SUD 2EME TRANCHE	
01 06		ABOBO SUD 3e TRANCHE	
01 07		ABOBO-TE	
01 08		AGBEKOI	
01 09		AGNISSANKOI AVOCATIER	
01 10		AGOUETO	
01 11		AKEIKOI	
01 12		ANADOR	
01 13		ANONKOI III	
01 14		ANONKOI-KOUTE	
01 15		AVOCATIER N'GUESSANKOI	
01 16		BANGO 1 & 2	
01 17		CENT DOUZE HECTARES	
01 18		CLOUETCHA KENNEDY	
01 19		DJIBI	
01 20		EXTENSION C	
01 21		HOUPHOUET BOIGNY	
01 22		N'PONON	
01 23		PLAQUE 1 ET 2	
01 24		SAGBE CENTRE	
01 25		SAGBE NORD	
01 26		SAGBE SUD	
01 27		SANS MANQUER	
01 28		SOGEFIHA HABITAT	
01 99		Not Identify	
02 01	2.AD-JAME	220 LOGEMENTS	
02 02	(Commune)	ADJAME-CIMETIERE OU MARIE THER	
02 03		ADJAME-NORD	
02 04		ADJAME-NORD-EST OU BRACODI	
02 05		ADJAME-VILLAGE	
02 06		BROMAKOTE OU PELLIEUVILLE	
02 07		DALLAS	
02 08		EBRIE	
02 09		HABITAT-EXTENSION	
02 10		INDENIE	
02 11		MAIRIE 1	
02 12		MAIRIE 2	
02 13		MIRADOR	
02 14		PAILLET	
02 15		ST-MICHEL	
02 16		SODECI FILTISAC	
02 17		WILLIAMSVILLE 1	
02 18		WILLIAMSVILLE 2	
02 19		WILLIAMSVILLE 3 UNIVERSITE ADJ	
02 99		Not Identify	
03 01	3.ATTECOUBE	ABOBO-DOUME VILLAGE	
03 02	(Commune)	AGBAN-ATTIE	
03 03		AGBAN-VILLAGE	
03 04		ATTECOUBE 3	
03 05		AWA	
03 06		BIDJAN-TE	
03 07		CITE FAIRMONT	
03 08		DJENE-ECARE	
03 09		DOUAGOVILLE	
03 10		ECOLE FORESTIERE	
03 11		ECOLIS	
03 12		ESPOIR	
03 13		GBEBOUTO	
03 14		JERUSALEM 1	
03 15		JERUSALEM 2	
03 16		JERUSALEM -RESIDENTIELL	
03 17		JEAN-PAUL II	
03 18		LA PAIX	
03 19		LACKMAN	
03 20		LAGUNE	
03 21		LOCODJORO	
03 22		MOSQUEE	
03 23		NEMANTOULAYE	
03 24		SAINT-JOSEPH	
03 25		SANTE CARREFOUR	
03 26		SANTE 3	
03 27		SANTE - VILLAGE	
03 28		SEBROKO	
03 99		Not Identify	
04 01	4.COCODY	7EME TRANCHE	
04 02	(Commune)	AGBAN GENDARMERIE	
04 03		AGHIEN	
04 04		AKOUEDE ANCIEN	
04 05		AKOUEDE NOUVEAU	
04 06		AKOUEDE VILLAGE	
04 07		ALLABRA SOGEFIA	
04 08		AMBASSADE	
04 09		ANGRE	
04 10		ANONO	
04 11		ATTOBAN	
04 12		BLOCKAUSS	
04 13		BONOUMIN	
04 14		CANEBIERE	
04 15		CENTRE	

HIS Survey Area (Commune only)	Abidjan District	Central 10 Communes	04	16		CHU	
			04	17		CITE DES ARTS	
			04	18		CITE DES CADRES	
			04	19		COCODY VILLAGE	
			04	20		COPRACI COPRIM	
			04	21		DANGA	
			04	22		DEUX PLATEAUX 1-AE	
			04	23		DEUX PLATEAUX EST	
			04	24		DEUX PLATEAUX II	
			04	25		DJOROGOBITE I	
			04	26		DJOROGOBITE II	
			04	27		ECOLE GENDARMERIE	
			04	28		ECCI RIVIERA	
			04	29		E.N.A	
			04	30		LYCEE TECHNIQUE	
			04	31		M'BADON	
			04	32		M'POUTO	
			04	33		OPERATION PALMERAIE GENIE 2000	
			04	34		PLATEAU-DOKUI	
			04	35		RIVIERA GOLF I	
			04	36		RIVIERA GOLF II	
			04	37		RIVIERA 3-4 ET 5	
			04	38		RIVIERA PALMERAIE	
			04	39		SIDECI RIVIERA	
			04	40		SIDECI ZOO	
			04	41		SOGEFIHA RIVIERA I	
			04	42		SOPIM VALLON	
			04	43		UNIVERSITE	
			04	44		VAL-DOYEN	
			04	99		Not Identify	
			05	01	5.KOUMASSI	ABIA-KOUMASSI	
			05	02	(Commune)	E.M.C.C.	
			05	03		GRAND MARCHE	
			05	04		MAIRIE	
			05	05		MOSQUEE	
			05	06		NORD-EST 1	
			05	07		NORD-EST 2	
			05	08		PRODOMO SOPIM PANGOLIN	
			05	09		PROGRES	
			05	10		REMBLAI	
			05	11		SICOGI 1	
			05	12		SICOGI 2	
			05	13		SICOGI 3	
			05	14		SOGEFIHA ZONE INDUSTRIELLE	
			05	99		Not Identify	
			06	01	6.MARCORY	ABETY VILLAGE	
			06	02	(Commune)	ADAIMIN	
			06	03		ALIODAN	
			06	04		ANCIEN KOUMASSI VILLAGE	
			06	05		ANOUMABO	
			06	06		BIETRY	
			06	07		CHAMPROUX	
			06	08		GNANZOUA	
			06	09		HIBISCUS	
			06	10		JEAN-BAPTISTE MOCKEY	
			06	11		KABLAN BROU FULGENCE	
			06	12		KONAN RAPHAEL	
			06	13		MARIE KORE	
			06	14		RESIDENTIEL	
			06	15		ZONE 4	
			06	99		Not Identify	
			07	01	7.PLATEAU	40 LOGEMENTS	
			07	02	(Commune)	BANCO 6BATS B.CSP2	
			07	03		CAMP GALLIEN	
			07	04		CAMP GENDARMERIE INDENIE	
			07	05		CARENA PORT DE PLAISANCE MOBIL	
			07	06		CHIENS MECHANTS	
			07	07		CITE ESCULAPE	
			07	08		CITE POLICIERE	
			07	09		KM -MARCHE	
			07	10		PORT ET DOUANE RUE DU COMMERCE	
			07	11		RAN DEFENSE SODECI INSP	
			07	12		RAN GARAGE	
			07	13		RAN LAGUNE GARE DE TRAIN PTT P	
			07	14		STADE	
			07	99		Not Identify	
			08	01	8.PORT-BOUET	AEROPORT	
			08	02	(Commune)	ABATTOIR 1	
			08	03		ABATTOIR 2	
			08	04		ABATTOIR 3	
			08	05		ABOUABOU	
			08	06		ABROGOUAMAN	
			08	07		ADJAHUI-NAMOUE	
			08	08		ADJOUFFOU 1	
			08	09		ADJOUFFOU 2	
			08	10		ADJOUFFOU VILLAGE	
			08	11		AKA ANGHUI	
			08	12		AKO	
			08	13		ALLADJAN	
			08	14		AMANGOUA	
			08	15		ANANI AMAMOU	
			08	16		BENOGOSSO	
			08	17		BLOC 500 II	
			08	18		BLOC PALMINDUSTRIE	
			08	19		BRAKRE	
			08	20		CAMP DOUANES VRIDI	
			08	21		CIE PLAGE	

08	22		COMMISSARIAT 1	
08	23		COMMISSARIAT 3	
08	24		COMMISSARIAT SAINTE ANNE	
08	25		COMMISSARIAT SOGEFIHA	
08	26		DERRIERE WHARF	
08	27		ELLOKRO	
08	28		GONZAGUEVILLE	
08	29		HOPITAL 43e BIMA	
08	30		HOPITAL GRAND MARCHE	
08	31		HOPITAL 1	
08	32		JEAN-FOLLY	
08	33		MAFIBLE 1	
08	34		MAFIBLE 2	
08	35		MOUSSAKRO	
08	36		OCEAN	
08	37		PHARE 3	
08	38		PETIT BASSAM	
08	39		PHARE COLLEGE MODERNE	
08	40		PHARE LITTORAL	
08	41		VRIDI 3 ECOLE	
08	42		VRIDI 3 FOYER	
08	43		VRIDI-CANAL SIR	
08	44		VRIDI CHAPELLE	
08	45		VRIDI GENDARMERIE	
08	99		Not Identify	
09	01	9.TREICHVILLE	ANTONIN DIOULO	
09	02	(Commune)	ARRAS 1	
09	03		ARRAS 2	
09	04		ARRAS 3	
09	05		AUGUSTE DENISE	
09	06		BOA KOUASSI	
09	07		BONI PIERRE	
09	08		BOUBAKAR SAKO	
09	09		CITE FONCTIONNAIRE	
09	10		CITE RAN	
09	11		CRAONE	
09	12		CYRILLE POLNEAU	
09	13		DE GONZAGUE	
09	14		DOCTEUR DJESSOU LOUBO	
09	15		ENTENTE	
09	16		EZAN PASCAL	
09	17		GEORGES KASSI	
09	18		HABITAT BELLE-VILLE	
09	19		JACQUES AKA	
09	20		JEAN YAO	
09	21		JEANNE D'ARC	
09	22		KOUAME ALBERT	
09	23		KOUASSI-LENOIR	
09	24		EL MANSOUR	
09	25		MAMADOU COMARA	
09	26		MORY DIOMANDE	
09	27		NOTRE DAME	
09	28		PAUL TEASSON	
09	29		PIERRE KOUAME	
09	30		SENI FOFANA	
09	31		SERY KORE	
09	32		SEYNI GUEYE	
09	33		TANOI BLAISE	
09	34		VOLTAIRE	
09	35		YOBOU LAMBERT	
09	36		YOMAN KACOU	
09	37		ZONE INDUSTRIELLE	
09	38		ZONE PORTUAIRE	
09	99		Not Identify	
10	01	10.YOPOUGON	ADIAPPO DOUME	
10	02	(Commune)	ANCIEN QUARTIER SICOI	
10	03		ANDOKOI	
10	04		AZITO	
10	05		BEAGO	
10	06		BANCO 2	
10	07		CAMP MILITAIRE	
10	08		GARE-SUD SODECI-GFCI	
10	09		GESCO MANUTENTION	
10	10		ILE BOULAY	
10	11		KM 17	
10	12		KOUTE VILLAGE	
10	13		MAIRIE	
10	14		NIANGON ADJAME	
10	15		NIANGON LOKOA	
10	16		NIANGON NORD	
10	17		NIANGON SUD	
10	18		NOUVEAU QUARTIER SOPIM BANCO	
10	19		PORT-BOUET 2	
10	20		SIDECI-SICOI LOCATION-VENTE L	
10	21		SOGEFIHA KOUTE MUNICIPALITE	
10	22		TOIT ROUGE	
10	23		YOPOUGON ATTIE	
10	24		YOPOUGON SANTE	
10	25		ZONE INDUSTRIELLE	
10	99		Not Identify	
11	01	11.ANYAMA	CEG	
11	02		CHRISTIANKOI	
11	03		DERRIERE RAIL	
11	04		GARE	
11	05		P.K. 18	
11	06		PALMERAIE	
11	07		RAN	
11	08		RESIDENTIEL	

		3 communes incorporated into Abidjan in 2001	11	09		SCHNEIDER	
			11	10		ZOSSONKOI	
			11	11		ANYAMA North Area in commune	Thomasset, Yapokoi
		Expanded 6 communes	11	12		ANYAMA East Area in commune	Anyama-Ahouabo, A
			11	13		ANYAMA West Area in commune	Azaguie-Blida, Ebimp
			11	14		ANYAMA (outside commune: west side)	
			11	15		BROFODOUME	
			11	99		Not Identify	
			12	01	12.BINGERVILLE	AGRICULTURE	
			12	02		BLACHON	
			12	03		EECI	
			12	04		GBAGBA	
			12	05		GBAGBA EXTENSION	
			12	06		HARRIS OU CIMETIERE	
			12	07		RESIDENTIEL OU PLATEAU	
			12	08		BINGERVILLE North Area in commune	Akandje, Angorankoi,
			12	09		BINGERVILLE South Area in commune	Abatta, Akouedo Atti
			12	10		BINGERVILLE East Area in commune	Achokoi, Adjame Bin
			12	11		BINGERVILLE (outside commune)	
			12	99		Not Identify	
			13	01	13.SONGON	ABADJIN BIMBRESSO	
			13	02		ABADJIN DOUME	
			13	03		ABADJIN KOUTE	
			13	04		ADIAPOTE	
			13	05		ADIAPOTO 1	
			13	06		ADIAPOTO 1 CITE ADMINISTRATIVE	
			13	07		ADIAPOTO 2	
			13	08		ADIAPOTO MORONOU	
			13	09		AUDOIN BEUGRETO	
			13	10		AUDOIN-SANTE	
			13	11		AYEHOUAYI	
			13	12		GODOUME	
			13	13		PALMAFRIQUE ANGUÉDEDOU	
			13	14		SONGON AGBAN	
			13	15		SONGON AGBAN ATTIE N.2	
			13	16		SONGON AGBAN GARE	
			13	17		SONGON DAGBE	
			13	18		SONGON DAGBE EXTENSION	
			13	19		SONGON KASSEMBLE	
			13	20		SONGON M'BRATHE	
			13	21		SONGON SOUS-PREFECTURE	
			13	22		SONGON TE	
			13	23		SONGON (South Area of SONGON commune)	
			13	24		SONGON (outside commune)	
			13	99		Not Identify	
			14	01	14.GRAND-BASSAM	BELLE-VILLE	
			14	02	(Commune)	BROMAKOTE	
			14	03		CAFOP	
			14	04		CHATEAU D'EAU	
			14	05		CONGO	
			14	06		FRANCE	
			14	07		FRANCE RESIDENTIEL	
			14	08		MOOSSOU BEGNINI	
			14	09		MOOSSOU KOUMASSI	
			14	10		ODDOS	
			14	11		ODDOS 2	
			14	12		PETIT PARIS	
			14	13		PHARE	
			14	14		GRAND-BASSAM North Area in commune	Modeste, Vitre1, Vitr
			14	15		GRAND-BASSAM South Area in commune	Azutetti, Gbamble
			14	16		GRAND-BASSAM East Area in commune	Mondoukou
			14	99		Not Identify	
			15	01	15.ALEPE	BERTHE	
			15	02		C.E.G	
			15	03		CHATEAU	
			15	04		COMMERCE	
			15	05		RESIDENTIEL	
			15	06		VILLAGE	
			15	07		SOGEFIHA ALEPE	
			15	08		ALEPE North Area in commune	ABROTCHI
			15	09		ALEPE East Area in commune	NIANDA
			15	10		ALEPE West Area in commune	MONTEZO
			15	11		ALEPE (outside commune)	
			15	12		OGHLWAPO (new Sub prefecture)	
			15	99		Not Identify	
			16	01	16.AZAGUIE	AHOUA	
			16	02	(Commune)	GARE	
			16	03		AMANIKRO	
			16	04		ASSEMBLE DE DIEU	
			16	05		BAMBOU	
			16	06		BOUSSAN GABOUGOU	
			16	07		BROMAKOTE	
			16	08		DJOULABOUGOU	
			16	09		RESIDENTIEL COLLEGE	
			16	10		AZAGUIE (outside Quartier area in commune)	
			16	11		AZAGUIE (outside commune)	
			16	99		Not Identify	
			17	01	17.BONOUA	BEGNERI	
			17	02	(Commune)	BRONOUKRO	
			17	03		IMPERIER	
			17	04		KOUMASSI	
			17	05		MIMBI	
			17	06		BONOUA East Area in commune	
			17	07		BONOUA West Area in commune	
			17	08		BONOUA (outside commune)	

17	99		Not Identify	
18	01	18.DABOU	AGBANOU	
18	02		AKROMAYAKI	
18	03		CAFOP-SODEPALM	
18	04		DABOU ANCIEN	
18	05		KPASSI AFFRE	
18	06		MEMET VILLE	
18	07		TCHOTCHORAF	
18	08		TEF PALMERAIE	
18	09		WROD	
18	10		GBOUGBO 2	
18	11		DABOU North Area in commune	
18	12		DABOU South Area in commune	
18	13		DABOU West in commune	
18	14		DABOU (outside commune)	
18	99		Not Identify	
19	01	19.JACQUEVILLE	ANCIEN QUARTIER	
19	02	(Commune)	COCOTERAIE	
19	03		HABITAT	
19	04		MOSQUEE	
19	05		NOUVEAU QUARTIER	
19	06		RESIDENTIEL	
19	07		SICOR	
19	08		SODEPALM	
19	09		JACQUEVILLE East Area in commune	Abreby, Aoukro, Adou
19	10		JACQUEVILLE West Area in commune	Addah, Adesse, Adjou
19	99		Not Identify	

Outside Great Abidjan

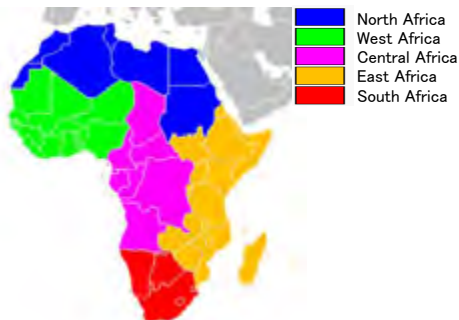
D Region

Region

41	00	AGNEBY-TIASSA
42	00	BAFING
43	00	BAGOUE
44	00	BELIER
45	00	BERE
46	00	BOUNKANI
47	00	CAVALLY
48	00	DISTRICT DE YAMOUSSOUKRO
49	00	FOLON
50	00	GBEKE
51	00	GBOKLE
52	00	GOH
53	00	GONTOUGO
54	00	GUEMON
55	00	GRANDS PONTS (Except DABOU and JACQUEVILLE)
56	00	HAMBOL
57	00	HAUT-SASSANDRA
58	00	IFFOU
59	00	INDENIE-DJUABLIN
60	00	KABADOUGOU
61	00	LA ME (Except ALEPE and OGHLWAPO)
62	00	LOH-DJIBOUA
63	00	MARAHOUÉ
64	00	MORONOU
65	00	NAWA
66	00	N'ZI
67	00	PORO
68	00	SAN-PEDRO
69	00	SUD-COMOE (Except BONOUA)
70	00	TCHOLOGO
71	00	TONKPI
72	00	WORODOUGOU

Foreign Countries

81	00	West Africa
82	00	North Africa
83	00	Central Africa
84	00	East Africa
85	00	South Africa
86	00	Europe
87	00	Asia
88	00	North America
89	00	South America
90	00	Oceania

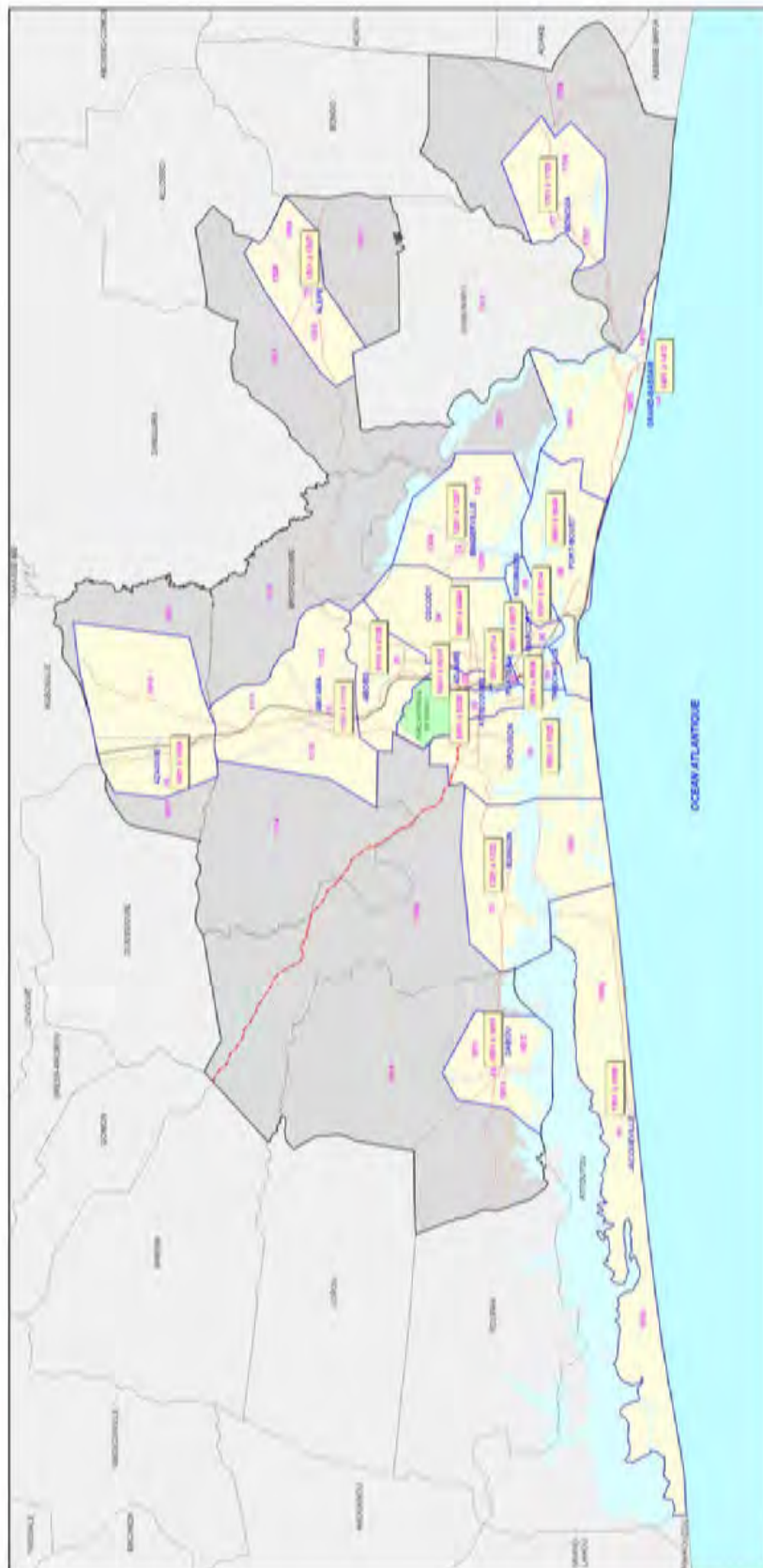


99 99 Not Identify





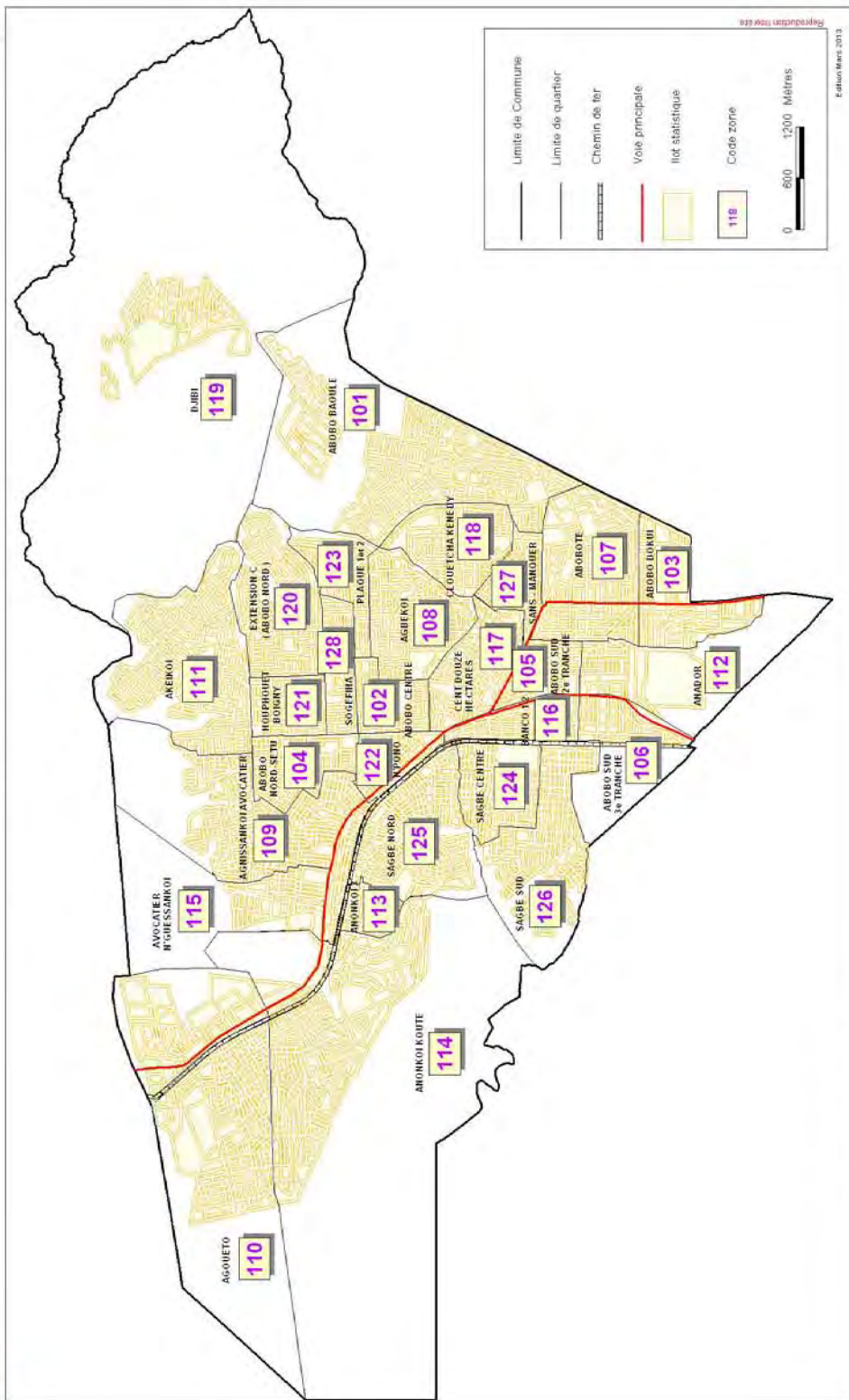
COMMUNES DU GRAND ABIDJAN

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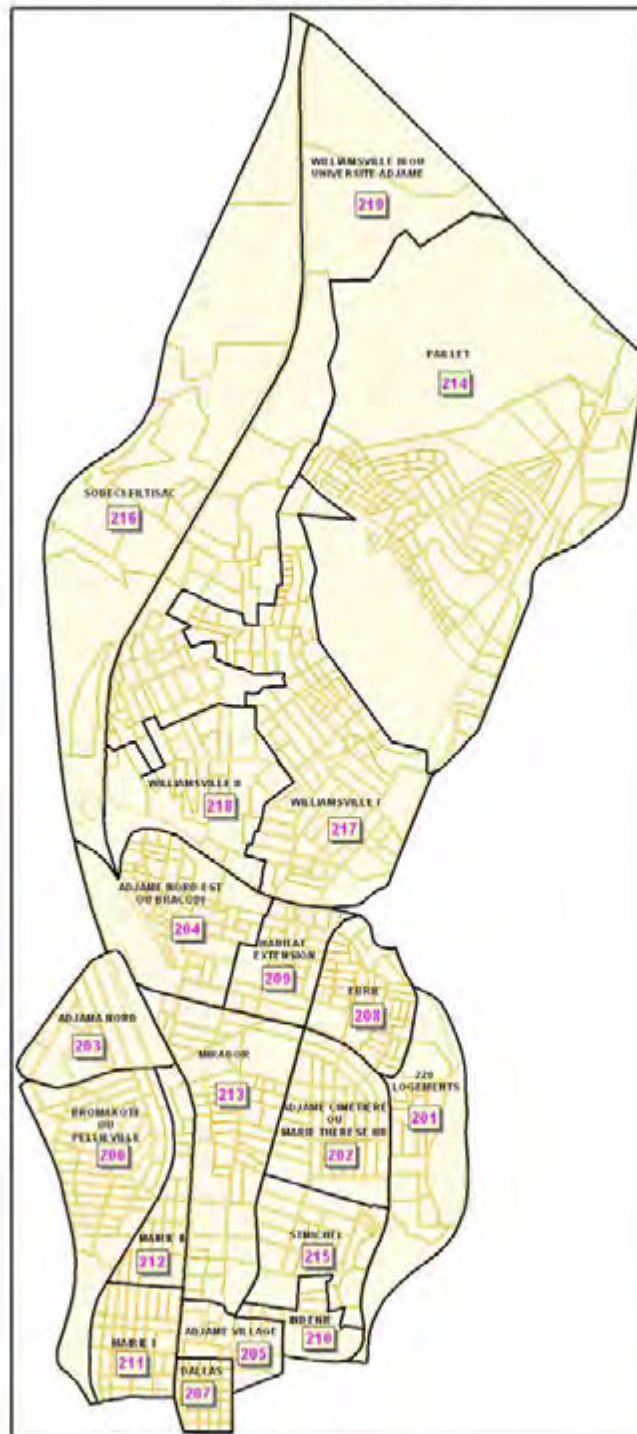
COMMUNE D' ABOBO



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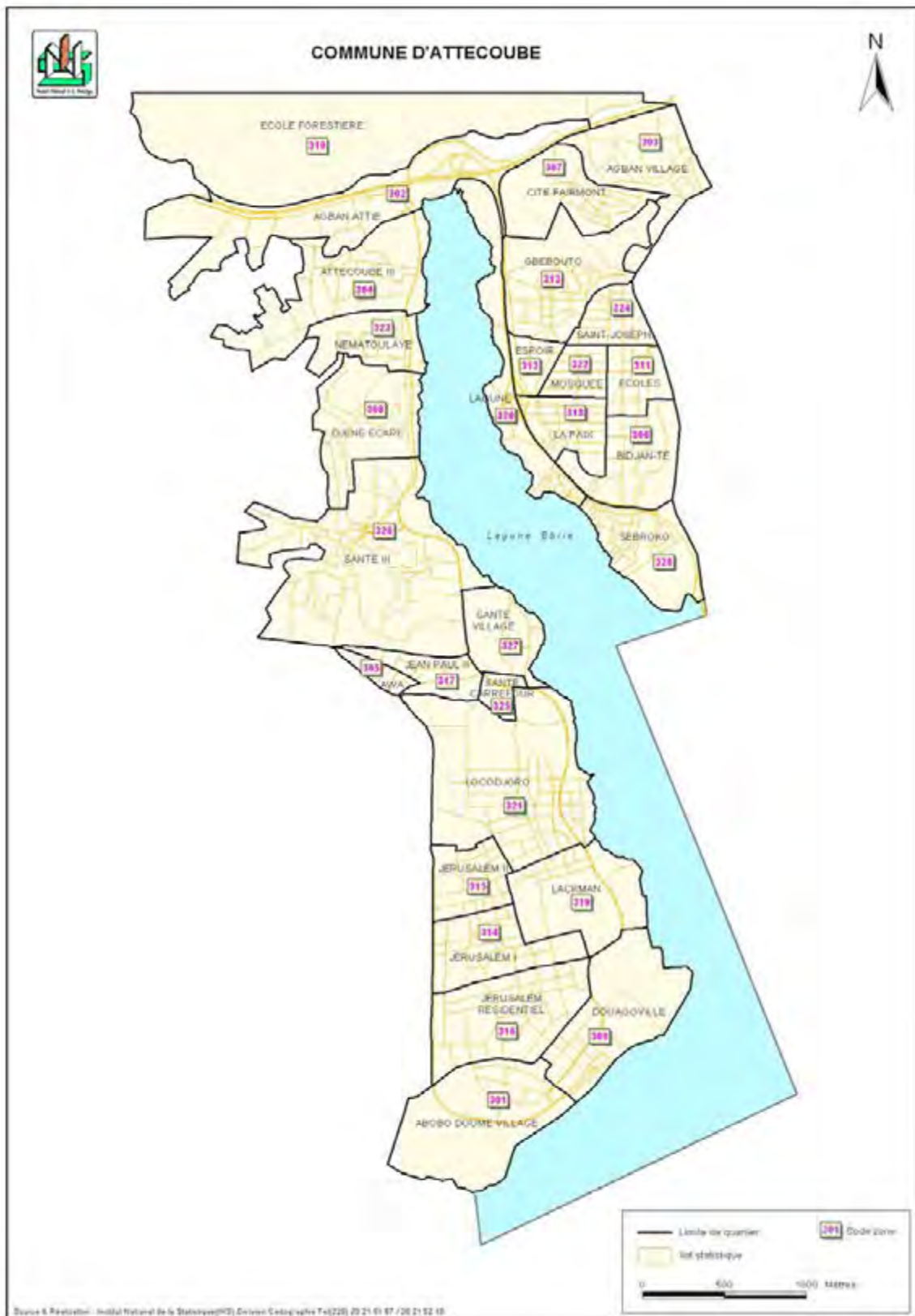


COMMUNE D'ADJAME



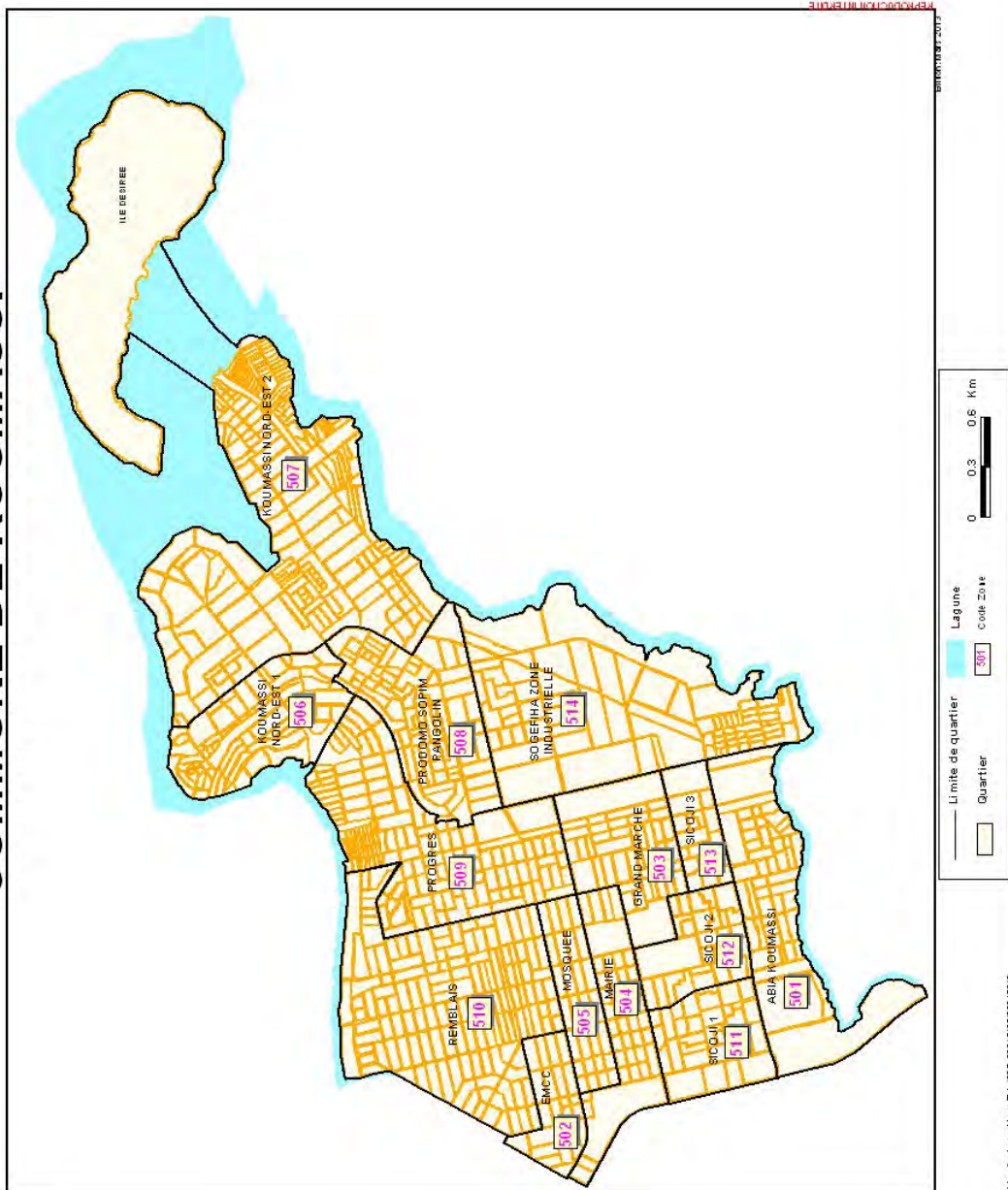
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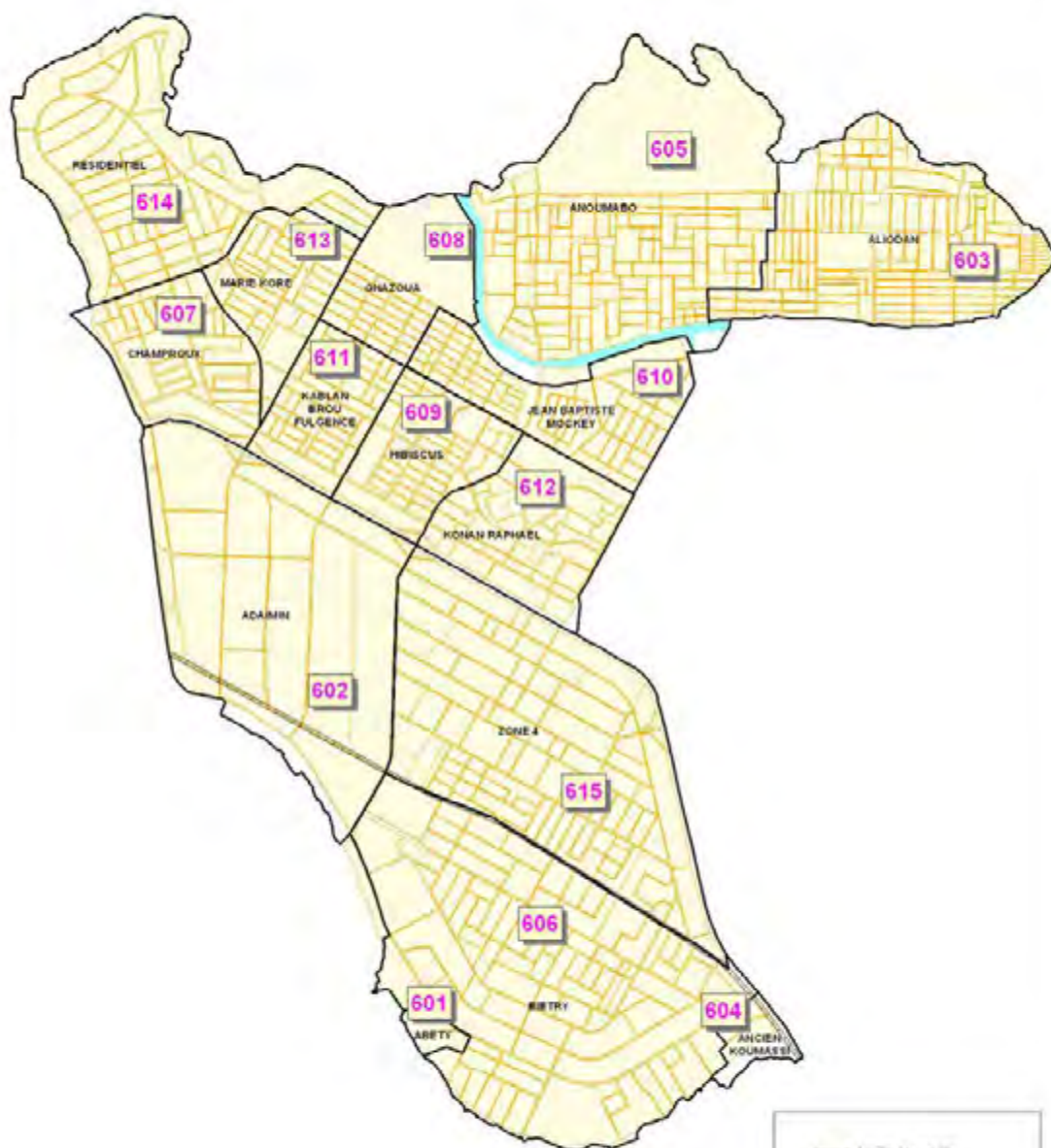


COMMUNE DE KOUMASSI





COMMUNE DE MARCORY



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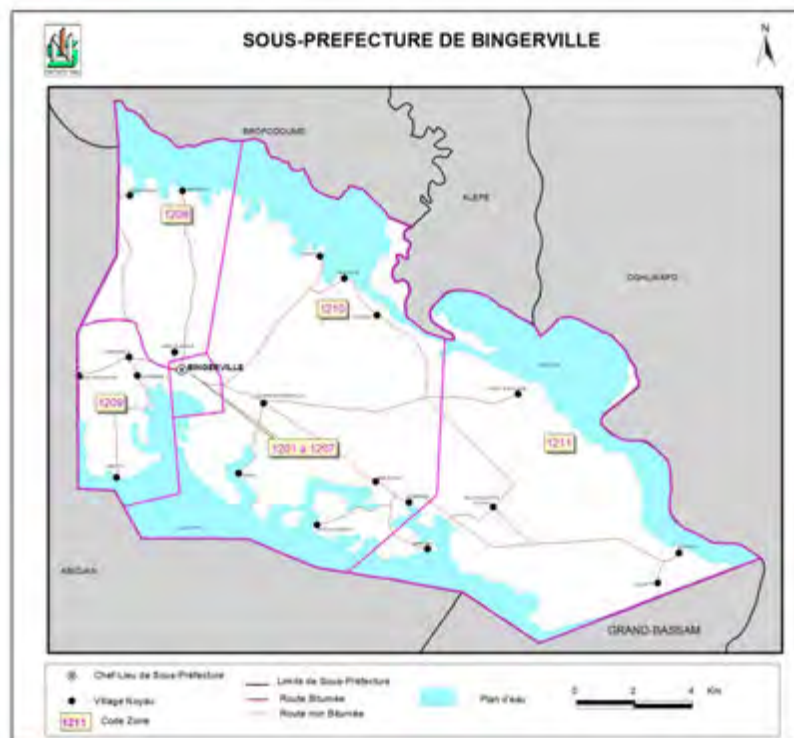
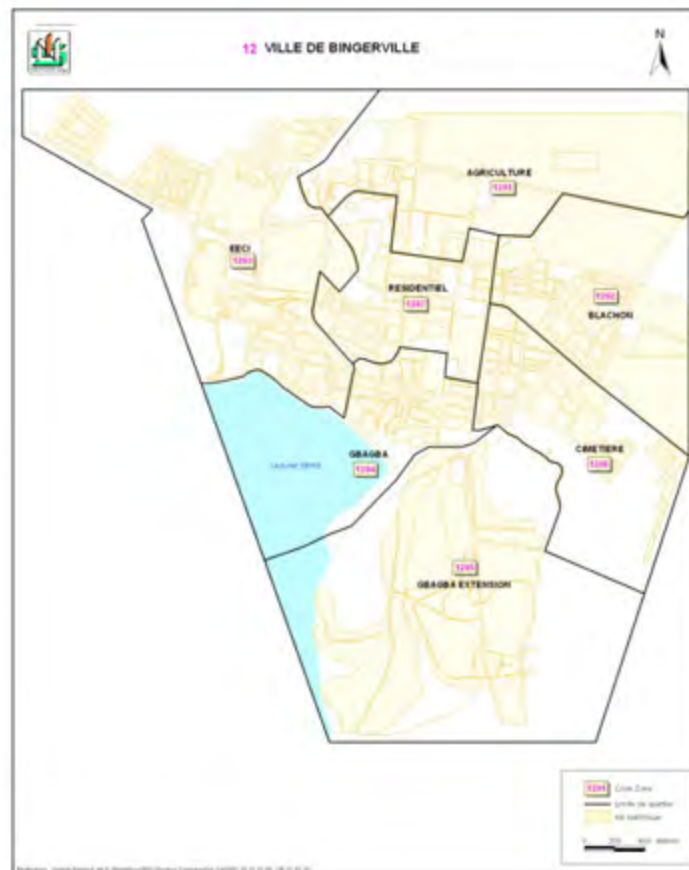


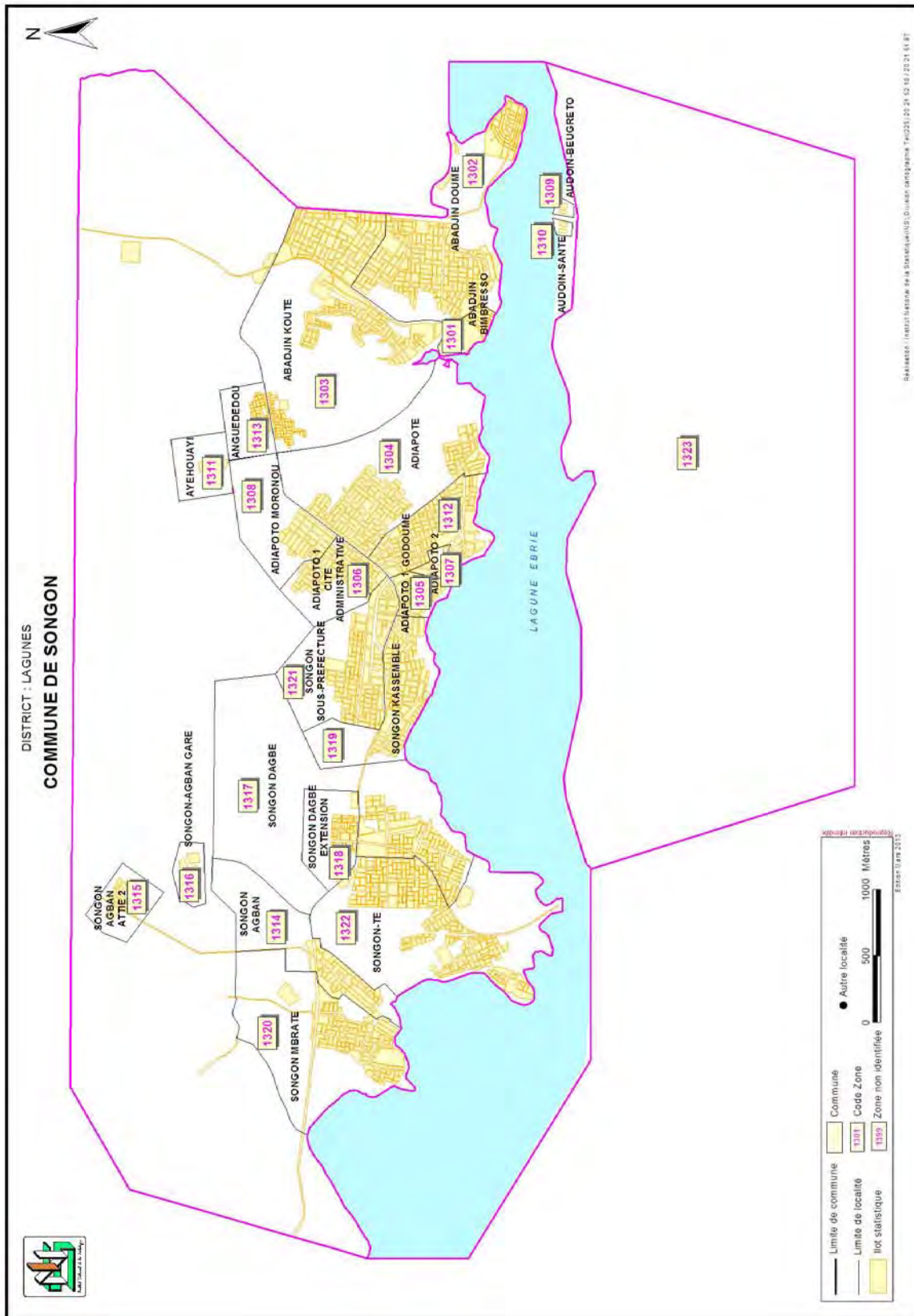


COMMUNE DE PORT-BOUET



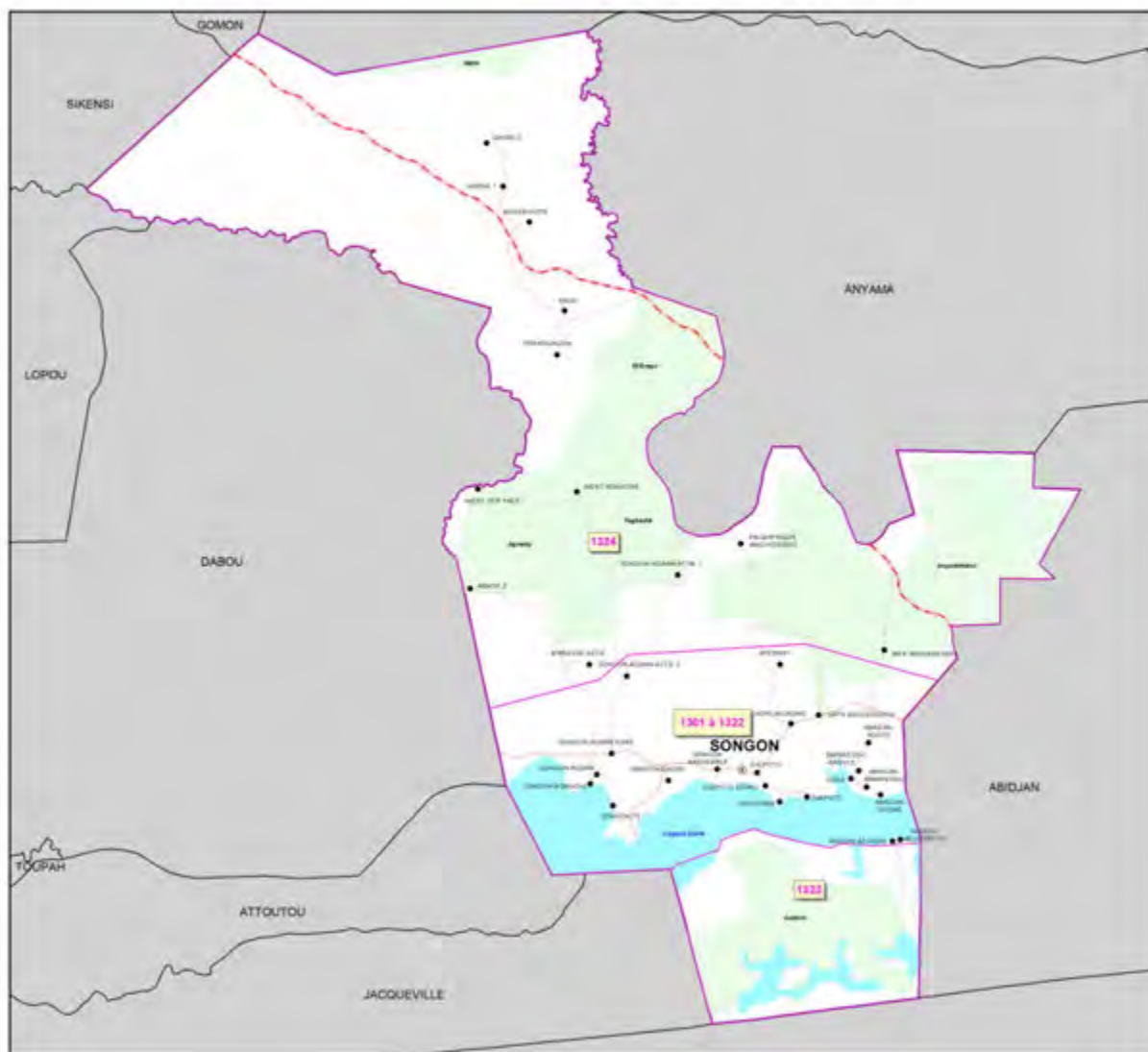


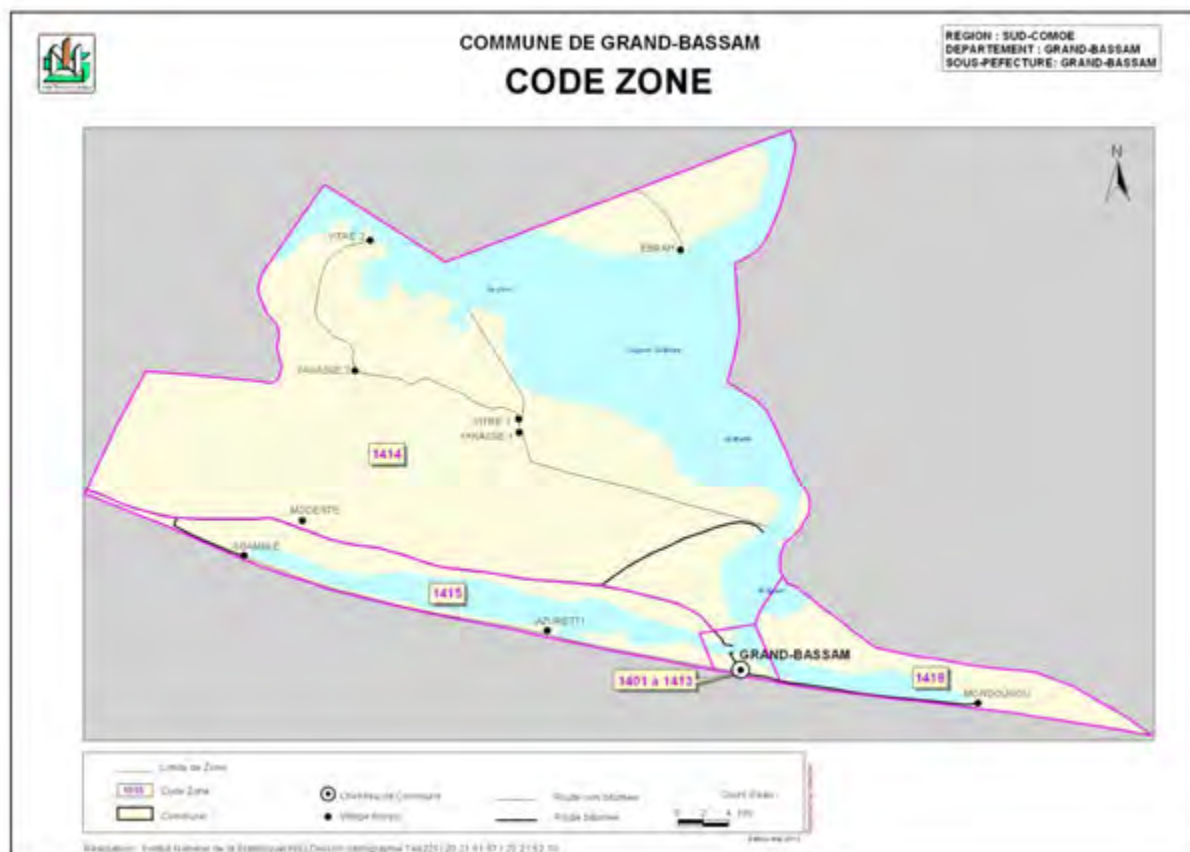
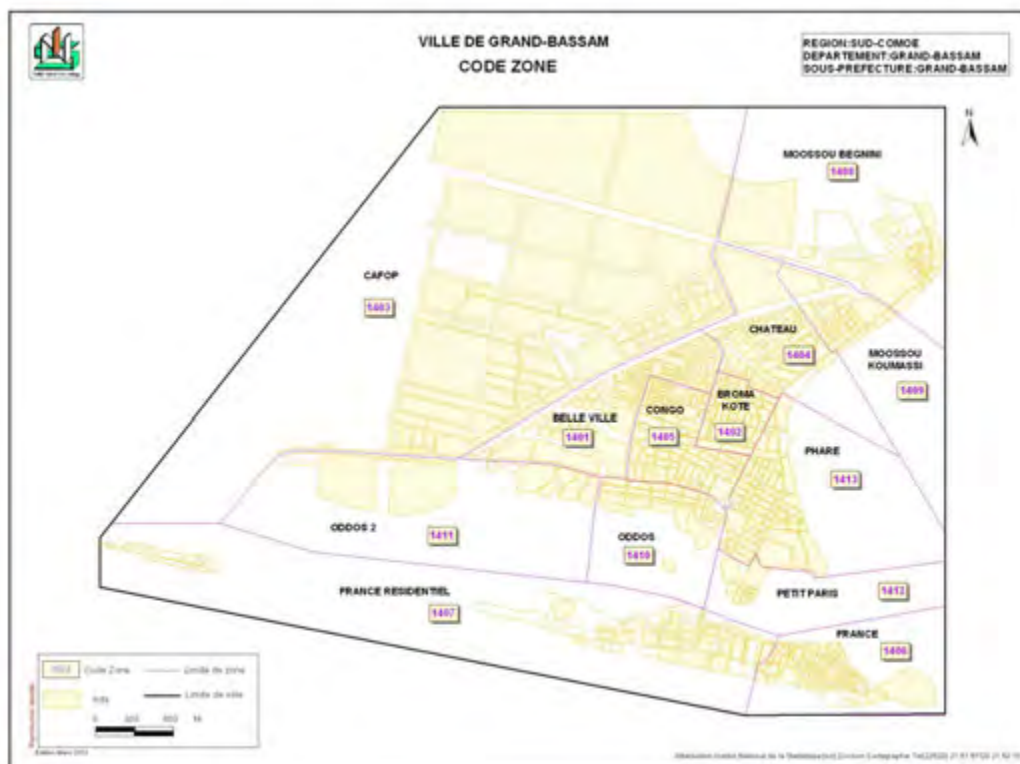


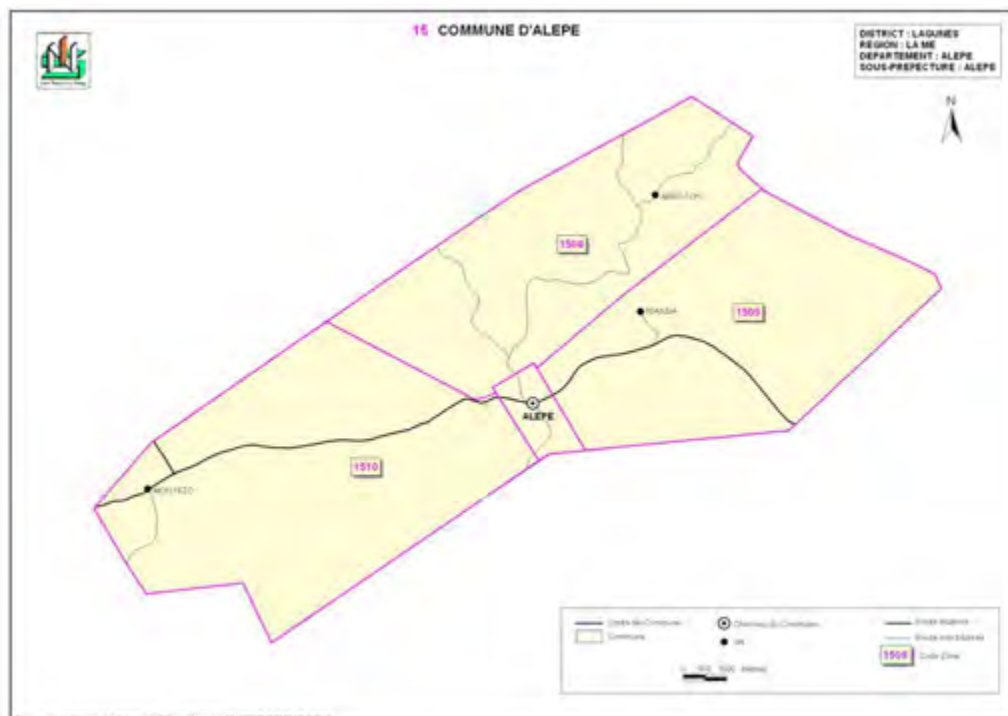
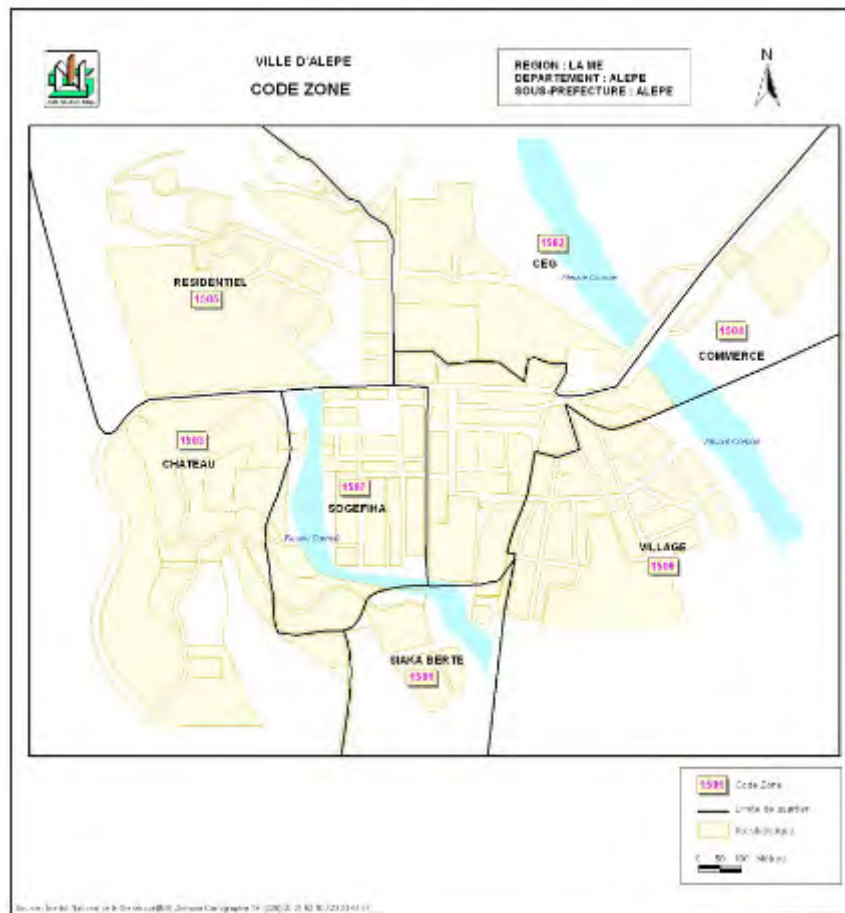


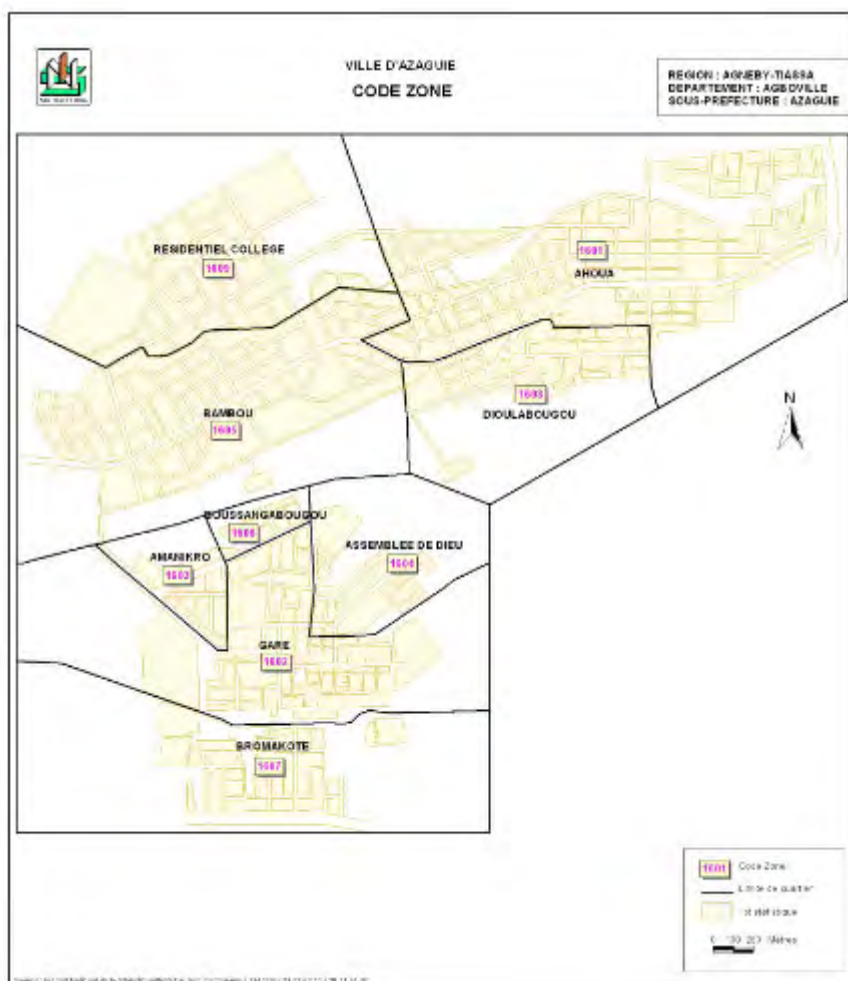


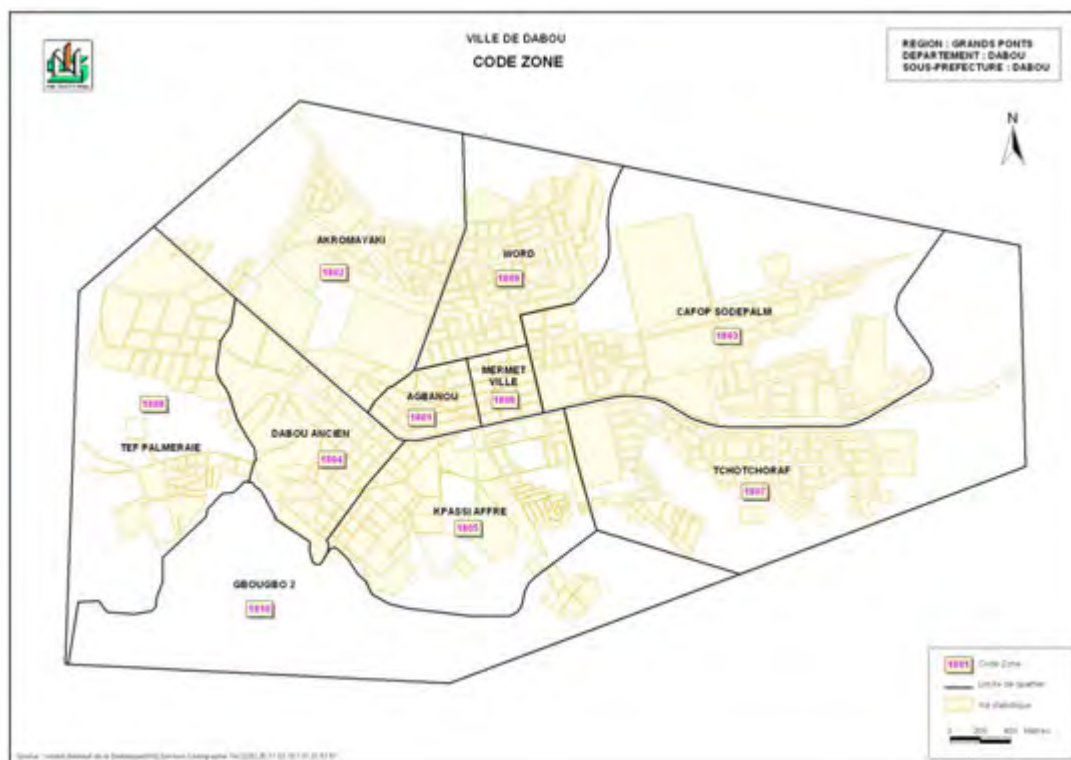
SOUS-PREFECTURE DE SONGON











Appendix B

(Page B-1 to B-36)

Review of the Road Projects in the Master Plan 2000

1.0 Completed or On-going Projects

3 rd Bridge between Riviera and Marcory (Henri Konan Bédié Bridge) and its access roads	
	Status: Under-construction (July 2012 to December 2014)
	Actors: Ministry of Economic Infrastructures (Owner-Licensor), Ageroute (Owner-Licensor Representative), Bnetd (Owner-Licensor Engineer), SOCOPRIM (Licensee), Bureau VERITAS (External checking)
	Characteristics: The projects will link Cocody (Boulevard François Mitterrand) and Marcory (Boulevard Valéry Giscard d'Estaing) with a 6.4km long road, including a 1.5 km long bridge across the Ebré Lagoon carrying 2 x 3 traffic lanes. This will be the first tolled infrastructure in Abidjan District.

Source : JICA Study Team

Two major bridges have been built during the sixties and seventies, the Félix-Houphouët-Boigny Bridge and the Général-de-Gaulle Bridge, to connect the industrial zone in the South to the residential areas in the North, and to cross the Ebré Lagoon that stands in between. Since then, no other bridges have been built across the Ebré Lagoon, hindering the development of Abidjan as the two bridges can no longer cope with the growing population and the related traffic. The 3rd bridge between Cocody and Marcory, which is currently under construction, is expected to solve part of the problem.

Background of the Project

The study for this crossing was first carried out in 1998 with funding from the International Finance Corporation, the AfDB and the World Bank. However, the project was suspended during ten years due to civil war. The project restarted in 2009, and is now funded by the AfDB (prime), the IFC (WB Group), the FMO and the Mediocapital Bank. The MIGA (WB Group) is also involved as the insurer of this project. The construction and 30-year operation of the 3rd Bridge between Riviera and Marcory, or the Henri Konan Bédié Bridge, has been awarded to the SOCOPRIM (Société Concessionnaire du Pont Riviera-Marcory) in July 2012.

Description of the Project

The 1.5 km long bridge carrying 2 x 3 traffic lanes is part of a 6.4 km long road project, linking Riviera to Marcory, two major areas of the city. An interchange with the Boulevard Valéry Giscard d'Estaing will also be built. It will eventually allow 100,000 vehicles to cross the Ebré Lagoon every day.

The total cost of the project is currently estimated at approximately 221.4 M€. With the contingencies estimated at 8.0 M€, the cost of the project reaches 230.4 M€.

Implementation schedule

The construction of the road and bridge, which started in September 2012, will be performed by Bouygues Travaux Publics. The works are expected to last 27 months, with no interruption during the raining season.

- The first year will be mainly devoted to studies (pile foundations) and implementation of site installations (installation area north and south quays pile, workshop and manufacturing unit casing construction of the gantry and barges) (Figure 1.1).

- The development work itself will start in year one: 3rd month for the southern platform, 6th month for the northern platform (period for the backfill: 8 months) and 10th month for the installation of piles, pile caps and caissons of the viaduct (period for the installation works: 11 months). The major installation works of the viaduct will therefore be carried out in year 2.
- The finishing works (roads, sanitation, toll facilities, road signs ...) will begin at the end of the first year / beginning of second year (completion of the north and south platforms) and will be completed before the 26th month (equipment and finishing of the viaduct).
- The bridge will be finished at the end of the 26th month, and during the 27th month, SOCOPRIM will proceed with the loading test of the bridge.
- The bridge is expected to open in December 2014.



Source : JICA Study Team

Figure 1.1 View of the 3rd Bridge Construction Site

The Link between Boulevard Mitterrand / Boulevard de France

This road located in the thalweg between the Cocody University and the Riviera quarters 1 and 2 is currently been built (Figure 1.2) and will provide a fast and convenient bypass in the eastern part of Abidjan (with the completion of the Riviera-Marcory Bridge) between Cocody and other urban centers, especially those located in the northern part

- Junction to the Boulevard de France towards Cocody center, Plateau and Yopougon;
- Junction to the boulevard towards Cocody-Deux Plateau, Riviera and Bingerville;
- Easy connection to the Y3 Bypass (Abobo-Baoulé-Riviera Link) which allows a fast access to the Cocody commune.



Source : JICA Study Team

Figure 1.2 View of the Link Construction Site near Boulevard François Mitterrand

Jacqueville Bridge	
	
Source : JICA Study Team	
Status: Under-construction (August 2009 to January 2014)	
Actors: Ministry of Economic Infrastructures (Client), Ageroute (Client Representative), Arab Contractors (Contractor), LBTP (Geotechnical Laboratory), Bureau VERITAS (External checking)	
Characteristics: The bridge was design as a 570 m long prestressed concrete beam-girder bridge, consisting of 15 spans of 38.10 m each. The cross section of the bridge supports a 7.50 m wide carriageway with one traffic lane in each direction and two sidewalks of 1.25 m each.	

Background of the Project

Jacqueville Department is a large agricultural area famous for its production of coconut and palm oil. The seabed in this area has great potential in offshore deposits such as oil and natural gas. In addition, this coastal area can become a major tourist area in Côte d'Ivoire.

As part of its overall policy to develop infrastructure and to open up isolated areas, the Government of Côte d'Ivoire has decided to build a bridge over the Ebrié Lagoon to connect the Jacqueville Department. Currently, a ferry boat ensures the crossing but it is unreliable (Figure 1.3). People sometimes have to wait for a long time, as the priority is given to trucks transporting coconuts and palms. Traffic is approximately 300 vehicles / day.



Source : JICA Study Team

Figure 1.3 Ferry Boat connecting the Jacqueville Department

Objective of the Project

The main objective of the Jacqueville Bridge is to improve the living conditions of people in the Jacqueville department. Especially, the project aims to improve the road infrastructure of the area; fight against poverty by connecting the area to the rest of the road network and increasing the income of population living in the vicinity of the project; and develop transport infrastructure to support agricultural development and tourism.

The project will ultimately eliminate ferry crossing operation costs and other precarious crossing means such as canoes; save time for users who are using this road; and promote the industrial development and tourism in this coastal area.

Current Status of the Project

Following an international call for tenders, AGEROUTE selected Arab Contractors to build the bridge and works began in August the 1st 2009 (Figure 1.4). The construction period was estimated at 24 months and the total construction cost was estimated at 16,826,609,165 FCFA tax included.

However, following the results of additional geotechnical survey carried out at the Abidjan-side abutment location, presence of a compressible area that could cause significant differential settlement was detected and the design had to be significantly modified from the project agreement.

The bridge length was increased by an extra span of 38.10 m to avoid losing time while waiting for the consolidation of the compressible area after the introduction of the embankment preloading. The modified bridge length is now 608.10 m long and consists of 16 spans of 17 with piers supported by bored piles. This change resulted in an additional cost of 1,758,390,804 FCFA and an additional 8 months to the construction period. The projected date of completion of the construction work is scheduled for January 31, 2013.



Source : JICA Study Team

Figure 1.4 View of the Jacqueville Bridge Construction Site

Abidjan-Bassam Expressway	
	
Source : JICA Study Team	
Status: Under-construction (August 2012 to February 2015)	
Actors: Ministry of Economic Infrastructures (Client), Ageroute (Client Representative), China Machinery Engineering Corp. (Contractor)	
Characteristics: The Abidjan-Bassam Expressway will be a 2 x 3 traffic lane road of 28 km in total length, between the Carrefour de la place Akwaba at Port Bouet and the quartier Moossou in the Grand-Bassam Commune.	

Background of the Project

The road between Abidjan and Grand-Bassam is considered as a vital road for West Africa as it is part of the trans African international road connecting Dakar (Senegal), Abidjan and Lagos (Nigeria) along the coast.

Many studies have been carried out for this project. In March 1996, a study conducted by the BNETD in March 1996 evaluated the possibility to implement of a toll road between Abidjan and Yamoussoukro and Abidjan and Grand-Bassam. The Sctt-Tunisie then prepared and submitted the detailed design and bidding documents in

March 2008. The detailed design had concluded that the expressway could be constructed by the strengthening of the existing road and its widening by constructing of a new carriageway parallel to the existing roads. However, studies carried out by the Centre de Recherche Océanographique (CRO) have shown that the risk of erosion of this new road would be important as the existing road is located very near the coastline (70 m north). A new study for the road alignment was then carried out further north to the existing road to avoid any coastal erosion, which was the alignment finally selected for this expressway.

Objective of the Project

The objectives of this project are:

- To provide a high speed link between Abidjan and Grand-Bassam,
- To save time and improve the safety of road users,
- To improve the connection to the Southeast region of Côte d'Ivoire and Ghana,
- To develop tourism.

In particular, this project will enhance the tourism potential of the town of Grand-Bassam, located 60km from Abidjan, which was the first capital of Côte d'Ivoire and whose Historic Town is already classified as a World Heritage. The expressway will provide a fast and safe access to this late 19th- and early 20th-century colonial town planned with quarters specializing in commerce, administration, housing for Europeans and for Africans, which has become a major resort town of Côte d'Ivoire.

The project, once completed, will provide a reliable access to the VITIB (Village des Technologies de l'information et de la Biotechnologie), a free biotechnology and information technology zone established near Grand-Bassam and will allow Bonoua to become a major industrial area as projected, which would generate further activities and jobs.

Description of the Project

The Abidjan-Grand-Bassam Project can be divided into two sections (28 km in total):

- A fist urban section of a total length of 8.5km, which starts at the Carrefour de la place Akwaba at Port Bouet and which ends at the security corridor of Gonzagueville.
- A second interurban section, of 19.9 km of length, starting at the security corridor of Gonzagueville up to the quartier Moossou, in the Grand-Bassam Commune.

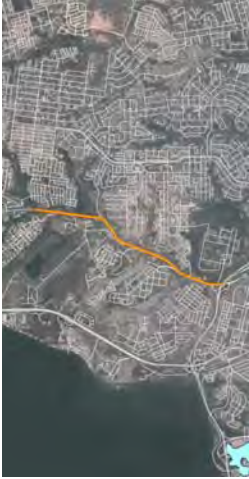
Financing

The construction Abidjan-Bassam Expressway, at an estimated total cost of 62 billion FCFA, will be mainly financed by China through the Export-Import Bank which has provided a 52.7 billion FCFA (\$100 million) loan over the next 20 years. The Ivory Coast State will provide an additional 9.3 billion FCFA (\$17.4 million) to complete the financing.

Current Status of the Project

The China Machinery Engineering Corporation (CMEC) is in charge of constructing this expressway. Earthworks are already underway. The construction is expected to last 30 months and be finished by February 2015.

Widening of the Route du Zoo



Source : JICA Study Team

Status: Completed (August 2009 to October 2010)

Actors: Ministry of Economic Infrastructures (Client), Ageroute (Client Representative), Bneld, PUJUR, Fadoul

Characteristics: The widening and rehabilitation of the Route du Zoo has been carried on a total length of 2.2km This main access road to Abobo was occupied by many illegal sellers that were creating traffic congestion.

The widening of the Route du Zoo on a 2.2km distance is one of the components of the PUJUR project which started in August 2009. As mentioned previously, the PUJUR is a project funded by the World Bank through its subsidiary IDA (International Development Association). It consists in the widening and rehabilitation of the road between Williamsville and Abobo zoo.

The works had been carried out in difficult conditions as it was not allowed to close the road which is one of the main access roads to Abobo. The relocation of utilities (Sodeci, Ci-Telecom) took longer than expected and the completion date could not be respected due to the difficulties encountered on the sites. The construction period that was first estimated at 6 months took 14 months.

2.0 Current Status of Priority Projects

Many road projects mentioned in the Master Plan 2000 have not yet been implemented. In this section, we will evaluate the current status of planned roads considered as major structuring roads. Those roads are the same as the ones that the MCLAU has requested a review by a letter dated 12th of July 2013 and are listed below (the letter is for plan identification):

- A. La Voie Triomphale; a main road through Plateau
- B. La voie Y4; the outer ring road linking Songon with Port Bouet, via Abobo and Cocody
- C. Le Boulevard de France; a west to east link road passing the Golf Course in Cocody
- D. Le Boulevard Larille; the main north south road through Cocody to link with Y4
- E. Le prolongement du boulevard Mitterrand; the extension of the Mitterrand Boulevard to Bingerville
- F. Le Parkway; the extension of the Dabou-Songon highway through Yopougon to Plateau
- G. Le voie V28; the main road through Yopougon to the new Port on Bouley Island
- H. Le voie V2; an arterial road through Yopougon paralleling the road V28
- I. Le voie V6; a southern ring road for Yopougon linking by bridge to the Plateau.
- J. Le voie V9; new road along the western edge of Yopougon industrial zone
- K. Le voie V23; part of the proposed highway V28
- L. Le voie Y3; a partially constructed and dirt road through Cocody that includes the southern section of I 87 and connects to the Alepe Road P2 to the north.

The other road projects of the Master Plan 2000 that are not in this list will also be evaluated in the next section.

The routes of the roads have been legally approved and land subdivided for their implementation; in some cases they are now partially and illegally occupied

The review of the roads has been conducted in two parts. The first part will be an on-site investigation of the roads. Then, the results of this site investigation have been then assessed in detail and recommendations have been made of the carriageways and junctions suitable for the right of ways that are actually available.

Process of Review

The review will be conducted through site visits, photographic record and assessment of the road engineering capability i.e., right of way width, number of carriageways, geometry, intersections and necessity for elevated construction. The potential to implement the road along its planned route will be assessed and practical alternative routes identified where substantial illegal development precludes an unencumbered alignment. The broad planning implications (excluding costs and political consideration) will be defined. Following the findings of the traffic surveys and land use survey, currently being undertaken, options that may involve substantial amendment to the alignments will be evaluated to form a component of the comprehensive transport master plan.

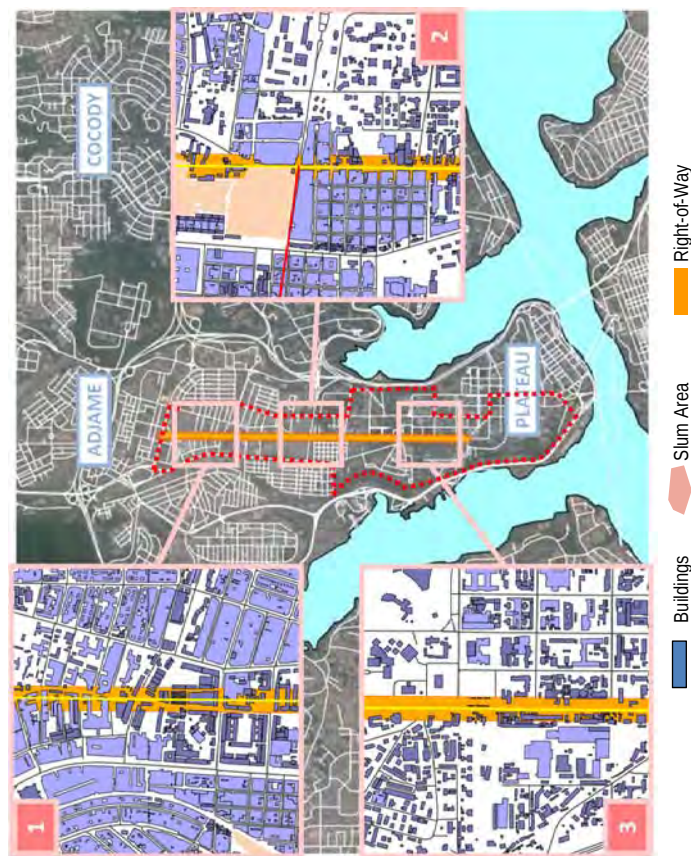
2.1 The Voie Triomphale

Since 1960, and in first apparition in the Abidjan Master Plan, many studies have been carried out for the Voie Triomphale, mostly between 1963 and 1978. The aim of this road was to help improve circulation between the Plateau and Adjame. The MTPCTP (Ministère des Travaux Publics de la Construction et des Postes et Telecommunications) in 1988 proposed a 8 lanes carriageway with two lane on each side. Along with the construction of this landmark road, many facilities were supposed to be constructed such as the Assembly, the Ministries and the Supreme Court, which would bring the Voie Triomphale as the politic center of the country.

Appendix B Review of the Road Projects in the Master Plan 2000

Since the 10th June 1981, the Voie Triomphale and the surrounding 340 hectares have been declared by decree as of public interest. This has forbidden any construction inside the project area in the central area of the District.

The latest design of the Voie Triomphale is a dual four lane (34m width) - plus two three lane slip roads, all within a 70 m alignment road reserve. The alignment of the road is shown in the above figure. It is proposed to display a similar monumental urban characteristic as the Avenue de Champs Elysees in Paris. Unlike that road which is 2.1 km in length and was originally laid out across fields and market gardens in 1667, the proposed road is 3.4km long. It will impact upon the existing urban fabric, requiring the removal of many existing properties; and will have a substantial influence on the existing road network of Plateau and Adjame communes.



Source : JICA Study Team

Figure 2.1 Alignment of the Voie Triomphale

The route, shown in orange (Figure 2.1), at its southern end follows the widened Boulevard Cardé and Avenue 11. Proceeding to the north the proposed road will cut through existing properties in Adjame and Mirador Quarters. The proposed route terminates at Boulevard du General de Gaulle.

The new road is seen the urban intervention to undertake a massive restructuring and renewal of the downtown city centre of Abidjan, area demarcated by red dashed lines in the figure above.

Right-of Way

As it can be seen in Figure 2.1, many buildings are constructed inside the northern section of the ROW. If the project is to be implemented, it would require important resettlement. The following photographs (Figure 2.2 to Figure 2.5) show the current status of the Boulevard Carde and Avenue 11.



Figure 2.2 End of Boulevard Carde



Figure 2.3 View north

Figure 2.2 and Figure 2.3 are at the southern end of Boulevard Carde. In Figure 2.2 termination of the route will require removal of the existing mayor's office to allow for a formal plaza. In Figure 2.3, the low rise residential buildings along the left hand side of the boulevard will be removed to enable the road widening for Voie Triomphale.



Figure 2.4 The gap

Figure 2.4 illustrated the pinch point of the proposed Voie Triomphale between the twin water towers and the government offices, which marks the junction of Boulevard Carde and Avenue 13. Figure 2.5 shows the commercial and office buildings that will not be affected by the new road. The low rise buildings on the right hand side are part of the SITRA rail and will need to be removed.



Figure 2.5 View south



Figure 2.6 National Library

Figure 2.6 shows one of the cultural buildings to be affected by the road widening along Avenue 13. Some will need to be removed; others may be retained to serve as national landmarks along the new boulevard.



Figure 2.7 View south

Figure 2.7 shows a residential building that will be under threat for removal. Figure 2.8 shows the route between the military camp to the left and the police compound to the right as Avenue 13 rises to the junction with Avenue Toussaint Louverture.



Figure 2.8 View north

The following Figure 2.9 to Figure 2.12 show the junction of Voie Triomphale with Avenue Reboul, which will require major urban renewal works to accommodate the widening of both roads.



Figure 2.9 View north towards Avenue Reboul

In view 3.8 properties on left in Dallas quartier will be affected by the road widening necessary for the new road Voie Triomphale.



Figure 2.10 Junction with Boulevard Reboul

The proposed Voie Triomphale will continue on a straight alignment that will require removal of the mosque to the left of the junction, as well as the church (currently undergoing renovation) in the centre of the photo. The road will then continue through the developed areas of Adjame Village and Mirador quarters that include markets, Abrogou shopping area, housing, cemetery and the old bus station. The Voie Triomphale terminates at Boulevard du General De Gaulle.



Figure 2.11 View East along Avenue Reboul



Figure 2.12 View West along Avenue Reboul

Recommendations

From an urban planning perspective the Voie Triomphale is the mechanism for initiating the urban renewal of the Plateau District for major commercial and civic facilities. The road would therefore provide the opportunity for major restructuring of the central core of the city. In addition the road becomes a significant urban design feature; the undisputed rhetoric of government's hand in directing an image that displays the city's future role international role. The road will cause widespread demolition of both government and private property. The timing and implementation of the road and its contiguous urban renewal projects must be carefully considered. Economic slowdown and subsequent delays could leave extensive areas of the city centre left with vacant lots for a considerable time. A more prudent sequence of events should be the initiation of urban renewal, followed by the implementation of the new road.

The traffic and transport merits for the scheme will be discussed following the traffic survey findings.

2.2 The Voie Y4

This is the proposed outer ring road. The full extension of this road in the northern direction links Songon with Port Bouet, via the communes of Abobo, Cocody, Koumassi (Figure 2.13). The prime function of this road will be to divert traffic, especially heavy goods vehicles (HGV) away from the congested central city communes of Abidjan and the bridges crossing the lagoon that link the mainland to Petit Bassam. An important secondary function will be to provide strategic road access to new industrial and suburban employment areas. The southern direction of the ring road from Songon crosses the new bridge across the Ebrié lagoon and then connects with the coastal road to cross Canal Vridi.

The road will be of dual carriageway highway standard. It will link directly to the main radial routes into the city. The planned and existing right-of-way is 70 meters from Port Bouet to Abobo Akéikoi and 50 meters from Abobo to the PK 18 crossroad and 100 meters from the PK intersection to the Dabou and Jacqueville crossroad. Junctions with the local or the strategic roads of Abidjan long this length should take into account the road geometry of weaving lanes for access and egress, and the nature of the main land uses.

It is anticipated that the construction of this road will stimulate residential development at the peripheral areas of Abidjan city, a trend that is already in progress in anticipation of the road. Major new development can be expected at; Dabou, Songon, Attingue, Anyama. Cocody, Bingerville, Port Bouet, Grand Bassam and Bonoua: as a consequence of the road.



Source: JICA Study Team

Figure 2.13 Alignment of the Voie Y4

2.2.1 Songon to Abobo Section

This route will cross the Autoroute de Nord and provide access to the new Atinguie Industrial Zone. The land it traverses includes agricultural land and large palm and rubber plantations. Prior to forming an intersection with the PK18 a new residential development has been laid out that will require adjustment to the alignment.

The existing two lane T120 road has a 50m wide road reserve. There are permanent structures to restrict expansion to a dual two lane carriageway (Figure 2.14). However, the bridge crossing the railway line will have to be widened as it is of two lane carriageway width (Figure 2.15).



Figure 2.14 Existing T170 right of way



Figure 2.15 T170 Railway Bridge

2.2.2 Abobo to Cocody Section

The original route alignment from the Autoroute d'Abobo (through the quarters of Avocatier, Akeikoi, Quartier C, Paque and Abobo Baoule) to the P2 Alepe Road, follows a 70m wide reserve that has along its length been intermittently occupied by illegal shacks, temporary structures, agricultural land, car repair yards and vehicle parking areas. The route can be traversed along earth roads or narrow footways through vegetation. The route width is substantially reduced by the construction fencing for the new Abobo Justice Place, however it is understood that the actual completed site area will not impinge upon the road right of way.



Figure 2.16 Junction with Road P2



Figure 2.17 Abobo Baoule section



Figure 2.18 Quartier C section



Figure 2.19 Akeikoi junction with Q125

The most northern section is blocked by new buildings; see Figure 2.20 yellow tone areas. The removal of these would enable the original alignment of Y4, shown as red dashed line, to be constructed. Figure 2.21 and Figure 2.22 below are viewed towards the east.



Source: JICA Study Team

Figure 2.20 Y4 Alternative Alignment East from T170 and Autoroute d'Abobo Junction



Figure 2.21 New development blocking route



Figure 2.22 Alternative alignment beside the original

An alternative northern route, yellow dashed line, may be possible to avoid the buildings blocking connection to the T170. This would involve an elevated road structure of 2km length along an undeveloped steep sided river valley, as shown in Figure 2.24. This realignment option will be expensive and is not recommended if illegal properties can be removed.

The possible new alignment shown by the dashed white line, Figure 2.23 will enter the valley from the left side of the photo along a small valley in the mid-distance, that is, above the foreground buildings. The road will then follow the valley to the top of the picture.



Figure 2.23 Alternative alignment inside the valley

2.2.3 Cocody Section

This section has experienced substantial development of permanent housing along the designated route. In many cases this has reduced the width of the roads right of way.

2.2.3.1 Alepe Road to Boulevard Francois Mitterrand

Figure 2.24 shows the route through the quarters of Angre, Djorogobite and Riviera Palmeraie from the Alepe Road P2 to Boulevard Francois Mitterrand.

The red dashed line is the possible route and the blue dashed line is the original route which is blocked by new permanent buildings. The shaded areas along the route are significant informal housing / market areas across the entire road right of way (Figure 2.25).



Source: JICA Study Team

Figure 2.24 Section between Alepe Road and Boulevard Francois Mitterrand



Figure 2.25 Extensive informal settlement between Palmeraie and Nouveau Camp D' Akouedo



Figure 2.26 New housing built on the original route

To the north of Road L84 in Djorogobite the original route has been completely built over by a large housing compound. To the south of the road the original route is blocked by numerous individual premises. Figure 2.26 has been taken towards the south from the L84.

An alternative route is presently available alongside a new social site and through a non-substantial cattle corral. The pictures in Figure 2.27 below are towards the north.



Figure 2.27 Alternative route for Y4 in Cocody

2.2.4 Boulevard Francois Mitterrand to Ebrié Lagoon



Figure 2.28 Junction Boulevard Francois Mitterrand

The section of the road immediately south and north of Boulevard Francois Mitterrand is clear of illegal permanent structure. There are a few temporary structures or vehicle repair and cement block making. The rest of the land has some agricultural crops or is waste ground.

Further south between Camp Militaire d'Akouedo and Boulevard de France numerous large houses have been built, along a 450m section of the route, within the road reserve. In one place, Figure 2.29 this has reduced the road right of way to some 28m. At Boulevard de France, Figure 2.30 a new house within the road reserve (reduced to 28m) will affect the future junction design.



Figure 2.29 Road reserve reduced to 28m



Figure 2.30 Junction Boulevard De France

South of Boulevard De France new housing parallel to road E151, immediately west of Riveria Residentielle has reduced a 360 m section the right of way to in places 36m.

The other structures along the route are of a temporary nature, informal markets, 0 and squatter housing. It is understood that these can be removed and the people relocated to more formal accommodation. Both views below are to the south.



Figure 2.31 MPouto informal market



Figure 2.32 Bridge landing to Marcoy

2.2.5 Koumassi to Port Bouet Section

This route has been seriously compromised by permanent structures at the bridge landing side in Marcoy Alodan the large informal settlement of Sogefia Sansfil. Within Koumassi alignment there has been substantial permanent building, which both blocks a direct alignment and significantly restricts the right of way for a major new road.

Recommendations

The ring road is of major strategic importance for growth Greater Abidjan. A route unobstructed by permanent structures is possible with some realignment at Abobo Avocatier and Djorogobite. There are some places where the proposed right of way reserve is compromised by permanent structure, they are:

- The railway bridge on Road T120 Abobo. The bridge should be widened to accommodate a dual two carriage way road.
- Recent housing development within the right of way south of Camp Militaire D' Akouedo, that in places (up to 05Km in total) has reduced the unobstructed right of way from 70m to between 36 and 28m.
- The bridge landing on the Marcoy Alodan and the ground level route across Koumassi Progres is blocked by substantial development. All routes are heavily restricted in terms of an unrestricted 70m wide right of way.

Taking the above into account to avoid clearance of permanent structures it is recommended that the Master Plan 2000 route of Y4 is not extended across Ebrié Lagoon to Port Bouet via Petit Bassam. Therefore, an alternative routing should be considered. Two alternatives are proposed for further reviewed, they are:

- A. The Y4 (Ring Road) to run from Songon to Boulevard Francois Mitterrand on it original route with some alignment modifications as described earlier. The section of Boulevard Francois Mitterrand from the Y4 intersection (east to the new road) for 2.2km to be upgraded to take additional traffic. A major interchange with the proposed road just now named "Boulevard A" (the road has not been named), which then becomes the main crossing of Ebrié Lagoon via Ile Desiree to Koumassi Nord Est 2. This ring road then crosses to link in with the proposed airport development road in Port Bouet. This is the MCLAU preferred route. The section of the Y4 south of Boulevard Francois Mitterrand should be downgraded to a major arterial road to serve the existing main residential areas
- B. The Y4 (Ring Road) to run from Songon to Boulevard Latrille and then take a new route utilising an upgraded extension of Boulevard Latrille and its extension through Cocody Djorogobite to link with the Boulevard Abata and then cross Ebrié Lagoon as Option A above.

- C. This alternative runs between Option A and Option B, though the future residential area planned in the western part of Cocody.



Figure 2.33 Boulevard Mitterrand / "A" Junction



Figure 2.34 Boulevard "A" view south



Figure 2.35 Y4 Alignment Options Cocody – Port Bouet
Source: JICA Study Team

2.2.6 Southern Section



Source: Google Earth

Figure 2.36 The Vridi Canal

the Eastern part of Jacqueville sub-prefecture and Petit-Bassam, creating a ring road connecting all port related activities areas and providing a fast and reliable access from one area to another for workers of the industrial zone. The infrastructure that will cross the Vridi Canal will have to allow the free passage of ships underneath. Both bridge and tunnel can be considered for this crossing.

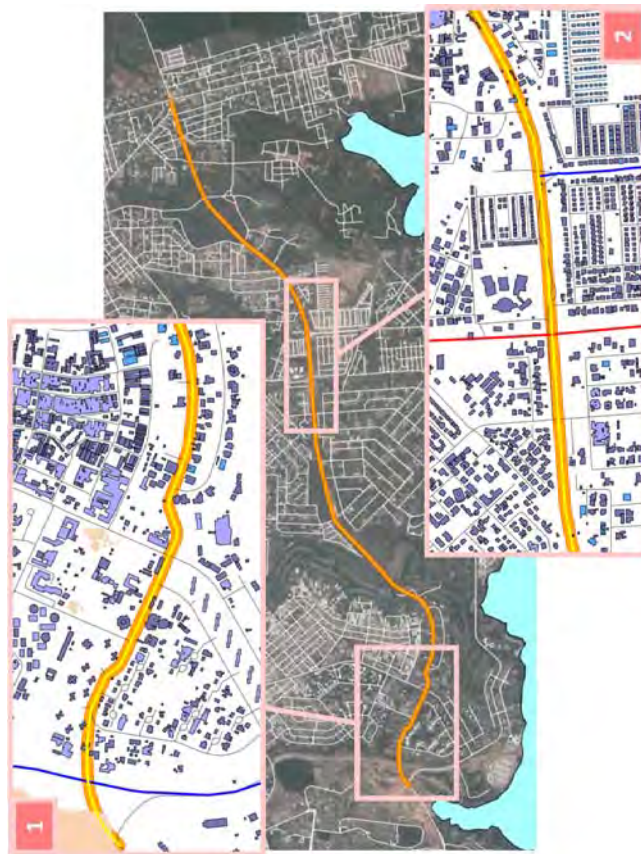
The table below gives some examples of bridges and tunnel used to cross such canal. The Bridge over the Suez Canal was designed as a cable-stayed bridge in order to provide sufficient vertical and horizontal water clearance. The main issue is the length of the access road on each side of the crossing. The second example is a vertical lift bridge over the Seine River. The deck is lifted every time a ship wants to pass underneath. The main concerns for those types of bridge are the risk of mechanical failure which could block the ships inside the Lagoon and the high maintenance cost. The third example is a tunnel built under the Bosphorus Strait. The high cost of such structure is the main drawback.

Table 2.1 Types of Crossing for Vridi Canal

Bridge over the Suez Canal	Vertical lift Bridge over the Seine River	Immersed Tunnel under the Bosphorus Strait

2.3 Boulevard de France Redressé

This is a proposed link road near the Golf Course in Cocody Riviera 1 and 4. It will function as an alternative Cocody - Bingerville route to Boulevard François Mitterrand. The figure above shows the proposed alignment in orange.



Source: JICA Study Team

Figure 2.37 Alignment of the Boulevard de France Redressé

The solid red line in Figure 2.42 and Figure 2.43 indicates the section of the road already constructed. The unbuilt of the road is described below in as eastern and western sections.

2.3.1 Eastern Section

The eastern section, Figure 2.38, connects to the Boulevard "A"; at this point the route is blocked by temporary illegal structures and partially encroached by a permanent local private market, see Figure 2.39. Of major concern that is the illegal land fill, as indicated in black tone on Figure 2.42. The current Government proposal is to remove the landfill, although the timing is not confirmed and therefore may impact the construction of the road.



Figure 2.38 Junction with Boulevard A



Figure 2.40 M'Pouto informal market



Figure 2.39 Route alongside new local market



Figure 2.41 Bridge landing to Marcoy

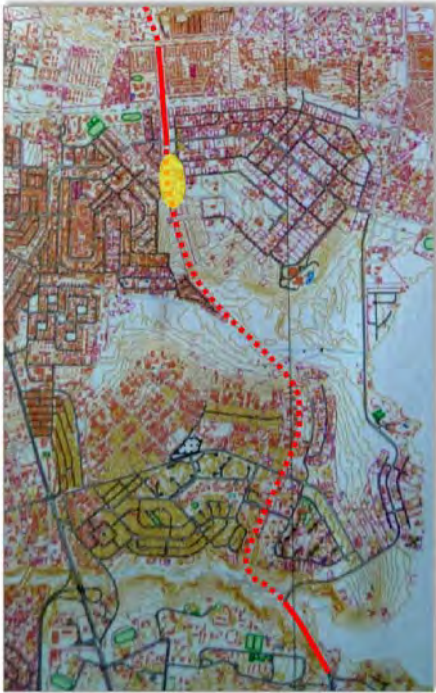


Source : JICA Study Team

Figure 2.42 Location of the illegal land fill

2.3.2 Western Section

This section is shown on Figure 2.43. With the exception of the large illegal buildings near to the junction with Boulevard Arsene Usher Assouan (Figure 2.44 and Figure 2.45), the route is unobstructed by permanent built structures (Figure 2.46 and Figure 2.47).



Source : JICA Study Team

Figure 2.43 Western Section



Figure 2.44 Illegal housing with ROW



Figure 2.45 Restricted available space



Looking West



Looking East

Figure 2.46 Routes towards golf course

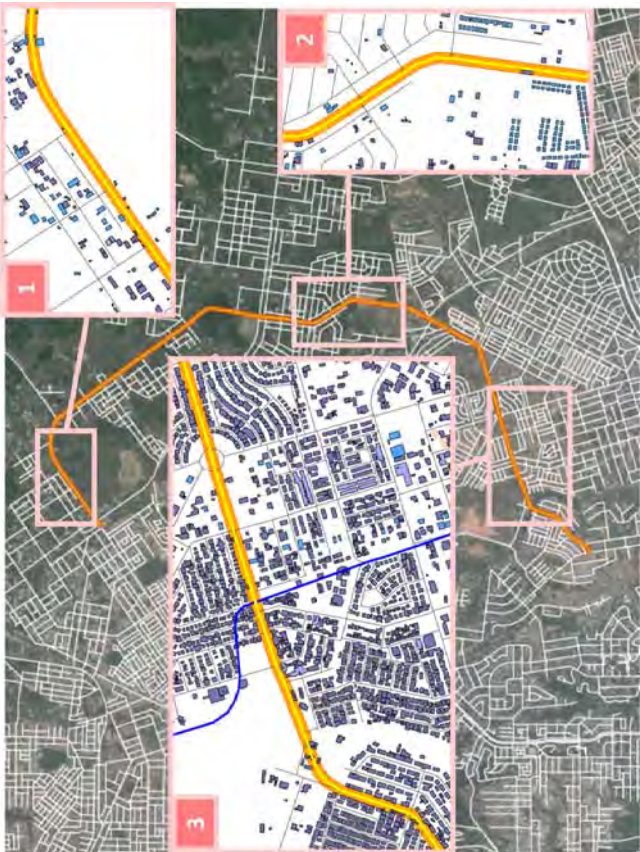


Figure 2.47 Route looking west through temporary car repair yards

Recommendations

The right of way for the Boulevard De France route is available for a new road. However, the unsanitary landfill will need to be removed as there will be conflict between road traffic using or crossing the new road with the free flow of through traffic. Illegal structures should be removed where they impinge on the right of way. If possible the alignment should avoid the private market, at the eastern end of the road that provides employment to the local low income population.

2.4 Extension of the Boulevard Latrille



Source: JICA Study Team

Figure 2.48 Alignment of the Extension of the Boulevard Latrille

The Boulevard Latrille is the primary arterial road through Cocody. The road runs from the south at Ambassade quartier, through the main commercial areas of Deux Plateau quartiers to Angre quartier in the north. This review considers the extension of the road into ant through Djorogobite quartier to its link with Road I 98. The proposed road is shown in blue dashed line on Figure 2.49. There are no significant impediments along the right of way to the construction of the road. Figure 2.50 to Figure 2.56 shows the current status of the route.



Source : JICA Study Team

Figure 2.49 Extension of Boulevard Latrille



Figure 2.50 unpaved section of Boulevard



Figure 2.51 the Boulevard extension east



Figure 2.52 Proposed route view south



Figure 2.53 View north route through plantation



Figure 2.54 Proposed route view south



Figure 2.55 Proposed route view west



Figure 2.56 proposed route at junction with proposed Y4 connecting to road 198

Recommendations

The right of way for the extension of the Boulevard Latrille route is available and unobstructed for the entire route, subject to the removal of a palm plantation. The major issue will be the decision on the main junctions to provide access to new and existing development areas and the proposed Y4 highway.

2.5 Extension of the Boulevard François Mitterrand



Source: JICA Study Team

Figure 2.57 Alignment of the Extension of the Boulevard François Mitterrand

This route shown in orange line in Figure 2.57 is the proposed extension of the Mitterrand Boulevard in Bingerville Commune. The majority of this route is through undeveloped land and plantations (Figure 2.58 to Figure 2.61).



Figure 2.58 Connection to existing road



Figure 2.59 Extension to the east at junction



Figure 2.60 Route to east



Figure 2.61 Extension past Bingerville

Recommendations

The right of way for the extension of the Boulevard Francois Mitterrand to bypass Bingerville appears to be available as review is by means of satellite as road access to the proposed route is mainly un-drivable. The major issue will be the decision on the main junctions to provide access to the main through Bingerville.

2.6 The Parkway or Voie V23

Yopougon, one of the two biggest residential areas in Abidjan District with a population estimated at around one million inhabitants in 2013, does not have a direct access to Treichville, the main industrial area of Abidjan. Thus all commuters living in Yopougon and working in Plateau or the port area have to go through the Northern Highway running south of Banco Forest, the only link between Yopougon and Plateau. It is thus very urgent to build a new bridge connecting directly Yopougon to Treichville and the rest of the activity areas.

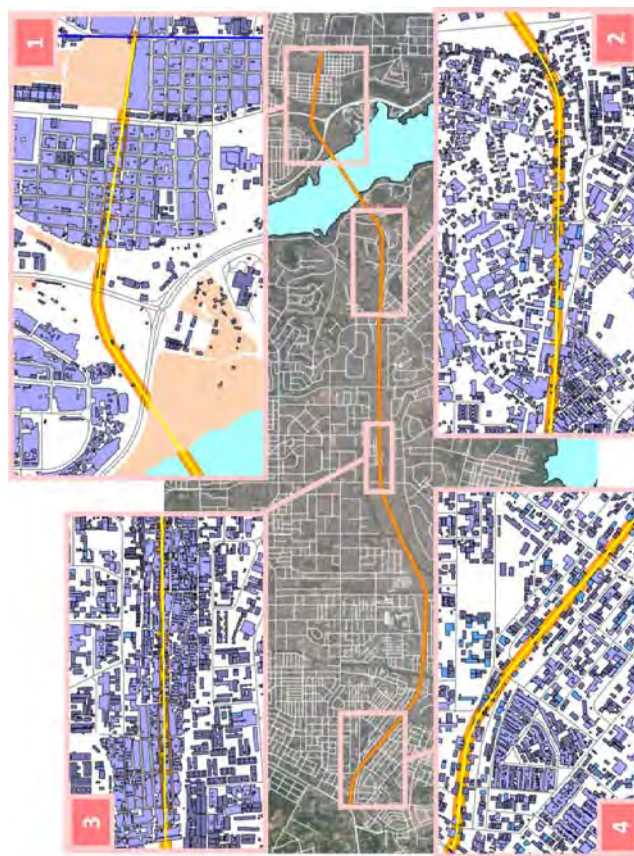
In addition to the Banco Southern Bridge connecting the southern area of Yopougon to the Plateau or Treichville, another bridge is planned in the extension of the Reboul Link to provide an additional East –West connection. The 5th bridge is expected to relieve the congested Autoroute du Nord or Northern Highway by providing a direct access between Cocody and Yopougon.

The Reboul Link is an East-West axis road which was designed to connect the central districts to Cocody and Yopougon. The project consists in extending the Reboul Avenue up to the Attécoubé junction. The Communes of Cocody and Yopougon would be directly connected with the future 5th Bridge or Banco Northern Bridge. The completion of this road will help decongest the Autoroute du Nord or Northern Highway, promoting East-West travel. These two routes across the south of Yopougon commune form the proposed link between the planned Dabou-Songon-Yopougon Highway and the Bridge No.5 link from Attécoubé to Plateau. There has been extensive settlement along the route both in terms of permanent buildings and informal housing and markets.



Source : JICA Study Team

Figure 2.62 Quartier Boribana



Source: JICA Study Team

Figure 2.63 Alignment of the Parkway

Figure 2.64 and Figure 2.65 below show the proposed crossing of 'Parkway' with Boulevard Principle. Figure 2.66 and Figure 2.67 show the extent of the informal housing and markets along the route alignment. These occupy the

entire right of way (ROW) for the new road. The view of Figure 2.64 is the typical facade of informal development, as it fronts the existing roads that cross the road corridor, for the eastern and central sections of the 'Parkway'.



Figure 2.64 Route to east



Figure 2.65 building within ROW



Figure 2.66 Route to east



Figure 2.67 Route to west

Figure 2.68 satellite image below shows the extent of illegal settlements as the 'Parkway' (red lines) crosses the proposed highway to the new port area – road V28 (orange lines).



Source: JICA Study Team

Figure 2.68 'Parkway' route satellite image of illegal settlement

The western section of the route is less occupied by slum settlements. However the right of way appears to be occupied in many places by more permanent buildings see Figure 2.69 to Figure 2.72.



Figure 2.69 View west from road T91



Figure 2.70 Right alignment blocked

Pictures 8.9 and 8.10 show substantial permanent buildings across right of way at junction with road S86 in Niangon quartier.



Figure 2.71 Route to east



Figure 2.72 Route to west

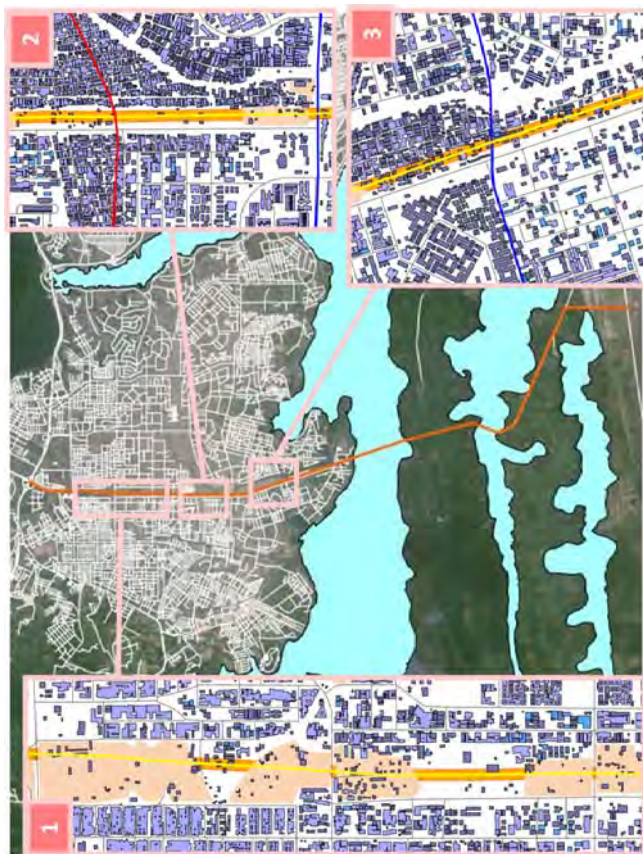
Recommendations

The Parkway is one of the most important proposed transport routes under the Master Plan 2000. It completes a new highway link from Dabou to Plateau and was also earmarked for a rail link. The current status of the route is that for the majority of its length the right of way is completely occupied by illegal residential development, a consequence of the rapid influx of immigrants into Yopougon over the past decade. It is understood that the bridge link – Bridge 5-to Plateau along this route is due for feasibility study by BNETD.

The importance of the route and its affect upon the road system in Plateau will require further study. However, the timing of the project must take into account, the take time taken to remove and rehouse the existing population, and demolish the many permanent structures and substantial buildings.

2.7 The Voie V28

‘Road V28’ is the highway through Yopougon and across Elbré Lagoon to the future Port on Boulay Island. Figure 2.7.3 shows the route through Yopougon. The route across Boulay Island and Ile Brakre are through undeveloped agricultural lands and will be investigated from satellite imagery.



Source: JICA Study Team

Figure 2.73 Alignment of the Voie V28

2.7.1.1 Development of Boulay Island as an Expansion of the Port

The current undeveloped state of Boulay Island is due to the lack in infrastructure connecting this island. The island is not served by adequate transport link, as the only access is by boat (15 minutes from downtown).

Meanwhile, the Treichville-Marcoy-Koumassi Island and the Pelti-Bassam are getting more and more packed and there is no more space for expansion for the Autonomous Port of Abidjan and other related industries. This lack of space for port and manufacturing development are resulting in the loss of potential investments and creation of jobs. The Boulay Island, located in the southern part of Yopougon Commune, is relatively unpopulated and provides a very vast undeveloped area in the vicinity of the urban area of the Abidjan District.

The Voie V28 will thus trigger the development of the Boulay Island by allowing the implementation of the expansion of the Port. According to the information gathered, the APA would like to develop the eastern part of the Boulay Island, the southern part of Yopougon and the eastern part of Jacqueville Sub-Prefecture, as illustrated in the figure below (Figure 2.74 and Figure 2.75). Thus road and rail infrastructures will have to be built to link those areas to the rest of the transport network and allow such development.



Source: Autonomous Port of Abidjan

Figure 2.74 Development Plan of the Autonomous Port of Abidjan



Source: <http://www.parti-ecologique-ivoirien.org/economie/Port-d-Abidjan-100-MILLIARDS-POUR-L-EXTENSION.php>

Figure 2.75 Computer Graphic of the Port Expansion on Boulay Island

In 2008, it was planned to expend the Autonomous Port of Abidjan on this Island connecting it with Yopougon with a new bridge. However the project has faced a strong opposition among the local residents.

2.7.2 A Bridge to cross the Ebrié Lagoon: the 4th Bridge

In the Master Plan 2000, a bridge connecting the urbanized area of Yopougon to the Boulay Island has been planned near Azito. It is located where the Ebrié Lagoon width is the narrowest, near the existing high voltage electricity lines that go from Yopougon, Boulay Island, Jacqueville sub-prefecture and Petit-Bassam.

The design of the bridge has to be considered while taking into account:

- The current and future main roads going through Yopougon
- The future development of the Boulay Island and its road/rail network

In particular, if the APA intends to use the northern bank of the Boulay Island as a container terminal, the crossing will have to be located west enough or have enough vertical clearance to let ships reach the northern area of the Island.

2.7.2.1 Previous studies carried out for the crossing (from AGEROUTE)

A study has been carried out and the main characteristics of the bridge have been defined. The following sections give a brief description of the bridge design.

- Geometry: the bridge will span over the Ebrié Lagoon, connecting the Azito quartier in Yopougon to Boulay Island. The bridge was design with a total length of 969.10 meters between abutments, consisting of 22 independent spans including 20 intermediate spans of 44.10 m span and two side spans of 43.55 meters (C1-P2, P22-C23).
- In the horizontal plan, the axis of the structure is straight and perpendicular to the axes of its supports.
- Longitudinally, the bridge alignment follows a curve of radius 20 000 meters between supports C1-P11 and P12-P22. The highest point of the bridge is located at NGCI 11.410 between piers No. 11 and 12.
- Cross section: The deck provides two traffic lanes. It consists of a carriageway of 7.00 meters wide and two sidewalks of 1.65 meter width. The transverse profile is with a double slope of 2.5%.

2.7.3 Right-of-Way of the Voie V28

The northern section of the route is partially occupied by illegal temporary structures, car yards and other non-permanent uses. The southern section is completely occupied by illegal slum dwellings, see yellow toned area on Figure 2.76.

The Figure 2.77 and Figure 2.80 show the state and range of activities within the right of way.

The route crossing the two islands south of the Ebrié Lagoon are characterised by plantations and food crop cultivation, see picture 9.6. There are some large scale private residential properties that also may be affected by the route.



Source: JICA Study Team

Figure 2.76 Illegal occupation of the ROW

The right of way runs alongside the High Voltage power line and will require a safety clearance from the overhead power lines.



Figure 2.77 Route to south



Figure 2.78 Route to north

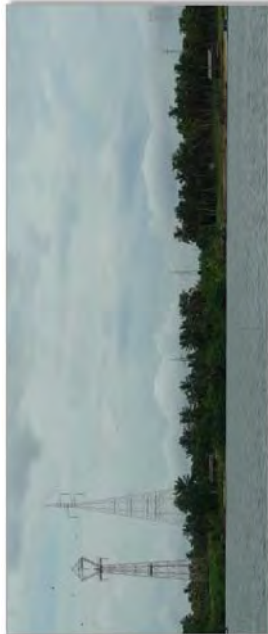


Figure 2.79 Route across Boulay Island looking north

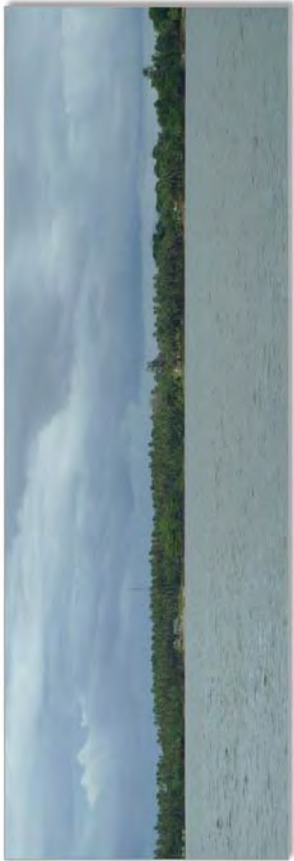


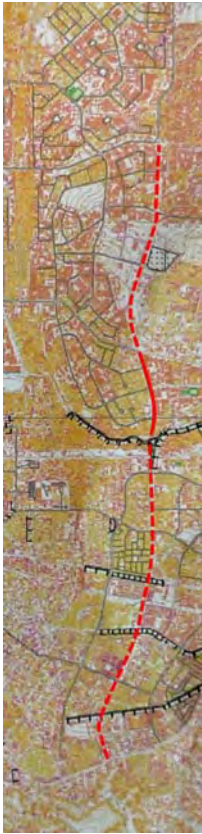
Figure 2.80 Route across Brakre Island looking south

Recommendations

This route is essential for the operation of the new port. The existing structures and uses along the route, although in the southern section of extensive, are of a temporary nature and thus should not affect the early construction of the route. It is understood that preliminary works dredging works have already commenced for the bridge link – Bridge 4 –across the Ebrié Lagoon is due for construction by BNETD.

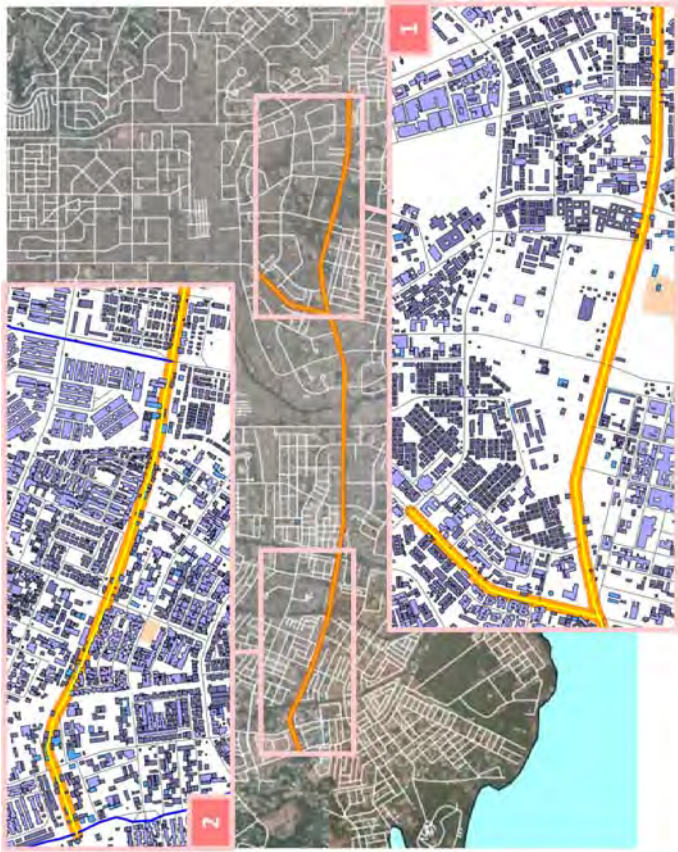
2.8 The Voie V2

This is the central of three parallel routes that run from west to east across southern Yopougon. The northern is the 'Parkway', the southern is Voie V6. The dashed red line in Figure 2.81 shows the uncompleted section of the route V2. The solid red line shows the constructed section, which does not utilize the entire right of way. This route is also planned for a major water supply pipeline, for which works have commenced. Illegal structures along the route have been marked by MCLAU.



Source : JICA Study Team

Figure 2.81 Route of Road V2



Source : JICA Study Team

Figure 2.82 Alignment of Voie V2

Taking the junction with road T.107 as the midpoint of the route; the eastern section of road is partially paved and generally unconstructed its entire length. The unconstructed section is a major pedestrian route and has a large informal open air market. The route is shown in Figure 2.83 to Figure 2.88.



Figure 2.83 View east along V2



Figure 2.84 Reduced road width of V2



Figure 2.85 Market at junction with road



Figure 2.86 Continuation east



Figure 2.87 Continuation east



Figure 2.88 Junction with Road M2

The western section of the route is unpaved and access is by dirt track or footpath, see pictures Figure 2.89 to Figure 2.91. At the junction with the proposed Voie V6 there are a number of buildings blocking the route, see Figure 2.93 and Figure 2.94.



Figure 2.89 View east along V2



Figure 2.90 Continuation west



Figure 2.91 Continuation west



Figure 2.92 House on right to be removed



Figure 2.93 Illegal houses at V6 junction



Figure 2.94 Junction with Voie V6

Recommendations

The route V6 should be considered for implementation in the short under the 2030 plan. Works to remove illegal structures within the right of way will have to be undertaken to enable the construction of the new water supply pipeline; whose works have already commenced in some areas. The permanent buildings to be demolished will be in the western section of the road.

Further consideration should be given to upgrading and extending this route as the primary west to east road through southern Yopougon; due to the possible constraints and delays on the early implementation of Parkway, and the fact that the V6 route is blocked by developed.

2.9 The Voie V6

This route creates a southern ring road for Yopougon, see Figure 2.93. It would enable a route directly off the Dabou-Songon-Yopougon Highway, by means of a bridge across Banco Bay in Attécoubé to connect with southern Plateau and link with the bridges to Petit Bassam. However, inspection of the route indicates that extensive sections of the road are completely blocked by new and under construction permanent structures, indicated by yellow tone areas on Figure 2.94.



Source : JICA Study Team
Figure 2.95 Alignment of Voie V6



Source : JICA Study Team
Figure 2.96 The route of Road V6

2.9.1 South Banco Bridge

A 520m long bridge with a carriageway of 14m was planned between Yopougon (Abobodoume) and Plateau (wood parc on Carena Side). However, the bridge did not have sufficient clearance for ships to go underneath it and the relocation of the Carena would have been too costly. Thus the bridge has been abandoned.

2.9.2 Right-of-Way

The pictures below show the western section of the road till it is blocked by development. From the proposed junction with Dabou Road there is 2.5Km of unblocked, though in places restricted width, route. See Figure 2.93 to Figure 2.103.



Figure 2.97 Dabou Road Junction



Figure 2.98 Route view south



Figure 2.99 At junction with road T20



Figure 2.100 Restricted width



Figure 2.101 New church



Figure 2.102 New construction



Figure 2.103 Building in the centre of the route

The middle section of the route is so heavily developed that a clear unimpeded right of way is not available, see satellite image below (Figure 2.104).



Source : JICA Study Team

Figure 2.104 Middle Section of Route V6

The eastern section of the route passes through an existing subdivided housing area, see Figure 2.105 to Figure 2.107.



Figure 2.105 Junction with Road K3



Figure 2.106 New construction in Jerusalem Quarter view east



Figure 2.107 Route across Attécoube to Plateau

Recommendations

The implementation of the entire road V2 appears to be compromised due to substantial permanent structures along sections of the route.

Consideration should be given to extending the Route V6 to link with the unobstructed section of Route V2 i.e.

- The western link to the Dabou Road,
- The relatively clear eastern section and bridge link to Plateau.

In the Master Plan 2000, a bridge connecting Yopougon and Plateau has been considered. However, in this configuration, commuters from Yopougon have to go first to Plateau and then cross the Ebrié Lagoon using the two existing bridges (Général-de-Gaulle Bridge and the Félix-Houphouët-Boigny Bridge), which are already heavily congested. It is thus recommended to build an additional bridge right next to the Félix-Houphouët-Boigny Bridge or to build a bridge connecting directly Yopougon to Treichville without going through Plateau.

2.10 The Voie V9

This is proposed new road along the western edge of Yopougon industrial zone (Figure 2.108). It will provide additional access to the industrial area which is experiences congestion at its two main entrances. The route also includes a reserve for a possible rail route serving the new port area on Boulay Island.



Source : JICA Study Team

Figure 2.108 Alignment of Voie V9

Occupation of the Right-of-Way

The route has been occupied by illegal permanent and temporary structures along its entire length. The route is also reserved for the laying of a potable water main. Permanent structures for removal have been identified and marked by MCLAU.

The following photographs (Figure 2.109 to Figure 2.114) show the general environment and buildings along the route.



Figure 2.109 Wall of storage compound blocks road right of way at the northern end of the Yopougon Industrial Estate



Figure 2.110 New construction and electricity supply



Figure 2.111 New building across entire ROW



Figure 2.112 View south from R16



Figure 2.113 Large informal market within ROW at Ayakro



Figure 2.114 Junction of V9 and Autoroute du Nord

Recommendations

The implementation of the entire road V9 should be feasible with the removal of the illegal structures. This would require the demolition of the storage compound wall at the northern end of the industrial area.

2.11 The Voie Y3

This is the linking of two south to north roads through Cocody (see Figure 2.115). There is a wide right of way of which sections are paved with two lane roads (in solid red line). The remaining sections are dirt roads (in dashed red lines). The completed road will link Boulevard Francois Mitterrand with the Alepe Road P2, and form two junctions with the existing Boulevard Andre Larille and its proposed extension, relieving the Boulevard Larille and the rue des Jardins during peak hours. With the completion of the Riviera-Marcory Bridge, this road will provide direct access to the Petit-Bassam Island from Abobo.

It was designed with the following characteristics:

- 30 meters ROW;
- 2 roadways of 7 meter (2x2 lanes);
- 2 shoulders of two meters each.



Source : JICA Study Team

Figure 2.115 Alignment of Voie Y3

Current State of the Right-of-Way

The route is unobstructed. However, sections are restricted in width by permanent buildings or steep terrain and this may result in the provision of only two lanes rather than the proposed four lanes. The southern section of the existing road I 87 from the junction with Boulevard Francois Mitterrand north to the future junction with the extension of Boulevard Andre Latrille (road D above) is shown in Figure 2.116 to Figure 2.119 below.



Figure 2.116 New church



Figure 2.117 New construction



Figure 2.118 Restricted width view north



Figure 2.119 Realigned road from I 87

The northern section of the road to the Alepe Road is shown below in Figure 2.120 to Figure 2.124.



Figure 2.120 Paved section view north



Figure 2.121 Unpaved section view north



Figure 2.122 View north to Latrille junction



Figure 2.123 Alignment changes to west



Figure 2.124 View west to junction with Alepe Road P2

Recommendations

The route is unobstructed and except for a section near the future junction with the extension of Boulevard Andre Latrille and the stretch north of the existing Boulevard Andre Latrille should be capable of implementation as a four lane carriageway. The first mentioned of these restrictions above would require the demolition of substantial houses and possible slope stabilization works. The second section would also require removal of some substantial buildings including a mosque. These sections may have to be down-graded to a two lane carriageway.

2.13 Road Engineering Issues

This section sets out the initial road engineering findings; see Figure 15.1 and Table 15.1.

This section sets out the initial road engineering findings; see Figure 15.1 and Table 15.1.

[illegible]

Source : JICA Study Team

Figure 2.125 Satellite image of the routes

Table 2.3 Status and Recommendations of the Master Plan 2000 Major Roads

Road	Map Ref.	Status and Recommendation
Voie Triomphale	1	Since there are buildings in the whole section, this plan is difficult to implement.
Voie Y4	2	Sections in Abobo, Cocody, and Koumassi are occupied by buildings and are difficult to construct.
		A. It is crossing the agriculture-related facilities. Detouring plan may be possible.
		B. North section in Abobo needs detouring due to many buildings in the ROW. Utilizing swamp area, etc. may be possible.
		C. East section in Cocody has already been urbanized with buildings. Thus, detouring plan is difficult. Informal buildings in the ROW seem to be small houses.
Boulevard France		D. There are buildings in the sections in Koumassi and southwards, and the plan is difficult to implement.
	3	A: There are buildings in some sections of south Cocody, and the plan is difficult to implement. B: There are buildings in some sections of Riviera, and the plan is difficult to implement.
Boulevard Latrille	4	There are buildings in the north sections, and the plan is difficult to implement.
Boulevard Mitterrand	5	No obstructions are observed.
Parkway / Voie V23	6	Since there are buildings within ROW in most of the sections in Yopougon, this plan is difficult to implement. Special attention should also be paid to steel towers with high-voltage cables.
Voie V28	7	Since there are buildings within ROW in some sections in west Yopougon, the plan is difficult to implement.
Voie V2	8	Since there are buildings within ROW in some intermediate sections in south Yopougon, the plan is difficult to implement.
Voie V6	9	If removal of permanent structures unfeasible utilise route V6 as described above a major west to east route across southern Yopougon to link Dabou Road with Plateau.
Voie V9	10	Since buildings are scattered in most of the sections, this plan is difficult to implement.
Voie Y3	11	Some sections have already been completed, and the plan could be implemented without any major problems.

3.0 Current Status of Other Road Projects

The following section will review the road projects mentioned in the Master Plan 2000 that have not yet been analyzed in the previous section.

3.1 Widening of the Boulevard de Marseille

The widening of the Boulevard Marseille has already been mentioned in the Master Plan 1985. However, since then, no widening works has been carried out and only the reinforcement of this road has been studied. The section of the Boulevard de Marseille mentioned in the Master Plan 2000 only concerns the section between Boulevard du Canal and the Boulevard Pierre et Marie Curie. This section is heavily congested during the evening as many restaurants are located in this area.



Source : JICA Study Team

Figure 3.1 Section concerned by the Widening of the Boulevard de Marseille

Clearance of the Right-of-Way

The widening of this 2-lane road to a 2x2 lane road can be implemented without major resettlement as the building built along this road are built with sufficient space from the road centerline ([1] and [2] in Figure 3.1 and Figure 3.2). Only some buildings will have to be relocated on the eastern part of the alignment.



Figure 3.2 Boulevard de Marseille

Recommendation

This Project could be implemented very quickly as it requires only a few resettlements. The section indicated on the Master Plan 2000 is indeed the most congested section of the Boulevard de Marseille. However, the widening of the whole Boulevard de Marseille would be even more efficient as it could provide an alternative for road users and trucks from the Port which currently are piling up on the Boulevard Valéry Giscard d'Estaing.

The widening of the whole Boulevard de Marseille would also be an ideal extension of a twinning of the Felix Houphouët Boigny Bridge, if the project really takes place.

3.2 The Vridi Bypass and the Vridi Bridge

The Vridi Industrial Zone, located West of Port-Bouët and South of Treichville, is a vital industrial zone for Greater Abidjan and for the rest of the country. The Société Ivoirienne de Raffinage (SIR) and Petroci are both based in this area.

Currently this industrial zone is connected to the rest of the road network by only a single road running through Treichville (called Boulevard Vridi) and Port-Bouët (called Boulevard Petit-Bassam). Thus all trucks from the Vridi industrial zone have to transit through the same road before reaching a major road such as the Boulevard Valéry Giscard d'Estaing. The port area is thus highly congested, which increases the transport costs, delivery time and the risks of accidents.

In the Master Plan 2000, a Y-shaped road was planned that would connect the southern part of the Vridi Industrial Zone via a parallel road running east to the Boulevard de Vridi. This alternative road would allow road users to directly access or exit the industrial zone from the Boulevard du Canal up to the Carrefour Solibra via a bridge, called the Vridi Bridge, or via a road that would be connected to the Boulevard Marseille. This new infrastructure would thus provide an alternate access to the industrial zone.

In September 2013, the Ministry of Transport requested the BNETD to carry out a study for the development of 300 hectares of reclaimed land in Vridi Bay. A meeting was held in November 2013 with the Autonomous Port of Abidjan (PAA) to define the scope of the study. During this meeting, it was made clear that the PAA wanted the BNETD to carry out a study for the Vridi Bridge. The BNETD has thus started the survey for this bridge.

The study only considered the alignment connecting the Boulevard du Vridi and the Boulevard du Canal. During the first meeting with the PAA, the PAA told the BNETD that they wanted the bridge to connect the Boulevard du Vridi with the Boulevard du Canal, in the extension of the Boulevard Charles de Gaulle. Although the Charles de Gaulle or the Houphouët de Boigny Bridges are currently very congested, the PAA believe that the 3rd Bridge will relieve the traffic on both existing bridges and that sending all the Port traffic on those two bridges would not be a problem. Thus, they have not studied the option where the Vridi Bridge is built in the extension of the 3rd Bridge and connected to the VGE Interchange.

As the PAA intends to expand the Vridi IZ with reclaimed land on the lagoon, the Vridi Bridge would only have to cross the lagoon over a short length. The rest would be access roads built on the reclaimed land (Figure 3.3).



Source: Autonomous Port of Abidjan

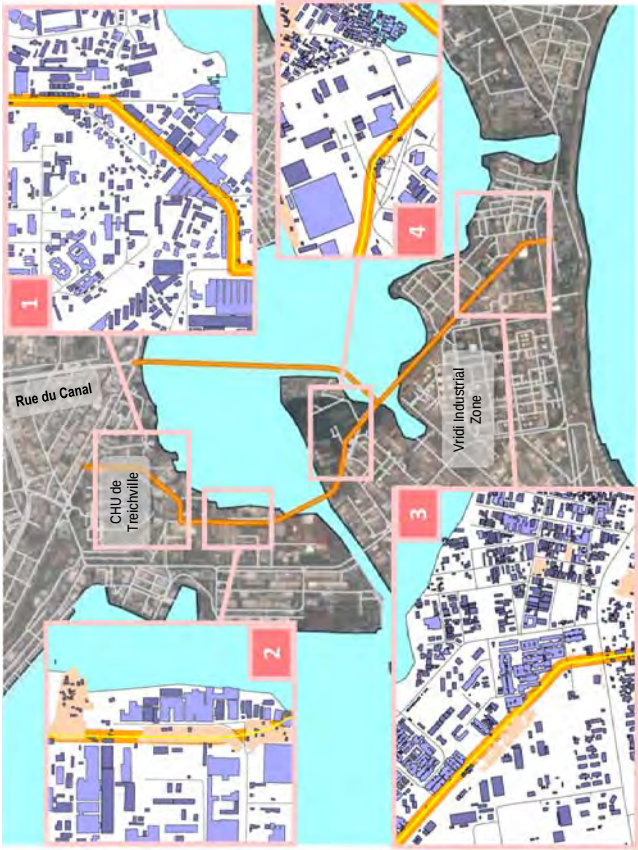
Figure 3.3 Future Expansion of the Vridi-Bliéry Port

The study compared two options: the first one consists of the construction of a bridge to cross only the lagoon and that will be connected to the Boulevard de Marseille with a roundabout; the 2nd one consists of the construction of a bridge to cross the lagoon but also the Boulevard de Marseille. In the first case, the bridge would be 350m long, and in the second case, the bridge would be 600m long. Various bridge types have been considered, such as post-tension PC I-girder bridge (VIPP), composite bridge (I steel beam with concrete deck), and box-girder bridge. The Vridi Bridge would support 2x2 traffic lanes with two decks. The span has been set at 50m.

For the study, the BNETD have carried out a topographic survey and an EIA has been prepared. The EIA is now available although it is still a draft. The PAA gave BNETD the lagoon topographic data and also the report on the geological investigation carried out with an auger on the Vridi IZ side. In March 2014, a traffic survey was carried out for the Vridi Bridge.

Right-of-Way

The two northern sections of the Y-shaped road can both be easily implemented: only one building stands in the way of the Vridi Bridge (Figure 3.5) while sufficient space is available behind the CHU de Treichville to widen the existing road (Figure 3.6). However, the rest of the road section will be more difficult to implement as it runs mostly through slum areas (in pink) that have been developing behind the industrial facilities (Figure 3.7). Indeed, people who cannot afford to take transport facilities to go to their work, have started living near their working place, in illegal settlements. Thus, the ROW of the Vridi Bypass is already occupied and will require many resettlements.



Source : JICA Study Team

Figure 3.4 Alignment of the Vridi Bypass and the Vridi Bridge



Figure 3.5 Location of the Vridi Bridge



Figure 3.6 Existing Road behind the CHU de Treichville



Figure 3.7 Slum Area behind Industrial Facilities

Recommendations

The Vridi industrial area is of vital importance for the Ivory Coast economy. It relies on only one main road running through this industrial zone to be connected to the rest of the road network (Figure 3.8). Further studies will be required before any projects can be implemented. In particular, the optimum alignment of the bridge will have to be carefully studied. The current alignment would send all the traffic to the Solibra Intersection and the two existing bridges across the lagoon, which are already very congested. To make good use of the 3rd Bridge that is currently under construction, a new link should be considered to connect the Port to this new infrastructure.



Source : JICA Study Team

Figure 3.8 Evolution from the Master Plan 2000 to the SDUGA Master Plan in Vridi Area

3.3 Sagbe / Abobo Baoule / Boulevard Latrille Link

This projected road will connect the western part of Abobo to the Djibi area. The completion of this road will also connect the center of Abobo to Cocody through Abobo Baoulé, two quarters separated by a thalweg.

Right-of-Way

Most of the ROW is occupied by illegal settlement as the space that was previously available for the construction of this road was quickly overwhelmed by the urban sprawling ([1], [2] and [3] of Figure 3.9).



Source : JICA Study Team

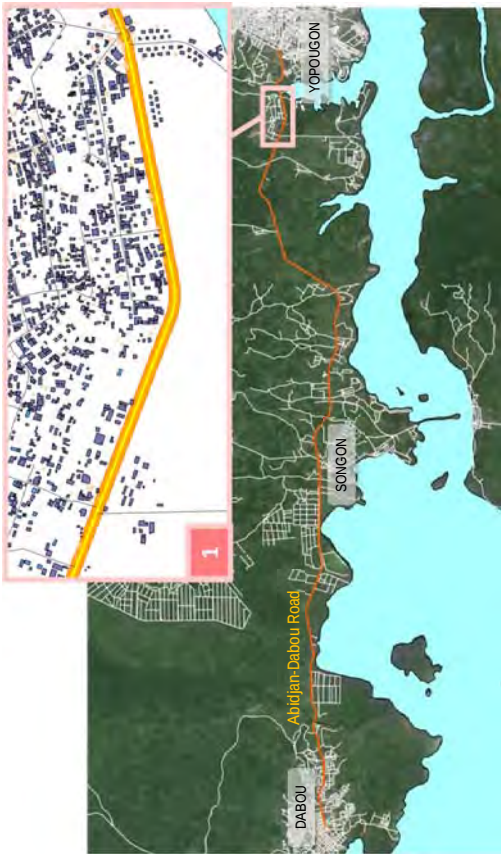
Figure 3.9 Alignment of the Sagbe / Abobo Baoule / Boulevard Latrille Link

Recommendation

This project could be redundant if the Voie Y4 is been constructed. Only both ends of the roads could be implemented to create links between major roads.

3.4 Widening of the Abidjan-Dabou Road

The route between Abidjan and Dabou is one of the first paved roads in the country, built in 1962. It connects Abidjan to the western part of the country and ultimately to Liberia. The traffic on this road seems to be not very important and the widening of this road is probably based on the assumption that Dabou and Jacqueville will quickly develop and trips between the western part of Great Abidjan and Abidjan Center will increase.



Source : JICA Study Team

Figure 3.10 Alignment of the Abidjan-Dabou Road

Right-of-Way

Most of the ROW is still unoccupied as urban sprawl has not yet reached the western part of Abidjan District ([1] of Figure 3.10).

Recommendation

Lands are available along the existing roads and the widening of the roads does not seem to be a problem. This should be done in the near future while the space is still available. The road section along Yopougon should also be widened to provide a fast access from the Autoroute du Nord. There is currently sufficient space to construct a 2x2 carriageway but the expansion of Yopougon could quickly squat the ROW.

The idea would be to connect the Route de Dabou to the Voie V9 and create an Interchange with the Autoroute du Nord (Figure 3.11). This will probably ameliorate the traffic flow on this road and keep heavy vehicle traffic outside of Yopougon.



Source : JICA Study Team

Figure 3.11 Section of the Route de Dabou along Yopougon

3.5 Center Road of Boulay Island

As described previously, the Boulay Island is targeted as an expansion area for the Autonomous Port of Abidjan. With the V28, this center road will provide the main arterial road of this future port and industrial zone (Figure 3.12).



Source : JICA Study Team

Figure 3.12 Alignment of the Center Road of Boulay Island in the Master Plan 2000

Right-of-Way

The Boulay Island is mostly uninhabited so the construction of this road will probably require only very limited relocation.

Recommendation

The western section of this center road of Boulay Island may not be necessary. Only the section up to the Voie V28 should be considered. In this configuration, trucks from the Port will be forced to take the Voie V28, preserving the Jacquleville Sub-Prefecture from the traffic generated by the Port (Figure 3.13).



Figure 3.13 Trucks Corridor

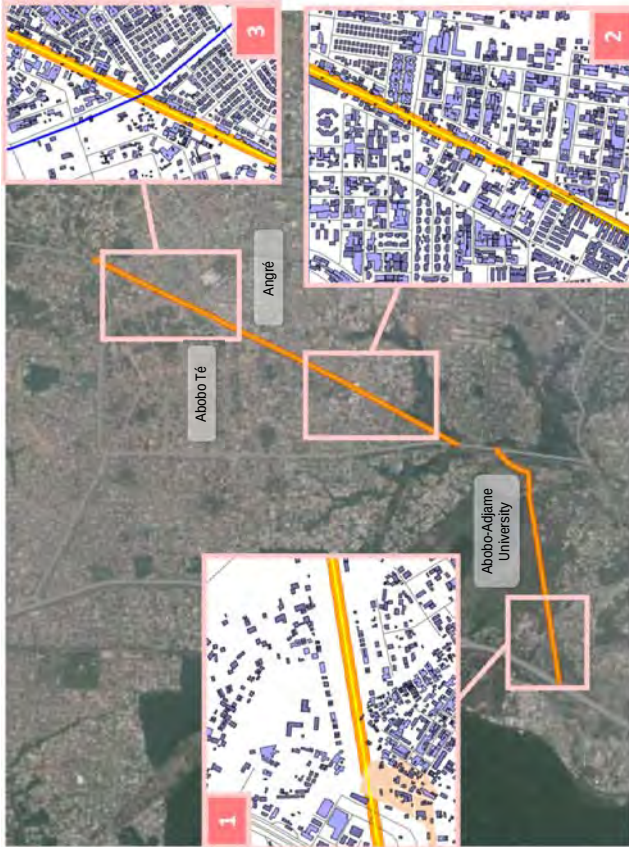
3.6 The Link between the Abobo Expressway and the Route d'Alépé

This road was designed to provide a direct link between the Abobo Expressway and the Route d'Alépé. The alignment would run between the quartier Abobo Te and the quartier d'Angre and would head south of the Abobo-Adjame University Campus.

Right-of-Way

The section of the road that runs through the campus of the Abobo-Adjame University can be easily implemented as there is almost no construction in the way ([1] of Figure 3.14).

However, the ROW of the section between Abobo Te and Angre is now occupied by many new buildings. The implementation of this road seems very difficult ([2] and [3] of Figure 3.14, Figure 3.15 and Figure 3.16).



Source : JICA Study Team

Figure 3.14 Alignment of the link between the Abobo Expressway and the Route d'Alépé



Figure 3.15 Southern end of the road section running between Abobo Te and Angre



Figure 3.16 Construction between Abobo Te and Angre

Recommendation

As the ROW is been squatted by many hard construction, this road will be difficult to implement. Further site inspection is required to decide whether this road should still be considered in the Master Plan 2030.

3.7 The Link between Abobo Expressway and the voie Y3

In addition to all the North-South arterial roads planned in the Master Plan 2000, this road connecting the Abobo Expressway to the Voie Y3 was designed to provide a fast East-West link that had been lacking for the road network of this area.

Right-of-Way

The eastern part of the road is already a 2x2 road. The western part is still an unpaved road on which illegal construction has already started to expand ([1] of Figure 3.17). However, the ROW had been set and most of the resettlement that will have to be carried out concerns precarious construction that can be easily removed. Sufficient space is allocated between buildings and won't have to be removed ([2] of Figure 3.17).



Figure 3.17 Alignment of the link between the Abobo Expressway and the voie Y3

Recommendation

This East-West link would provide a much needed link between all the North-South arterial roads. However, the ROW is been squatted and it may not be possible to secure sufficient space for a 2x2 traffic lane carriageway.

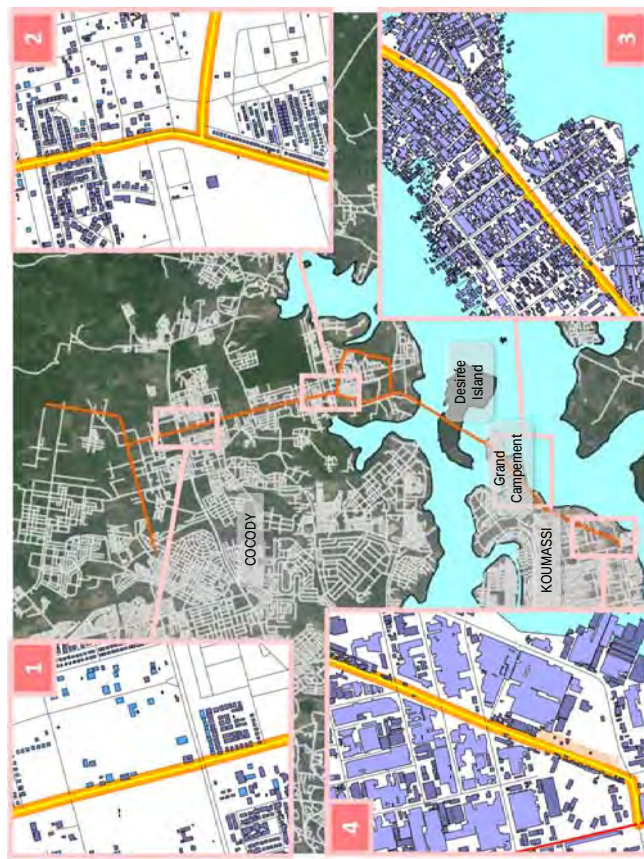
3.8 The Ile Désirée Crossing

This road project was the third crossing between Treichville-Marcory-Koumassi and Plateau-Cocody planned in the Master Plan 2000. Located east to the planned ring road Voie Y4, the project would have provided a direct access between the currently under-construction residential areas located between Cocody and Bingerville and the industrial area of Koumassi.

The road would go through the Desirée Island along the high voltage lines in order to reduce the length of the bridges required to cross the Ebré Lagoon.

Right-of-Way

The northern section of this road is running through new residential areas that have been planned according to the Master Plan 2000. Thus no relocation will be required as sufficient space have been secured for the access road (see [1] and [2] in Figure 3.18).



Source : JICA Study Team

Figure 3.18 Alignment of the Ile Désirée Crossing

However, in Koumassi, the road runs through a very dense slum area called Grand Campement with precarious habitations (Figure 3.19 and Figure 3.20). The project implementation will require important resettlements ([3] in Figure 3.18).



Figure 3.19 Slum Area of Grand Campement



Figure 3.20 Ile Desiree from Koumassi

Along the southern part of the alignment, sufficient space can be secured to widen the current Boulevard Antananarivo (Figure 3.21 and Figure 3.22).



Figure 3.21 Boulevard Antananarivo in the Quartier Koumassi Nord Est



Figure 3.22 Boulevard Antananarivo in the Quartier Industrielle

Recommendation

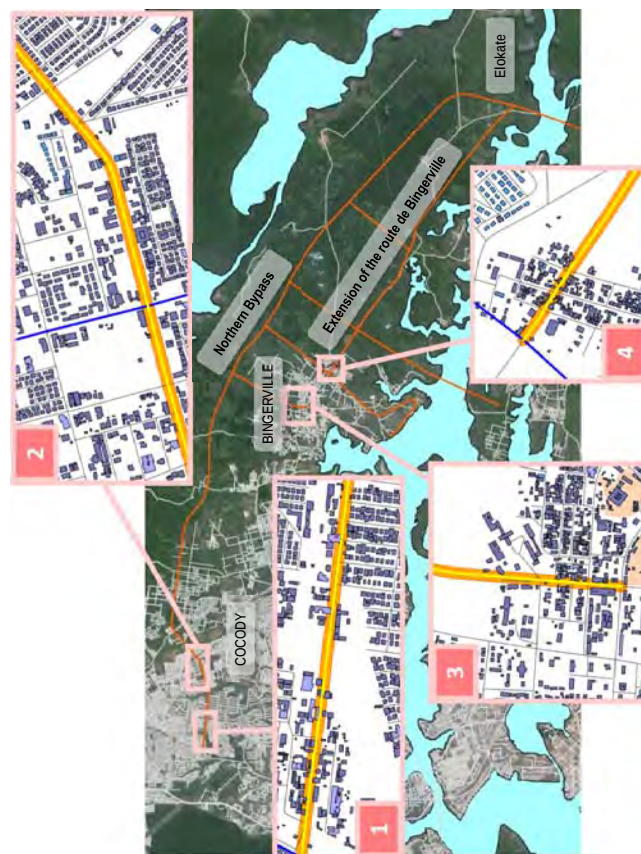
As suggested previously while evaluating the voie Y4 alignment, the northern part of this road could be merged with the voie Y4 as the right of way of this road is been occupied. Inside Koumassi, the road would not be extended to the Boulevard Antananarivo as it would require too much relocation. The alignment would instead head directly to Port Bouet through the Aerocite.

3.9 Road Network of Bingerville Peninsula

The Master Plan 2000 projected that the peninsula on which Bingerville is located will be one of the main urban development areas of the Great Abidjan and has set a road network accordingly. An extension of the route de Bingerville was planned up to Elokate and another road has been considered as an extension of the Boulevard François Mitterrand running north and connecting directly Adjame-Abobo to Grand-Bassam through Cocody. Additional North-South roads linking those two roads have also been planned to complete the road network east to Bingerville.

Right-of-Way

The eastern part of the planned road network runs through rural area where the ROW can easily be secured. In the west, the connection of the road network to the Route du Zoo ([1] in Figure 3.23) seems difficult to carry out as many constructions are in the way. The road may have to end earlier at the Boulevard Latrille. Around Bingerville, some precarious habitation will have to be removed to provide sufficient space for the construction of the new roads ([3] and [4] in Figure 3.23).



Source : JICA Study Team

Figure 3.23 Bingerville Peninsula Road Network proposed in the Master Plan 2000

Recommendation

As the area around Bingerville will probably become a major development area, the three roads planned (northern bypass, extension of the Boulevard François Mitterrand and extension of the route de Bingerville) in the Master Plan 2000 should be maintained at least up to eastern part of Bingerville. The land must be secured quickly before urban sprawl makes it difficult or costly to secure land for those arterial roads.

The major change in the Master Plan 2030 is the extension of the Northern Bypass up to Bonoua to alleviate the pressure on the single bridge crossing at Grand Bassam and also reduce the potential flow of traffic coming from

the east along the upgraded Alepe Road into the congested road system of Abobo (Figure 3.24). The Extension of the boulevard François Mitterrand will merge to this Northern Bypass so as to allow the mass transport corridor located on the boulevard François Mitterrand to extend up to Borrooua (BRT).

The Northern Bypass has another purpose which is in fact to provide a barrier to new development along the northern edge of the peninsula, an important potable water catchment area. Restricted access to the highway will support the philosophy of a green separation between the urban area of Abidjan at the satellite town of Bonoua. The urban edge of Abidjan will be at the large plantation east of Bingerville. Beyond that plantation, the towns of Bregbo, Elokate and Ebre will be zoned for low density tourist related development.



Figure 3.24 Evolution from the Master Plan 2000 to the SDUGA Master Plan in the Bingerville Peninsula
Source : JICA Study Team

3.10 Road Network of the Airport Area

In the Master Plan 2000, a ring road around the airport and Gonzagueville was considered. Starting from the Akawaba roundabout, the road would have connected all the land strips located in the Northern area of the airport (Figure 3.25).



Source : JICA Study Team

Figure 3.25 Alignment of the Airport Ring Road in the Master Plan 2000

However, the development of the surrounding area of the airport in Port Bouët has been awarded to a private company that is planning this land as a mixed-used real estate development, called Aérocity. This "private city" will be equipped with housing, commercial, tertiary as well as industrial real estate aimed at attracting international investors in a stable and secure legal and financial framework (the land rights would be guaranteed by the State).

The whole city has already been planned with sufficient details, including transport and road network. The following major roads are being considered in addition to the airport boulevard and the Grand-Bassam road in the South (Figure 3.26):

- In the North, a road that would cross the lagoon to provide a direct access between the Aérocity and Koumassi,
- Two North-South axis, one west to the airport and another one east, establishing a link between the northern area of the Aérocity and Bassam Road.



Primary Road Secondary Road Local Road Aérocity Concession perimeter
Source : Aérocity

Figure 3.26 Planned Road Network in the Aérocity

The Aérocity has been planned with an integrated public transportation to increase its attractiveness. The public transports mentioned are (Figure 3.27):

- A BRT system providing a fast connection between the Aérocity and Marcoré or Koumassi (in blue)
- An express connection from the city centre to the airport (in purple)
- A ferry-bus system with several stations along the lagoon (in green)
- The creation of multimodal poles integrating other public transport modes (mini-cabs, taxis, inter-urban buses, coaches) at the airport and the Akwaba roundabout.

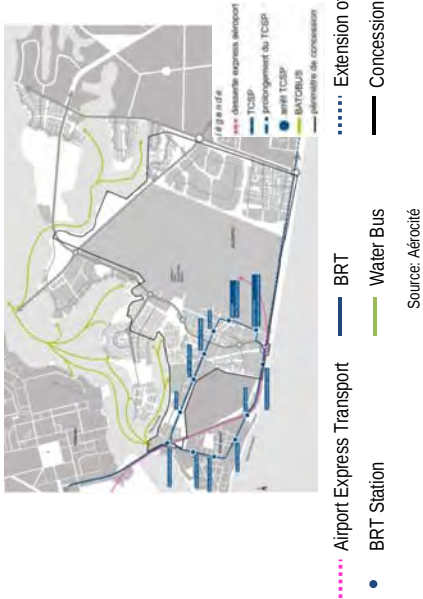


Figure 3.27 Planned Transport Network in the Aérocity

As the development of this area has been awarded to a private firm, the road network in this Aérocity will be adjusted to the planning accordingly. The following figure (Figure 3.28) shows the difference for the road network between the Master Plan 2000 and the SDUGA Master Plan.



Figure 3.28 Road Network in the surrounding area of the Airport

3.11 Road Network of the Grand-Bassam Peninsula

With the construction of the new Expressway between Abidjan and Grand-Bassam, the road network planned in the Master Plan 2000 for this area has to be completely reviewed. The Abidjan – Bassam Expressway will become the primary road used for transit transport between Abidjan and Ghana. Trucks will be kept away from the existing Abidjan – Bassam Road, which will help preserve the tourist potential of this coastal area. This secondary road will however remain the main access road to Grand-Bassam

To help develop the northern area of the Grand-Bassam Prefecture, a road running north of the Abidjan – Bassam Expressway will be considered. The road will provide a direct link between the Voie Y4 with its new alignment and Grand-Bassam, through the Aérocity and the VITB, the new IT and Biotechnology Park (Figure 3.29).



Figure 3.29 Road Network in the surrounding area of the Grand-Bassam

Appendix C

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Study on the High-Capacity Corridors

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1.0 Overview

1.1 Urban Mass Transit system introduction cases in Western Africa region

In recent years, a considerable number of cities have introduced their own UMT (Urban Mass Transit) in their city area. To take a look on how the UMT introduction has been made and in these cities will be a useful reference for Abidjan and will contribute to the formulation of an UMT introduction plan in Abidjan.

Table 1.1 shows a location map for the cities where urban mass transit has been introduced in Africa. Until recently, in the Africa continent, specifically in the sub-Sahara region, there are four countries that have cities providing urban mass transit services in their city area.

Table 1.1 List of Urban Mass Transit Introduction Cases in Western Africa Region

Location	Country	Year Opened	Type of Mass Transit	Population of City		GDP per capita PPP	
				('000)	as of year	(USD)	year
Algiers	Algeria	2011	Metro (Tram)	2,740	2009	7,792	2011
Constantine	Algeria	2013	Tram		2009		
Oran	Algeria	2013	Tram	770	2009	4,187	1987
Cairo	Egypt	1987	Metro (Tram)	7,787	2006		
Alexandria	Egypt		Tram	4,110	2206	4,268	2011
Rabat	Morocco	1863	Tram	621	2004		
Casablanca	Morocco	2011	Tram	2,937	2004	4,236	1985
Tunis	Tunisia	2012	Light Rail	984	unknown		

Source: JICA Study Team

As for the mode of transit, there are two kinds of train, i.e. Metro and Tram (including light rail) selected in most cases. As a topological feature of the listed cities, all of them are a capital city of the country or the one following it. In addition, all cities are located on the Mediterranean coast.

In view of past typical introduction cases of UMT in the world, whether UMT can be adopted or not is ultimately dependent on the transport demand size expected for UMT and the financial competence to afford a huge initial investment cost. Regarding the transport demand size, it is considered to be in proportion to the demographic size/population density of each city. Regarding the financial competence of each country, the per capita GDP indicator is considered as its alternative indicator.

Based on this assumption, the corresponding statistics indicators are collected on all Sub-Saharan countries as well as Maghreb countries.

Selected statistics indicators are as follows;

- Population: Population of the city as of the year when UMT was introduced if the city has UMT at present. Otherwise latest population.
- GDP per capita: GDP per capita as of the year when UMT was introduced. (This indicator actually stands for the national level but is selected as a substitute indicator revealing the general economic situation in a selected city.)

Table 1.2 shows an overview of the collected statistic indicators for the above mentioned countries, including cities with UMT and cities lacking UMT provision.

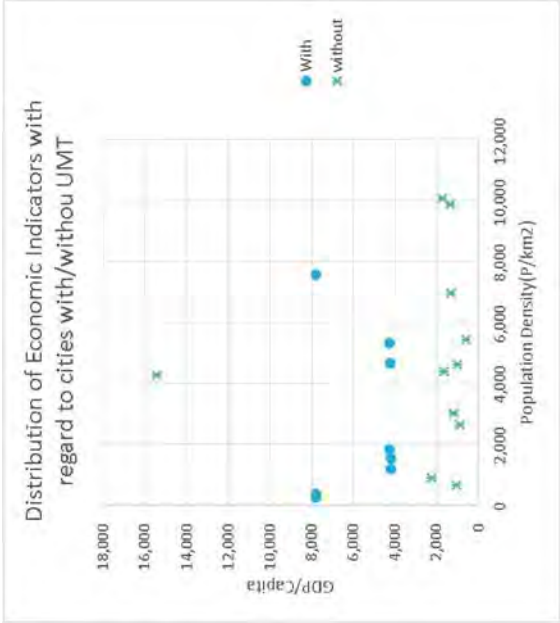
Table 1.2 Statistics for selected cities without UMT

Location	Country	Population of City		GDP per capita PPP	
		('000)	as of year	(USD)	year
Abidjan	Cote d'Ivoire	4,250	2008	1,757	2013
Cotonou	Benin	779	1012	1,364	2013
Ouagadougou	Burkina Faso	1,524	2006	1,304	2013
Bissau	Guinea-Bissau	355	2004	1,028	2013
Monrovia	Liberia	465	1986	564	2013
Tripoli	Libya	1,700		15,460	2013
Bamako	Mali	160		1,047	2013
Nouakchott	Mauritania	881	1999	2,244	2013
Niamey	Niger	1,302	2011	574	2013
Lagos	Nigeria	158,423	2011	2,294	2013
Dakar	Senegal	2,399	2004	1,675	2013
Freetown	Sierra Leone	1,070	2006	1,171	2013
Banjul Serrekunda	The Gambia	330	2006	1,679	2013
Lomé	Togo	738	2006	906	2013
Bata	Republic of Equatorial Guinea	173	2005	26,057	2013

Source: JICA Study Team

Although city population size is considered to show potential transport demand for UMT, city population density is considered to be a better indicator because this indicator reflects the effect of spatial restriction of the respective city.

Using city population density instead of the population itself, the relationship between the city population density and GDP per capita is examined for each city. Figure 1.1 shows the distribution of related statistics indicators by each city, also displaying whether the city provides UMT or not.



Source : JICA Study Team

Figure 1.1 Distribution of City Population Density and GDP per capita by cities

A clear separation was found between cities with UMT and cities without UMT according to their GDP per capita. No significant relationship was observed between with/without UMT and population density although conventional wisdom suggests the higher the city population density is, the more UMT is selected for the city.

According to this chart, a border line which separates cities with/without UMT is observed and its cutoff line seems to be 4,000 USD per capita GDP.

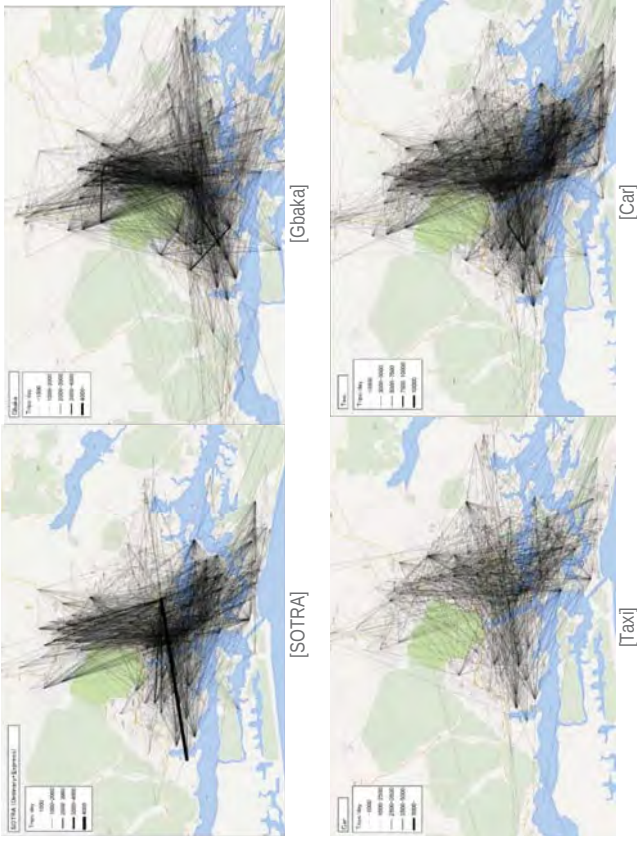
According to the economic framework, future per capita GDP growth rate in Cote d'Ivoire is assumed at 4.9%/year. If it is applied to the current value, 1,757 USD as of 2013, it is estimated that per capita GDP will reach 4000 USD by year 2025.

This result shows greater the Abidjan district could introduce its first mass transit line until 2025 at the latest.

1.2 Project Rationality of High-Capacity Corridors

Needless to say, project rationality is first thing to be clarified among other things, i.e. each project is verified on whether it could be a solution with virtual effectiveness under a future transport demand prospect. As its first approach, clarification on a macro trend of transport demand in the Abidjan district is made, observing traffic desired lines based on HIS result.

Figure 1.2 shows the current traffic desired line by mode, excluding walking trips.



Source : JICA Study Team

Figure 1.2 Traffic Desire Lines by Vehicle Mode

The traffic desired line shows the virtual transport service coverage required for traffic demands by people, and it provides a prototype of desirable transit routes. According to the figure, the following points are observed.

- Due to their similarity of transport service characteristics, it is considered that the transport demand for SOTRA and Gbaka displays a basic service pattern of a mass transit system. According to its pattern, a notable demand concentration appears for the north-south direction, i.e. from Abobo through Plateau to Marcory and Koumassi, and the west-east direction, i.e. from Yopougon through Plateau to Cocody. These matters indicate the existence of two major transport corridors to be coped with mass transit system.

- Comparing with SOTRA, transport demand for Gbaka seems to be multi-directional and consists of shorter trips. Taking into account the demand characteristics of mass transit, in which massive but directional demand is suitable, trip diversion is expected more for SOTRA.
- It is noted that a clear accumulation of transport demand by SOTRA from Yopougon to Cocody is in contrast for the conventional understanding that the north-south transport demand is larger than that of west-east.
- Compared with SOTRA and Gbaka, traffic demand for taxis, including Woro-Woro and cars, shows more disperse trip patterns. In this regard, trip diversions from both modes to mass transit are considered to be relatively lower than that of SOTRA and Gbaka.
- Based on the above discussion, it is recognized that the development of high capacity transport corridors which are comprised of mass transit systems on the North-South axis and West-East axis has enough specific rationality to examine its viability.

1.3 Identification of the corridors

The following three routes are selected as the rail based high capacity transport corridors based on previous study, related information, and existing public transport demand.

Table 1.3 Outline of High capacity Railway Corridors

CORRIDOR TYPE	NORTH-SOUTH		WEST-EAST
	T-1-1 ¹	T-1-3	T-1-2
Basic project concept	• Main high capacity link through North-South urban axis • Providing with high speed access route for F. H. Boigny Airport.	Extension of T-1-1 line up to Grand Bassam area.	• Main high capacity link through West-East urban axis. • Acceleration of compact urban development in Yopougon area.
Project background	• Existing urban transport proposal by Korean consortium, in which new urban train services were supposed to be introduced on existing railway.	• N/A	Existing urban transport proposal by EGIS in 2012, which shows possibility of west-east transit route in long term context.
Start/End locations	From Anyama district to F.H. Boigny Airport	From south of the airport to Grand Bassam.	From Yopougon district through Plateau and Cocody to Bingerville
Applied transit system	Conventional mass rapid transit system.	Same as left.	Unknown
Right of Way	Existing railway track and existing road (Boulevard Valéry Giscard D'Estaing) connected with existing railway section.	Existing road (Bassam express road, National road T-1-100) +new road.	Existing road(Boulevard Francois Mitterrand) / +New road
Source : JICA Study Team			
Main feature of Project Routes	Transport demand Focus	The route covers large commuter's trip demand between the north residential area and the south business district such as Plateau and Port Bouët area. The route provides also main airport access to the Airport.	Expecting future corridor development rather than existing transport demand
	Topographic Feature	The north and middle parts of the route are located in hilly terrain but the south part is located in lowland near the coast area.	The route is located at lowland flat land near the coast.
	Urban development	The route contributes to the development of the suburban core in Anyama district.	Integration of Grand Bassam area with Abidjan district.
			The route covers large commuter's trip demand between the west residential area and the east and south business districts.
			The route is located at highland terrain, but there are many valleys.
			Facilitating main axis function for developing dense compact land use along the west-east urban axis.

¹ Regarding the North-South corridor, there is another route alternative using tramway which was proposed by a French group, but it is omitted from discussion because its transport characteristics is almost the same as T-1-1 and less transport demand was expected according to demand forecast. Its detail will be reviewed in Appendix.

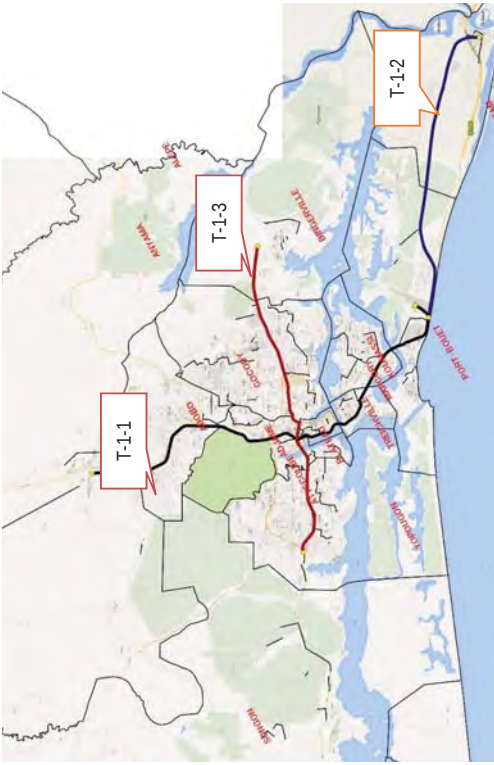


Figure 1.3 Location of Rail-Based Corridors



Figure 1.4 Location of Corridors and Ground Height Condition

2.0 North-South corridor (T-1-1)

Appendix C Study on the High-Capacity Corridors

2.1 Horizontal alignment and stations

This route covers the area from Anyama to the Airport in Port Bouët, in which Abobo, Adjame, Plateau, Treichville, Marcory, Koumassi and Port-Bouët communes are included. The right of way for 80% of the section of route will be acquired on the existing railway track and the rest will be set on the existing road, Boulevard Valéry Giscard D'Estaing.

Stations should be planned to secure adequate transport services and convenience for passengers as an urban transit system, while existing stations should be maintained after the introduction of urban train services.

As a result, stations are planned as shown in Table 2.1, and the horizontal route plan is shown in Figure 2.1.

Table 2.1 Station Plan (T-1-1)

Station No.	kilometer	Remarks
1	0.0	Anyama station
2	5.8	
3	10.1	
4	11.0	Banco station
5	13.8	
6	16.5	
7	17.7	Adjame
8	19.5	
9	21.0	
10	23.1	Plateau station
11	24.9	Treichville station
12	26.5	
13	28.8	
14	30.7	
15	32.4	
16	35.8	
17	37.3	F.H.Boigny Airport station

Source: JICA Study Team

Total route length is around 37km and seventeen stations are placed along it. The average space between stations is calculated at 2.3km.

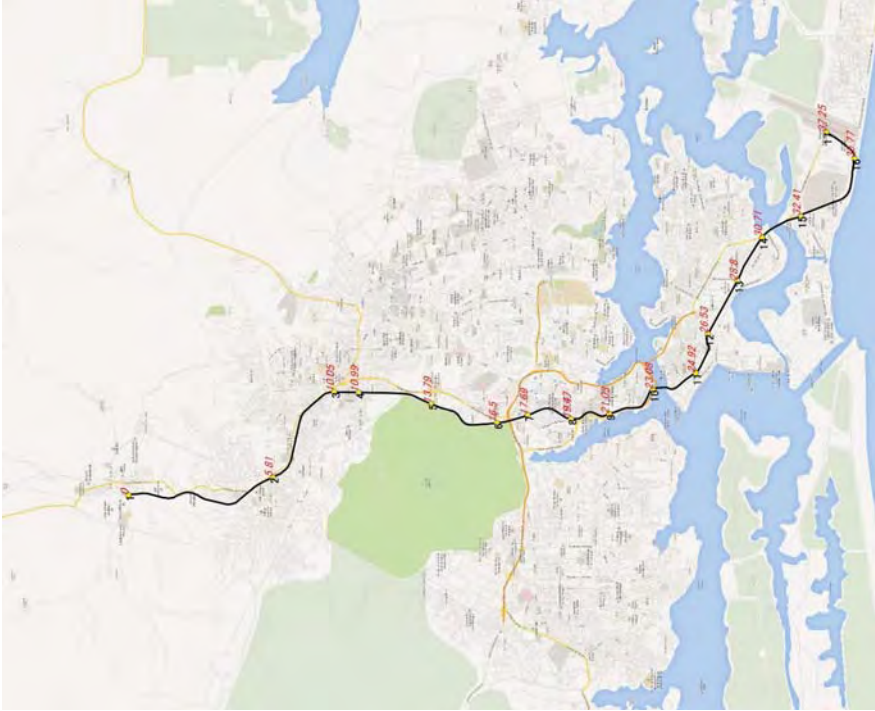
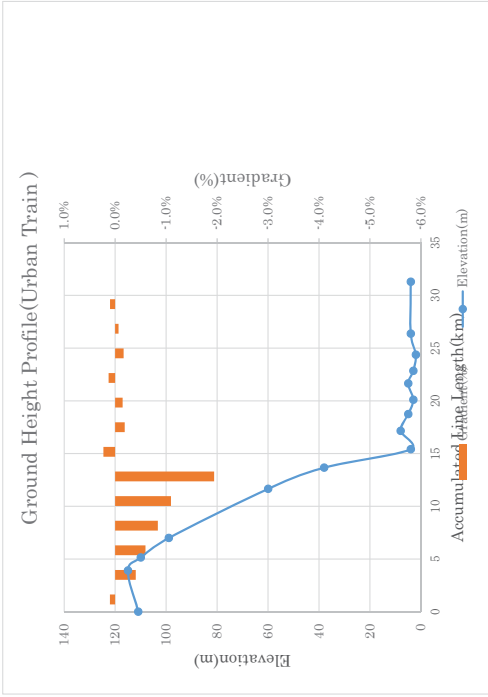


Figure 2.1 Station Plan (T-1-1)

2.2 Elevation profile

As for the vertical alignment, the route is located on hilly terrain stretching from Abobo to Plateau with down slope ground level. The geographical feature of ground height is shown in Figure 2.2.

The largest gradient appears at around the 13km point on the route, however it remains within the limit number applicable for conventional railway systems.



Source: JICA Study Team

Figure 2.2 Elevation and Gradient of Topography

2.3 Railway infrastructure

In this plan, a new railway system is installed on the existing railway facilities, so current railway facilities will be reused as railway infrastructure, however, for new railway sections, where no railway operation was provided previously, how to provide railway infrastructure will be a significant issue. Based on the existing situation of railway crossing other transport facilities, the type of railway infrastructure is selected as shown in Table 2.2.

- From 0 km to 25km : Existing rail facilities, at grade track, will be used but converted for double track use because most of the road railway crossings are made in grade separated.
- From 25km : Viaduct structures or bridge structure are applied because many road crossings are done at grade completely.

Table 2.2 Rail Infrastructures Plan and Inventory Data on Railway Crossing

Route Kilometer	Facilities	Description	Current railway crossing			Planned Railway Infrastructure
			At grade	Grade separation	Rail under	
0.00	Sta. 1	Anyama station				Use current rail infrastructure at grade, upgrading single track into double track.
5.78	Rd Cr	T170 Level cr	✓			
5.81	Sta.2					
9.74	Rd Cr	Level cr	✓			
10.05	Sta.3					
10.98	Rd Cr	Level cr	✓			
10.99	Sta.4	Banco station				
13.79	Sta.5					
16.50	Sta.6					
16.89	Rd Cr	R-Flyover		✓		
17.49	Rd Cr	R-Flyover		✓		Constructing new railway infrastructure by elevated type, i.g. bridge or viaduct because there are many level railway crossings existed for these sections.
17.69	Sta.7	Adjame				
18.11	Rd Cr	R-Flyover	✓			
19.47	Sta.8					
21.03	Sta.9					
21.33	Rd Cr	R-Under			✓	
23.08	Sta.10	Plateau station				
23.45	Bridge	F.H.Boigny L=0.5km			✓	
23.89	Rd Cr	R-Under			✓	
24.92	Sta.11	Treichville station				
26.01	Rd Cr	Level cr	✓			
26.31	Rd Cr	Level cr	✓			
26.53	Sta.12					
26.57	Rd Cr	Level cr	✓			
27.60	Rd Cr	Level cr	✓			
27.90	Rd Cr	Level cr	✓			
28.35	Rd Cr	Level cr	✓			
28.80	Sta.13					
28.90	Rd Cr	Level cr	✓			
30.71	Sta.14					
30.96	Rd Cr	Level cr	✓			
32.07	Rd Cr	Level cr	✓			
32.41	Sta.15					
33.08	Rd Cr	Level cr	✓			
33.25	Rd Cr	Level cr	✓			
33.42	Rd Cr	Level cr	✓			
34.04	Rd Cr	Level cr	✓			
34.62	Rd Cr	Level cr	✓			
35.77	Sta.16	Branch st				
37.25	Sta.17	F.H.Boigny Airport station				

Source: JICA Study Team

2.4 Station and track layout

2.4.1 Modification of existing railway stations

Since the existing railway track is currently used for an exclusive train service route by SITARAIL, dual railway usage for urban mass transit service and inter regional train service is applied. At the same time, facilitation of double track and electrification will be carried out after a mass transit system introduction. For the corresponding railway sections, there are 4 stations in operation for long distance passengers train services by SITARAIL. These stations will be converted to the dual-functional station for both inter regional train services and urban rapid train services, and the remaining eleven stations will be built as exclusive rapid train stations.

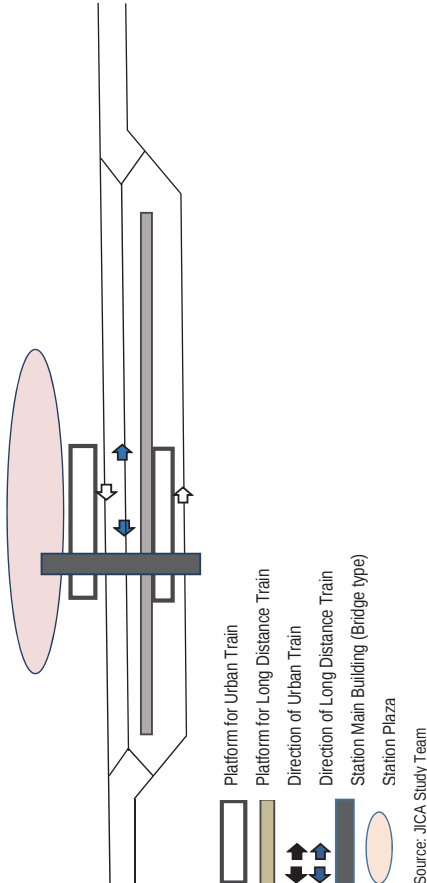


Figure 2.3 Station layout of Existing Station with Urban Train Services

2.4.2 Station plan

Table 2.3 shows various station types applied to T-1-1 route, depending on the railway infrastructure, passenger demand and surrounding physical conditions.

The new stations are introduced only for urban trains. As for the platform type, the side platform type is applied for intermediate stations while the island platform type is applied for terminal stations at the start and end points.

Table 2.3 Example of Station Type

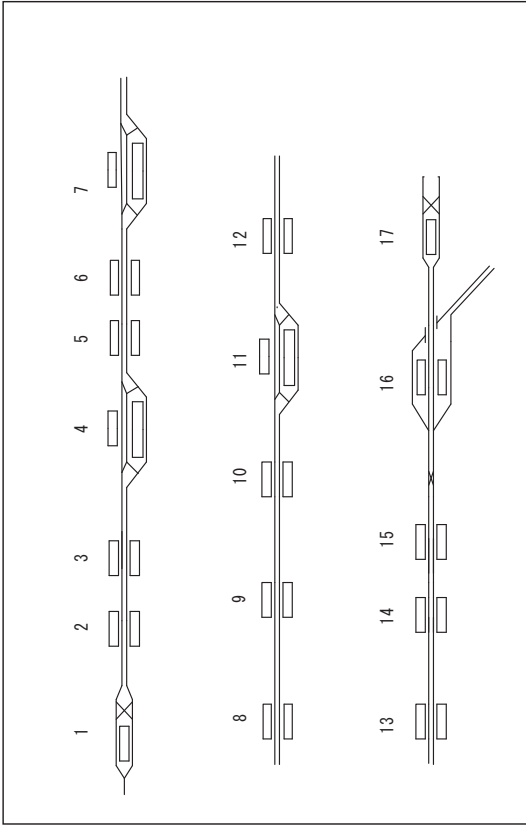
	Station Type	Station Section	Remarks
Surface Rail Track Sections	Existing Stations		Banco Adjamé Treichville
	New Station (Island-platform)		For stations expecting relatively large passengers volume.
	New Station (Side Platform)		For stations expecting relatively small passengers volume.
Elevated Railway Sections	Island platform		
	Side Platform Type		

Source: JICA Study Team

2.4.3 Track layout plan

A track layout plan was made as shown in Figure 2.4, considering following conditions:

- No.1 station is planned as a station to change from single to double track.
- No.4, 7 and 11 stations are the stations to be modified from existing stations.
- No.16 station is designated to be a branch station for the extension route to Grand Bassam.
- No.17 station is planned as a terminal station.



Source: JICA Study Team

Figure 2.4. Track Layout Plan for T-1-1 Route

2.5 Tentative Train Operation Plan

The train operation plan should be finalized based on detailed examination on the railway alignment and precise demand forecast. This section clarifies the overview on the train operation aspect based on the demand forecast result and others. The basic plan of train operation is determined as shown in Table 2.4.

Based on the demand in 2030, the number of trains (8 cars) is estimated at 20 trains for the peak-hour. Accordingly the required cars are estimated at 450 cars. That implies that the train depot would be required to be around 5 ha in size.

Table 2.4 Basic Train Operation Plan

Item	Parameters	Remarks
Total daily ridership	364,800 (2025) 432,900 (2030)	According to demand forecast
Peak load	26,100 PPHPD (2025) 31,500 PPHPD (2030)	
Nominal car capacity	140 passengers	Assuming conventional rapid transit car.
Maximum car capacity	210 passengers	Assuming congestion ratio is 150% X nominal capacity
Operation route length	37.3 km	From Anyama to airport
Running time for round trip	154 minutes	Assuming commercial speed is 30 km/h and reversing operation time is 5 minutes.
Train capacity in peak hour	1600 passengers/train	8 cars/train
Required train headway	3 minutes	20 trains/peak hour
Required number of cars	450 cars	Including spare cars

Source: JICA Study Team

2.6 Existing land use in railway corridor

2.6.1 Abobo Banco



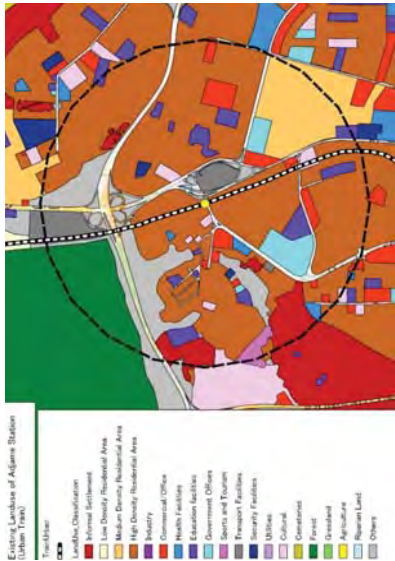
Source : JICA Study Team

Figure 2.5 Abobo Banco

- A large informal settlement is seen to the west of the station, however the area along the railway track, which would become serious issue for right of way acquisition, is comparatively small. To the east of the station, there is a high density residential area.

- Currently passengers transport services (for inter-regional) are run by SITARAIL. At the station, when urban train project is implemented, station function and facilities have to be upgraded for both urban train services and inter-regional train services.

2.6.2 Adjamé



Source : JICA Study Team

Figure 2.6 Adjamé

- Adjamé station is located close to the SOTRA bus terminal (Gare Nord) and has a beneficial location in terms of railway access convenience because there are direct road approach sections provided for the North-South direction and the East-West direction. Particularly the physical condition of being close to the SOTRA bus terminal implies it is necessary to develop the station as a model of comprehensive inter-modal transport facilities, connecting urban mass transit with road transport (public and private vehicles).
- The land-use for the area surrounding the station shows several spots which are utilized by commercial/office use and educational facilities while a larger part is utilized by high and medium density residential use. Contrary to Abobo Banco, area intrusion by informal settlement is comparatively lower. A lot for transport facilities is found at the northern edge of the station catchment boundary. This area is designated for the construction of a new bus terminal complex for an international mode interchange and multi-purpose function, however currently most of land is used as informal business activity.

2.6.3 Plateau Lagune



Source : JICA Study Team

Figure 2.7 Plateau Lagune

- The station is located at the south end of the Plateau district and is also close to the Houphouët Boigny Bridge in which railway track passes through to connect to the Treichville district.
- The land-use surrounding station features very little residential use while Government offices and commercial/office use is dominant.
- The station is also close to a SOTRA bus terminal (Gare Sud, refer to below) and good modal change functions will be expected.

2.6.4 Treichville



Source : JICA Study Team

Figure 2.8 Treichville

- The station is located adjacent to an existing port and currently both railway freight and passengers transport services are provided in this station. International trains, passengers and freight, are dispatched from this station, thus the Treichville station functions as a international gateway station.
- Land-use surrounding the station has clearly different features between the sea side and land side. The sea side area consists of port and industrial use, and the land side is covered by commercial/office land use and medium-high density residential land use. Since relatively intensive land use exists, a spatial constraint factor will be a major issue for station expansion.

2.7 Related Technical Issues

As for the technical issues, the following points are considered:

- Train motive power: In principle, an electric power system should be adopted due to maintenance and ecological reasons. As its traction system, it is desirable to use EMU (Electric Multiple Unit) system that is commonly applied in urban transport.
- Railway track: Because of transport capacity and train service with high frequency, a double track system should be applied. Regarding its track gauge, the normal standard gauge (1,435 mm) is desirable while meter gauge is used as the current track gauge. If so, as another technical issue, the gauge conversion will become a serious problem.
- Train depot: For the parking and maintenance work of rolling stocks, a train depot is needed. The required area size depends on the number of train sets; however, it will require approximately 3-5 ha at the very least. Its location should be chosen in terms of available land lot size and surrounding land use condition because in general, train depots are regarded as an environmental hazardous facility.
- Countermeasures for railway level crossing: At present there are a considerable number of level crossings on existing railway track. When urban trains, which operate at a high speed and more frequently, is introduced, necessary safety countermeasures are required to avoid traffic accidents, except for the elevated railway section.

2.8 Preparation of Inter Modal Transport Facilities

The urban train route is located relatively far from the surrounding populated area because its alignment utilizes existing railway track. Regarding the current population within the railway corridor defined by a circular boundary with its radius length of 1km, it is estimated around 695,000. This fact means that major potential passengers seems to be living far from the nearest station and they require specific access transport such as buses and other feeder mode transport. In this regard, it is important to prepare effective mode interchange facilities to make modal change smoother for collecting passengers demand.

A typical example of inter modal transport facilities, including station plaza as used in Japan, is shown in Figure 2.9.



Source: JICA Study Team

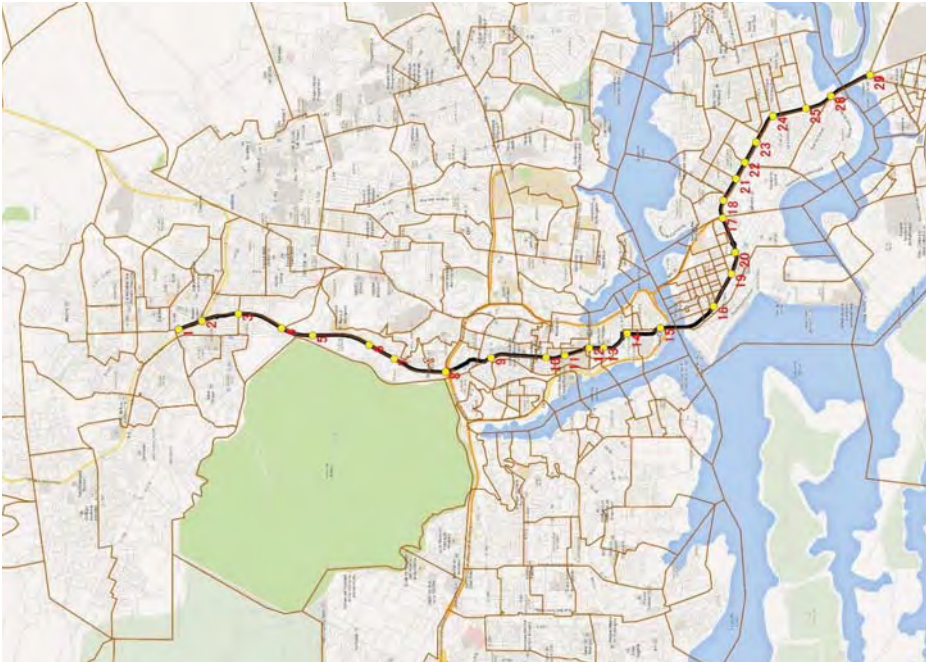
Figure 2.9 An Example of Mode Interchange Facilities

3.0 North-South Corridor (Tramway Alternative)

3.1 Horizontal alignment

This route is serving the area along its route length of 25km from Abobo to Port Bouët, of which alignment is similar to that of Project T-1-1. (see Figure 3.1)

Appendix C Study on the High-Capacity Corridors



Source: JICA Study Team

Figure 3.1 Horizontal Alignment of Tramway Route

Compared with Project T-1-1, a major difference is derived from its right of way, i.e. the right of way of the tramway route is designated to be existing road space while Project T-1-1 assumes existing railway track as its right of way. As for the road in which route is adopted, most road sections are categorized as trunk roads, i.e. Autoroute D'Abobo for the north route section and Boulevard Valéry Giscard D'Estang for the south route section. These roads are considered to have sufficient road width to allocate track

space of mass transit. An example of perspective view of tramway station is illustrated as shown in Figure 3.2.

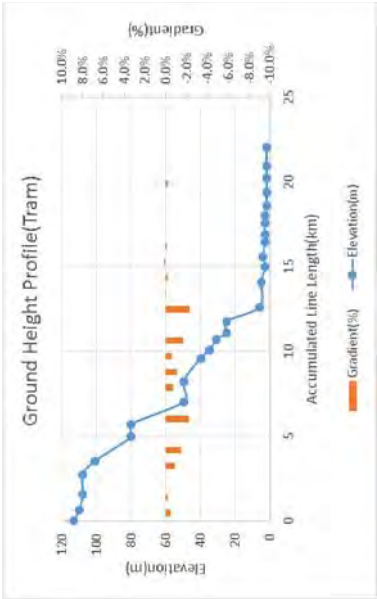


Source: JICA Study Team

Figure 3.2 Perspective View of Tramway Station with Access Footpath Bridge

3.2 Elevation profile

Regarding the elevation profile, the tramway route has almost the same profile as Project T-1-1 as shown in Figure 3.3. Since its largest gradient of ground is within 2%, a steel wheel based system is considered to be adaptable.



Source: JICA Study Team

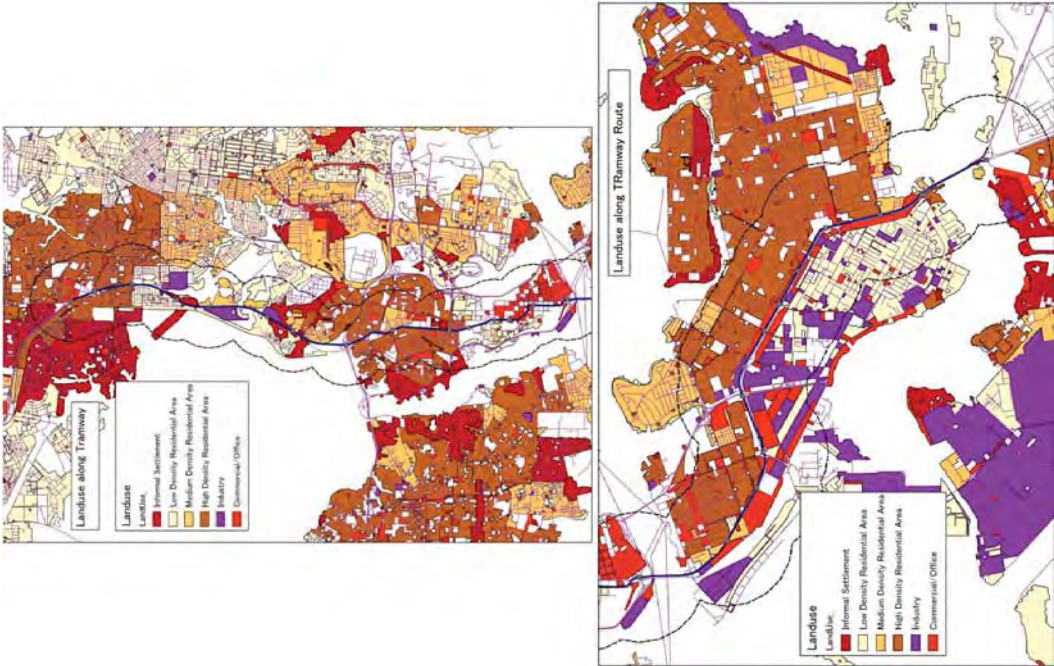
Figure 3.3 Elevation and Gradient of Topography

3.3 Existing land use in railway corridor

As for the corridor of the tramway route, the existing land use pattern is shown in Figure 3.4 based on the land use survey result.

Land use along the route tends to vary by each commune, and in particular land use has changed clearly between the north area of Plateau and the rest of the railway corridor, i.e. while the former area mostly consists of residential use, the latter is comprised of other land use such as commercial and industrial use.

As for the area of informal settlement which needs significant countermeasures for project implementation, small lots are seen in Adjame commune, but none in the other districts. In this regard, it is considered that the issue of informal settlement is marginal in the tramway route alternative.



Source: JICA Study Team

Figure 3.4 Existing Land use in Corridor of Tramway Route

3.4 Tentative Train Operation Plan

Table 3.1 shows the result of the train operation plan for the tramway route (only for reference purposes). As shown in the table, the calculated train operation seems to be unrealistic in that it requires so many trams dispatching during peak hour train services. In this regard, Project T-1-1 which is based on conventional MRTI cars is considered to be a practical solution for North-South high capacity corridor.

Table 3.1 Basic Train Operation Plan

Item	Parameters	Remarks
Total daily ridership	217,000 (2030)	According to demand forecast
Peak load	17,000 PPHPD (2030)	
Nominal car capacity	100 passengers	Assuming articulated LRT
Maximum car capacity	150 passengers	Assuming congestion ratio is 150% X nominal capacity
Operation route length	27.8 km	From Abobo to Port Bouët
Running time for round trip	138 minutes	Assuming commercial speed is 25 km/h due to delay at grade intersection. Reversing operation time is assumed 5 minutes.
Train capacity in peak hour	150 passengers/train	
Required train headway	0.5 minutes	113 trains /peak hour
Required number of cars	304 cars	Including spare cars

Source: JICA Study Team

4.0 North-South corridor (T-1-3)

Appendix C Study on the High-Capacity Corridors

4.1 Horizontal alignment and stations

The route starts at the branch station (No.16 in T-1-1) and reaches the center of Grand Bassam. The total route length is estimated at around 25km and it will be constructed as a new railway track because there are no significant transport facilities or right of way. Since the current area characteristics along the railway corridor seem to be lowly populated except for the area near airport and in the vicinity of Grand Bassam, a low number of stations are planned.

Ten stations are planned as shown in Table 4.1 and Figure 4.1.

Table 4.1 Station Plan (T-1-3)

Station No.	Kilometers	Remarks
1	0.00	Airport branch pt.
2	4.91	
3	7.73	
4	9.39	
5	12.27	
6	14.76	
7	17.46	
8	19.88	
9	22.58	
10	24.82	Grand Bassam station

Source: JICA Study Team

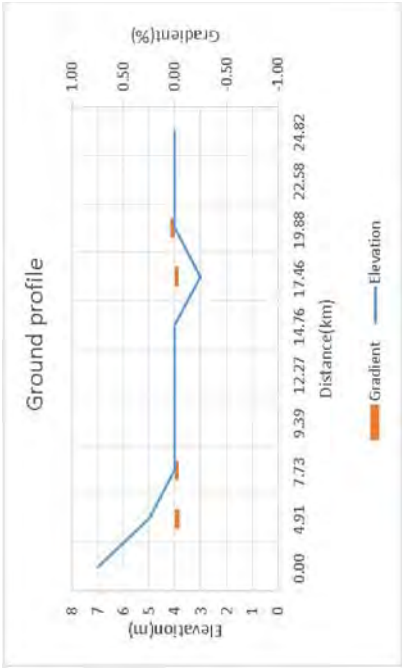


Source: JICA Study Team

Figure 4.1 Station Plan (T-1-3)

4.2 Elevation profile

The target route passes through the flat land near the Atlantic coast line and the ground profile has completely flat terrain characteristics as shown in Figure 4.2.



Source: JICA Study Team

Figure 4.2 Elevation and Gradient of Topography

4.3 Current land condition of the corridor

Current land use along the route, which is described by a boundary of 1km radius, is shown in Figure 4.3. According to this picture, it is observed that the areas, except for stations 1, 2 and 10, are mostly used for agricultural or are natural forest zones, and there is no urban land use. In the same way, the current population within the aforementioned area is estimated at around 64,000 and its population density is estimated at 22 persons/ha. As far as it may be concerned with a passenger railway system, only the inter-city rail system should be utilized, rather than an urban transit system in mid-term context.



Source: JICA Study Team

Figure 4.3 Current Land Use along Route (T-1-3)

4.4 Infrastructure

As per the current land use situation, the necessary railway infrastructure will be developed as a rural railway standard in which the surface railway track is used except for in a few urbanized areas. As for the track standard, a double track provision will be desirable in the long term, however a single track application might be adopted tentatively, taking into account of demand. The infrastructure plan along the corridor is shown in Table 4.2.

Table 4.2 Infrastructure Plan (T-1-3)

Route Kilometer	Facilities	Description	Infrastructure
0.00	Sta 1	Airport brach pt.	Elevated railway (Viaduct)
4.91	Sta 2		
7.73	Sta3		surface railway (Embankment)
9.39	Sta4		
12.27	Sta5		
14.76	Sta6		
17.46	Sta7		
19.88	Sta8		
22.58	Sta9		Grand Bassam station
24.82	Sta10		

Source: JICA Study Team

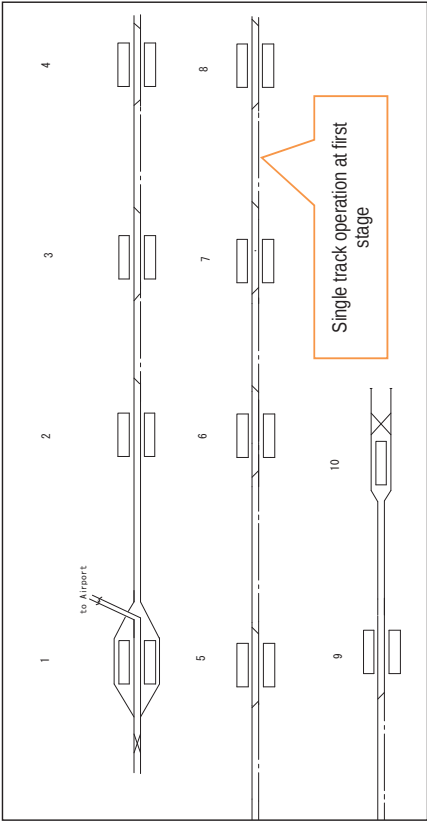
4.5 Station and track layout

Taking into account low demand in the near future, stage by stage development in which single track operation will be adopted at first, then double track operation will be introduced according to the demand growth, is proposed. Table 4.3 shows the station plan and the track layout is shown in Figure 4.4.

Table 4.3 Station Plan

Station Type	Station Section	Remarks
Station elevated in railway sections		No.1 Branch station near airport
Stations surface in railway sections		No.3 to No. 9 stations.
Island platform		No.10 Grand Bassam station

Source: JICA Study Team



Source: JICA Study Team

Figure 4.4 Track Layout (T-1-3)

4.6 Tentative Train Operation Plan

Based on the demand forecast result and others, the basic plan of train operation is determined as shown in Table 4.4.

In this plan, the possibility of a single track train operation is examined.

If a single track train operation is adopted, the minimum train headway is restricted by station spacing distance because no two trains can coexist between stations. Accordingly:

- The longest station spacing distance exists between No.4 and No.5 and it is around 2.9km.
- If train speed is assumed at 30km/h, the required minimum headway time is estimated at six minutes.
- Train headway should be set up over six minutes. If shorter headway time is preferred, the double track train operation has to be considered.

Table 4.4 Station Plan

Item	Parameters	Remarks
Total daily ridership	126,200 (2030)	According to demand forecast
Peak load	9,200 PPHPD (2030)	
Nominal car capacity	140 passengers	Assuming conventional rapid transit car.
Maximum car capacity	210 passengers	Assuming congestion ratio is 150% X nominal capacity
Operation route length	24.8 km	From Branch point to Grand Bassam
Running time for round trip	55 minutes	Assuming commercial speed is 30 km/h and reversing operation time is 5 minutes.
Train capacity in peak hour	1000 passengers/train	5 cars/train
Required train headway	6 minutes	10 trains /peak hour
Required number of cars	55 cars	Including spare cars

Source: JICA Study Team

4.7 Related Technical Issues

As for the technical issues, the following points are considered:

- Train motive power: Due to commencing inter-city train service at first stage, locomotive traction type could be applicable while EMU is chosen in T-1-1 sections.
- Railway track: Due to the small demand expected at its first stage, single track operation would be a possible option for the short term perspective even though the right of way should be secured by a double track standard at the first step. Owing to the demand growth along the corridor, gradual track upgrading might be carried out.
- Train depot: For the parking and maintenance work of rolling stocks, a train depot is needed. The required area size depends on the number of train sets, however, it will require approximately 3-5 ha at least. Its location should be chosen in terms of available land lot size and surrounding land use condition.

5.0 West East Corridor (T-1-2)

Appendix C Study on the High-Capacity Corridors

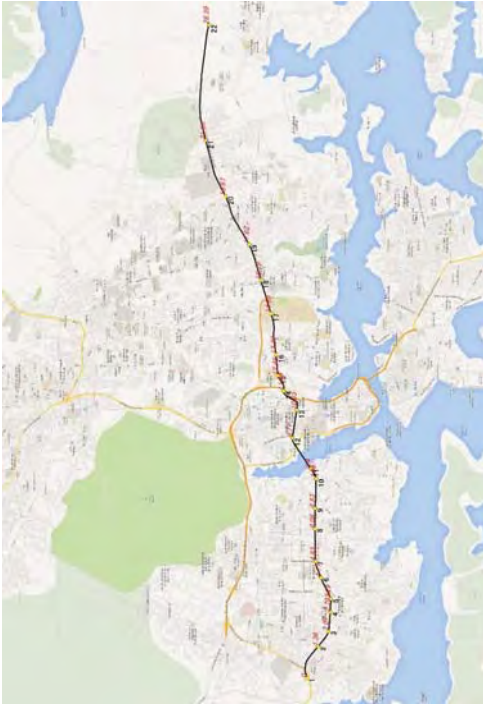
5.1 Horizontal alignment and stations

This route is serving the area within its route length of 26km from Yopougon to Bingerville along the west-east urban axis. Its transit corridor includes Yopougon, Attécoubé, Plateau, Adjame, Cocody and Bingerville communes respectively. As its right of way, a part of the road sections which is proposed as a future principal road in Yopougon and Attécoubé commune, and existing motorway, Boulevard François Mitterrand, are adapted. As for the newly build road sections in Yopougon and Attécoubé commune, project coordination will be required the in planning and implementation stages. Since the route section between Attécoubé and Plateau crosses over Baie de Banco, a special long spanned bridge construction will be required. An alternative route is applicable to avoid cost increase due to the special bridge construction, using land approach by Boulevard de la Paix, however the route length increase by more than 5km.

Table 5.1 Station Plan (T-1-2)

Station No.	Kilometers	Remark
1	0.00	Yopougon sta.
2	1.36	
3	2.07	
4	2.79	
5	3.29	
6	4.17	
7	4.83	
8	6.06	
9	6.83	
10	7.96	
11	8.40	
12	9.77	Plateau sta.
13	10.83	
14	11.84	
15	12.48	
16	13.29	
17	14.88	
18	16.19	
19	17.62	
20	19.67	
21	21.94	
22	26.39	Bingerville sta.

Source: JICA Study Team

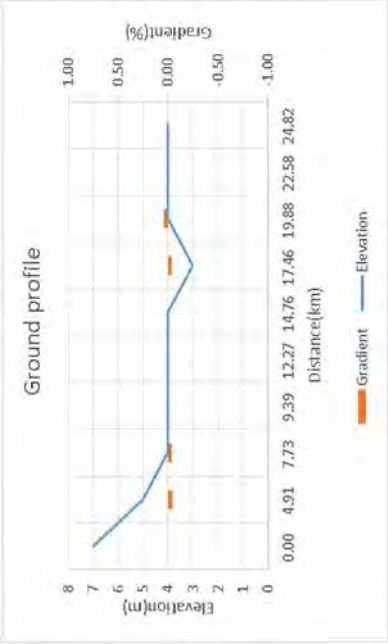


Source: JICA Study Team

Figure 5.1 Station Plan (T-1-2)

5.2 Elevation profile

As for the vertical alignment, the route is located on lower land along the Lagoon coast, and highland terrain in other urban area. The geographical feature of ground height is shown in Figure 5.2.



Source: JICA Study Team

Figure 5.2 Ground Profile (T-1-2)

As shown in the figure, the ground terrain has ab up & down slope shape and the largest gradient reaches more than 3% which is the upper limit gradient applicable to steel wheel rail systems. In this connection, it is considered that a mass transit other than steel wheeled system will be preferred if other measures are not considered.

5.3 Overview of applicable transit system

The specific feature on this route is its vertical alignment has a steep gradient of more than 6% as long as its alignment is following ground profile. In this connection, it implies the transit system selection would be an important issue. Table 5.2 shows a brief comparison of the transit systems which can cope with tough vertical alignment.

Table 5.2 System Feature of Selected Transit

System	AGT* (*Automated Guide Transit)	Monorail	LIM* train (*Linear Induction Motor)
Image view			
1.Vehicle length(m)	9.0	15.0	16.0
2.Vehicle width(m)	2.5	2.9	2.5
3.Height(m)	3.5	5.2	3.2
4.Axle load(max)	9 tf	11 tf	11 tf
5.Traction power	Rotation motor+rubber tyre	Rotation motor+rubber tyre	Linear induction motor, steel wheel
6.Guidance system	Lateral pinched guide	Guided wheel	Steel rail guide
7.Track	Concrete slab	Track beam	Steel rail
8.Minimum curve radius(m)	30	70	100
9.Max gradient(%)	6	6	6
10.Vehicle capacity passengers	60	105	100

Source: JICA Study Team

According to this table, it is noted that specific mechanical characteristics, such as rubber wheel support and linear motor propulsion system, can cope with severe vertical alignment more than 6 % in gradient.

Among them, the AGT and monorail systems are categorized as medium capacity transport systems while LIM system is considered to be medium-large capacity transport system.

Transit system selection is not only based on technical issues but is strongly affected from other aspects such as political and economic matters.

5.4 Infrastructure plan

As for the railway infrastructure, the elevated type track structure is selected due to the following reasons:

- The target corridor is passing through intensely developed urban area.
- Along the route, rail alignment encounters physical obstacles such as road flyover structures, wide carriageway of roads and water body areas.
- As a common feature of applicable transit system explained above, their track structure is considered to prefer elevated type structure.

Table 5.3 Infrastructure Plan and Inventory of Crossed Roads

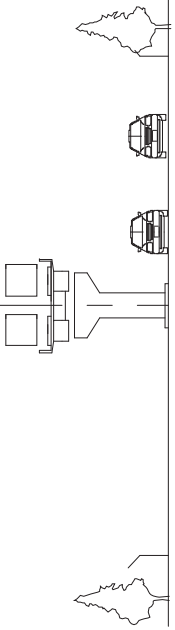
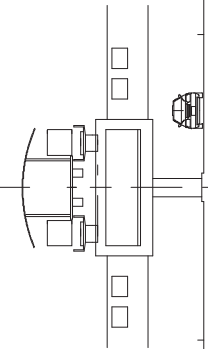
Route Kilometer	Facilities	Description	Grade separation		Infrastructure
			At grade	Reil over / Reil under	
0.00	Sta 1	Youpogon station			(Concrete pier+girder, Bridge)
0.34	Road	Route de Dabou	✓		
1.36	Sta 2				
1.39	Road	S95	✓		
2.07	Sta3				
2.79	Sta4				
2.79	Road		✓		
3.29	Sta5				
4.17	Sta6				
4.83	Sta7				
4.83	Road	Boulevard	✓		
6.05	Road				
6.06	Sta8				
6.83	Sta9				
6.83	Road				
7.96	Sta10				
8.27	Road			✓	
8.40	Sta11				
8.86	Bay	Bridge over Bas de Bessé (C-0 line)		✓	
9.77	Sta12				
9.77	Road	Boulevard de oeste		✓	
10.32	Road				
10.58	Road				
10.83	Sta13				
11.84	Sta14				
11.84	Road	Boulevard de Gaule			
12.48	Sta15				
12.84	Road				
13.29	Sta16				
13.65	Road	Boulevard André Larille			
14.88	Sta17				
16.52	Road				
16.19	Sta18				
17.62	Sta19				
19.67	Sta20				
21.94	Sta21				
26.39	Sta22				

Source: JICA Study Team

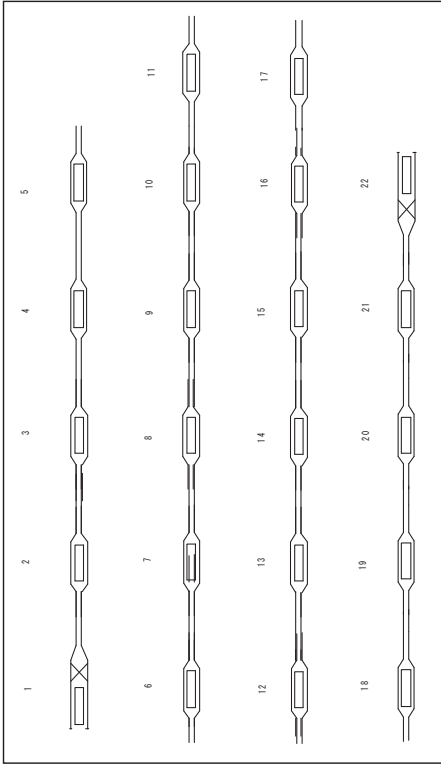
5.5 Track structure and layout plan

As for the transit system, several types are applicable as described before. Images of track and station structures will be shown in Table 5.4 if AGT (Automated Guide Transit) is applied.

Table 5.4 Image of Track and Station

Type	Section view	Remarks
General section		Supporting structure is located in median separator.
Stations		Island platform is applied.

Source: JICA Study Team



Source: JICA Study Team

Figure 5.3 Track Layout Plan

5.6 Tentative Train Operation Plan

Based on the demand forecast result and others, the basic plan of train operation is determined as shown in Table 5.5.

As shown in section 5.3, for this corridor a transit system coping with steep vertical alignment will be preferable due to its terrain characteristics. However, because of a relatively large peak load, medium capacity systems such as AGT seems to be unfavorable and it is considered that a transit system corresponding with medium to large transport capacity, i.e. monorail or LIM train, seems to be a better choice.

Table 5.5 Basic Train Operation Plan

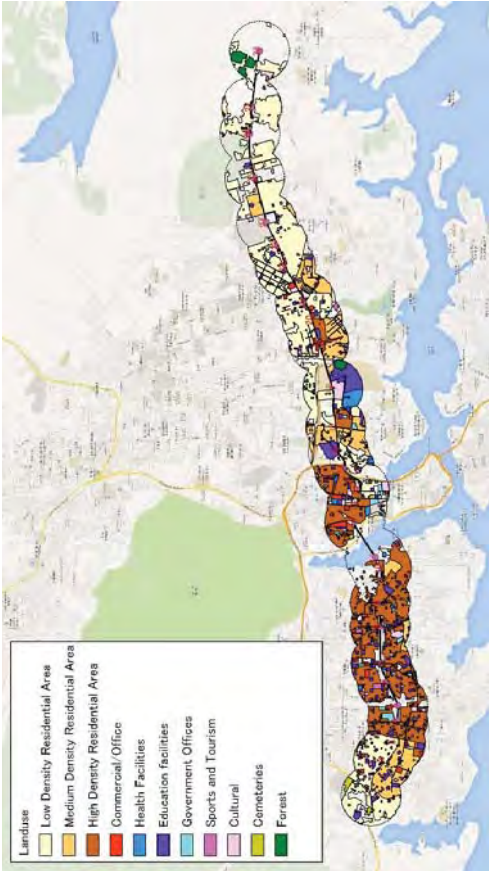
Item	Parameters	Remarks
Total daily ridership	369,800 (2030)	According to demand forecast
Peak load	29,000 PPHPD (2030)	
Nominal car capacity	100 passengers	Assuming LIM train specification
Maximum car capacity	150 passengers	Assuming congestion ratio is 150% X nominal capacity
Operation route length	26.4 km	From Yopougon to Bingerville
Running time for round trip	58 minutes	Assuming commercial speed is 30 km/h and reversing operation time is 5 minutes.
Train capacity in peak hour	1500 passengers/train	10 cars/train
Required train headway	3 minutes	20 trains /peak hour
Required number of cars	220 cars	Including spare cars

Source: JICA Study Team

5.7 Existing land use in railway corridor

Figure 5.4 shows the existing land use in railway corridor T-1-2.

As shown in the figure, separated by the north-south road, Boulevard De Gaulle, the western half and eastern half areas have different land use patterns, i.e. the western area, covering Yopougon, Attécoubé and Plateau communes, is mostly high density residential use while the eastern area, covering Cocody and Bingerville, specified with mixed land use combined with lower density residential use, education facilities and cultural uses.



Source: JICA Study Team

Figure 5.4 Existing Land Use in Railway Corridor of Project T-1-2

The areas of informal settlement are shown in Figure 5.5. It is seen that the informal settlement area has developed on a pretty large scale in Yopougon and Attécoubé communes. As the geographical feature of these areas, it is pointed out that most of the area consists of reserved space for future road projects or fringe coastal area of the lagoon with limited access. In particular on the area for future roads, it is critically concerned with the project because space for the focused road is also used as its right of way.

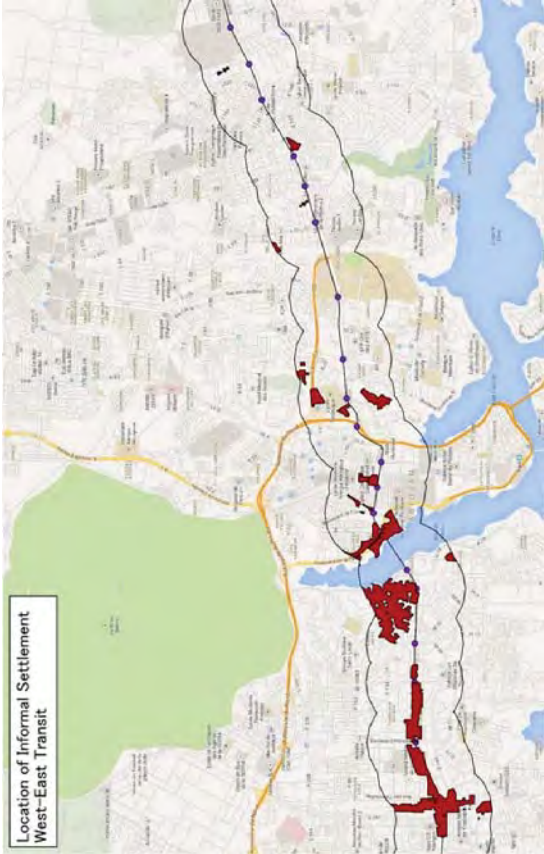


Figure 5.5 Area of Informal Settlement in Railway Corridor T-1-2

5.8 Related Technical Issues

As for the technical issues, the following points are considered:

- Right of way: This corridor route assumes that its ROW (Right of Way) is secured on road space which includes existing road. In this regard, space allocation between road traffic and transit structure become a crucial issue. This study assumes that the space of the road median separator will be allocated for transit in principle, however it requires some coordination with road traffic where serious road congestion takes place.
- Railway track: Because of transport capacity and train services with high frequency, a double track system should be applied. Regarding its track gauge, normal standard gauge (1,435 mm) is desirable because this corridor is newly developed railway without any conflict by current track standard.
- Bridge section over Banco bay: As a critical issue for this project, it is pointed out that passing over Banco bay seems to be headache issue. If single long span bridge is applied, its span length is estimated at nearly 800m and it means a huge investment cost burden to the project. Therefore it is important to examine whether another technical alternative to evade long span bridge, i.e. applying land basis rerouting, can be applied.
- Train depot: For the parking and maintenance work of rolling stocks, a train depot is needed. Required area size depends on the number of train sets; however, it will require approximately 3-5 ha

at the very least. Its location should be chosen in terms of available land lot size and surrounding land use condition because in general train depots are regarded as an environmental hazard.

Appendix D

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Preliminary Investigation Report for the Grain Terminal of Abidjan Port

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1.0 Present Situation of Abidjan Port

1.1 Abstract

The Port of Abidjan is managed by Abidjan Port Authority (PAA), which is an autonomous body highly independent from the government.

Major roles and duties of the PAA are as follows:

- Planning, coordinating and management of port activities
- Securing human safety and assets in the port area
- Procurement of port equipment
- Construction of port facilities

Present organization of the PAA is shown in Figure 1.1.

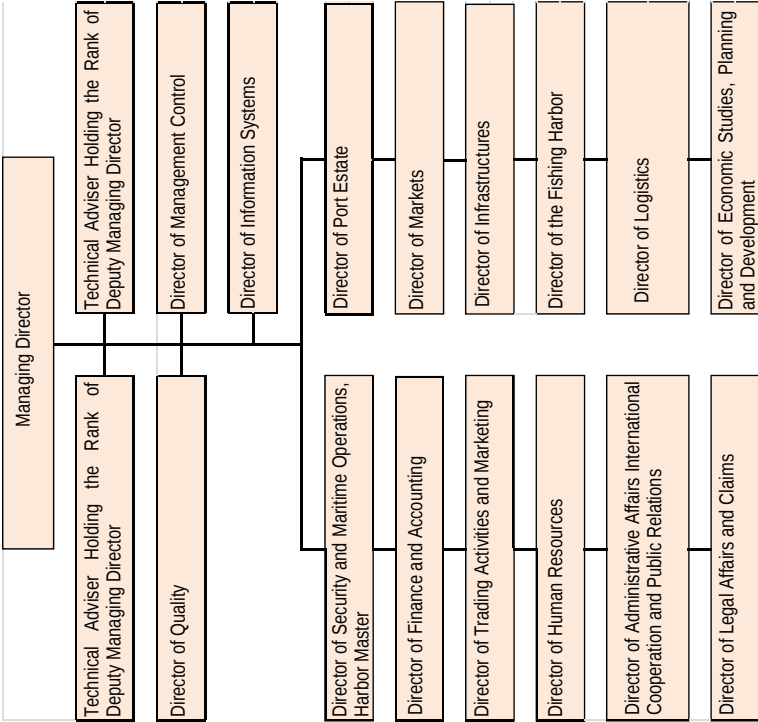


Figure 1.1 Organization of the PAA

Many organizations are involved in port development, management and operation. Roles and duties of relevant organizations are listed in Table 1.1.

Table 1.1 Roles and Duties of Relevant Organizations

Activity	Responsible Organization	Authorizing Organization	Final decision
Formulation of long term plan	PAA	MOT MOF	Government
Making plan of SEZ in Boule Island	PAA MOF	PAA MOF	Government
Formulation of development project	PAA	MOT	MOP
Identification of PPP project	PAA	MOT MOF	Government
Contract with concessioner on PPP	PAA	PPP Committee	Government
Construction of major facilities	PAA	MOT MOF	MOT MOF
Ancillary facilities and equipment	PAA	PAA-	PAA
Maintenance and Repair (Major facilities)	PAA	MOF	PAA
Maintenance and Repair (Equipment)	Operator	PAA	Operator
Securing budget for development	PAA	MOF (MOT)	MOF
Fundraising by loan	PAA	MOF (MOT)	Government
ODA request to JICA	PAA	MOF (MOT)	Government

PAA: Port Authority of Abidjan
MOEI: Ministry of Economy and Investment
MOT : Ministry of Transport
MOF: Ministry of Finance
MOP: Ministry of Planning
() : To be informed after decision making

1.2 Present Situation of Port Facilities

The Port of Abidjan has a water area of 1000 ha. There are 34 quays with berths stretching over 6 km; the total area of warehouses and sheds is 140,000m2 and that of open storage facilities is 105,000 m2.

Almost all major port facilities were constructed by France in the 1950s. Accordingly, the port has not been able to cope with the recent trend of large vessels with deep draught. It can be said that major facilities of the port are obsolete and out-of-date.

Due to the civil war, the maintenance and renewal of port facilities has not been carried out properly for these ten years and the superannuation of port facilities has become a serious issue. Systematic maintenance of port facilities should be carried out based on a comprehensive master plan for overall port development from the long-term perspective.

Port facilities under the control of PAA are outlined in Table 1.2.

Table 1.2 Outline of port facilities

Category	Item	Specification, Capacity
Vridi Canal	Channel Depth	-13.5m
	Channel Length	2700m
	Channel Width	370m
	Fairway Width	110m ???
Water Ways and Basins	Water Area	1,000ha
	Mooring Buoys	4 Buoys
	Mooring Area	16 Area
	Total Berth Length	960m
Container Terminal	Maximum Berth Depth	-13.0m
	Number of Berths	5
	Yard Area	34ha
	Gantry Crane	4 (Capacity of 40-60 tons)
	RTG	16 (Capacity of 40 tons)
North Quay Grain (Wheat) Terminal	Number of Berths	3 (No.1-3)
	Total Berth Length	450m
	Maximum Draught	9.5m
	Number of Berths	2
	Total Berth Length	270m
Marine Base	Maximum Draught	9.5m
West Quay Grain Terminal	Number of Berths	7 (No.6-12)
	Total berth Length	1,050m
	Maximum Draught	9.5m
	Number of Berths	2 (No.13-14)
	Total Berth Length	300
Mineral Terminal (No.15 Bulk, No.16 Oil terminal)	Maximum Draught	9.5m
	Number of Berths	5 (No.16-20)
	Total Berth Length	750m
	Maximum Draught	10.0m
	Number of Berths	2
South Quay	Total Berth Length	350m
	Yard Area	51,000m2
	Maximum Draught	-8.7m
	Warehouse	14,400m2
	Total Berth Length	500m
Fruit Terminal	Yard Area	8.1ha
	Warehouse	1 for vehicle, 2 for general cargo
Ro-Ro Terminal	Total Berth Length	1,520m
	Maximum Berth Depth	-7.0m
Fishery Port		

Source : PAA

1.3 Cargo Handling Volume

1.3.1 International Trade Cargo Volume

Table 1.3 shows the international trade cargo volume throughput of Abidjan port from 2007 to 2013. Average cargo handling volume is approx. 21,000,000 tons except in 2011, when the cargo handling

volume dropped significantly due to the civil war. Imports account for 65% of the total handling volume and exports 35%. In general, imports have been increasing and exports decreasing.

Table 1.3 International Trade Cargo Handling Volume of Abidjan Port from 2007 to 2013

	2007	2008	2009	2010	2011	2012	2013
IMPORT	10,836,426	11,170,460	11,895,949	12,800,826	9,628,024	13,612,599	13,984,421
- Petroleum products	3,538,777	3,753,012	4,295,085	5,075,007	3,126,309	4,590,853	4,575,038
- General cargo	6,919,045	6,933,942	7,088,733	7,220,966	6,034,761	8,528,813	8,894,973
- Fisheries	378,603	483,506	512,131	504,853	466,954	492,932	514,410
EXPORT	9,118,783	9,656,466	10,831,286	9,683,089	7,014,518	8,101,211	7,482,143
- Petroleum products	4,837,237	4,832,178	6,599,897	5,641,275	3,546,153	3,938,596	3,165,299
- General cargo	4,204,263	4,713,854	4,116,495	3,901,997	3,351,790	4,051,588	4,202,332
- Fisheries	77,283	110,434	114,894	139,818	116,575	111,027	124,512
TOTAL	19,955,209	20,826,926	22,727,236	22,483,915	16,642,542	21,713,810	21,476,564
- Petroleum products	8,376,014	8,585,190	10,894,982	10,716,282	6,672,462	8,529,449	7,740,337
- General cargo	11,123,308	11,647,797	11,205,229	11,122,962	9,386,551	12,580,401	13,097,305
- Fisheries	455,887	593,939	627,025	644,671	583,529	603,959	638,922

Source: PAA

1.3.2 Container Cargo Handling Volume

Table 1.4 shows container cargo handling volume throughput of Abidjan port from 2007 to 2013. Container cargo handling volume of Abidjan port was approx. 650,000 TEU except in 2010 and 2011, when the cargo handling volume fell due to the civil war. The cargo handling volume seems to have reached the handling capacity of the port. The number of laden containers for import cargo and export cargo are almost equal.

Table 1.4 Container Cargo Handling Volume Throughput of Abidjan Port from 2007 to 2013

	2007	2008	2009	2010	2011	2012	2013
IMPORT							
Empty containers	101,964	113,586	85,071	75,574	80,812	96,598	100,597
Full containers	101,433	115,220	127,768	132,878	130,024	153,235	169,827
Transship	67,613	91,537	93,205	75,020	58,999	68,999	57,694
Total	271,010	320,343	306,044	283,472	269,835	318,832	328,118
EXPORT							
Empty containers	51,713	73,012	65,382	54,361	55,306	83,949	80,707
Full containers	141,216	154,790	141,647	149,444	161,930	160,423	181,440
Transship	67,870	100,264	97,112	74,258	59,346	70,713	59,589
Total	260,799	328,066	304,141	278,063	276,582	315,085	321,736
TOTAL							
Empty containers	153,677	186,598	150,453	129,935	136,118	180,547	181,304
Full containers	242,649	270,010	269,415	282,322	291,954	313,658	351,267
Transship	135,483	191,801	190,317	149,278	118,345	139,712	117,283
Total	531,809	648,409	610,185	561,535	546,417	633,917	649,854

Source: PAA

1.3.3 Main Grain Commodities and Handling Volume at Present Grain Wharf

Table 1.5 shows cargo handling volume of main commodities handled at the existing grain wharf of Abidjan port. These volumes include transit cargo volume for landlocked countries.

The largest import grain cargo is rice, followed by wheat and sugar. As to export cargo, cacao is the largest commodity, followed by cashew nuts and coffee. A large volume of cacao is exported from San Pedro port which is close to the main production area in the western part of the country. Cashew nuts are mainly exported as container cargo.

Table 1.5 Grain Cargo Handling Volume of Abidjan Port from 2007 to 2013

Commodity	2007	2008	2009	2010	2011	2012	2013
Import							
Rice in bulk, Rice in package	1,144,090	910,095	1,496,192	1,069,866	1,215,282	1,773,040	1,311,756
Wheat	255,659	291,739	468,996	628,656	515,469	641,699	667,507
Sugar	155,244	110,195	150,461	182,477	124,922	187,821	303,908
Export							
Coffee beans	109,232	63,361	87,985	96,197	35,100	83,816	86,148
Cocoa beans	405,001	396,996	484,437	398,542	609,443	501,597	503,614

Source: PAA

1.3.4 Transit Cargo Volume of Abidjan Port

Table 1.6 shows transit cargo and transshipment cargo handling volume throughput of Abidjan port from 2007 to 2013.

Table 1.6 Transit Cargo and Transshipment Cargo Handling Volume Throughput of Abidjan Port from 2007 to 2013

	2007	2008	2009	2010	2011	2012	2013
IMPORT	2,482,872	2,191,079	2,390,823	3,523,627	2,395,163	2,557,354	3,132,374
Transshipment	1,775,984	1,664,643	1,317,111	2,676,797	1,712,471	1,167,479	1,564,644
Overall Transit throughput	706,888	526,436	1,073,711	846,829	682,692	1,389,874	1,567,730
* Landlocked countries	706,746	525,762	1,073,680	844,335	681,448	1,375,773	1,555,398
- Burkina Faso	444,403	281,956	482,394	441,747	330,533	667,851	740,926
- Mali	262,159	242,553	579,062	402,082	349,593	699,616	803,701
- Niger	184	1,252	12,224	506	1,323	8,306	10,770
* Other coastal countries	142	674	31	2,495	1,244	14,101	12,332
EXPORT	1,489,100	1,876,828	1,516,755	3,530,477	2,010,194	2,041,181	1,684,802
Transshipment	1,302,528	1,690,791	1,332,814	3,339,522	1,927,946	1,817,924	1,424,066
Overall Transit throughput	186,572	186,037	183,941	190,955	82,248	223,257	260,736
* Landlocked countries	186,572	186,037	183,941	190,955	82,248	223,257	260,736
- Burkina Faso	74,475	102,694	106,557	109,234	63,869	90,246	144,879
- Mali	112,097	83,344	77,384	81,721	18,378	133,011	115,857
- Niger	0	0	0	0	0	0	0
* Other coastal countries	0	0	0	0	0	0	0
TOTAL	3,971,972	4,067,907	3,907,577	7,054,104	4,405,357	4,598,534	4,817,176
Transshipment	3,078,512	3,355,434	2,649,925	6,016,320	3,640,417	2,985,403	2,988,710
Overall Transit throughput	893,460	712,473	1,257,652	1,037,784	764,940	1,613,131	1,828,466
* Landlocked countries	893,318	711,799	1,257,621	1,035,290	763,696	1,599,030	1,816,134
- Burkina Faso	518,878	384,650	588,951	550,981	394,402	758,097	885,805
- Mali	374,256	325,897	656,446	483,803	367,971	832,628	919,558
- Niger	184	1,252	12,224	506	1,323	8,306	10,770
* Other coastal countries	142	674	31	2,495	1,244	14,101	12,332

Source: PAA

Abidjan port is an important gateway port for landlocked countries. Transit cargo is mainly for Mali, Burkina Faso and Niger. Transit cargo volume for Mali and Burkina Faso accounts for more than 95% of the total transit cargo volume of Abidjan port. Import and export volumes for transit have been increasing except during the civil war in 2010 and 2011.

According to an interview with PAA 70% of the cargo volume of landlocked countries was handled by Abidjan port before the civil war but that figure dropped to 10% during the conflict. However, Abidjan port's share of such cargo has recovered to 42%.

i) Transit Cargo Volume for Mali

Table 1.7 shows the transit cargo handling volume throughput of Abidjan port for Mali from 2010 to 2013. Total cargo handling volume rose from 480,000 tons in 2010 to 920,000 tons in 2013, an increase of 92%.

Import volumes of rice, wheat, sugar and fertilizer have been rapidly increasing. In exports, cotton has been increasing.

Table 1.7 Transit Cargo Handling Volume Throughput for Mali from 2010 to 2013

	2010	2011	2012	2013
Import	62,927	105,259	256,695	193,729
Rice	48,600	40,358	51,106	100,634
Wheat	847	0	10,998	12,477
Other Cereals	507	0	0	601
Flour	137,237	94,279	165,794	221,112
Sugar	2,897	2,031	7,595	4,235
Daily Products	1,257	278	296	1,801
Profiles, Toles	70,443	59,206	142,148	92,958
Fertilizer	1,513	4,810	1,213	430
Construction material	75,854	43,372	63,771	175,726
Others	402,082	349,593	699,616	803,703
Export	10,947	0	0	0
Beans	67,538	15,205	125,497	110,505
Cotton	3,235	3,173	7,515	5,352
Others	81,720	18,378	133,012	115,857
Grand Total	483,802	367,971	832,628	919,560

Source: PAA

ii) Transit Cargo Volume for Burkina Faso

Table 1.8 shows the transit cargo volume throughput of Abidjan port for Burkina Faso from 2010 to 2013. Total cargo handling volume rose from 550,000 tons in 2010 to 885,000 tons in 2013, an increase of 61%. Import volumes of rice, fertilizer, sugar and refined oil have been rapidly increasing. In exports, cotton has been increasing.

Table 1.8 Transit Cargo Handling Volume Throughput for Burkina Faso from 2010 to 2013

	unit : ton			
	2010	2011	2012	2013
Import				
Rice	169,579	170,984	301,092	286,037
Wheat	42,113	29,400	28,600	32,782
Other Cereals	8,417	4,890	13,665	14,244
Flour	6,514	2,379	4,541	1,783
Daily Products	2,867	1,460	3,112	5,243
Salt	8,778	4,580	9,360	7,735
Fertilizer	74,131	33,829	72,425	91,005
Sugar in Bag	27,587	14,044	20,966	66,132
Refined Oil	18	9,980	87,812	57,779
Others	101,745	58,988	126,277	178,187
Total	441,749	330,534	667,850	740,927
Export				
Beans	10,412	11,302	8,071	27,239
Sesami	17,721	6,319	13,561	15,887
Cotton	55,011	13,708	58,173	89,687
Sugar	0	600	0	0
Others	26,091	31,940	10,441	12,066
Total	109,235	63,869	90,246	144,879
Grand Total	550,984	394,403	758,096	885,806

Source: PAA

iii) Transit Cargo Volume for Niger

Table 1.9 shows the transit cargo volume throughput of Abidjan port for Niger from 2010 to 2013. Total cargo handling volume had increase from 500 tons in 2010 to 10,000 tons in 2013. Rice has been imported since 2012.

Table 1.9 Transit Cargo Handling Volume Throughput for Niger from 2010 to 2013

	unit : ton			
	2010	2011	2012	2013
Import				
Rice	0	0	6,200	8,199
Others	506	1,323	2,106	2,571
Total	506	1,323	8,306	10,770
Export				
Sesami	0	0	0	0
Others	0	0	0	0
Total	0	0	0	0
Grand Total	506	1,323	8,306	10,770

Source: PAA

1.4 Port working facilities, working conditions & Warehousing

1.4.1 Number of Bulk ships entering Abidjan port and cargo handling volumes

Shown below are the number of ships entering Abidjan and average annual cargo handling volumes. Also shown are maximum worked tonnages as per record at Table 1.10.

Table 1.10 Number of Grain cargo vessels discharged per year (2010-2013 total wharf)

(3 zones = North3, West 7, South 3 wharfs in total)

	2010	2011	2012	2013
Wheat	42	34	45	42
Rice	117	140	179	152
Sugar	28	25	24	29
3 zones in Total	187	199	248	223
(Annual tonnage)				
Wheat	628,656	515,469	241,699	667,507
Rice	1,069,866	1,215,282	1,773,040	1,311,756
Sugar	182,477	124,922	187,821	303,908
Average per vessel	10,059	9,325	10,494	10,238

(Each vessel average tonnage handled and Maximum tonnes)

	2010	2011	2012	2013
Wheat	14,968	15,161	14,260	15,893
Rice	9,144	8,680	9,905	8,630
Sugar	6,517	4,997	7,512	10,479
(Max figure by vessel)				
Wheat	63,315	42,900	30,200	43,175
Rice	48,256	60,097	45,878	50,233

Source: PAA Statistics

As shown in Table 1.10, the import ratio of Rice from year 2010 to 2013 was slow but it was seen to increase in 2012 because of the change of the rice tax system (see 1.77 million tonnes) in this year so it caused an unusual increase in import volumes.

We guess there will be no rapid increase in the number of bulk ships calling, or the size of ships until the planned dredging completion at VRIDI Canal and extension of the wharf and providing adequate ship draft by around the year of 2020.

However, the South Wharf reclaim project seems to have started to modify No.2 container terminal in advance of the Grain terminal construction. This could cause the bulk ships will lose their ready access to the berthing wharf because we expect a slow increase in the bulk ship entry and expect congestion afterwards.

Consequently, if construction of the Grain Terminal is delayed at this stage, we can expect a large burden on the cargo forwarder, consignee and shipping charterers of the rice importing to Abidjan port because of the increasing cost.

We cover ship port stay times in another chapter.(refer 1.5.5 Table 1.16)

1.4.2 Grain cargo wharf utilization.

Wheat and Rice cargo utilization at standard wharfs is shown in Table 1.11

Table 1.11 Wheat and Rice Wharf utilization

(Silo)	2010	2011	2012	2013
(Wheat)				
North Wharf 480 m	3.58	2.94	3.66	3.8

(whole Wharf for Rice)

(all Grains)	2010	2011	2012	2013
Wharf all length 2630m	1.11	1.27	1.84	1.37

Rice was purchased largely in Year 2012 because of the change of Tax regulations.

Source: PAA statistics

NB. Setting 1,000 tons handling per day per one meter length of the wharf = 1.0 (standard)

By Table 1.11, Wheat handling using the Silo at North Wharf is attaining a higher ratio up to 3.8 which seems good utilization compared to the standard 1.0.

The rice operation is mainly concentrated at the West wharf but occasionally it is not available because of another kind of ship (such as Cement in bags or a Sugar vessel) but PAA has no exact data for only rice discharged at West quay so we are obliged to combine the whole rice tonnage discharged by all the available quay lengths to arrive at the total in the West, North partly as to 2,630 meters.

But the rice utilization in the year of 2012 was a peak showing a 1.84 index figure however, the year of 2013 was back to 1.37, just beyond 1.0.

1.4.3 Occupation of the Wharf

As per PAA's quarterly report, the first quarter of 2014 occupation ratio is shown in Table 1.12 (excluding Cement import vessels and Cocoa beans export vessels). The major import cargo into Abidjan port, rice, occupies 67.7 % of the wharf and it is clear that the quantities in 2012, 2013, and 2014 are sharply increasing.

The use of the wharf actually follows port operation functions, 1) wharf marshalling and temporary storage at the wharf and shed. 2) Forwarder's cargo stowed temporarily 3) Truck feeder delivery to Burkina Faso and Mali with transit cargo 4) Shed utilization of leased spaces on the wharf are shared.

Therefore, during ship operations (discharging) it is usually congested with trucks, fork lifts and cargo sorting groups on the narrow shore apron.

Table 1.12 Wharf occupation average ratio at Abidjan Port (%)

By Zone	Wharf Occupation average ratio (2014=only 1st quarter compare 2013/2014			
	2012	2013	2014	
North (3 Silos)	40.5	51.2	50.3	-0.9
West (7 ware houses)	45.6	58.1	67.7	9.6
South (4 ware houses)	30.7	36.3	48.1	11.8

Source: PAA/DEEP

1.5 Entry of the vessels

1.5.1 Grain carrying vessels

We call grain carriers Bulk Carriers. Present working style is to load 50kgs rice bags into a net sling (30-40 bags per net) in the ships hold and lift them using the ship's gear which then swings them onto the shore side which is a standard in Abidjan.



Source: JICA Study Team

Figure 1.2 Rice discharging at Abidjan Port (1)



Source: JICA Study Team

Figure 1.3 Rice marshalling on the apron at Abidjan (2)



Source: JICA Study Team

Figure 1.4 Truck loading work and conditions

In the case of Rice bags, there is a split discharge, one for Abidjan and the other is called transit cargo to other countries such Burkina Faso and Mali, and occasionally Niger, which requires sorting out for delivery. The transit cargo may be loaded directly onto the trucks to dispatch immediately to the required countries.

The above photo shows rice that was directly discharged from a vessel and sorted out for the trucks by port labor or the trucking company being loaded onto a vehicle for delivery to another area.

1.5.2 Warehouse at wharf

At the West wharf, there is one warehouse (No.6~11). PAA controls the rent (per annum or per month basis) and leases it out to the main forwarders.

Approximately 20 companies are usually registered on request applications for the warehouse space. Basically one year rent is a standard but the shortest is for one month.

It is mainly being used for storage for Rice, Sugar, Fertilizer, and exporting Cocoa beans for peak season rent during September to the next March.

PAA is not concerned with the cargo in the shed but leaves control to the forwarders who always pay attention to their cargoes that are in storage.

Shown below on Table 1.13 is the current rental cost (currency CFA).

Table 1.13 Charge table for wharf warehouse for rent

(One year)	CFA	Short Period (1 month)
No roof ware house	5400 /m ²	
With Roof shed	9360 /m ²	480 /m ²

Source : Created from PAA Data

As explained, the warehouse is usually used for Rice and Cocoa beans for export and Cement import. Rice and Sugar might be picked up directly from ships alongside and there are always many trucks in the queues on the wharf.

If in the future this traditional custom and procedure continues, we need to consider the best method such as a shore crane on the quay and providing a delivery truck lane to avoid congestion on the wharf.

1.5.3 Warehouse utilization (average)

As shown in Table 1.14, the utilization of the warehouse during 2012~2014 second quarter, North wharf for Wheat was over 80%, West wharf for Rice, Sugar, Salt, Fertilizer etc. was 60% which is growing rapidly.

Table 1.14 Average Warehouse utilization (per : %)

	2012	2013	2014	compare 2013/2014
North (5 houses)	58.1	75.3	80.1	4.8
West (7 houses)	46.6	53.4	59.6	6.2
South (4 houses)	46.8	76.9	86.0	9.1
Average	50.5	68.5	75.2	6.7

Source: PAA/DEEP

Created by visiting Investigator

1.5.4 All vessels that called at Abidjan on a yearly basis (Commercial only)

Shown in Table 1.15 is the number of vessels that called at Abidjan Port per year. Over 10% of the vessels are Bulk Carriers.

Table 1.15 Number of vessels called at Abidjan per year

	2010	2011	2012	2013	Var % 2013/2012
Conventionals	252	180	215	226	5.1
Container ship	824	561	693	774	11.7
Car carrier	265	156	198	210	6.1
Bulk Carrier	184	170	248	268	8.1
Tanker	262	161	137	87	-36.5
Oil handling	196	184	354	339	-4.2
Reefer vessel	150	161	159	168	5.7
others	196	183	358	269	-24.9
Total vessels	2,329	1,756	2,362	2,341	-0.9

Bulk Carrier including Rice,Wheat and Sugar in major

Source: Crated by PAA stats

1.5.5 Vessel Port-Time in Abidjan

We have examined the extract vessel waiting time outside the harbor and port stay time at the West wharf during 2012 and up to May 2014 using PAA's data extraction for all vessels which is shown in Table 1.16 below.

We have excluded non-standard days used in the port such engine trouble, repair work and other reasons for vessels staying over 10 days. We can guess by this table that berth congestion and anchoring still continues and causes a burden to the traders or the carriers.

Therefore, the average port stay in Abidjan is increasing, even excluding such vessels in due to accident, repair or similar reasons. The number of cement cargo vessels is increasing because the cement is needed to make the extensive repairs to the buildings and the road infrastructures and therefore, the West wharf congestion is expected to increase.

Table 1.16 West Wharf usage in Abidjan Port (Days)

Year	Vessels	LOA (meter)ave.	Wait out port	Entry-Sailed(average)
2012	27	172.0	2.48	11.00
2013	32	177.4	3.96	13.60
2014 (up to May)	14	180.7	5.00	9.00

Source: PAA created using PAA Statistics

As Table 1.16 indicates, in the year of 2013, Grain vessels waited 3.96 days outside the port and the average port stay was 13.6 days from entry signal to sailing out.

PAA Data has no particular details such as rainy days or weather recovery waiting time but the total time includes such inevitable loss-time at the port.

1.6 Data and Information on Natural Conditions

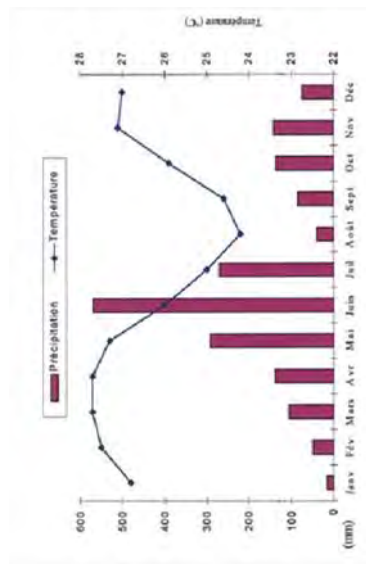
1.6.1 Tide data

Tide data of Abidjan port is as follows.

- H.W.L +1.60
- M.W.L +1.10
- L.W.L +0.80
- C.D.L ±0.00

1.6.2 Rain fall and Temperature

Figure 1.5 shows average monthly rainfall data and average temperature of Abidjan from 1960 to 1999. Rainfall is heaviest in June (over 500mm) while it is lowest in January and August. Monthly average temperature ranges between 24°C and 28°C throughout the year.



Source: PROFIL ENVIRONNEMENTAL du PORT D'ABIDJAN

Figure 1.5 Monthly Rainfall and Temperature in Abidjan

1.6.3 Wind Velocity and Direction

Table 1.17 shows the monthly record of maximum wind velocity and direction in Abidjan from 1961 to 1975.

Table 1.17 Monthly Record of Maximum Wind Velocity and Direction

	Directions	Vitesses (km/h)	date
Janvier	Est	72	26/01/63
Février	Est	65	28/02/64
Mars	Nord-Est	61	03/03/62
Avril	Est-Nord-Est	68	14/04/65
Mai	Est	100	14/05/73
Juin	Est	76	03/06/63
Juillet	Sud-Ouest	43	08/07/75
Août	Sud-Ouest	36	24/08/75
Septembre	Est	58	14/09/68
Octobre	Est	28	26/10/73
Novembre	Sud	36	05/11/74
Décembre	Sud-Est	40	02/12/75

Source: PROFIL ENVIRONNEMENTAL du PORT D'ABIDJAN

1.6.4 Earthquake

Not Applicable

1.6.5 Geologic Stratum

Geological stratum of Abidjan is formed with clayish-sand and sandy-clay. Surface of the ground is covered by a humus layer 30cm thick.

1.6.6 Soil Condition

In-situ soil condition testing has been conducted at the new grain terminal candidate area. The Menard Pressure meter test has been applied to confirm horizontal reaction force of each soil layer. Standard penetration test was not conducted. Figures 1.6, 1.7, 1.8 and 1.9 show Locations of Bore-hole tests and three bore-hole test results for SP1, SP2 and SP3.

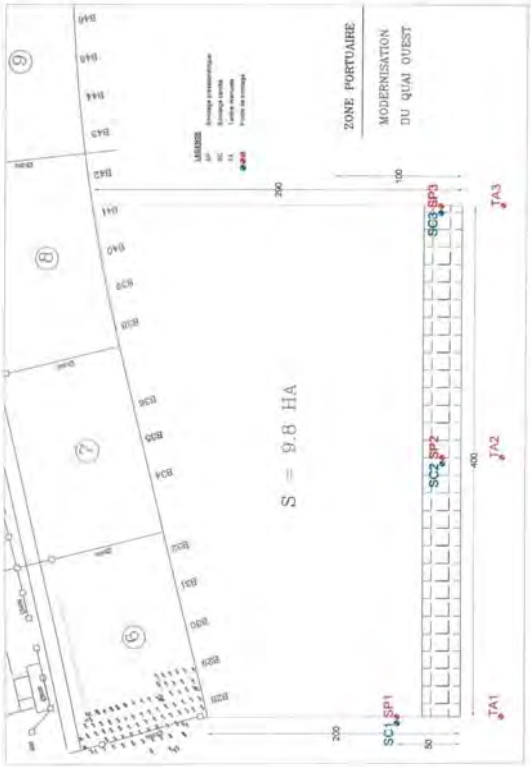


Figure 1.6 Locations of Bore-Hole Tests

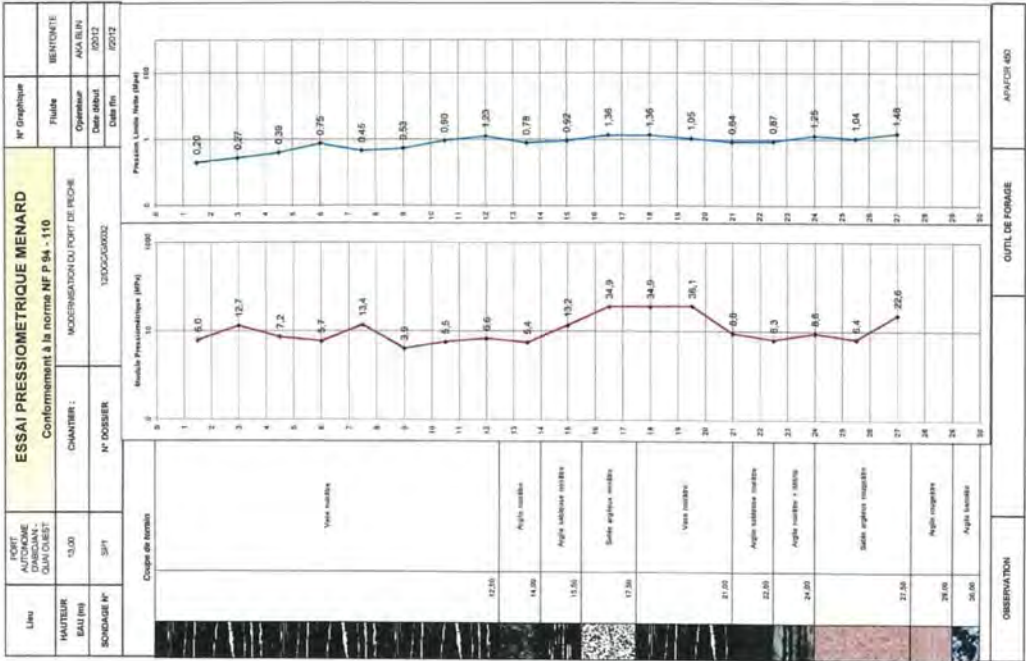


Figure 1.7 Bore-hole Data SP1

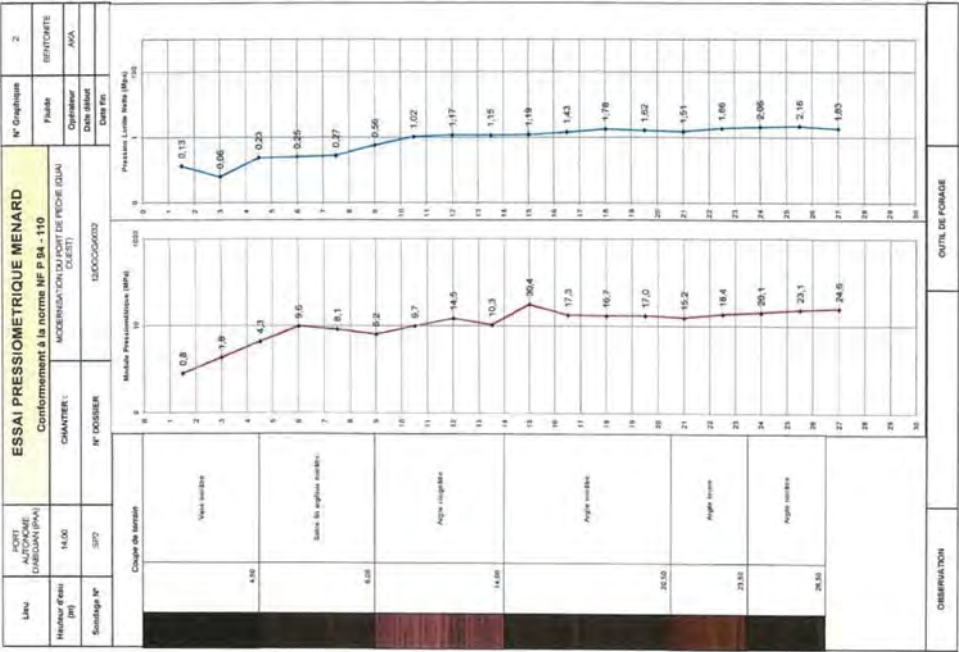


Figure 1.8 Bore-hole Data SP2

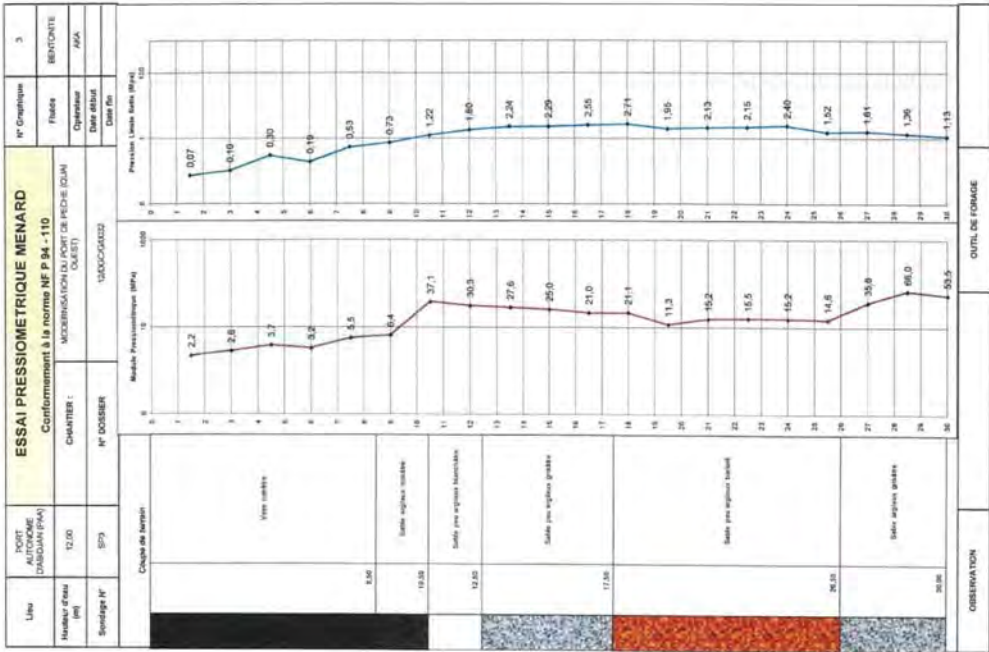


Figure 1.9 Bore-hole Data SP3

1.7 Data and Information on Environmental Conditions

PAA prepared Environmental Reports in 2006, 2009 and 2012. The Environmental Report content regarding Abidjan port is as follows.

- Laws and regulations applicable to port development projects
- Environmental Standards (Water Quality, Sediment Quality, Air Quality, Noise and Vibration)
- Environmental data (Water Quality, Sediment Quality, Air Quality) in Abidjan port
- Inventory of Fish, Animals, Birds, and Plants living in Abidjan port

From an interview with PAA staff in charge of environmental issues, the JICA Study Team obtained the following information.

- There is no natural reserved area in Abidjan port.
- RAP (Resettlement Action Plan) Manual of World Bank is applied
- EIA (Environmental Impact Assessment) Manual is prescribed
- Agence Nationale De l'Environnement (ANDE) has a list of registered environmental consultants

2.0 Port Policy and Port Planning

2.1 Role and Status of the Port of Abidjan in the West African Region

The population of West Africa (Ecowas area) has increased almost fourfold from 78 million in 1960 to 300 million in 2011. During this period, international trade volume also sharply increased. In 1970, total value of exports was \$US 2.9 billion and that of imports was \$US 2.7 billion. In 2003, total value of exports had reached \$US 26.9 billion and that of imports had reached \$US 32.3 billion, increases of 9.2 times and 12 times respectively over the 30-year period. While four-fifths of the total trade value was trade with European countries in 1970, by 2003 one-fourth of the total import value was derived from Asian countries, indicating that the trade area has greatly expanded.

There are 20 large ports in the region each of which handles more than 500 thousand tons of cargo per year. Total cargo volume handled at these ports is approximately 140 million tons. Major ports are Abidjan, Tema, Cotonou, Lome, Dakar, Lagos and Douala. These ports import daily necessities and export minerals and goods as the major port in their respective countries. In addition, these ports are gateways for neighboring inland countries and compete with each other for the inland market.

The Port of Abidjan is the largest port in the West African Region and is located in the center of the West African Region, and it is easily accessible from inland neighboring countries. It has obtained the status as the maritime center of the West African French Language Zone. The port also ranks first in Africa in the export of certain agricultural products (such as cocoa, coffee, pineapples and bananas) as well as timber and manganese ore. The Port of Abidjan is the largest container port in the West African Region and is regularly called at by 53 shipping lines including two Japanese shipping lines. The Port of Abidjan is the hub port of the West African region in terms of cargo handling volume and number of shipping lines. It has a strong connection with inland countries such as Burkina Faso, Mali, Niger etc., handling a significant amount of the transit cargo for these countries.

According to the PAA, before the civil war, 70% of the cargo of the inland countries had been handled at Abidjan. However, with the onset of the war, those cargoes largely shifted to other ports such as Cotonou, Tema and Rome. The share of Abidjan rapidly dropped to 10%. Since the end of the civil war, the transit cargo of inland countries has been returning to Abidjan and its share has now grown to 42%. While the basic structure of the international cargo flow in the West African Region is now changing and competition among the major ports in the region is intensifying, the port of Abidjan will continue to play a very important role in the region.

2.2 Current Development Plans of the Port of Abidjan

2.2.1 Major Plans related to Abidjan Port Development

2.2.1.1 Development Plans for the Regional Economic Communities

Among the various development projects listed in the PIDA (Program for Infrastructure Development in Africa), each of the various development projects in the ECOWAS region is prioritized and listed in the Priority Action Plan (PAP). High priority (S3/S4) is given to the enhancement of trade and promotion of the PPP project in Abidjan-Lagos Coastal Corridor; 290 million US\$ in development funds have been allocated for that purpose.

2.2.1.2 National Development Plan of Cote d'Ivoire

The basic economic policy of the government of the Cote d'Ivoire is

- To become a rising nation by 2020
- To promote large scale infrastructure development
- To activate the national economy and
- To promote social development.

To realize these policies, the National Development Plan (PND) has been drafted. The PND includes a four year plan (from 2012 to 2015) in various sectors such as infrastructure, energy, telecommunications and agriculture. PND allocates 2,820 billion CFA for investment in infrastructure and the transportation service sector. In order to modernize and expand the Port of Abidjan, the following projects shall be implemented under the PND: (a) Construction of a new container terminal to accommodate larger vessels, (b) Deepening and expansion of Vridi Canal, (c) Gradual expansion and modernization of the conventional berths, (d) Development of a port highway, (e) expansion of the land area by reclamation. The PND includes 16 projects related to the Port of Abidjan and 18 projects related to the Port of San Pedro.

2.2.1.3 Port Policy of Cote d'Ivoire

Since independence in 1960, the Government of Cote d'Ivoire has continuously promoted the development of the Port of Abidjan and the Port of San Pedro. High priority is given to maximizing cargo handling capacity at the port of Abidjan as well as ensuring that it is the main gateway port for inland countries by strengthening its distribution route to inland countries and addressing the bottleneck of transportation at the borders. The port of San Pedro ranks first in cacao exports and also aims to be the largest exporter of timber and mineral ore in the West African Region.

2.2.2 Long Term Development Plan

There is no consistent or comprehensive long-term plan (Master Plan) for the Port of Abidjan although many development plans have been studied and proposed over the years (see Figure 2.1). The various individual projects proposed have not been based on a future demand forecast carried out in a scientific way, nor have consistency and priorities among these projects been systematically studied or evaluated. For example, the functional allotment between the plan of the free trade zone in Bouley Island and the

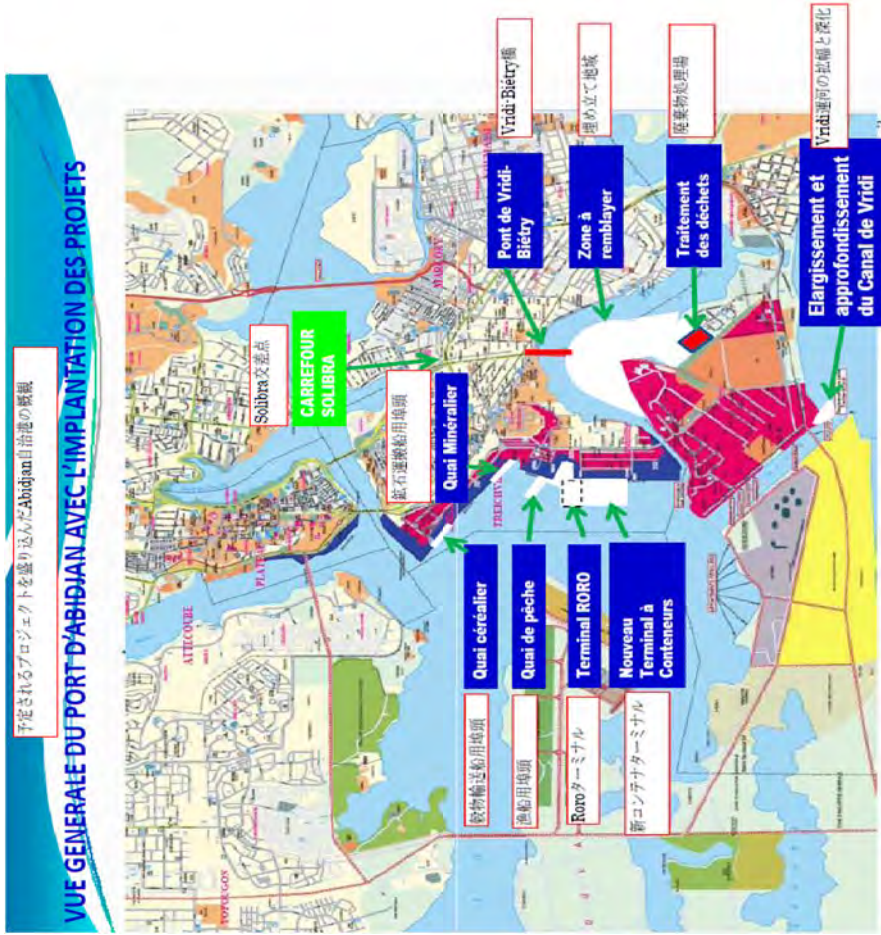
existing port facilities is not clearly mentioned. Although the development plan for Boulay Island is still in the conceptual stage, the construction of the access bridge and relocation of the inhabitants have been designated as high priority projects and budgeted with 50 billion FCFA in the PND. The bridge for the access road from Yopougon Area has already been financed with 28 billion FCFA by Banque Ouest Africaine de Développement (BOAD) and ECOWAS Bank for Investment and Development (EBID) . The construction period was expected to run from 2012 to 2015, but the construction has not started yet.



Figure 2.1 Basic Layout of Major Port Facilities

2.2.3 Priority Development Projects at the Port of Abidjan

The port development projects which the PAA proposed as the short term development projects (from 2012 to 2020) are shown in Figure 2.2. The duration of those projects varies from 1.5 years to 4 years.



Source: PAA

Figure 2.2 The long term conceptual plan and short term priority projects of the Port of Abidjan

Outlines and current status of those projects are as follows.

2.2.3.1 Deepening the Vridi Canal with expansion of its entrance

According to the PAA, the loan agreements with China and construction contract with the CHEC have been concluded. CHEC is conducting a site survey for preparation of construction work. A loan from the BOAD is expected for the supervisory work on the construction contract, but this loan has not been finalized yet.

The channel will be deepened to -18m deep by 2.5km in length and the opening of the canal will be expanded (to 370m in width) and deepened (to -20m in depth) .

A French consultant has made studies on the anticipated sedimentation problem due to the expansion of the entrance of the canal. The studies have proposed some alternative countermeasures against sedimentation such as extension and re-enforcement of the soil-saving jetty (presently 25m long) on the west side of the opening or prior dredging to trap sediment to prevent deposit from building up at the entrance of the canal.

Even with these countermeasures, sediment might accumulate in the canal and regular maintenance dredging might be necessary after the entrance of the canal is expanded.

Presently, PAA carries out maintenance dredging of 0.8 to 1.0 million m3 in the lagoon area once every two years. It is still not clear how much maintenance dredging will be necessary after improvement of the canal. This might largely affect the future operation and maintenance cost of the canal, but it is not directly critical to the feasibility of the new grain terminal project. Target year of the project has been officially set as 2017, however it might be shifted to 2018 due to the delay of the project. The details of the contract with CHEC have not been made available. The width of the fairway where the depth is 18m has not been determined yet, but one-way traffic will continue even after the completion of the project.

Besides the deepening and expansion of the canal, the oil jetties on the east bank of the canal will be relocated to the north shore of the West Bank of the canal. After the relocation, the deepening and expansion of the fairway necessary for two-way traffic will be possible. The required width of the fairway to enable two-way traffic is now under study. The capacity of the canal will be greatly improved after the relocation. The time schedule for the relocation of the oil jetties largely depends on when the oil refineries on the East Bank can be relocated to the West Bank, which is not clear at present. It might take a long time to realize two-way traffic in the canal.

The Vridi Canal is the only entrance from the outer sea and no alternative route is envisaged even in the long term. Since the number and size of the vessels calling at the Port of Abidjan may increase further, it should be continuously examined whether the width and depth of the canal is sufficient even in the long term. In developing the West Bank of the canal, the land use plan and facility allocation should be prepared so as not to prevent further expansion of the canal width. For the new grain terminal, the depth of the canal is important for the entry of the large size grain carriers but two-way traffic is not a critical issue for the project.

Table 2.1 Deepening the Vridi Canal with expansion of its entrance

Present situation and problems to be solved	• The depth of the channel is officially listed as -13.5m. Large vessels with a draught more than 11.5m are restricted from transiting the canal for safety reasons. • Maximum width of the canal is 370m, but the width of the opening has been narrowed to 220m in order to protect against waves and prevent alongshore sediment from precipitating. • There are some oil jetties on the east bank of the canal, navigation is restricted when oil tankers are at berth. The fairway of the canal has been narrowed and navigation is limited to one-way traffic using a time-sharing scheme. • Traffic capacity is limited due to one-way traffic and waiting for the tide.
Outline of the Project	• Deepening the channel to -18m by 2.5km in length. • Deepening and expanding the opening of the canal (to 370m in width and -20m in depth). • Anti-sedimentation measures such as extension and re-enforcement of the soil-saving jetty (presently 25m long) on the west side of the opening. • Transfer the oil jetties to the north end of the West Bank
Project Cost	139,700 million CFA (Cost estimated in NDP)
Project period	4 years
Present status of the contract	• Loan agreement with China and construction contract with the CHEC has been concluded. • CHEC is reportedly conducting a site survey for preparation of construction work.
Reference	PROJET 1 : ELARGISSEMENT ET APPROFONDISSEMENT DE LA PASSE D'ENTREE DU CANAL DE VRIDI  COMPLEXITE DE LA NAVIGATION A L'ENTREE / SORTIE 

Source : PAA

2.2.3.1 Deepening the Vridi Canal with expansion of its entrance

According to the PAA, the loan agreements with China and construction contract with the CHEC have been concluded. CHEC is conducting a site survey for preparation of construction work. A loan from the BOAD is expected for the supervisory work on the construction contract, but this loan has not been finalized yet.

The channel will be deepened to -18m deep by 2.5km in length and the opening of the canal will be expanded (to 370m in width) and deepened (to -20m in depth) .

A French consultant has made studies on the anticipated sedimentation problem due to the expansion of the entrance of the canal. The studies have proposed some alternative countermeasures against sedimentation such as extension and re-enforcement of the soil-saving jetty (presently 25m long) on the west side of the opening or prior dredging to trap sediment to prevent deposit from building up at the entrance of the canal.

Even with these countermeasures, sediment might accumulate in the canal and regular maintenance dredging might be necessary after the entrance of the canal is expanded.

Presently, PAA carries out maintenance dredging of 0.8 to 1.0 million m3 in the lagoon area once every two years. It is still not clear how much maintenance dredging will be necessary after improvement of the canal. This might largely affect the future operation and maintenance cost of the canal, but it is not directly critical to the feasibility of the new grain terminal project. Target year of the project has been officially set as 2017, however it might be shifted to 2018 due to the delay of the project. The details of the contract with CHEC have not been made available. The width of the fairway where the depth is 18m has not been determined yet, but one-way traffic will continue even after the completion of the project.

Besides the deepening and expansion of the canal, the oil jetties on the east bank of the canal will be relocated to the north shore of the West Bank of the canal. After the relocation, the deepening and expansion of the fairway necessary for two-way traffic will be possible. The required width of the fairway to enable two-way traffic is now under study. The capacity of the canal will be greatly improved after the relocation. The time schedule for the relocation of the oil jetties largely depends on when the oil refineries on the East Bank can be relocated to the West Bank, which is not clear at present. It might take a long time to realize two-way traffic in the canal.

The Vridi Canal is the only entrance from the outer sea and no alternative route is envisaged even in the long term. Since the number and size of the vessels calling at the Port of Abidjan may increase further, it should be continuously examined whether the width and depth of the canal is sufficient even in the long term. In developing the West Bank of the canal, the land use plan and facility allocation should be prepared so as not to prevent further expansion of the canal width. For the new grain terminal, the depth of the canal is important for the entry of the large size grain carriers but two-way traffic is not a critical issue for the project.



Figure 2.3 Present situation of the Vridi Canal

2.2.3.2 The development of the second container terminal and the new Ro-Ro terminal

The first container terminal with the maximum berth depth of -13m has an annual capacity of 900,000 TEU. To cope with the sharply increasing container cargo, a second container terminal with an annual capacity of 1,500,000 TEU is going to be constructed accompanied by a new Ro-Ro terminal. Although the maximum water depth of the container berth is -13m at present, some over-Panamax container vessels which mount 15 columns of containers have already called by reducing their cargo load to adapt its draught to the berth depth. As the size of container vessels calling at the port is expected to increase rapidly, the development of the second container terminal is urgently needed.

The construction cost of the second container terminal and the new Ro-Ro terminals is estimated at 580 million EUR, and the construction contract with the CHEC has been concluded in combination with the Vridi Canal Project. The three international banks, namely West-African Banque Atlantique, Societe Generale and Afreximbank, decided to give a loan of 200 million EUR to the PAA to cover the total construction cost of the second container terminal. Accordingly, construction work should soon commence. The remaining 380 million EUR has not been secured yet. The concession of operating and management of the second container terminal has already been awarded to a consortium featuring APM which is the current operator of the existing first container terminal. Terminal facilities and cargo handling equipment are to be prepared by the consortium at a cost of 243 million EUR. The operation of the terminal is expected to start in 2018.

For the construction of the TC2, the waterfront line is planned to be shifted offshore by 500m and should be consistently arranged within the overall water area utilization plan. Even after the expansion of the container terminal, there is sufficient distance, more than 1000m, between the terminal and Boulay Island and thus this new terminal will not obstruct future development of Boulay Island.

On the other hand, the shifting of the cargo presently handled at the south quay, which is to be demolished for the construction of the new terminal, is an urgent and serious issue. PAA expects that this shifted cargo can be handled at another berth by raising the cargo handling productivity, but a thorough study has not yet been conducted. Presently, a considerable amount of grain cargo is handled at the south quay and is expected to shift to the West Quay. Once the construction of the new grain terminal starts, cargo presently handled at West Quay should shift to other facilities, but no concrete plans have been drafted.

Table 2.2 The development of the second container terminal and the new Ro-Ro terminal

Present situation and problems to be solved	• The first container terminal with the maximum berth depth of -13m has an annual capacity of 900,000 TEU. To cope with sharply increasing container cargo, a second container terminal with an annual capacity of 1,500,000 TEU is going to be constructed accompanied by a new Ro-Ro terminal. Total annual capacity comes up to 2,400,000 TEU • Accompanied by Ro-Ro terminal
Outline of the project	• Container berth length 375m X 2berth • container berth depth -18m • Container yard of 37.5ha (750m X 500m)
Project Cost	Infrastructure: 580 million EUR, Terminal facilities and equipment: 243 million EUR
Project period	3 years
Present status of the contract	• Construction contract with the CHEC has been concluded together with the new Ro-Ro terminal construction and Vridi Canal project.
Reference	

SOURCE : PAA

2.2.3.3 The new grain terminal project

Presently, general grain cargo is handled at Berths No.6~No.12 of the West Quay and some berths in the South Quay. To cope with the increasing grain cargo volume and growing vessel size of grain carriers, the new grain terminal is planned to be constructed in front of the existing berths No.6~No.8. This new terminal will have a length of 400m and a depth of -15m in order to accommodate vessels with a draught of -13.5m; terminal space will be 10ha.

A request to fund this project through grant aid was submitted to JICA in September 2013. In the estimated cost breakdown, construction work on the quay wall, dredging and reclamation are shed, but pavement of the yard, the cargo handling equipment and storage facilities such as warehouse or shed are not included. This indicates that the development of these facilities and equipment and terminal operation may be carried out by a PPP scheme, though the PAA has not decided this yet. Different from the case of the mineral terminal, there are many small or medium sized companies presently handling grain cargo. There is no specific private company expected to carry out a PPP project at present.

PAA requested grant aid from JICA for the new grain terminal because it has higher priority than the new mineral terminal. The new grain terminal is important as a regional gateway not only for Cote d'Ivoire but also neighboring countries for importing essential products such as food. Different from the mineral terminal, the grain terminal should be located in the port of Abidjan, which is close to the major consumption area of the food; population in the hinterland is 6 million.

In the request paper for the grant aid for the new grain terminal, there are no quantitative explanations on the future cargo volume, vessel size, or productivity of cargo handling or required storage capacity, which are necessary to justify the basic specifications of the project such as berth depth, berth length, and space of the terminal area.

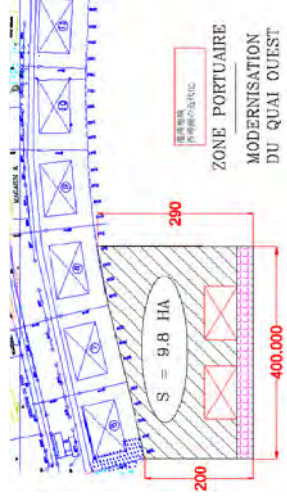
Usually, Pana Max size vessels with 70 thousand DWT need a berth of -15m deep and 300m long. PAA planned the berth of 400m in order to accommodate one Pana Max vessel or two small size vessels simultaneously. PAA stated that the berth length could be adjusted to the limit of project cost.

Regarding the required space of 10ha for the new grain terminal, the PAA explained that this terminal should function as a distribution center for grain being transported to the hinterland including neighboring landlocked countries and that the collection and distribution facilities need to be separated for each country since the kind and quality of grain differs by country. Accordingly, sufficient space is necessary for preparing these facilities in the terminal area. Although no quantitative background of the required space is provided by the PAA, the land space in the terminal area is apparently insufficient at present and a considerable amount of land space is required to cope with the future increase in cargo volume.

The existing sheds and warehouses in the hinter area of the berth are planned to be used even after the construction of the new grain terminal, however it might be better to maximize terminal space utilization by re-arrangement of the function and facilities in the area surrounding the terminal during the construction work on the project. In that case, the present situation of usage and the situation of the superannuation of shed and warehouse should be carefully examined.

Regarding the plan for the sea bed reclamation for terminal expansion, the utilization of the water area should be carefully harmonized with vessel navigation and the other development projects such as the container terminal development on Bouley Island across the water.

Table 2.3 The new grain terminal project

Present situation and problems to be solved	• Superannuation of facilities • Lack of hinter space behind the berth • Lack of depth of the berth
Outline of the project	Berth of 400m in length and -15m in depth Terminal area of 9.8ha
Project cost	45,320,451 US\$ (Construction cost requested to be covered by JICA grant aid.) 30,000 million FCFA (Document on the Consultative Group Meeting in December 2012)
Project period	3years
Present status of the contract	Requesting grant aid for the construction of infrastructure of the terminal from JICA.
Reference	

Source : PAA

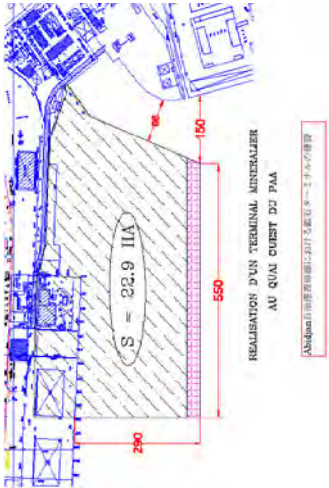
2.2.3.4 New mineral terminal

A new mineral terminal is planned to be constructed to cope with the increased export of mineral ores like manganese ores and import of cement and material for cement. A deep sea berth -15 m in depth and 550m in length is planned in order to accommodate large ore carriers with 13.5m draught, since the size of ore carriers has been growing. Different from the case of the grain terminal, there are a small number of private companies handling mineral cargo at present, and Sea Investment Co., the largest operator of manganese ore, is considered to be a potential operator of the new mineral terminal. However, while Sea Investment is said to be very interested in operation, they are reluctant to invest in infrastructure themselves.

Generally, an ore carrier with 80 thousand DWT has a draught of 13m and vessel length of 260 m, and requires a berth with a depth of -15m and length of 300m. PAA planned a berth of 550m in total length. This berth is a little short for two vessels of this size, but is able to accommodate a large and a smaller size vessel simultaneously.

The development plan of this new mineral berth has been revised several times and is still under consideration; the physical plan of the new mineral terminal also has not yet been fixed.

Table 2.4 The new mineral terminal

Present situation and problems to be solved	• Superannuation of facilities • Shortage of hinter space • Insufficient depth of berth
Outline of the project	Berth length 550m, Berth depth -15m, Yard 22.9ha,
Project cost	34.375 million FCFA (Document on the Consultative Group Meeting in July 2012)
Project period	3 years
Present status of contract	The physical plan of the terminal is presently under revision by PAA.
Reference	

Source : PAA

2.2.3.5 Fishery Port Development

Abidjan is the base port for the tuna fishing of the West African Region. But as the facilities in Abidjan fishery port are shallow and superannuated, it has been difficult to cope with the increasing handling volume and growth in the size of fishing boats. Accordingly, a new fishery port is now under construction with a loan from the West African Development Bank (BOAD).

Construction work is contracted to a joint venture of European contractors. Reclamation material is excavated from the seabed outside of the canal.

Table 2.5 Fishery Port Development

Present situation and problems to be solved	Superannuation of the facilities Shallow water depth (<7m) of the berths
Outline of the project	Construction of berths with depth of 10 to 13m Reclamation for terminal space of 8.4ha
Project cost	60millionUS\$ (Contract amount)
Project period	1.5years (Contract period)
Present status of the contract	Under construction
Reference	

Source : PAA

2.2.3.6 Development of the Vridi Birty Area

In order to compensate for the shortage of land space in the port area, large scale reclamation of 200 ha and construction of a bridge over the harbor will be carried out to alleviate the heavy traffic congestion in the center of the city and allow cargo to be transported smoothly between the port area and the trunk road. According to PAA, a concrete land use plan and quantitative verification of required space for this reclamation area has not been prepared yet. According to BOAD, a part (40ha) of the total reclamation was financed by BOAD in Feb.2013 and the construction contract is presently under negotiation between PAA and the contractor selected by tender. On the other hand, the Ministry of Transport commissioned BNETD to study the feasibility of expanding the total reclamation plan to 300ha in Sep.2013. BNETD is currently conducting the study.

The harbor road plan needs to be consistent with the trunk road plan of the Great Abidjan Urban Development Plan.

Table 2.6 Development of the Vridi Birty Area

Present situation and problems to be solved	Shortage of land space in the port area Heavy traffic congestion in the center of the city
Outline of the project	Bridge for the harbor road, Reclamation of 200ha
Project cost	75 billion CFA for reclamation work 25 billion CFA for bridge construction
Project period	3 years for reclamation
Present status of contract	Under negotiation with the contractor selected by bidding
Reference	

Source : PAA

2.2.4 Long Term Development Projects

As part of the long term future development of the Port of Abidjan, area development plans are proposed for Boulay Island and the West Bank Area of the canal where development has yet to take place.

2.2.4.1 Boulay Island Development Project

The development of a large scale Free Trade Zone and container terminal is planned. An access highway connecting the island with the north area of Abidjan diverting cargo traffic from the urban area is also proposed. This project has also been authorized under the National Development Plan with the following budget:

- 488 billion FCFA for development of the Free Trade Zone
- 27 billion FCFA for the Container Terminal

After completion of the development of the second container terminal, total container handling capacity will be 2,400,000 TEU which is sufficient to handle the projected cargo. Development of the container terminal in Boulay Island does not seem to be urgent. Since this container terminal is planned for supporting the Free Trade Zone, its development would depend on the development status of the Free Trade Zone.

2.2.4.2 West Bank of the Canal Development

The development of the petrochemical complex is planned at the West Bank area of the canal with the relocation of the existing oil jetties and oil refineries that are currently on the East Bank of the canal to the West Bank, where oil jetties will not disrupt vessel transit of the canal. After the relocation of the oil jetties, the capacity of the canal will be greatly improved. The timing of the relocation of the oil refineries from the East Bank to the West Bank is not clear at present, and it may take a long time. Regarding the development of the West Bank of the canal, the land use plan and facility allocation should be prepared so as not to prevent further expansion of the canal width.

Those two long term development projects are still in the conceptual stage, however, some parts of these projects are recognized as urgent projects in the NDP. Although there seems to be some mismatching between maturity and priority of the projects, it is very important to implement a long term projects taking into account the limited water and land space at the Port of Abidjan.



Figure 2.4 A panoramic model featuring development of Bouley Island (the entrance hall of the PAA)

2.3 Preliminary review for justification of the new grain terminal development project

2.3.1 Consistency with high-priority plans

Many corridor plans featuring Abidjan Port are proposed by ECOWAS and other multi-national organizations. Those plans are given high priority.

In the National Development Plan, many projects concerning Abidjan Port development are evaluated highly among the projects to be carried out up to the year 2020. In particular, construction of the new grain terminal is given high priority.

Accordingly, the new grain terminal project is consistent with high-priority plans and national policy.

2.3.2 Consistency with the overall port development plan

At present there is no comprehensive master plan for port development but there is an overall location map of all projects under consideration in the long term. In this plan, implementation priority of each individual project is not mentioned. Priority of each individual project might largely depend on the

investors concerned. However, the new grain terminal is naturally given high priority equal to Vridi Canal or the second container terminal.

Accordingly, the new grain terminal project is consistent with the overall port development plan.

2.3.3 Consistency with policy to maximize utilization of the limited water area

A group of new container terminals are planned on Bouley Island. They are planned at the West end of Bouley Island which faces the West Quay across the water area. The new grain terminal is planned to be constructed by extending the face line of the West quay 300 m toward Bouley Island.

The distance between the existing quay and Bouley Island is more than 1300 m. There will still remain 1000 m of open water after the 300 m reclamation works to the offshore side.

It seems possible to coordinate the utilization of the water area between the new grain terminal and the container terminals, which are expected to be constructed in future on Bouley Island.

There are four mooring buoys and sixteen anchorage areas in the water area of the port which extends 1000 ha. Some anchorage areas might need to be rearranged, but this is not a critical issue.

Accordingly, the new grain terminal project is consistent with the policy to maximize the utilization of the limited water area.

2.3.4 Consistency with road traffic management in the hinterland area

In the master plan study on the traffic of Greater Abidjan, the formulation of a trunk road network is proposed based on future traffic projections including cargo traffic to/from Abidjan Port, so as not to cause serious congestion in the hinterland area.

Accordingly, the new grain terminal project is consistent with the road traffic management in the hinterland area.

2.3.5 Coordination with other major projects in the port

The major projects which may significantly affect the implementation of the new grain terminal are Vridi Canal, the second container terminal and the new ore terminal.

The improvement project of Vridi Canal has already started and should not cause problems for the implementation of the new grain terminal so long as it is not considerably delayed.

The construction of the second container terminal may take place in the same period as the Vridi Canal. It will be difficult to handle all grain cargo in the West Quay and other facilities after construction work for the second container terminal begins and the South Quay becomes unavailable for use. Furthermore, when construction work on the new grain terminal starts, it would seem to be impossible to handle all the grain cargo by only the remaining berths No.9 and No.10 in the West Quay. To minimize this critical period, the new grain terminal should be constructed as early as possible.

If all the ore cargo handled at berths No.11 to No.15 could be shifted to alternative facilities or ports, and the remaining berths No.9 to No.15 might manage to handle all the grain cargo during the construction of the new grain terminal. However, finding such alternative facilities is fairly difficult.

Even if the alternative facilities can be prepared, it's possible that there would be a steep increase in handling and land transportation cost if the alternative facilities are far from Abidjan Port.

Accordingly, the implementation of the new grain terminal project should be carefully coordinated with the other major projects in the port.

3.0 Demand Forecast of Grain Cargo Handling Volume of Abidjan Port

3.1 Target Years

JICA Study Team sets the target years as 2020, 2025 and 2030.

3.2 Population Forecast in Target Years

As a population census has not been conducted in Cote d'Ivoire for a long time, the JICA Study Team refers to the data of "World Population Prospects: The 2012 Revision, Key Findings and Advance Table" of the United Nations Department of Economic and Social Affairs/ Population Division to estimate the population in the target years.

The JICA Study Team adopted the forecast population in 2025 and calculated population in 2020 and 2030.

Table 3.1 shows the forecast population of Cote d'Ivoire, Mali, Burkina Faso and Niger in each target year.

Table 3.1 Population Forecast of Cote d'Ivoire, Mali, Burkina Faso and Niger

Country	2013	2020	2025	2030
Cote d'Ivoire	20,316	23,675	26,414	29,035
Mali	15,302	19,077	22,319	25,698
Burkina Faso	16,935	20,463	23,428	26,198
Niger	17,831	23,433	28,477	34,034

Source: UN + JICA Study Team

3.3 Cargo Volume of Cote d'Ivoire

3.3.1 Import Grain Cargo

3.3.1.1 Rice

Rice is the principal food of Cote d'Ivoire and consumption volume has been increasing along with the increase in population and economic growth. Table 3.2 shows rice volume throughput of domestic consumption, production and import from 2006 to 2014.

Table 3.2 Consumption, Production and Import Volumes of Rice in Cote d'Ivoire from 2006 to 2014

	2006	2007	2008	2009	2010	2011	2012	2013	2014
Consumption	1,350,000	1,350,000	1,350,000	1,330,000	1,320,000	1,530,000	1,600,000	1,650,000	1,700,000
Production	439,000	465,000	442,000	447,000	469,000	456,000	471,000	520,000	520,000
Import	920,000	845,000	800,000	900,000	850,000	1,400,000	990,000	1,150,000	1,200,000

Source: USDA Foreign Agricultural Service

Rice consumption increased 22% from 1,350,000 tons in 2006 to 1,650,000 tons in 2013, an increase of 22%. Although domestic rice production increased by 18% in the same period, rice imports have been increasing every year as the production volume has not been able to match the increasing consumption.

a) Forecast Consumption Volume in Target Years

Consumption volumes in target years are forecast using estimated population and consumption volume per capita. Consumption volume per capita has been increasing from 60kg in 1980 to 81kg in 2013. The JICA Study Team assumes the per capita volume of rice consumption in the target years is 81kg.

- Year 2020 0.081ton/capita × 23,675,000 = 1,917,675 tons
- Year 2025 0.081 ton/capita × 26,414,000 = 2,139,534 tons
- Year 2030 0.081 ton/capita × 29,035,000 = 2,351,835 tons

b) Forecast Production Volume in Target Year

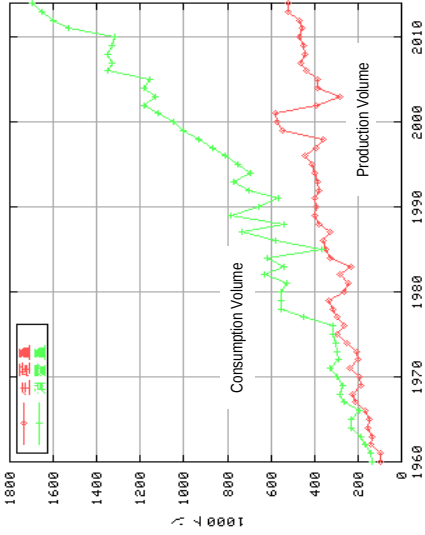
The Government of Cote d'Ivoire released a national Strategy on Rice Production (STRATEGIE NATIONALE DEVELOPPEMENT DE LA FILIERE RIZ) in 2008 and a revised edition (SNDR 2012-2020) in 2011 aiming for self-sufficiency by 2016.

To achieve this national strategy, rice production volume has to increase by three times the present production level by 2016.

However, it is uncertain whether such a rapid increase in production is possible nor it is known to what extent the production volume has already increased. Therefore, the JICA Study Team will conduct a rice production forecast from an independent standpoint.

According to the USDA Foreign Agricultural Service data, production volume from 2006 to 2014 has stabilized and average production volume is 470,000 tons. From this data, there is no significant indication that the production volume will increase to the extent described in the National Strategy.

Figure 3.1 shows rice production and consumption volume throughout of Cote d'Ivoire from 1960 to 2013. (Source: World Food Statistics, Professor Ito, Kyusyu University)



Source: World Food Statistics, Professor Ito, Kyusyu University

Figure 3.1 Production and Consumption Volumes of Rice in Cote d'Ivoire from 1960 to 2013

Rice production volume increased from 100,000 tons in 1960 to 520,000 tons in 2013 with an annual increase rate of 3.1%. The JICA Study Team assumes a 3.1% increase rate in the production volume up to the target years.

Year 2020 $520,000 \times (1.031)^7 = 643,893$ tons
Year 2025 $520,000 \times (1.031)^{12} = 750,080$ tons
Year 2030 $520,000 \times (1.031)^{17} = 873,777$ tons

c) Forecast Import Volume in Target Years

Year 2020 $1,917,675 - 643,893 = 1,273,782$ tons
Year 2025 $2,139,534 - 750,080 = 1,389,454$ tons
Year 2030 $2,351,835 - 873,777 = 1,478,058$ tons

3.3.1.2 Wheat

Each year, all wheat for domestic consumption is imported and any surplus volume is exported. Table 3.3 shows consumption, import and export volume of wheat from 2006 to 2014.

Table 3.3 Consumption, Import and Export Volumes of Wheat for Cote d'Ivoire from 2006 to 2014

	2006	2007	2008	2009	2010	2011	2012	2013	2014
Consumption	205,000	260,000	246,000	350,000	370,000	380,000	390,000	400,000	410,000
Import	263,000	309,000	317,000	547,000	493,000	568,000	558,000	550,000	560,000
Export	60,000	49,000	71,000	155,000	144,000	180,000	149,000	150,000	150,000

Source: USDA Foreign Agricultural Service

Wheat consumption volume increased from 205,000 tons in 2006 to 400,000 tons in 2013 or by 95%.

a) Forecast Consumption Volume and Import Volume in Target Years

Consumption volumes in target years are forecast using estimated population and consumption volume per capita. Consumption volume per capita was 20 kg in 2013. The JICA Study Team assumes the per capita wheat consumption volume in the target years is 20 kg.

Year 2020 $0.020 \text{ ton/capita} \times 23,675,000 = 473,500$ tons
Year 2025 $0.020 \text{ ton/capita} \times 26,414,000 = 528,280$ tons
Year 2030 $0.020 \text{ ton/capita} \times 29,035,000 = 580,700$ tons

3.3.1.3 Sugar

Since the end of the civil war, sugar production has been increasing while sugar imports have been decreasing. The JICA Study Team assumes that the production volume will be able to meet the consumption volume in the target years.

3.3.2 Export Grain Cargo

3.3.2.1 Cacao

Cacao is a very important export commodity of Cote d'Ivoire which accounts for 40 % of world production. Currently, 95% of the production volume is exported. As to export packing style, 70% is in bags and 30% is exported as processed.

As 70 % of the cacao production area is in the western part of the country, a large volume of cacao is exported from San Pedro port which is close to the main production area.

According to Le Conseil du Café-Cacao (CCC), cacao handling volume shares of Abidjan port and San Pedro port are 56% and 44% on average respectively in the past five years.

a) Forecast Production Volume in Target Years

Table 3.4 shows Le Conseil du Café-Cacao forecast production volume of Cote d'Ivoire and the whole world.

Table 3.4 Cacao Production Volume Estimation of Cote d'Ivoire and Whole World

	unit: ton			
	2015	2018	2020	2023
World	4,200,000	4,750,000	4,800,000	5,000,000
Cote d'Ivoire	1,470,000	1,662,000	1,680,000	1,750,000

Source: Le Conseil du Café-Cacao (CCC)

Forecast Production Volume of Year 2025 and 2030

The JICA Study Team assumes an annual increase rate in cacao production of 2.2% up to 2030 based on CCC's estimated production volume from 2015 to 2023.

$$\begin{aligned} \text{Year 2025} & 1,750,000 \times (1.022)^2 = 1,828,000 \text{ tons} \\ \text{Year 2030} & 1,750,000 \times (1.022)^7 = 2,038,000 \text{ tons} \end{aligned}$$

b) Forecast Export Volume in Target Years

The Study Team assumes that the ratio of domestic consumption volume, export volume, the ratio of packing style between bags and processed, and the ratio of handling volume of Abidjan port and San Pedro Port will not change in the target years.

$$\begin{aligned} \text{Year 2020} & 1,680,000 \times 0.95 \times 0.7 \times 0.56 = 625,632 \text{ tons} \\ \text{Year 2025} & 1,828,000 \times 0.95 \times 0.7 \times 0.56 = 680,747 \text{ tons} \\ \text{Year 2030} & 2,038,000 \times 0.95 \times 0.7 \times 0.56 = 758,951 \text{ tons} \end{aligned}$$

3.3.2.2 Coffee

Coffee beans were once an important export commodity crop of Cote d'Ivoire. However, planted acreage, production volume and export volume greatly decreased during the civil war. Table 3.5 shows production and export volumes of coffee from 2005 to 2013.

Table 3.5 Production and Export Volumes of Coffee in Cote d'Ivoire from 2005 to 2013

	2005	2006	2007	2008	2009	2010	2011	2012	2013
Production	123,720	146,820	125,800	111,180	141,000	96,000	96,000	105,000	114,000
Export	120,600	125,700	113,400	93,300	122,700	59,100	97,200	100,800	102,000

Source: USDA Foreign Agricultural Service

a) Forecast Production Volume in Target Years

Production volume of coffee dropped sharply during the civil war. Some farmers reportedly shifted their cultivation from coffee to rubber. (JICA: Agriculture Sector Basic Information collection and confirmation Study in Cote d'Ivoire, March 2013)

The production volume of coffee is unlikely to increase in the future. The JICA Study Team assumes that the production volume in the target years is 118,000 tons, the average production volume from 2005 to 2013.

b) Forecast Export Volume in Target Years

From 2005 to 2013, 88% of the production volume was exported on average. According to Le Conseil du Café-Cacao (CCC), coffee bean handling volume shares of Abidjan port and San Pedro port are 92% and 8% respectively. The JICA Study Team assumes those shares will not change in the target years.

$$118,000 \times 0.88 \times 0.92 = 95,533 \text{ tons}$$

3.4 Cargo Volume for Landlocked Countries

The JICA Study Team forecasts transit cargo volume for Mali and Burkina Faso.

3.4.1 Mali

3.4.1.1 Rice

Table 3.6 shows rice consumption, production and import volumes of rice from 2006 to 2014.

Table 3.6 Consumption, Production and Import Volumes of Rice in Mali from 2006 to 2014

	2006	2007	2008	2009	2010	2011	2012	2013	2014
Consumption	789,000	803,000	1,140,000	1,316,000	1,400,000	1,400,000	1,450,000	1,460,000	1,500,000
Production	684,000	703,000	1,055,000	1,268,000	1,500,000	1,130,000	1,250,000	1,290,000	1,350,000
Import	105,000	100,000	100,000	100,000	120,000	150,000	140,000	150,000	150,000

Source: USDA Foreign Agricultural Service

Rice consumption volume in Mali increased from 790,000 tons in 2006 to 1,460,000 tons in 2013 or by 85%. Domestic rice production volume increased from 680,000 tons in 2006 to 1,290,000 tons in 2013 or by 90%. To fill the gap between consumption and production, average import volume of rice from 2011 to 2013 has been 150,000 tons.

a) Forecast Consumption Volume in Target Years

Consumption volumes in target years are forecast using the estimated population and consumption volume per capita. Consumption volume per capita was 100 kg in 2013. The JICA Study Team assumes the per capita rice consumption volume in the target years is 100 kg.

$$\begin{aligned} \text{Year 2020} & 0.100 \text{ ton/capita} \times 19,077,000 = 1,907,700 \text{ tons} \\ \text{Year 2025} & 0.100 \text{ ton/capita} \times 22,319,000 = 2,231,900 \text{ tons} \\ \text{Year 2030} & 0.100 \text{ ton/capita} \times 25,698,000 = 2,569,800 \text{ tons} \end{aligned}$$

b) Forecast Production Volume in Target Years

Mali's degree of self-sufficiency in rice has been 80% - 90% in the last 10 years due to its policy of increasing rice production. (Reference: JICA Project Summary Table, Mali Agricultural Policy Advisor)
The JICA Study Team assumes the degree of self-sufficiency of rice production is 85% in the target years.

Year 2020 $1,907,700 \text{ ton} \times 0.85 = 1,621,545 \text{ tons}$

Year 2025 $2,231,900 \text{ ton} \times 0.85 = 1,897,115 \text{ tons}$

Year 2030 $2,569,800 \text{ ton} \times 0.85 = 2,184,330 \text{ tons}$

c) Forecast Import Volume in Target Years

Year 2020 $1,907,700 \text{ ton} \times 0.15 = 286,155 \text{ tons}$

Year 2025 $2,231,900 \text{ ton} \times 0.15 = 334,785 \text{ tons}$

Year 2030 $2,569,800 \text{ ton} \times 0.15 = 385,470 \text{ tons}$

3.4.1.2 Wheat

Table 3.7 shows domestic supply volume, production, import and export volumes of wheat from 2003 to 2011.

Table 3.7 Supply, Production and Import Volumes of Wheat in Mali from 2003 to 2011

	2003	2004	2005	2006	2007	2008	2009	2010	2011
Domestic Supply Volume	98,273	90,227	97,534	132,387	123,216	119,247	158,589	165,877	169,107
Export Volume	10,601	3,739	3,537	319	2,698	3,002	0	13	75
Import Volume	101,248	58,357	134,934	224,140	117,330	82,466	158,123	182,102	155,339
Production Volume	7,626	8,942	4,805	8,565	8,585	13,116	15,132	33,842	33,842

Source: FAOSTAT 2013

Wheat supply volume increased from 98,000 tons in 2003 to 169,000 tons in 2011 or by 72%. Domestic production volume has been increasing gradually, however, production volume of 2011 covered only 20% of the domestic supply.

a) Forecast Consumption Volume in Target Years

Due to the limited availability of wheat volume data in Mali, the JICA Study Team regards domestic supply volume as domestic consumption volume.

Wheat consumption volumes in target years are forecast using the estimated population and per capita consumption. Wheat supply volume per capita was only 11 kg in 2011, while rice consumption per capita is 100 kg. The JICA Study Team assumes the wheat consumption will not increase.

Year 2020 $0.011 \text{ ton/capita} \times 19,077,000 = 209,847 \text{ tons}$

Year 2025 $0.011 \text{ ton/capita} \times 22,319,000 = 245,509 \text{ tons}$

Year 2030 $0.011 \text{ ton/capita} \times 25,698,000 = 282,678 \text{ tons}$

b) Forecast Production Volume in Target Years

Domestic wheat production volume is small and it is unlikely that production will significantly increase in the future. Therefore, the JICA Study Team assumes the production volume in the target years is 33,800 tons, the same as the level of 2010 and 2011.

c) Forecast Import Volume in Target Years

Year 2020 $209,847 \text{ ton} - 33,800 \text{ ton} = 176,047 \text{ tons}$

Year 2025 $245,509 \text{ ton} - 33,800 \text{ ton} = 211,709 \text{ tons}$

Year 2030 $282,678 \text{ ton} - 33,800 \text{ ton} = 248,878 \text{ tons}$

3.4.1.3 Sugar

Table 3.8 shows supply, import and production volumes of sugar from 2003 to 2011.

Table 3.8 Supply Production and Import Volumes of Sugar in Mali from 2003 to 2011

	2003	2004	2005	2006	2007	2008	2009	2010	2011
Domestic Supply	136,896	137,612	140,082	153,506	154,282	161,228	157,167	137,086	121,993
Import Volume	106,274	72,255	133,288	144,114	132,224	129,167	71,287	85,807	90,713
Production	31,280	32,200	32,200	29,472	31,987	32,200	35,880	31,280	31,280

Source: FAOSTAT 2013

The volume of domestic sugar supply ranged between 122,000 tons and 161,000 tons from 2003 to 2011. Average annual supply volume is 144,000 tons. Production volume is approx. 32,000 tons every year. Import volume makes up for the shortage.

a) Forecast Consumption Volume in Target Years

Due to the limited availability of sugar volume data in Mali, the JICA Study Team regards domestic supply volume as domestic consumption volume.

Total domestic sugar consumption volumes in the target years are forecast using estimated population and consumption volume per capita. Average supply volume per capita was 9.4 kg from 2003 to 2011. Therefore, the JICA Study Team assumes the sugar consumption volume in the target years is 9.4 kg.

Year 2020 $0.0094 \text{ ton/capita} \times 19,077,000 = 179,324 \text{ tons}$

Year 2025 $0.0094 \text{ ton/capita} \times 22,319,000 = 209,799 \text{ tons}$

Year 2030 $0.0094 \text{ ton/capita} \times 25,698,000 = 241,561 \text{ tons}$

b) Forecast Production Volume in Target Years

Production volume is stable at approx. 32,000 tons every year. Accordingly, the JICA Study Team assumes the production volume in target years is 32,000 tons.

c) Forecast Import Volume in Target Years

Year 2020 179,324ton – 32,000 ton = 147,324 tons
Year 2025 209,799 ton – 32,000 ton = 177,799 tons
Year 2030 241,561 ton – 32,000 ton = 209,561 tons

3.4.2 Burkina Faso

3.4.2.1 Rice

Table 3.9 shows consumption, import and production volumes of rice from 2006 to 2014.

Table 3.9 Consumption, Import and Production Volumes of Rice in Burkina Faso from 2006 to 2014

	2006	2007	2008	2009	2010	2011	2012	2013	2014
Consumption	214,000	175,000	297,000	359,000	420,000	415,000	470,000	480,000	495,000
Import	140,000	130,000	180,000	230,000	230,000	260,000	260,000	280,000	275,000
Production	74,000	45,000	127,000	139,000	178,000	157,000	210,000	200,000	220,000

Source: USDA Foreign Agricultural Service

Rice consumption volume increased from 210,000 tons in 2006 to 480,000 tons in 2013 or by 128%. Domestic production volume has been increasing since 2008, with production reaching 210,000 tons in 2012. However, the gap between the consumption volume and production volume has been widening every year, import volume doubled from 140,000 tons in 2006 to 280,000 tons in 2013.

a) Forecast Rice Consumption Volume in Target Years

Consumption volumes in target years are forecast using the estimated population and consumption per capita. Consumption per capita was 28 kg in 2013. Therefore, the JICA Study Team assumes the rice consumption volume in the target years is 28 kg.

Year 2020 0.028 ton/capita × 20,463,000 = 572,964 tons
Year 2025 0.028 ton/capita × 23,428,000 = 655,984 tons
Year 2030 0.028 ton/capita × 26,198,000 = 733,544 tons

b) Forecast Production Volume in Target Years

According to the data of USDA, rice production increased greatly from 45,000 tons in 2007 to 210,000 tons in 2012. However, as production volume in 2013 and the estimated volume in 2014 are at the same level, it is difficult to expect a further large increase in production. Therefore, the JICA Study Team assumes the increase rate in the rice production volume is 3.0%, the same as Cote d'Ivoire.

Year 2020 220,000 × (1.03)⁶ = 262,692 tons
Year 2025 220,000 × (1.03)¹¹ = 304,531 tons
Year 2030 220,000 × (1.03)¹⁶ = 353,035 tons

c) Forecast Import Volume in Target Years

Year 2020 572,964 – 262,692 = 310,272 tons
Year 2025 655,984 – 304,531 = 351,453 tons
Year 2030 733,544 – 353,035 = 380,509 tons

3.4.2.2 Wheat

Table 3.10 shows consumption and import volumes of wheat from 2006 to 2014. Wheat consumption volume increased from 91,000 tons in 2006 to 200,000 tons in 2013 or by 120%. The entire consumption volume has been imported.

Table 3.10 Consumption and Import Volumes of Wheat in Burkina Faso from 2006 to 2014

	2006	2007	2008	2009	2010	2011	2012	2013	2014
Consumption Volume	91,000	85,000	101,000	142,000	173,000	189,000	203,000	200,000	205,000
Import Volume	91,000	85,000	101,000	142,000	173,000	189,000	203,000	200,000	205,000

Source: USDA Foreign Agricultural Service

a) Forecast Wheat Consumption Volume and Import Volume in Target Years

Consumption volumes in target years are forecast using estimated population and consumption per capita. Average consumption per capita was 5 kg from the 1970s to the mid 1990s, however, consumption per capita increased to 12 kg in 2013. Therefore, the JICA Study Team assumes that the wheat consumption per capita in the target years is 12 kg and the entire consumption volume will be imported in the target years.

Year 2020 0.012 ton/capita × 20,463,000 = 245,232 tons
Year 2025 0.012 ton/capita × 23,428,000 = 281,136 tons
Year 2030 0.012 ton/capita × 26,198,000 = 314,376 tons

3.4.2.3 Sugar

Table 3.11 shows supply, production and import volumes of sugar from 2003 to 2011.

Table 3.11 Supply, Import and Production Volumes of Sugar in Burkina Faso from 2003 to 2011

	2003	2004	2005	2006	2007	2008	2009	2010	2011
Domestic Supply	52,104	44,413	73,318	77,847	87,949	63,524	63,897	66,901	101,214
Import Volume	30,951	15,513	72,883	45,886	52,743	26,749	27,101	30,195	64,415
Production	36,800	36,800	36,800	36,800	36,800	36,800	36,800	36,800	36,800

Source: FAOSTAT 2013

The supply volume of sugar ranged from 44,000 tons to 101,000 tons from 2003 to 2011. Average annual supply volume is 70,000 tons. Domestic production is approx. 37,000 tons every year. Import volume has made up for the gap between the supply and production volumes.

a) Forecast Consumption Volume in Target Years

Due to the limited availability of sugar volume data in Burkina Faso, the JICA Study Team regards domestic supply volume as domestic consumption volume.

Consumption volumes in the target years are forecast using estimated population and consumption volume per capita. Average sugar supply volume per capita was only 4.1 kg from 2003 to 2011. 4.1 kg is quite small compared with the consumption volume of Mali which has a similar GNI per capita. Therefore, the JICA Study Team assumes the sugar consumption in the target years is 9.4 kg, the same level as in Mali

Year 2020	$0.0094 \text{ ton/capita} \times 20,463,000 = 192,352 \text{ tons}$
Year 2025	$0.0094 \text{ ton/capita} \times 23,428,000 = 220,223 \text{ tons}$
Year 2030	$0.0094 \text{ ton/capita} \times 26,198,000 = 246,261 \text{ tons}$

b) Forecast Production Volume in Target Years

Domestic production of sugar is approx. 37,000 tons every year and a large increase in production is unlikely in the future. Therefore, the JICA Study Team assumes production volume in the target years is 37,000 tons.

c) Forecast Import Volume in Target Years

Year 2020	$192,352 \text{ ton} - 37,000 \text{ ton} = 155,352 \text{ tons}$
Year 2025	$220,233 \text{ ton} - 37,000 \text{ ton} = 183,233 \text{ tons}$
Year 2030	$246,261 \text{ ton} - 37,000 \text{ ton} = 209,261 \text{ tons}$

3.4.3 Examination of Cargo Handling Volume Share of Abidjan Port for Landlocked Countries

Dakar port in Senegal competes with Abidjan port for the transit cargo of Mali. Tema port in Ghana and Lome port in Togo compete with Abidjan port for the transit cargo of Burkina Faso.

According to an interview with PAA staff, 70% of the cargo volume of landlocked countries was handled by Abidjan port before the civil war but that figure dropped to 10% during the conflict. However, Abidjan ports share of such cargo has recovered to 42%.

3.4.3.1 Cargo Handling Volume Share for Mali

Table 3.12 shows a comparison of the Abidjan-Bamako Corridor and Dakar-Bamako Corridor from the view point of transport distance and transportation hours.

Table 3.12 Comparison Table of Abidjan-Bamako Corridor and Dakar-Bamako Corridor

Corridor	Distance km	Turnaround time (days)
		Loaded Truck
Abidjan Dakar	1,238	13.6
Bamako Bamako	1,387	14.0

Source: USAID Abidjan-Bamako Corridor Report March 2013, Bamako-Dakar Corridor Report March 2013

The distances between Abidjan -Bamako and Dakar – Bamako are 1,238 km and 1,387 km respectively, a difference of 149 km. The turnaround time of a loaded truck from Abidjan to Bamako and Dakar to Bamako is almost identical; 13.6 days in the case of the former and 14.0 days in the latter. Although the Abidjan corridor has a slight advantage in terms of transport distance, the JICA Study Team assumes that the cargo handling volume share of Abidjan port and Dakar port in Mali cargo is 1:1.

3.4.3.2 Cargo Handling Volume Share for Burkina Faso

Table 3.13 shows a comparison of Abidjan-Ouagadougou Corridor, Lome-Ouagadougou Corridor and Tema-Ouagadougou Corridor from the view point of transport distance and transportation hours.

Table 3.13 Comparison Table of Abidjan-Ouagadougou Corridor, Lome-Ouagadougou Corridor and Tema-Ouagadougou Corridor

Corridor	Distance km	Turnaround time (days)
		Loaded Truck
Abidjan Ouagadougou	1,228	15.3
Lome Ouagadougou	1,020	22.0
Tema Ouagadougou	1,057	26.3

Source: USAID Abidjan-Ouagadougou Corridor Report March 2013, Tema- Ouagadougou Corridor Report March 2013, Lome-Ouagadougou Corridor Report March 2013.

The transport distance of Abidjan –Ouagadougou corridor is about 200km longer than the Tema-Ouagadougou and Lome-Ouagadougou corridors. However, the Abidjan corridor has a great advantage in terms of turnaround time. Turnaround time of the Abidjan corridor is 40% and 30% less than the Tema corridor and Lome corridor respectively

In addition to shorter turnaround time, Abidjan port has a railway connection with Burkina Faso. Therefore, Abidjan port has a big advantage in collecting transit cargo for Burkina Faso in terms of transport hours and transport capacity compared with the other two corridors.

The JICA Study Team assumes that Abidjan port will recover its previous share of 70% of the transit cargo for Burkina Faso in the target years due to the abovementioned advantages of the Abidjan corridor.

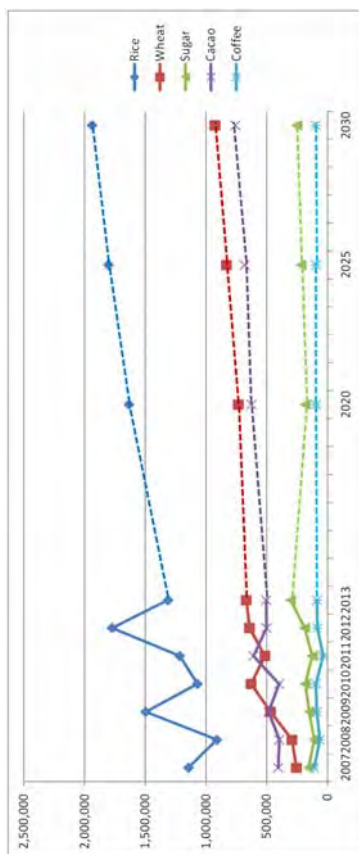
3.5 Total Cargo Volume

Table 3.14 shows the forecast for grain cargo handling volume of Abidjan port for Cote D'Ivoire (Rice, wheat, cacao and coffee), Mali, and Burkina Faso (Rice, wheat and sugar) in the target years. Figure 3.2 shows the grain cargo volume forecast by commodity.

Table 3.14 Result of Grain Cargo Handling Volume Forecast of Abidjan Port in Target Years

	2020	2025	2030
unit: ton			
Cote d'Ivoire			
Import			
Rice	1,273,782	1,389,454	1,478,058
Wheat	473,500	528,280	580,700
total	1,747,282	1,917,734	2,058,758
Export			
Cacao	625,632	680,747	758,951
Coffee	95,533	95,533	95,533
total	721,165	776,280	854,484
Total	2,468,447	2,694,014	2,913,242
Mali			
Import			
Rice	143,078	167,393	192,735
Wheat	88,024	105,855	124,439
Sugar	73,662	88,900	104,781
total	304,763	362,147	421,955
Burkina Faso			
Import			
Rice	217,190	246,017	266,356
Wheat	171,662	196,795	220,063
Sugar	108,746	128,263	146,482
total	497,599	571,075	632,902
Total			
Import	2,549,644	2,850,956	3,113,614
Export	721,165	776,280	854,484
Total	3,270,809	3,627,236	3,968,098

Source: JICA Study Team



Source: JICA Study Team

Figure 3.2 Grain Cargo Volume Forecast by Commodity

4.0 Bulk Carrier (Grain) Forecast at Port of Abidjan

4.1 Vessel Size and Type

4.1.1 The bulk carriers that called at Abidjan Port

The following list indicates actual vessels that called into Abidjan during 2012~2013 at the West Wharf (berths No.6~8) at Table 4.1

Table 4.1 Ships calling into Abidjan during 2012~2013 (West Wharf)

Ships Name	Deadweight (DWT)	LOA (m)	LOW (m)	Full Draft (m)	Loadable (Ton)	Load Ratio (%)
AGIA FILOTHEI	58,802	196	32	13	25,891	48.9
VEGA LIBRA	53,743	190	32	13	10,926	22.6
OIGA TOPIC	45,483	186	30	12	12,015	29.4
BLACKBIRD	43,246	185	31	11	13,841	35.6
MARE DOJO	42,628	183	31	11	15,895	41.4
THOR WIND	39,087	187	29	11		
ST KRILL	38,883	180	30	11	22,062	63.0
MARINA R	37,766	190	29	10	8,085	23.8
APOSTOLOS 2	34,699	179	28	11	30,081	96.3
EUROSUN	33,774	180	30	10	3,000	9.9
ORIENT TIGER	33,500	180	30	10	30,200	100
AFRICAN SWAN	32,776	177	28	10		
BELASITZA	30,696	186	24	10	7,903	28.6
SILVRETTA	29,721	171	27	10	13,149	49.2
SUPER ADVENTURE	28,630	172	27	10	12,782	49.6
RATTANA NAREE	28,442	170	27	10	5,216	20.4
LAKE DANY	28,358	169	27	10	12,034	47.2
SANAGA	28,215	169	27	10	13,490	53.1
TURGUT REIS	27,910	170	25	11	23,062	91.8
CN JUMBOS	27,321	166	27	10	11,547	47.0
SIDER ORICONO	25,019	149	26	10	8,022	35.6
BULK FLOWER	24,969	158	25	10	3,159	14.1
VTC SKY	23,581	154	26	10		
CHIEF	23,509	156	25	10	15,036	71.1
VTC PHOENIX	22,763	153	26	10		
VEGA STAR	22,035	158	25	9	13,166	66.4
CENTURY HOPE	16,213	137	23	8		

Ships Name	Deadweight (DWT)	LOA (m)	LOW (m)	Full Draft (m)	Loadable (Ton)	Load Ratio (%)
GOLDEN EAGLE	55,989	190	32	13		
COS ORCHID	55,539	190	32	13		
MAGNUM POWER	53,632	190	32	13	19,932	41.3
BULK PARASO	53,503	190	32	12	23,678	49.2
MARIA D	50,450	190	32	12	16,000	35.2

Appendix D Preliminary Investigation Report for the Grain Terminal of Abidjan Port

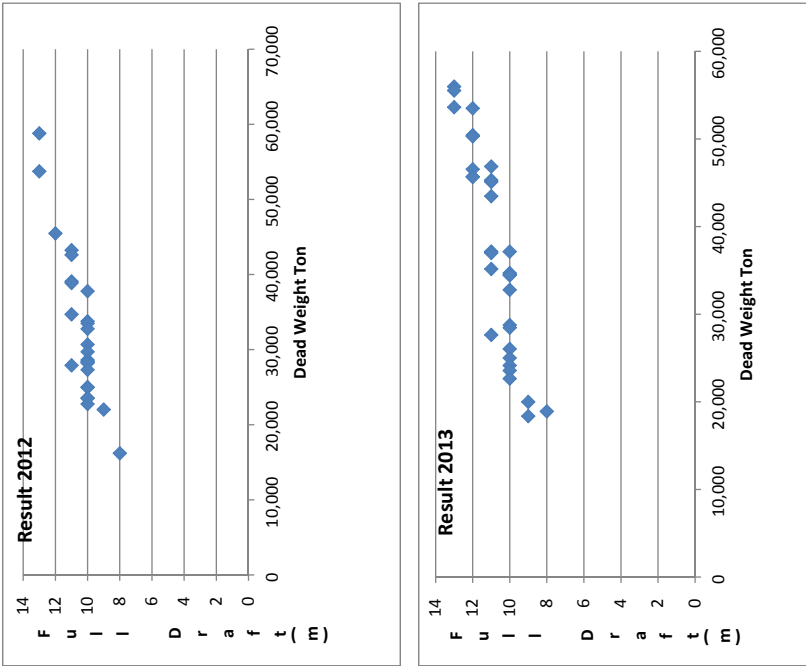
MALTO BLOSSOM	50,307	190	32	12	
COS BONNY	46,864	187	32	11	
SAGA ADVENTURE	46,550	199	31	12	
SHENG QIANG	45,706	186	30	12	
JAHAN	45,665	186	30	12	90.3
BK DUKE	45,320	190	31	11	
HAWK	45,111	188	31	11	
SEA GRACE	43,473	186	30	11	10,033
ELEGANT SW	37,163	178	29	11	7,334
INTERLINK ACQUITY	37,152	190	29	10	21,055
PEBBLE BEACH	37,003	190	28	11	19,106
YANGTZE SPLIT	35,169	180	28	11	
NAVIOS LYRA	34,707	180	30	10	13,400
SIRIUS	34,537	180	30	10	
TATE 1	34,439	180	30	10	32,926
MARGAU	32,790	180	28	10	19,056
IPANEMA	28,768	170	27	10	25,268
HAGIAI SARI	28,467	169	27	10	14,046
UNIBROTHERS	27,650	178	23	11	24,075
BIRCH 5	26,045	172	25	10	6,820
SIDER KING	25,013	157	25	10	
GREAT HARMONY	24,159	160	26	10	7,724
VTC SKY	23,581	154	26	10	11,547
VTC DRAGON	22,662	153	26	10	9,259
AROSA	20,001	155	24	9	19,959
HEGINA	18,917	140	25	8	
ROYAL PESCADORES	18,369	148	23	9	

Source: JICS Team created based on PAA Statistics

According to Table 4.1, vessels that called at the West Wharf were in the 20,000DWT~60,000DWT range which is classed as Handy Size to Handy Max within the category of bulk carriers. The cargo weights that are loaded cannot be to the full capacity of the ship because West Wharf has only a 9.5 meter draft, therefore, full capacity loading is not possible for those larger sized vessels.

There were a few vessels which loaded approximately 90-100% cargo but we assume that those came in on a high tide and discharged before arrival of low tide.

PAA information includes a few bulk carriers that were around 40,000~50,000 Dead Weight Tons but those could not reach the West Wharf because of the shallow depth at the quay. As a temporary measure, those should have berthed at the Container Terminal, which has a of draft -1.3m.



Source : PAA and JICA Study Team

Figure 4.1 DWT and Full Draft of vessels that called into Abidjan 2012 & 2013

We show in Figure 4.1 the dead weight tons and maximum draft of the vessels that berthed at the west wharf.

It is obvious that those ranged from 8 meters to 13 meters and more larger vessels were berthed in 2013 than in 2012. In 2014 up to June about 30% of the vessels that called had a draft over 12 meters and the number of such larger bulk ships is increasing gradually.

4.1.2 A comparison with the other West African ports in Bulk Ship voyaging

We show in Table 4.2 below the current West African sea port depths. The number of the ports in West Africa is very limited compared with its land area and the populations. This is due to the natural conditions as the seacoast is not suitable for the establishment of ports and therefore, it is natural that the cargo volume and movements are smaller than in South Africa.

Table 4.2 West Africa Ports & berth depths

Port Name	Country	Total Berths	Container berths	Max. Depth (meters)
Luanda	Angola	3	1	9.5
Pontle Noire	Congo Rep	9	N/A	9.5
Libreville	Gabon	N/A	N/A	3
Douala	Cameroon	13	3	9.5
Lagos	Nigeria	34	6	10.5
Cotonou	Benin	8	1	11
Lome	Togo	6	2	12
Abidjan	Cote d'Ivoire	34	5	10.6
Conakry	Guinea	12	1	10.5
Dakar	Senegal	47	16	10
Matadi	DRC	10	2	8.9

Source : Global Information book

As indicated in the Table, most of those West African ports have around 10 meter depth therefore, we assume that the Over Pana Max (Draft 15 meters) and Pana Max (draft 12 meters) are not now allowed to enter the port. This is very similar to the situation in Abidjan in which most of the vessels are Handy Type or Handy Max.

4.2 Scope of the ship type in the near future

As a standard, Handy Max type vessels are around 40,000~60,000 DWT and are chartered for long journeys enabling low cost freight, therefore, we see many cases where they carry bulky cargo such as 'Clinker' material for cement.

On the other hand the Handy Max type ranges from 10,000~40,000 DWT, so they are often used to carry cargo such as cement and fertilizer. Since 1999 the number of the Handy Max type has been expanding.

Table 4.3 indicates historical movements from 1999 to date. Typical Handy Max type will be 52,000~58,000 DWT and equipped with ships gear.

Table 4.3 Handy Max type bulk carriers record

Built Year	DWT	LOA (m)	B (m)	Summer Draft (m)	Gear
1999	48,900	190	32.20	11.6	4 ship gear (25t)
2001	50,000	190	32.26	11.9	4 ship gear (30t)
2003	52,000	190	32.20	12.3	4 ship gear (30t)
2003	58,500	186	32.26	12.8	4 ship gear
2005	56,000	190	32.26	12.6	4 ship gear

Source: JICA Study Team

The type called Pana Max is in the 60,000~80,000DWT range and are often used for Wheat parcel carriage in bulk and this type usually has no ships gear.

This fact suggests that the future ships calling into Abidjan and the other West African countries will be the Handy Type and Handy Max type. Especially the Handy max has its own ships gear and many of the same type have called at this port in the past after long haul voyages from the Rice growing areas in Asia.

If those vessels could load the full DWT of rice, the total transport cost would be much less than currently.

4.3 The problem area at the Grain Berth in Abidjan Port

In Abidjan port, discharge of the Rice Bags from the hold to the quay uses the ships own gear with net slings, so each lift is approx. 2 tons (50Kgs x 40). There is no belt-conveyor to directly carry the cargo into the warehouse which makes the work slower.

At present, proposed new Grain terminal has no detailed plan regarding cargo loading and unloading so that we guess PAA will issue a plan at a later stage by issuing a public concession to a major Rice trader and machinery and gantry cranes on the shore side will be included as a PPP issue.

In Japan, the Rice imported from USA is packed in 1 ton Flexi-Bags whilst that imported from Thailand is in 30Kg bags at present. This application should be investigated with Abidjan Port Labor Union in advance to obtain concurrence regarding accepting such big changes in the procedures.

The most important issue is loading the trucks directly from the ships which is not being done at present and is causing queues and congestion so that we strongly recommend creating a truck-lane separately to coordinate smooth loading of the trucks.

Current import volume of the Rice at Abidjan was 135 million tons in the year of 2013 which averages 8,900 tons per vessel. Current import forecast, including transit Rice to the other countries, would be as shown below if the same size vessel calls continue.

(Year=Rice import forecast tonnage)

Year 2020=163 million tons = 183 calls

Year 2025=180 million tons = 202 calls

Year 2030=194 million tons = 218 calls needed.

If the same sized vessels called, year 2025 would require 50 more calls than at present and year 2030 would need 66 additional calls.

When we observed the ships being unloaded at the West Wharf, there were two ships, one discharging Rice and the other cement which means shore work would be done at the West Wharf if the berth is open for work.

If we do not secure a new Grain terminal, we are very afraid that grain discharge operations will be interrupted due to competition for the berth space which will interrupt the delivery of the grain to the final consumers.

The new Grain terminal is designed to accommodate two ships at one long berth (400m) therefore it shall be possible to operate a gantry crane and ships gear together using a 4 gang system.

Provision of a gantry crane is one way to guarantee the ability of at least two gangs to continue working if the ships gear goes out of order.

If the depth of the quay increased to -15meters, the Handy Max type can berth with a full load and the total load will be 1.5 ~ 2 times the current volume of Rice that can be handled which decreases the number of ships that can call to those with only a half of a load. If we employ a Flex-Bag system at the new Grain terminal, as described in section 5.2(3) later, the efficiency will be enough to handle future expected volumes.

The port of Abidjan also has to study berth allocation more precisely after confirming ETA and berth/departure time to achieve efficient ship operation with quick turnarounds.



Source: JICA Team

Figure 4.2 Loading onto truck (Long distance and short distance)

5.0 Necessity and Development Policy for the New Grain Terminal

5.1 Problems to solve and correspondence

5.1.1 QuayDraft

Grain vessels currently calling into Abidjan port are about 30,000DWT of Handy Size to 58,000DWT class of Handy Max type but the size of each varies.

The Handy Max type vessel has a draft of about 13 meters or more when fully loaded, therefore, at present they are adjusting to the existing West Wharf draft of -9.5m by only loading half of the maximum cargo of such type of vessel.

The 33 vessels that berthed at the West Wharf in the year of 2013 carried a total of 680,000 tonnes of Rice, for an average of about 20,600 tons per ship, however, we have unloaded 8,900 tonnes from all of the small parcel vessels additionally.

If the –depth of the water alongside the berth is increased to 15 meters, the cargo volume of Rice could be more than double at each calling so to increase the tonnage is not much of a problem, subject to crane availability, and the change of the Rice packing style from 50kgs bags to the Flex-Bag.

5.1.2 Congestion problems to solve at the Discharge yard

After the rice is unloaded, some goes directly to the warehouse at the wharf, some is delivered directly to the domestic distributors, some to the cargo forwarder’s warehouse for their own handling and storage purposes and a lot is transit Rice that goes to Landlocked countries such as Burkina Faso, and Mali, therefore there is congestion around the ships during the discharge operations due to the limited apron space.

In order to promote smooth delivery, we suggest creating a dedicated truck lane and having advanced meetings to preplan loading and unloading operations and truck sorting for each destination. Further we saw a quite lot of trucks in long queues on both sides of the main road that were waiting to obtain Customs approval or clearance. The New Grain terminal must solve this congestion problem together with smooth Customs clearance with ordinary truck lanes with allocated spaces.

5.1.3 improvement of anchor waiting time and working efficiency

We need to consider to following points to improve.

- VRIDI Canal dredging in advance
- Build the new Grain Terminal (Length 400m、Depth 15meters)

Appendix D Preliminary Investigation Report for the Grain Terminal of Abidjan Port

- Equipment to be provided includes a Wharf Gantry crane and fork lift to handle 1 ton Flex-Bag loading onto the trucks.
- Implement Flex-Bag packaging for loading at the port and domestic delivery. The current Rice bags could be manually packed into Flex-Bags.

In the near future, Flex-Bags such as those being used in Japanese ports for importing Rice from the USA should be adopted which will permit the handling of a ton at a time instead 50 Kgs bags.

Our investigation in Japan indicates (by Tally Sheet) that approximately 6,000 bags (6,000 tonnes) could be handled within 2.5 days by 2 gangs which is appropriate for larger size vessels such as Handy Max that can be berthed and finished within 5-6 days if the berth permitted their draft and it was equipped with a gantry crane.

To facilitate the transition before changing to 1 ton bags, the existing 50kg bags may packed in 1 ton bags as an outer container for lifting purposes then, labor efficiency will be greatly improved.

Flex-Bags are shown below in the example photos and sketch.

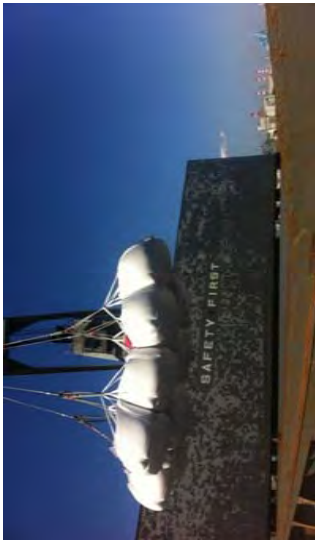
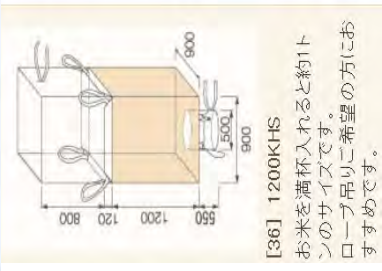


Figure 5.1 Flex-Bags onboard and discharge by lifter (12 bags)

5.1.4 No.2 Container Terminal construction and conventional berth

As planned, the No.2 Container Terminal construction will close the South Wharf operations (No.17~20 with 437,683 tonnes in below) and those grain unloading operations must be shifted elsewhere on a permanent basis.

Warehouse areas will be described in chapter 5.2.2 later.

Table 5.1 2013 Grain handled at each berth

Total Grain	2,032,023 tons
2013 (Tons)	
WEST	687,997
SOUTH	437,683
NORTH	794,573
OTHERS	111,770

Source: PAA Data Base

As shown in Table 5.1, the total Grain handled at the South Wharf was 437,683 tons which is approximately 30% of the total import, excluding Wheat, that was discharged at North Solo in bulk.

We know that West Wharf (No.6~12 with 7 berths) is already in full operation and if we consider more imports such as the increase in import of Cement (2013 increased 550%) we recommend establishing a new separate Grain terminal as soon as possible.

It is , therefore, important that Abidjan port should improve its capacity for grain handling by changing its operational methods in addition to increasing the depth of the quay enabling larger DWT ships in full loaded condition to berth alongside.

5.2 Capacity plan to meet Demand

5.2.1 Handling Capacity to meet Demand

The West Wharf shall continue handling all of the Grains (excluding Wheat) for the time being including transit cargo bound for other countries.

Table 5.2 2013 Forecast of Grain Cargo for the future

	2020	2025	2030
Imported Rice	1,273,782	1,389,454	1,478,058
Export Cacao and Coffee	721,165	776,280	854,484
Import Rice (Transit)	360,268	413,410	459,091
Import Sugar (Transit)	182,408	217,163	251,263
Total	2,537,623	2,796,307	3,042,896

(Unit : Ton)

Source: Research Team

Table 5.2 indicates gross forecast for the Grain handling at West Wharf in 2020, which will total about 2.54 million tons. Compared with 2013 (2.21 million) this is a 15% increase and will reach a 38% increase in 2030 at 3.04 million tons.

We also indicate at Table 5.3 Grain handling berth occupation in 2013 at the West and South Wharfs (excluding North where mostly Wheat is handled.)

Table 5.3 2013 West Wharf -Berth Occupation

Items	unit	formula	result
a. handled cargo	'000 Ton		1,615,664
b. per call average	Ton/Call		8,926
c. average calls	Call/Annum	a/b	181
d. capability	Ton/Gang/Call	40/th x 2 G x0.7	56
e. berth hours	Hours / Annum	(b/d+6) x c	29,937
f. working ratio	Hours / Annum	(12 x 365 x 0.95) days	4,161
g. berth occupation	%	e/(f x b)	72
Berth number (B)	10		

Source: JICA Team

As shown in Table 5.3, we can easily see that the berth occupation ratio (g) in the West Wharf is already over 70%, however, the actual number of vessels calling into the West Wharf is over that figure because we did not count the Cement and other general cargo vessels.

According to "Port Development by the United Nations" , Berth groups with more than 6 units are recommended not to exceed a 70% occupation rate for economical and efficient operation so that we consider this is a maximum figure which should not be exceeded.

Furthermore, we forecast that there will be an increase in demand in the future, and therefore, vessels will have to wait a longer time than current at outside of the harbor or at anchor due to the congestion described above.

5.2.2 Warehouse Capacity Deficit

5.2.2.1 Warehouses and yard

If we put the figure, say as for each 100% ratio on existing wharf ware houses by zone, the PAA report for the first quarter of 2014 is shown in Table 5.4

Looking at the first quarter of 2014, when construction of No.2 Container Terminal was begun on the South Wharf, those South 4 warehouses with a total area of 26,400m2 could not be used anymore and logically this means that there will be a shortage of about 20% (79,200 ton capacity).

And the peak season for Cacao Beans export runs from September to next March which means that there will be more and more demand for storage ware house, therefore, we can expect warehouse usage will be over 90% in this peak period. A new Grain terminal should cover this deficit by providing 4 more warehouses instead of only the two that PAA planned originally because of South is closed down.

Building a SILO at the new Grain terminal is another option to facilitate Wheat handling for larger vessels if necessary but at this stage it is just one of the possibilities.

Details are given in section 5.5.

Table 5.4 2013 Wharf Warehouse usage (%)

By Zone	Warehouse Usage (%)		
	2012	2013	2014
North (3 Silo)	58.1	75.3	80.1
West (7 ware houses)	46.6	53.4	59.6
South (4 ware houses)	46.8	76.9	86.0
Average/total	50.5	68.5	75.2

Source: PAA/DEEP

Table 5.5 Further, we have obtained from PAA the areas for all of the Abidjan wharf warehouses.

Table 5.5 Ware House at Abidjan

WAREHOUSE	AREA (m ²)	ZONE	TONS (CBM)
Warehouse 1	4,800	NORTH	
Warehouse 2	6,000		
Warehouse 3	3,616		
Warehouse 3 bis	6,000		
Warehouse 4	6,000		
Warehouse 5	6,000	NORTH	
Total	32,416		81,040
Warehouse 5 bis	2,820	WEST	
Warehouse 6	6,000		
Warehouse 7	6,000		
Warehouse 7 bis	5,673		
Warehouse 8	6,000		
Warehouse 9	6,000		
Warehouse 10	6,000		
Warehouse 10 bis	6,765		
Warehouse 11	6,000		
Warehouse 11 bis	1,200		
Warehouse 12	6,000		
Warehouse 13	6,000		
Warehouse 13 bis	6,000		
Warehouse 14	6,000		
Total	76,458		191,145
Warehouse 17	7,200	SOUTH	
Warehouse 18	7,200		
Warehouse 19	6,000		
Warehouse 20	6,000		
Total	26,400		66,000
Abidjan Port Total	135,274 m ²		338,185

Source: PAA and JICA Team

Existing warehouse area : 135,274 m²
Exclude North Wharf Wheat : -32,416 m²
Possibility to improve existing : 0 m²

(Net area x (Forecast Growth) : 102,858 m² x 1.1 (Year 2025=113,144 m²) Total 113,144 m² is required. Therefore, excluding the existing West Wharf 76,458 m², the new Grain terminal needs warehousing area of 70,000 m², this equals 6 warehouses. (basis 1=6,000 m²). N.B. Forecast a 30% increase in gross

cargo in 2030, but ignored 20% for through transit cargo and direct local supply, that does not use a warehouse, distributed so 10% is actual need for warehousing.

5.2.2.2 Wharf Handling Capacity

According to PAA's initial proposal for the new Grain terminal, the new wharf would be 400 meters in length which can accommodate 2 ships of the Handy Max type at one time.

However, when construction of the new No. 2 container terminal on the South Wharf started those 4 berths are no longer usable and it is only possible to use the four berths of West Wharf (No.9-12) for Grain vessels making a total of 6 berths.

Therefore, we have to institute economical and skilled operations by following best practices to facilitate handling 3 million tons of Grain per year.

A quay depth 15 meters would enable vessels to load a full cargo (this means over 2 times the current load) and use a gantry crane and 4 gangs rather than 2 gangs which would keep wharf occupation below 70%

Flex-Bag operation is better than the current 50kg bag imports.

We have forecast total Grain volume in 2025 would be 2.8 million tons and we put here two cases for examination for your reference.

Examination Case 1

Case 1 (Table 5.6) based on the new Grain terminal handling Flex-Bags and minimum discharge rate of 150 tons per hour by a land side gantry crane together with the ships gear by 4 gangs at once whilst the existing West Wharf continues using the existing methods such 50kg bags loading 40 tons hourly by 4 gangs. As a result, 112 calls at West Wharf would be a limit for 70% occupancy and 1,000,000 tons are the ceiling because vessel average discharge is calculated at 8,926 tons per call.

Table 5.6 Examination Case 1

New Grain Terminal (2 berths)				
Items	unit	formula	result	
a. cargo handled	'000 Ton		1,900,000	
b. per call average	Ton/Call		20,000	
c. average calls	Calls/Annum	a/b	95	
d. capability	Ton/Gangs/Calls	150th x 4G x0.7	420	
e. berth hours	Hours / Annum	(b/d+6) x c	5,094	
f. working ratio	Hours / Annum	(10 x 365 x 0.95) days	3,468	
g. berth occupation	%	e/(f x B)	73.45	
Berth number (B)	2	New Grain Berths		

West Wharf (No.9-12) 4 berths				
Items	Unit	formula	result	
a. cargo handled	'000 Ton		1,000,000	
b. per call average	Ton/Call		8,926	
c. average calls	Calls/Annum	a/b	112	
d. capability	Ton/Gangs/Calls	40/h x 4G x0.7	112	
e. berth hours	Hours / Annum	(b/d+6) x c	9,601	
f. working ratio	Hours / Annum	(10 x 365 x 0.95) days	3,468	
g. berth occupation	%	e/(f x B)	69.22	
Berth number (B)	4	West Wharf berths		

Source: JICA Study Team

We can handle 2.9 million tons using this method.

Examination Case 2

On Table 5.7 both terminals handle only Flex-Bags by 4 gangs to discharge 3,700,000 tons in total
But West Wharf reaches its limit for calls per year.

Table 5.7 Examination Case 2

New Grain Terminal (2 berths)				
Items	unit	formula	result	
a. cargo handled	'000 Ton		1,900,000	
b. per call average	Ton/Call		20,000	
c. average calls	Calls/Annum	a/b	95	
d. capability	Ton/Gangs/Calls	150th x 4G x0.7	420	
e. berth hours	Hours / Annum	(b/d+6) x c	5,094	
f. working ratio	Hours / Annum	(10 x 365 x 0.95) days	3,468	
g. berth occupation	percentage	e/(f x B)	73.45	
Berth number (B)	2			

West Wharf (No.9-12) 4 berths				
Items	unit	formula	Result	
a. cargo handled	'000 Ton		1,800,000	
b. per call average	Ton/Call		8,926	
c. average calls	Calls/Annum	a/b	202	
d. capability	Ton/Gangs/Calls	150th x 4G x0.7	420	
e. berth hours	Hours / Annum	(b/d+6) x c	5,496	
f. working ratio	Hours / Annum	(10 x 365 x 0.95) days	3,468	
g. berth occupation	percentage	e/(f x B)	39.62	
Berth number (B)	4			

Source: JICA Study Team

5.3 Policy to Expand Handling Volume

We can propose the two following major processes.

- A) Provide 15 meters depth at the quay at the new Grain Terminal to enable Handy Max type vessels to be fully loaded, consequently the discharge volume per vessel will largely increase and contribute to terminal handling volumes.
- B) Working Rationalization. This way is to use a land side Gantry rail crane in addition to the ships gear, then 4 gangs would be workable at the peak. Furthermore, change the cargo packages from 50kg bags to Flex-Bags (1 ton) putting bags or bulk grain inside the Flex-Bags according to the domestic needs after discharge. This also shortens the ships port stay time.

We assume that an efficient truck lane for waiting, loading and unloading should be smoothly sorted out at the reclaimed new land. Cargo handling needs certain areas.

5.4 Comparison of the plans in the request to JICA and the proposal for the new grain terminal

The plan of construction, procurement and improvement of operation recommended in 5.3 is compared with the plan in the requested JICA as follows:

Table 5.8 Comparison of the plans in the request to JICA and the proposal for the new grain terminal

	Recommendation	Requested Project	Implementation
Deep Sea Berth	Depth -15m, Length 400m	Depth -15m, Length 400m	Available
Cargo Handling Equipment	Shore Cranes (Unloaders and Silos in case of handling wheat)	not included	Installation by private operator is expected
Improving cargo handling method	Introduction of large bags for cargo handling (Introduction of large folk lifts)	not included	Consensus among shippers, consignees and shipping lines is required
Storage Facilities	Construction of more than six warehouses (around 4ha in total)	not included	Construction by private operator is expected
Alleviating congestion in the terminal	Expansion of truck lane Preparation of waiting area Sufficient cargo handling space	not included	Prepared by private operator is expected
Land space of the terminal	Further detailed estimation of required space is necessary	Redamation of 10ha	detailed estimation in Basic Design

The proposal for the new grain terminal described in 5.4 is basically in line with the plan in the request to JICA by PAA to construct a deep sea berth for accommodating fully loaded large grain carriers in order to cope with the increasing grain cargo traffic along with improving cargo handling efficiency. Handy-max type vessels are expected to call for the time being, however Pana Max type vessels are also expected to call in the near future. For both vessels, a deep sea berth with depth of 15m and length of 400m is necessary to effectively handle increasing grain cargoes. Deployment of shore cranes is indispensable for accommodating Pana Max type vessels, since such vessels are usually not equipped with ship cranes. Shore cranes are also very effective in improving cargo handling productivity even in the case of handy-max type vessels which have their own ship cranes.

It is necessary for the shipper and consignee to reach an agreement on the need to introduce large bags into cargo handling. However, it does not require any specific facilities except some large fork lifts and can be realized without a large investment from the private operator

Construction of more than six warehouses is required to cope with the increasing cargo traffic (as well as to compensate for the four warehouses to be demolished in the South Quay) judging from present and increasing occupancy rate of existing warehouses.

There is a possibility to rearrange the functions of the North Pier and South Pier in which case wheat handling can be handled at the new grain terminal as bulk cargo. In this scenario, installation of onshore cargo handling equipment such as unloaders and storage facilities as silos would be necessary in the new grain terminal.

In order to alleviate traffic congestion in the terminal area and to improve truck operability, the expansion of the truck lane and preparation of a waiting area and sufficient cargo handling space are required.

Since the pattern of cargo movement in the terminal and type of cargo handling system have not been decided yet, a quantitative estimation of necessary space for the future terminal operation cannot easily be carried out at present. However, various measures to improve transportation to the hinterland including the preparation of a waiting lane for trucks would be possible within the planned terminal space of 10 ha.

Construction of the deep sea grain berth and reclamation of the terminal land space are included in the request to JICA for funding of the new grain terminal. However, installation of cargo handling equipment, construction of sheds and warehouses and pavement of the cargo handling yard are not included in the request to JICA. It seems PAA expects that these facilities and equipment will be provided under a PPP scheme. In that case, the capacity and specifications of the facilities and equipment should be clearly indicated as a requirement in the application of the PPP scheme.

5.5 Preliminary evaluation of feasibility of the new grain terminal project

This project is very important and urgent to cope with the serious shortage of grain cargo handling capacity in the Port of Abidjan. As described in the section 2.3, the new grain terminal project has been authorized in various high level plans such as the National Development Plan which describes the basic policy of the Government. It is also consistent with the overall port development plan, the policy for the maximum utilization of the limited water area in the port, and road traffic management in the hinterland.

Concerning the environmental impact of the requested project, it is necessary to pay attention to the water quality of the port area which is a closed water area with very little seawater exchange with the outer sea. However, it is possible to manage the environmental impact of the requested project since it seems to be minimal compared with other major development projects in the port area.

This requested project is formulated on the assumption that the deepening and expansion of Vridi Canal is to be implemented, and investment in cargo handling equipment and cargo handling operation are carried out by the private sector. Construction work on the Canal project is already in progress. Private operators will be interested in developing and operating terminal facilities since the grain cargo traffic will surely increase in the future.

The demolition of the South Quay due to the construction of the second container terminal makes this project urgent, however this project would be necessary regardless of the container terminal project due to the steady increase of grain cargo volume.

6.0	Recommendations on the further development of the Port of Abidjan
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There are many projects proposed for the development of the Port of Abidjan. The order of priority of these projects as expressed in the NDP and relevant plans does not necessarily reflect the maturity of each project such as concreteness of the plan or the level of consensus of the stake holders. The implementation of each project is not necessarily in harmony with the others. These problems may stem from the lack of a master plan for the long term overall development of the port. A comprehensive and consistent Master Plan for the port development is crucial in order to maximize the benefit and to minimize the cost of overall implementation of the development. The Master Plan should optimize the scale of each development project and optimize the usage of the limited land and water area in the port.

It is recommended to include the following issues in the Master Plan,

- (1) Master plan covers an estimation of the necessary area for the future port activities and formulation of a land use plan which gives supporting evidence to the land reclamation plan. Furthermore, the necessary dredging volume for improving the channels and basins in the port should be estimated. By balancing dredging volume and reclamation volume, a dredging plan and reclamation plan can be optimized and total development cost can be minimized. The Master Plan should also cover a road and railway development plan for connecting the port and hinterland area based on a thorough evaluation of future traffic demand arising from various port related activities.
- (2) Environmental preservation is also a key focus of the Master Plan. The lagoon of the port is vulnerable to water pollution because it is a closed water area with the canal as the entrance to the outer sea. The inflowing contamination flux from the hinterland caused by industry and living activities should be evaluated, and effective countermeasures against anticipated water pollution prepared.
- (3) In addition to construction of the new facilities, improvement and functional rearrangement of the existing facilities are also important. For example, many of the sheds and the warehouses in the port area are superannuated. The Master Plan should include an overall plan for rearrangement, replacement and repair, and a maintenance plan based on a careful assessment of present utilization and future needs. Since rearrangement of present facilities largely affects the actual port activities, the timing, method and procedure of implementation should be carefully examined.

Appendix E

(Page E-1 to E-6)

Initial Environmental Evaluation of Proposed Projects for Transport Sector

The initial environmental evaluation for proposed projects for the transport sector, except soft projects, was carried out based on the location map with protected area (Figure 1), the project profiles and field inspections. The 30 environmental items to evaluate for 4 groups (pollution, natural environment, social environment, and others) were used based on the JICA Environmental and Social Guideline. The evaluation was done qualitatively into 5 grades such as A+ (significant positive impact), B+ (positive impact), C+ (minimum positive impact), D (no impact), C- (minimum negative impact), B- (negative impact), and A- (significant negative impact). The result of initial environmental evaluation is shown in Tables C-1 and C-2. Each grade was assigned a point value, A+: 3, B+: 2, C+: 1, D: 0, C-: -1, B-: -2, A-: -3 points (Table3). The points were accumulated as total points, and categorized into 5 categories (I: almost no impact, II: minimum negative impact, III negative impact (necessity of mitigation measures), IV; negative impact (necessity of careful attention of mitigation measures), V: significant negative impact). The list of evaluation categories is shown in Table4. In the future, detailed environmental evaluations should be carried out in the FS stage.

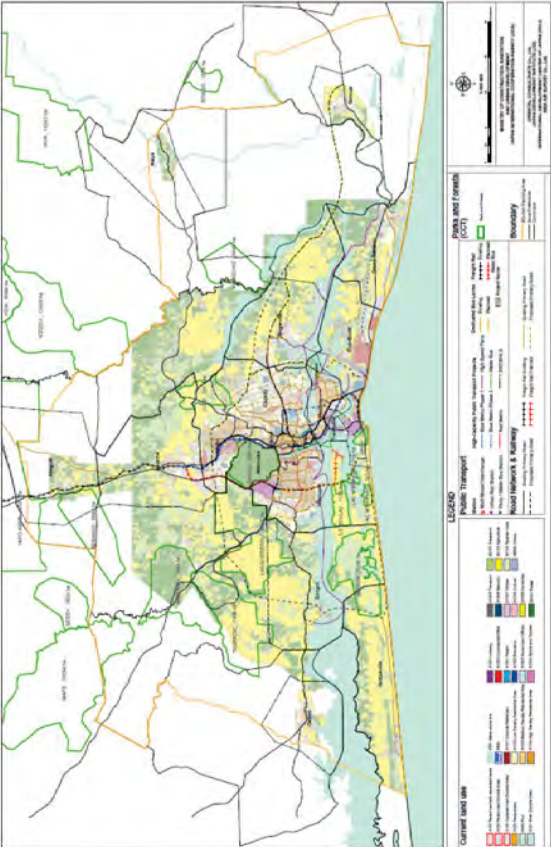


Figure 1 The location of the proposed projects and protected areas

Appendix E Initial Environmental Evaluation of Proposed Projects for Transport Sector

Table1 Initial Environmental Evaluation for Proposed Projects
for Transport Sector (Pollution & Natural Environment)

Proposed Projects	Pollution					Natural environment					
	Air pollution	Water pollution	Waste	Soil contamination	Noise & vibration	Land subsidence	Offensive odor	Bottom material	Protected area	Ecosystem	Hydrology
V. Road Development Plan											
V-1: Road Development of V4 Ring Road											
V-1-1: Development of V4 Ring Road - Sogoini / Autoroute du Nord Section	D	D	D	D	D	D	D	D	D	D	D
V-1-2: Development of V4 Ring Road - Autoroute du Nord / PK13	D	D	D	D	D	D	D	D	D	D	D
V-1-3: Development of V4 Ring Road - PK13 to Abobo Bypass Section	B+	D	D	D	D	D	D	D	D	D	D
V-1-4: Development of V4 Ring Road - Abobo Bypass / Francois Mitterand Section	C+	D	D	D	D	D	D	D	D	D	D
V-1-5: Development of V4 Ring Road - Francois Mitterand / Riviera 6 Section	C+	D	D	D	D	D	D	D	D	D	D
V-1-6: Development of V4 Ring Road - Desieres Island Bridges Section	B+	D	D	D	D	D	D	D	D	B+	B+
V-1-7: Development of V4 Ring Road - Aletoula Section	C+	C+	D	D	D	D	D	C+	C+	C+	C+
V-1-8: Development of V4 Ring Road - Canal du Vind Section	D	B+	D	D	D	D	D	B+	D	B+	B+
V-1-9: Development of V4 Ring Road - Jacqueline Section	D	D	D	D	D	D	D	D	D	D	D
V-2: Development of Bienville Area Road Network (BAARN)											
V-2-1: Development of BAARN - Bienville Northern Bypass	D	D	D	D	D	D	D	D	D	D	D
V-2-2: Development of BAARN - Extension of the Boulevard Francois Mitterand	C+	D	D	D	D	D	D	D	D	B+	B+
V-2-3: Development of BAARN - Widening of the Route de Boperville	D	D	D	D	D	D	D	D	D	D	D
V-2-4: Development of BAARN - Bienville BRT Road	D	D	D	D	D	D	D	D	D	D	D
V-3: Development of Bassam Area Road Network (BAARN)											
V-3-1: Development of BAARN - Abidin-Bassam Expressway (under construction)	D	D	D	D	D	D	D	D	D	D	D
V-3-2: Development of BAARN - Aletoula Area	C+	B+	D	D	C+	D	D	B+	D	B+	B+
V-3-3: Development of BAARN - Bassam Northern Bypass	D	D	D	D	D	D	D	D	D	D	D
V-3-4: Development of BAARN - Widening of the Route de Boula	D	D	D	D	D	D	D	D	D	D	D
V-4: Development of Yopougon Area Road Network (YoARN)											
V-4-1: Development of YoARN - V101 - V102 - V103 - V104 - V105 - V106 - V107 - V108 - V109 - V110 - V111 - V112 - V113 - V114 - V115 - V116 - V117 - V118 - V119 - V120 - V121 - V122 - V123 - V124 - V125 - V126 - V127 - V128 - V129 - V130 - V131 - V132 - V133 - V134 - V135 - V136 - V137 - V138 - V139 - V140 - V141 - V142 - V143 - V144 - V145 - V146 - V147 - V148 - V149 - V150 - V151 - V152 - V153 - V154 - V155 - V156 - V157 - V158 - V159 - V160 - V161 - V162 - V163 - V164 - V165 - V166 - V167 - V168 - V169 - V170 - V171 - V172 - V173 - V174 - V175 - V176 - V177 - V178 - V179 - V180 - V181 - V182 - V183 - V184 - V185 - V186 - V187 - V188 - V189 - V190 - V191 - V192 - V193 - V194 - V195 - V196 - V197 - V198 - V199 - V200 - V201 - V202 - V203 - V204 - V205 - V206 - V207 - V208 - V209 - V210 - V211 - V212 - V213 - V214 - V215 - V216 - V217 - V218 - V219 - V220 - V221 - V222 - V223 - V224 - V225 - V226 - V227 - V228 - V229 - V230 - V231 - V232 - V233 - V234 - V235 - V236 - V237 - V238 - V239 - V240 - V241 - V242 - V243 - V244 - V245 - V246 - V247 - V248 - V249 - V250 - V251 - V252 - V253 - V254 - V255 - V256 - V257 - V258 - V259 - V260 - V261 - V262 - V263 - V264 - V265 - V266 - V267 - V268 - V269 - V270 - V271 - V272 - V273 - V274 - V275 - V276 - V277 - V278 - V279 - V280 - V281 - V282 - V283 - V284 - V285 - V286 - V287 - V288 - V289 - V290 - V291 - V292 - V293 - V294 - V295 - V296 - V297 - V298 - V299 - V300 - V301 - V302 - V303 - V304 - V305 - V306 - V307 - V308 - V309 - V310 - V311 - V312 - V313 - V314 - V315 - V316 - V317 - V318 - V319 - V320 - V321 - V322 - V323 - V324 - V325 - V326 - V327 - V328 - V329 - V330 - V331 - V332 - V333 - V334 - V335 - V336 - V337 - V338 - V339 - V340 - V341 - V342 - V343 - V344 - V345 - V346 - V347 - V348 - V349 - V350 - V351 - V352 - V353 - V354 - V355 - V356 - V357 - V358 - V359 - V360 - V361 - V362 - V363 - V364 - V365 - V366 - V367 - V368 - V369 - V370 - V371 - V372 - V373 - V374 - V375 - V376 - V377 - V378 - V379 - V380 - V381 - V382 - V383 - V384 - V385 - V386 - V387 - V388 - V389 - V390 - V391 - V392 - V393 - V394 - V395 - V396 - V397 - V398 - V399 - V400 - V401 - V402 - V403 - V404 - V405 - V406 - V407 - V408 - V409 - V410 - V411 - V412 - V413 - V414 - V415 - V416 - V417 - V418 - V419 - V420 - V421 - V422 - V423 - V424 - V425 - V426 - V427 - V428 - V429 - V430 - V431 - V432 - V433 - V434 - V435 - V436 - V437 - V438 - V439 - V440 - V441 - V442 - V443 - V444 - V445 - V446 - V447 - V448 - V449 - V450 - V451 - V452 - V453 - V454 - V455 - V456 - V457 - V458 - V459 - V460 - V461 - V462 - V463 - V464 - V465 - V466 - V467 - V468 - V469 - V470 - V471 - V472 - V473 - V474 - V475 - V476 - V477 - V478 - V479 - V480 - V481 - V482 - V483 - V484 - V485 - V486 - V487 - V488 - V489 - V490 - V491 - V492 - V493 - V494 - V495 - V496 - V497 - V498 - V499 - V500 - V501 - V502 - V503 - V504 - V505 - V506 - V507 - V508 - V509 - V510 - V511 - V512 - V513 - V514 - V515 - V516 - V517 - V518 - V519 - V520 - V521 - V522 - V523 - V524 - V525 - 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V669 - V670 - V671 - V672 - V673 - V674 - V675 - V676 - V677 - V678 - V679 - V680 - V681 - V682 - V683 - V684 - V685 - V686 - V687 - V688 - V689 - V690 - V691 - V692 - V693 - V694 - V695 - V696 - V697 - V698 - V699 - V700 - V701 - V702 - V703 - V704 - V705 - V706 - V707 - V708 - V709 - V710 - V711 - V712 - V713 - V714 - V715 - V716 - V717 - V718 - V719 - V720 - V721 - V722 - V723 - V724 - V725 - V726 - V727 - V728 - V729 - V730 - V731 - V732 - V733 - V734 - V735 - V736 - V737 - V738 - V739 - V740 - V741 - V742 - V743 - V744 - V745 - V746 - V747 - V748 - V749 - V750 - V751 - V752 - V753 - V754 - V755 - V756 - V757 - V758 - V759 - V760 - V761 - V762 - V763 - V764 - V765 - V766 - V767 - V768 - V769 - V770 - V771 - V772 - V773 - V774 - V775 - V776 - V777 - V778 - V779 - V780 - V781 - V782 - V783 - V784 - V785 - V786 - V787 - V788 - V789 - V790 - V791 - V792 - V793 - V794 - V795 - V796 - V797 - V798 - V799 - V800 - V801 - V802 - V803 - V804 - V805 - V806 - V807 - V808 - V809 - V810 - V811 - V812 - V813 - V814 - V815 - V816 - V817 - V818 - V819 - V820 - V821 - V822 - V823 - V824 - V825 - V826 - V827 - V828 - V829 - V830 - V831 - V832 - V833 - V834 - V835 - V836 - V837 - V838 - V839 - V840 - V841 - V842 - V843 - V844 - V845 - V846 - V847 - V848 - V849 - V850 - V851 - V852 - V853 - V854 - V855 - V856 - V857 - V858 - V859 - V860 - V861 - V862 - V863 - V864 - V865 - V866 - V867 - V868 - V869 - V870 - V871 - V872 - V873 - V874 - V875 - V876 - V877 - V878 - V879 - V880 - V881 - V882 - V883 - V884 - V885 - V886 - V887 - V888 - V889 - V890 - V891 - V892 - V893 - V894 - V895 - V896 - V897 - V898 - V899 - V900 - V901 - V902 - V903 - V904 - V905 - V906 - V907 - V908 - V909 - V910 - V911 - V912 - V913 - V914 - V915 - V916 - V917 - V918 - V919 - V920 - V921 - V922 - V923 - V924 - V925 - V926 - V927 - V928 - V929 - V930 - V931 - V932 - V933 - V934 - V935 - V936 - V937 - V938 - V939 - V940 - V941 - V942 - V943 - V944 - V945 - V946 - V947 - V948 - V949 - V950 - V951 - V952 - V953 - V954 - V955 - V956 - V957 - V958 - V959 - V960 - V961 - V962 - V963 - V964 - V965 - V966 - V967 - V968 - V969 - V970 - V971 - V972 - V973 - V974 - V975 - V976 - V977 - V978 - V979 - V980 - V981 - V982 - V983 - V984 - V985 - V986 - V987 - V988 - V989 - V990 - V991 - V992 - V993 - V994 - V995 - V996 - V997 - V998 - V999 - V1000 - V1001 - V1002 - V1003 - V1004 - V1005 - V1006 - V1007 - V1008 - V1009 - V1010 - V1011 - V1012 - V1013 - V1014 - V1015 - V1016 - V1017 - V1018 - V1019 - V1020 - V1021 - V1022 - V1023 - V1024 - V1025 - V1026 - V1027 - V1028 - V1029 - V1030 - V1031 - V1032 - V1033 - V1034 - V1035 - V1036 - V1037 - V1038 - V1039 - V1040 - V1041 - V1042 - V1043 - V1044 - V1045 - V1046 - V1047 - V1048 - V1049 - V1050 - V1051 - V1052 - V1053 - V1054 - V1055 - V1056 - V1057 - V1058 - V1059 - V1060 - V1061 - V1062 - V1063 - V1064 - V1065 - V1066 - V1067 - V1068 - V1069 - V1070 - V1071 - V1072 - V1073 - V1074 - V1075 - V1076 - V1077 - V1078 - V1079 - V1080 - V1081 - V1082 - V1083 - V1084 - V1085 - V1086 - V1087 - V1088 - V1089 - V1090 - V1091 - V1092 - V1093 - V1094 - V1095 - V1096 - V1097 - V1098 - V1099 - V1100 - V1101 - V1102 - V1103 - V1104 - V1105 - V1106 - V1107 - V1108 - V1109 - V1110 - V1111 - V1112 - V1113 - V1114 - V1115 - V1116 - V1117 - V1118 - V1119 - V1120 - V1121 - V1122 - V1123 - V1124 - V1125 - V1126 - V1127 - V1128 - V1129 - V1130 - V1131 - V1132 - V1133 - V1134 - V1135 - V1136 - V1137 - V1138 - V1139 - V1140 - V1141 - V1142 - V1143 - V1144 - V1145 - V1146 - V1147 - V1148 - V1149 - V1150 - V1151 - V1152 - V1153 - V1154 - V1155 - V1156 - V1157 - V1158 - V1159 - V1160 - V1161 - V1162 - V1163 - V1164 - V1165 - V1166 - V1167 - V1168 - V1169 - V1170 - V1171 - V1172 - V1173 - V1174 - V1175 - V1176 - V1177 - V1178 - V1179 - V1180 - V1181 - V1182 - V1183 - V1184 - V1185 - V1186 - V1187 - V1188 - V1189 - V1190 - V1191 - V1192 - V1193 - V1194 - V1195 - V1196 - V1197 - V1198 - V1199 - V1200 - V1201 - V1202 - V1203 - V1204 - V1205 - V1206 - V1207 - V1208 - V1209 - V1210 - V1211 - V1212 - V1213 - V1214 - V1215 - V1216 - V1217 - V1218 - V1219 - V1220 - V1221 - V1222 - V1223 - V1224 - V1225 - V1226 - V1227 - V1228 - V1229 - V1230 - V1231 - V1232 - V1233 - V1234 - V1235 - V1236 - V1237 - V1238 - V1239 - V1240 - V1241 - V1242 - V1243 - V1244 - V1245 - V1246 - V1247 - V1248 - V1249 - V1250 - V1251 - V1252 - V1253 - V1254 - V1255 - V1256 - V1257 - V1258 - V1259 - V1260 - V1261 - V1262 - V1263 - V1264 - V1265 - V1266 - V1267 - V1268 - V1269 - V1270 - V1271 - V1272 - V1273 - V1274 - V1275 - V1276 - V1277 - V1278 - V1279 - V1280 - V1281 - V1282 - V1283 - V1284 - V1285 - V1286 - V1287 - V1288 - V1289 - V1290 - V1291 - V1292 - V1293 - V1294 - V1295 - V1296 - V1297 - V1298 - V1299 - V1300 - V1301 - V1302 - V1303 - V1304 - V1305 - V1306 - V1307 - V1308 - V1309 - V1310 - V1311 - V1312 - V1313 - V1314 - V1315 - V1316 - V1317 - V1318 - V1319 - V1320 - V1321 - V1322 - V1323 - V1324 - V1325 - V1326 - V1327 - V1328 - V1329 - V1330 - V1331 - V1332 - V1333 - V1334 - V1335 - V1336 - V1337 - V1338 - V1339 - V1340 - V1341 - V1342 - V1343 - V1344 - V1345 - V1346 - V1347 - V1348 - V1349 - V1350 - V1351 - V1352 - V1353 - V1354 - V1355 - V1356 - V1357 - V1358 - V1359 - V1360 - V1361 - V1362 - V1363 - V1364 - V1365 - V1366 - V1367 - V1368 - V1369 - V1370 - V1371 - V1372 - V1373 - V1374 - V1375 - V1376 - V1377 - V1378 - V1379 - V1380 - V1381 - V1382 - V1383 - V1384 - V1385 - V1386 - V1387 - V1388 - V1389 - V1390 - V1391 - V1392 - V1393 - V1394 - V1395 - V1396 - V1397 - V1398 - V1399 - V1400 - V1401 - V1402 - V1403 - V1404 - V1405 - V1406 - V1407 - V1408 - V1409 - V1410 - V1411 - V1412 - V1413 - V1414 - V1415 - V1416 - V1417 - V1418 - V1419 - V1420 - V1421 - V1422 - V1423 - V1424 - V1425 - V1426 - V1427 - V1428 - V1429 - V1430 - V1431 - V1432 - V1433 - V1434 - V1435 - V1436 - V1437 - V1438 - V1439 - V1440 - V1441 - V1442 - V1443 - V1444 - V1445 - V1446 - V1447 - V1448 - V1449 - V1450 - V1451 - V1452 - V1453 - V1454 - V1455 - V1456 - V1457 - V1458 - V1459 - V1460 - V1461 - V1462 - V1463 - V1464 - V1465 - V1466 - V1467 - V1468 - V1469 - V1470 - V1471 - V1472 - V1473 - V1474 - V1475 - V1476 - V1477 - V1478 - V1479 - V1480 - V1481 - V1482 - V1483 - V1484 - V1485 - V1486 - V1487 - V1488 - V1489 - V1490 - V1491 - V1492 - V1493 - V1494 - V1495 - V1496 - V1497 - V1498 - V1499 - V1500 - V1501 - V1502 - V1503 - V1504 - V1505 - V1506 - V1507 - V1508 - V1509 - V1510 - V1511 - V1512 - V1513 - V1514 - V1515 - V1516 - V1517 - V1518 - V1519 - V1520 - V1521 - V1522 - V1523 - V1524 - V1525 - V1526 - V1527 - V1528 - V1529 - V1530 - V1531 - V1532 - V1533 - V1534 - V1535 - V1536 - V1537 - V1538 - V1539 - V1540 - V1541 - V1542 - V1543 - V1544 - V1545 - V1546 - V1547 - V1548 - V1549 - V1550 - V1551 - V1552 - V1553 - V1554 - V1555 - V1556 - V1557 - V1558 - V1559 - V1560 - V1561 - V1562 - V1563 - V1564 - V1565 - V1566 - V1567 - V1568 - V1569 - V1570 - V1571 - V1572 - V1573 - V1574 - V1575 - V1576 - V1577 - V1578 - V1579 - V1580 - V1581 - V1582 - V1583 - V1584 - V1585 - V1586 - V1587 - V1588 - V1589 - V1590 - V1591 - V1592 - V1593 - V1594 - V1595 - V1596 - V1597 - V1598 - V1599 - V1600 - V1601 - V1602 - V1603 - V1604 - V1605 - V1606 - V1607 - V1608 - V1609 - V1610 - V1611 - V1612 - V1613 - V1614 - V1615 - V1616 - V1617 - V1618 - V1619 - V1620 - V1621 - V1622 - V1623 - V1624 - V1625 - V1626 - V1627 - V1628 - V1629 - V1630 - V1631 - V1632 - V1633 - V1634 - V1635 - V1636 - V1637 - V1638 - V1639 - V1640 - V1641 - V1642 - V1643 - V1644 - V1645 - V1646 - V1647 - V1648 - V1649 - V1650 - V1651 - V1652 - V1653 - V1654 - V1655 - V1656 - V1657 - V1658 - V1659 - V1660 - V1661 - V1662 - V1663 - V1664 - V1665 - V1666 - V1667 - V1668 - V1669 - V1670 - V1671 - V1672 - V1673 - V1674 - V1675 - V1676 - V1677 - V1678 - V1679 - V1680 - V1681 - V1682 - V1683 - V1684 - V1685 - V1686 - V1687 - V1688 - V1689 - V1690 - V1691 - V1692 - V1693 - V1694 - V1695 - V1696 - V1697 - V1698 - V1699 - V1700 - V1701 - V1702 - V1703 - V1704 - V1705 - V1706 - V1707 - V1708 - V1709 - V1710 - V1711 - V1712 - V1713 - V1714 - V1715 - V1716 - V1717 - V1718 - V1719 - V1720 - V1721 - V1722 - V1723 - V1724 - V1725 - V1726 - V1727 - V1728 - V1729 - V1730 - V1731 - V1732 - V1733 - V1734 - V1735 - V1736 - V1737 - V1738 - V1739 - V1740 - V1741 - V1742 - V1743 - V1744 - V1745 - V1746 - V1747 - V1748 - V1749 - V1750 - V1751 - V1752 - V1753 - V1754 - V1755 - V1756 - V1757 - V1758 - V1759 - V1760 - V1761 - V1762 - V1763 - V1764 - V1765 - V1766 - V1767 - V1768 - V1769 - V1770 - V1771 - V1772 - V1773 - V1774 - V1775 - V1776 - V1777 - V1778 - V1779 - V1780 - V1781 - V1782 - V1783 - V1784 - V1785 - V1786 - V1787 - V1788 - V1789 - V1790 - V1791 - V1792 - V1793 - V1794 - V1795 - V1796 - V1797 - V1798 - V1799 - V1800 - V1801 - V1802 - V1803 - V1804 - V1805 - V1806 - V1807 - V1808 - V1809 - V1810 - V1811 - V1812 - V1813 - V1814 - V1815 - V1816 - V1817 - V1818 - V1819 - V1820 - V1821 - V1822 - V1823 - V1824 - V1825 - V1826 - V1827 - V1828 - V1829 - V1830 - V1831 - V1832 - V1833 - V1834 - V1835 - V1836 - V1837 - V1838 - V1839 - V1840 - V1841 - V1842 - V1843 - V1844 - V1845 - V1846 - V1847 - V1848 - V1849 - V1850 - V1851 - V1852 - V1853 - V1854 - V1855 - V1856 - V1857 - V1858 - V1859 - V1860 - V1861 - V1862 - V1863 - V1864 - V1865 - V1866 - V1867 - V1868 - V1869 - V1870 - V1871 - V1872 - V1873 - V1874 - V1875 - V1876 - V1877 - V1878 - V1879 - V1880 - V1881 - V1882 - V1883 - V1884 - V1885 - V1886 - V1887 - V1888 - V1889 - V1890 - V1891 - V1892 - V1893 - V1894 - V1895 - V1896 - V1897 - V1898 - V1899 - V1900 - V1901 - V1902 - V1903 - V1904 - V1905 - V1906 - V1907 - V1908 - V1909 - V1910 - V1911 - V1912 - V1913 - V1914 - V1915 - V1916 - V1917 - V1918 - V1919 - V1920 - V1921 - V1922 - V1923 - V1924 - V1925 - V1926 - V1927 - V1928 - V1929 - V1930 - V1931 - V1932 - V1933 - V1934 - V1935 - V1936 - V1937 - V1938 - V1939 - V1940 - V1941 - V1942 - V1943 - V1944 - V1945 - V1946 - V1947 - V1948 - V1949 - V1950 - V1951 - V1952 - V1953 - V1954 - V1955 - V1956 - V1957 - V1958 - V1959 - V1960 - V1961 - V1962 - V1963 - V1964 - V1965 - V1966 - V1967 - V1968 - V1969 - V1970 - V1971 - V1972 - V1973 - V1974 - V1975 - V1976 - V1977 - V1978 - V1979 - V1980 - V1981 - V1982 - V1983 - V1984 - V1985 - V1986 - V1987 - V1988 - V1989 - V1990 - V1991 - V1992 - V1993 - V1994 - V1995 - V1996 - V1997 - V1998 - V1999 - V2000 - V2001 - V2002 - V20030											

Appendix E Initial Environmental Evaluation of Proposed Projects for Transport Sector

Proposed Projects	Social environment														Others					
	Resettlement	Poors	Minority/ indigenous people	Local economy (employment/ livelihood)	Land use/ local resource use	Water use	Existing social infrastructure/ social service	Social capital/ social society (decision making body)	Uneven distribution of benefits and damage	Conflict of interest in the region	Cultural heritage	Aesthetics	Gender	Children's rights	Infection of HIV / AIDS, etc.	Working environment (including occupational safety)	Accident	Impact of cross-border, and climate change		
V-5: Development of Abobo Area Road Network (ABARN)	A+	C-	C-	D	D	D	D	D	D	D	C-	D	D	D	D	C-	D	D		
	V-5-1: Development of ABARN - Extension of OL	A-	C-	C-	D	D	D	D	D	D	C-	D	D	D	D	C-	D	D		
	V-5-2: Development of ABARN - Western Abobo Bypass	B-	C-	C-	D	D	D	D	D	D	C-	D	D	D	D	C-	D	D		
	V-5-3: Development of ABARN - Widening of Western Banco Forest Bypass	C-	C-	C-	D	D	D	D	D	D	C-	D	D	D	D	C-	D	D		
	V-5-4: Development of ABARN - Widening of the Route de France	C-	C-	C+	C+	C-	D	D	C-	C-	C-	D	C+	D	D	C-	D	D		
	V-5-5: Development of ABARN - Widening of the Autoroute d'Abobo	C-	C-	C+	C+	C-	D	D	C-	C-	C-	C-	C+	D	D	C-	D	D		
	V-5-6: Development of ABARN - East-West Abobo-Cocody Link	C-	C-	C+	C+	C-	D	D	C-	C-	C-	C-	C+	D	D	C-	D	C-		
V-6: Development of Cocody Area Road Network (CoARN)																				
	V-6-1: Development of CoARN - Extension of Boulevard de la Liberté	B-	C-	C-	D	D	D	D	D	D	C-	D	D	D	D	C-	D	C+		
	V-6-2: Development of CoARN - Voie Y3	B-	C-	C-	D	D	D	D	D	D	C-	D	D	D	D	C-	D	C+		
	V-6-3: Development of CoARN - Old Y4 Alignment	B-	C-	C-	D	D	D	D	D	D	C-	D	D	D	D	C-	D	C+		
	V-6-4: Development of CoARN - Extension of the Boulevard de France	B-	C-	C-	D	D	D	D	D	D	C-	D	D	D	D	C-	D	C+		
	V-6-5: Development of CoARN - Boulevard de France Redressé	B-	C-	C-	D	D	D	D	D	D	C-	D	D	D	D	C-	D	C+		
	V-6-6: Development of CoARN - Widening of the Boulevard de la Liberté	B-	C-	C-	D	D	D	D	D	D	C-	D	D	D	D	C-	D	C+		
	V-6-7: Development of CoARN - Widening of the Rue des Palmiers	B-	C-	C-	D	D	D	D	D	D	C-	D	D	D	D	C-	D	C+		
	V-6-8: Development of CoARN - Widening of the Boulevard de la Comode	B-	C-	C-	D	D	D	D	D	D	C-	D	D	D	D	C-	D	C+		
	V-6-9: Development of Cocody Area Road Network (CoARN) - Widening of Boulevard d'Abobo	B-	C-	C-	D	D	D	D	D	D	C-	D	D	D	D	C-	D	C+		
V-7: Development of Central Area Road Network (CaARN)																				
	V-7-1: Development of CaARN - Voie Triomphale	A+	C-	C-	D	D	D	D	D	D	C-	D	D	D	D	C-	D	C+		
	V-7-2: Development of CaARN - 3rd Bridge (under construction)	C-	C-	C-	D	D	D	D	D	D	C-	D	D	D	D	C-	D	C+		
	V-7-3: Development of CaARN - Widening of the Boulevard de Marseille	B-	C-	C-	D	D	D	D	D	D	C-	D	D	D	D	C-	D	C+		
	V-7-4: Development of CaARN - Viad Bridge	D	C-	C-	D	D	D	D	D	D	D	D	D	D	D	C-	D	C+		
	V-7-5: Development of CaARN - Viad Northern Bypass	C-	C-	C-	D	D	D	D	D	D	C-	D	D	D	D	C-	D	B+		
	V-7-6: Development of CaARN - Grand-Campement Arterial Road	C-	C-	C-	D	D	D	D	D	D	C-	D	D	D	D	C-	D	C+		
	V-7-7: Development of CaARN - Upgrade of Felix Houphouët-Boigny Bridge	A-	C-	C-	D	D	D	D	D	D	C-	D	C	D	D	D	C-	D	C+	
	V-7-8: Development of CaARN - Upgrade of General de Gaulle Bridge	A-	C-	C-	D	D	D	D	D	D	C-	D	D	D	D	D	C-	D	C+	
	V-7-9: Development of CaARN - Viad Batié Bridge	A-	C-	C-	D	D	D	D	D	D	C-	D	D	D	D	D	C-	D	C+	
V-7-10: Development of CaARN - Viadogon Fichtelle Tunnel	A-	C-	C-	D	D	D	D	D	D	D	C-	D	D	D	D	C-	D	C+		

AH-: Significant positive/negative impact is expected.
BH-: Positive/negative impact is expected to some extent.
C+/-: Minimum positive/negative impact.
D: No impact is expected.

Appendix E Initial Environmental Evaluation of Proposed Projects for Transport Sector

Proposed Projects	Social environment														Others			
	Resettlement	Poors	Minority/ indigenous people	Local economy (employment/ livelihood)	Land use/ local resource use	Water use	Existing social infrastructure/ social service	Social capital/ social society (decision making body)	Uneven distribution of benefits and damage	Conflict of interest in the region	Cultural heritage	Aesthetics	Gender	Children's rights		Infection of HIV / AIDS, etc.	Working environment (including occupational safety)	Accident
V-8: Intersection Improvement																		
V-8-1: Intersection Improvement - Sobira (Treichville)																		
V-8-2: Intersection Improvement - Main d'Abobo (Abobo)																		
V-8-3: Intersection Improvement - Banco (Abobo)																		
V-8-4: Intersection Improvement - Palais de Sports (Treichville)																		
V-8-5: Intersection Improvement - Spinas (Yopougon)																		
V-8-6: Intersection Improvement - Keava (Yopougon)																		
V-8-7: Intersection Improvement - Super Pompier (Yopougon)																		
V-8-8: Intersection Improvement - Simake (Abobo)																		
V-8-9: Intersection Improvement - St Jean (Cocody)																		
V-8-10: Intersection Improvement - Palmaret (Cocody)																		
V-8-11: Intersection Improvement - ORO Inclusive (Treichville)																		
V-8-12: Intersection Improvement - Ichtalim (Koumassi)																		
V-8-13: Intersection Improvement - Zoo (Adjame-Cocody)																		
V-8-14: Intersection Improvement - Villamerville (Adjame)																		
V-8-15: Intersection Improvement - Carrefour de la Vie (Cocody)																		
V-8-16: Intersection Improvement - Carrefour de l'Ecole Nationale de Poles (Cocody)																		
V-8-17: Intersection Improvement - Carrefour de Marcori (Marcori)																		
V-8-18: Intersection Improvement Carrefour Oza																		
V-9: Development of Additional Roads																		
V-9-1: Development of an Alternative Road to the Route de Dabou																		
V-9-2: Development of an Alternative Connection between Autoroute du Nord - Carrefour Thomasnet																		
V-9-3: Development of an Elevated Road over Cocody Bay																		
V-9-4: Development of a Northern Extension of the 2nd Bridge																		
V-9-5: Development of a Connection Road between Boulevard Mirand and Grand Bassam																		
T: Public Transport Development Plan																		
T-1: Commuter Rail Development																		
T-1-1: North-South Rail Project Stage 1: Anyamé to Airport																		
T-1-2: North-South Rail Project Stage 2: Airport to Grand-Bassam																		
T-1-3: East - West Rail Project (Yopougon to Bongoville)																		
T-2: Bus Transportation Development																		
T-2-1: Development of BRT Service: Adjame - Baka																		
T-2-2: Development of BRT Service: Abobo - Koumassi Phase 1																		
T-2-3: Development of BRT Service: Abobo - Koumassi Phase 2																		
T-2-4: Development of BRT Service: Bongoville - Bonoua																		
T-2-5: Development of BRT Service: Yopougon - Dabou																		
T-2-7: Pilot project of communal transport (Improvement of local transport service by replacement of Wolo-Wolo)																		

AH-: Significant positive/negative impact is expected.
BH-: Positive/negative impact is expected to some extent.
C+/-: Minimum positive/negative impact.
D: No impact is expected.

Appendix E. Initial Environmental Evaluation of Proposed Projects for Transport Sector

Proposed Projects	Social environment														Others				
	Resettlement	Poors	Minority/ indigenous people	Local economy (employment/ livelihood)	Land use/ local resource use	Water use	Existing social infrastructure/ social service	Social capital/ social society (decision making body)	Uneven distribution of benefits and damage	Conflict of interest in the region	Cultural heritage	Aesthetics	Gender	Children's rights		Infection of HIV / AIDS, etc.	Working environment (including occupational safety)	Accident	Impact of cross-border, and climate change
T-3. Intermodal Transportation Terminal Development																			
T-3.1. Development/Improvement of intermodal centres at Adjame, and Central/Southern Plateau																			
T-4. Water-Based Transportation Development																			
T-4.1. East - West High Speed Ferry Service (Development of Lagoon transport Stations, Sangha - Grand																			
C-	D	D	D	D	C-	D	D	D	D	D	D	D	D	D	D	D	D	D	
T-4.2. Water Bus - Allocable to Tricouille																			
C-	D	D	D	D	C-	D	D	D	D	D	D	D	D	D	D	D	D	D	
F-1. Freight Transport Development Plan																			
F-1.1. Developing Direct Container Freight Loading & Unloading System																			
D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	
F-1.2. New Freight Railway Connecting to Western Part of Abidjan Port																			
C-	C-	C-	C+	C-	C-	D	D	D	D	D	C-	D	D	D	D	C-	D	D	
F-2. Truck Transport Services																			
F-2.1. Metropolitan Logistic Center Development																			
C-	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	

A+/-: Significant positive/negative impact is expected.
B+/-: Positive/negative impact is expected to some extent.
C+/-: Minimum positive/negative impact.
D: No impact is expected.

Appendix E. Initial Environmental Evaluation of Proposed Projects for Transport Sector

Table 3 Evaluation Points and Categorization for Proposed Projects for Transport Sector															
Proposed Projects	No. of Earth Evaluation						Category								
							To Points								
	A+	A	B	C	D	C+	B+	0-4 points	5-9 points	10-14 points	15-19 points	20- points			
V. Road Development Plan															
V-1. Development of V4 Ring Road															
V-1.1. Development of V4 Ring Road - Songon/ Autoroute du Nord Section	0	0	10	18	2	0	-8								
V-1.2. Development of V4 Ring Road - Autoroute du Nord / PK18	0	0	10	18	2	0	-8								
V-1.3. Development of V4 Ring Road - PK12 to Abobo Boulogne Section	1	2	4	23	0	0	-11								X
V-1.4. Development of V4 Ring Road - Abobo Boulogne/ François Mitterand Section	0	1	6	23	0	0	-8								X
V-1.5. Development of V4 Ring Road - Desirée Sarrat / Riviera 6 Section	0	1	6	23	0	0	-8								X
V-1.6. Development of V4 Ring Road - Desirée Sarrat Bridges Section	1	6	4	19	0	0	-19								X
V-1.7. Development of V4 Ring Road - Aéroport Section	0	1	10	19	0	0	-12								X
V-1.8. Development of V4 Ring Road - Canal du Vrai Section	0	5	9	16	0	0	-19								X
V-1.9. Development of V4 Ring Road - Jacquemelle Section	0	4	10	14	2	0	-16								X
V-2. Development of Bangerville Area Road Network (BAARN)															
V-2.1. Development of BAARN - Bangerville Northern Bypass	0	0	10	18	2	0	-8								X
V-2.2. Development of BAARN - Extension of the Boulevard François Mitterand	0	4	10	14	2	0	-16								X
V-2.3. Development of BAARN - Widening of the Route de Bangerville	0	1	6	23	0	0	-8								X
V-2.4. Development of BAARN - Bangerville BRT Road	0	0	5	25	0	0	-5								X
V-3. Development of Bassam Area Road Network (BAARN)															
V-3.1. Development of BAARN - Abidjan-Bassam Expressway (under construction)	0	0	9	19	2	0	-7								X
V-3.2. Development of BAARN - Bassam Northern Bypass	0	5	6	19	0	0	-16								X
V-3.3. Development of BAARN - Bassam Southern Bypass	0	0	9	19	2	0	-7								X
V-3.4. Development of BAARN - Bassam BRT Road	0	0	9	19	2	0	-7								X
V-4. Development of Yopougon Area Road Network (YoARN)															
V-4.1. Development of YoARN - Voie V23 - Parkway Section	1	2	4	22	1	0	-10								X
V-4.2. Development of YoARN - Voie V23 - 5th Bridge Section	1	6	4	18	1	0	-18								X
V-4.3. Development of YoARN - Voie V2	1	2	4	22	1	0	-10								X
V-4.4. Development of YoARN - Voie V6	1	2	4	22	1	0	-10								X
V-4.5. Development of YoARN - Voie V9	1	2	4	22	1	0	-10								X
V-4.6. Development of YoARN - Voie V20 - Industrial Zone Aéroport Road	1	2	6	20	1	0	-12								X
V-4.7. Development of YoARN - Voie V28 - Northern Section	1	2	4	22	1	0	-10								X
V-4.8. Development of YoARN - Voie V28 - 4th Bridge	1	6	4	18	1	0	-18								X
V-4.9. Development of YoARN - Voie V28 - Southern Section	1	2	4	22	1	0	-10								X
V-4.10. Development of YoARN - Widening of the Route de Dabou	1	2	4	22	1	0	-10								X
V-4.11. Development of YoARN - Yopougon Western Bypass	1	2	4	22	1	0	-10								X
V-4.12. Development of YoARN - Widening of the Voie V1	1	2	4	22	1	0	-10								X
V-4.13. Development of YoARN - Central Road of Boulogne Island	1	2	4	22	1	0	-10								X
V-4.14. Development of YoARN - Widening of the Voie V1	1	2	4	22	1	0	-10								X
V-5. Development of Abobo Area Road Network (ABARN)															
V-5.1. Development of ABARN - Extension of Q1	1	2	4	23	0	0	-11								X
V-5.2. Development of ABARN - Western Abobo Bypass	0	3	6	21	0	0	-12								X
V-5.3. Development of ABARN - Widening of Western Banco Forest Bypass	0	2	5	23	0	0	-9								X
V-5.4. Development of ABARN - Widening of the Route d'Alé	0	0	9	19	2	0	-7								X
V-5.5. Development of ABARN - West-West Abobo-Cocody Link	0	0	9	19	2	0	-7								X
V-5.6. Development of ABARN - East-West Abobo-Cocody Link	0	0	10	18	2	0	-8								X
V-6. Development of Cocody Area Road Network (CoARN)															
V-6.1. Development of CoARN - Extension of Boulevard Latite	0	1	6	22	1	0	-7								X
V-6.2. Development of CoARN - Voie Y3	0	1	6	22	1	0	-7								X
V-6.3. Development of CoARN - Oki V4 Alignment	0	1	6	22	1	0	-7								X
V-6.4. Development of CoARN - Extension of the Boulevard de France	0	1	6	22	1	0	-7								X
V-6.5. Development of CoARN - Boulevard de la République	0	1	6	22	1	0	-7								X
V-6.6. Development of CoARN - Widening of the Boulevard de France	0	1	6	22	1	0	-7								X
V-6.7. Development of CoARN - Widening of the Rue des Jardins	0	1	6	22	1	0	-7								X
V-6.8. Development of CoARN - Widening of the Boulevard de la Cotonne	0	1	6	22	1	0	-7								X
V-6.9. Development of Cocody Area Road Network (CoARN) Widening of Boulevard Aftaban	0	1	6	22	1	0	-7								X
V-6.10. Development of CoARN - Widening of the Boulevard de la Cotonne	0	1	6	22	1	0	-7								X
V-7. Development of Ceres Area Road Network (CoARN)															
V-7.1. Development of CoARN - Voie Timpale	1	2	4	22	1	0	-10								X
V-7.2. Development of CoARN - 3rd Bridge (under construction)	0	4	5	20	1	0	-12								X
V-7.3. Development of CoARN - Widening of the Boulevard de Marseille	0	5	6	18	1	0	-15								X
V-7.4. Development of CoARN - Vrai Bridge	0	4	3	22	0	1	-9								X
V-7.5. Development of CoARN - Vrais Northern Bypass	0	4	5	20	1	0	-12								X
V-7.6. Development of CoARN - Grand Campement Aftan Road	0	4	5	20	1	0	-12								X
V-7.7. Development of CoARN - Grand Campement Aftan Road	0	4	5	20	1	0	-12								X
V-7.8. Development of CoARN - Upgrade of Grand Campement Bridge	1	2	4	22	1	0	-10								X
V-7.9. Development of CoARN - Vrai Bessy Bridge	1	2	4	22	1	0	-10								X
V-7.10. Development of CoARN - Yopougon Technille Tunnel	1	2	4	22	1	0	-10								X

	No. of Each Evaluation					Category
	I	II	III	IV	V	

Proposed Projects	To: Points						5-9 points	10-14 points	15-19 points	20+ points	
	A	B	C	D	E	F					
V-8: Intersection Improvement											
V-8-1: Intersection Improvement - Sobira (Treichville)	0	0	1	2	1	1	-2	X			
V-8-2: Intersection Improvement - Naire Abobo (Abobo)	0	0	1	2	1	1	-2	X			
V-8-3: Intersection Improvement - Barro (Abobo)	0	0	1	2	1	1	-2	X			
V-8-4: Intersection Improvement - Salas de Sports (Treichville)	0	0	1	2	1	1	-2	X			
V-8-5: Intersection Improvement - Salas de Sports (Treichville)	0	0	1	2	1	1	-2	X			
V-8-6: Intersection Improvement - Kéroua (Yopougon)	0	0	1	2	1	1	-2	X			
V-8-7: Intersection Improvement - Sapeur Pompiers (Yopougon)	0	0	1	2	1	1	-2	X			
V-8-8: Intersection Improvement - Samake (Abobo)	0	0	1	2	1	1	-2	X			
V-8-9: Intersection Improvement - St Jean (Cocody)	0	0	1	2	1	1	-2	X			
V-8-10: Intersection Improvement - Palatine (Cocody)	0	0	1	2	1	1	-2	X			
V-8-11: Intersection Improvement - CHU Treichville (Treichville)	0	0	1	2	1	1	-2	X			
V-8-12: Intersection Improvement - Tchikanda (Cocody)	0	0	1	2	1	1	-2	X			
V-8-13: Intersection Improvement - Tchikanda (Cocody)	0	0	1	2	1	1	-2	X			
V-8-14: Intersection Improvement - Vieuxville (Adjamé)	0	0	1	2	1	1	-2	X			
V-8-15: Intersection Improvement - Carrefour de la Vie (Cocody)	0	0	1	2	1	1	-2	X			
V-8-16: Intersection Improvement - Carrefour de la Vie (Cocody)	0	0	1	2	1	1	-2	X			
V-8-17: Intersection Improvement - Carrefour de l'Ecole Nationale des Polices (Cocody)	0	0	1	2	1	1	-2	X			
V-8-17: Intersection Improvement - Carrefour de l'Ecole Nationale des Polices (Cocody)	0	0	1	2	1	1	-2	X			
V-8-18: Intersection Improvement - Carrefour de Maro (Marcory)	0	0	1	2	1	1	-2	X			
V-8-18: Intersection Improvement Carrefour Ora	0	0	1	2	1	1	-2	X			
V-9: Development of Additional Roads											
V-9-1: Development of Additional Road in the Route de Dabou	0	0	1	1	1	2	0	0	0	0	X
V-9-2: Development of Additional Road in the Route de Dabou	0	0	1	1	1	2	0	0	0	0	X
V-9-3: Development of the Boulevard Road over Cocody Bay	1	6	4	1	9	0	0	-1	9		X
V-9-4: Development of a Northern Extension of the 3rd Bridge	1	2	4	2	3	0	0	-1	1		X
V-9-5: Development of a Connection Road between Boulevard Mirand and Grand Bassam	4	4	1	10	14	2	0	-1	6		X
T: Public Transport Development Plan											
T-1: Commuter Rail Development											
T-1-1: North-South Rail Project Stage 1 Anyama to Airport	1	5	8	13	2	1	-2	1	-2		X
T-1-2: North-South Rail Project Stage 2 Airport to Grand Bassam	1	0	1	12	14	2	1	-1	-1		X
T-1-3: North-South Rail Project Stage 3 Grand Bassam to Airport	0	5	6	14	2	1	-1	-1	-1		X
T-2: Bus Transportation Development											
T-2-1: Development of BRT Service Adjamé - Basse Industrielle Zone	0	0	1	2	1	0	0	0	0		X
T-2-2: Development of BRT Service Adjamé - Koumassi Phase 1	0	0	1	2	1	0	0	0	0		X
T-2-3: Development of BRT Service Adjamé - Koumassi Phase 2	0	0	1	2	1	0	0	-8			X
T-2-4: Development of BRT Service Bingerville - Bonoua	0	4	3	2	3	0	0	-8			X
T-2-5: Development of BRT Service Yopougon - Dabou	0	0	3	2	3	0	0	0	0		X
T-2-7: Road project of commercial transport (Improvement of local transport service by replacement of Moto-Moto)	0	0	1	2	1	0	0	0	0		X
T-3: Development/Improvement of intermodal centres at Adjamé and Central/Southern Plateau											
T-3-1: Development/Improvement of intermodal centres at Adjamé and Central/Southern Plateau	0	0	3	7	0	0	-3				X
T-4: Water-based Transportation Development											
T-4-1: East - West High Speed Ferry Service (Development of Lagoon Transport Stations - Grand Bassam)	0	4	4	22	0	0	-12				X
T-4-2: Water Bus - Allée/Route to Treichville	0	0	7	23	0	0	-7				X
F: Freight Transport Development Plan											
F-1: Railway Transport Services											
F-1-1: Unloading Direct Container Freight Loading & Unloading System	0	0	1	2	0	0	0	1			X
F-1-2: Unloading Direct Container Freight Loading & Unloading System	0	5	10	13	2	0	-1				X
F-2: Truck Transport Services											
F-2-1: Metropolitan Logistic Center Development	0	0	3	27	0	0	-3				X

Appendix E. Initial Environmental Evaluation of Proposed Projects for Transport Sector

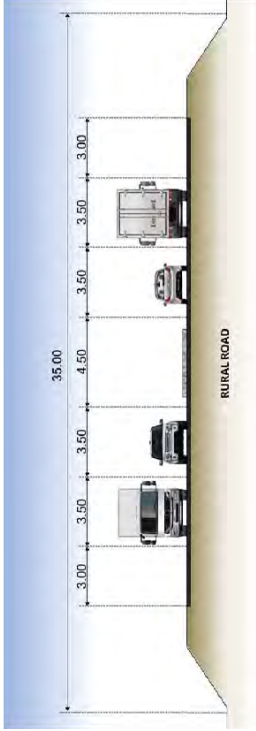
Category III (negative impact (necessity of mitigation measures))	
V-1-3	Development of Y4 Ring Road - PA13 to Abobo-Boulevard Section
V-1-7	Development of Y4 Ring Road - Aéroville Section
V-4-1	Development of YaARN - Voie V23 - Parkway Section
V-4-3	Development of YaARN - Voie V2
V-4-4	Development of YaARN - Voie V6
V-4-5	Development of YaARN - Voie V10
V-4-6	Development of YaARN - Yopougon Industrial Zone Aéroport Road
V-4-7	Development of YaARN - Voie V28 - Northern Section
V-4-9	Development of YaARN - Voie V28 - Southern Section
V-4-10	Development of YaARN - Widening of the Route de Dabou
V-4-11	Development of YaARN - Yopougon Western Bypass
V-4-12	Development of YaARN - Widening of the Voie V1
V-4-13	Development of YaARN - Widening of the Boulevard de Cocody
V-4-14	Development of YaARN - Widening of Sapeyco-Suble Link
V-5-1	Development of AbARN - Extension of Q1
V-5-2	Development of AbARN - Western Abobo Bypass
V-7-1	Development of CaARN - Voie Tromphale
V-7-10	Development of CaARN - 3rd Bridge (under construction)
V-7-2	Development of CaARN - Voie Northern Bypass
V-7-5	Development of CaARN - Voie Northern Bypass
V-7-6	Development of CaARN - Upgrade of Fric-Hautbaud Bridge
V-7-7	Development of CaARN - Upgrade of Genest de Gaulle Bridge
V-7-8	Development of CaARN - Voie Betty Bridge
V-7-9	Development of CaARN - Yopougon-Treichville Tunnel
V-7-10	Development of a Northern Extension of the 3rd Bridge
V-9-4	East - West High Speed Ferry Service (Development of Lagoon Transport Stations: Songon - Grand Bassam)
Category IV (low negative impact (necessity of mitigation measures))	
V-1-6	Development of Y4 Ring Road - Desirée Island Bridges Section
V-1-8	Development of Y4 Ring Road - Jacqueville Section
V-2-2	Development of BaARN - Extension of the Boulevard François Mitterand
V-2-2	Development of BaARN - Aéroville Area
V-2-3	Development of YaARN - Voie V23 - 3th Bridge Section
V-2-4	Development of YaARN - Voie V23 - 3th Bridge Section
V-2-5	Development of YaARN - Widening of the Boulevard de Marseille
V-2-6	Development of an Elevated Road over Cocody Bay
V-2-9	Development of a Connection Road between Boulevard Mitterand and Grand Bassam
T-1-2	North-South Rail Project Stage 2: Airport to Grand-Bassam
T-1-3	East - West Rail Project (Yopougon to Bingenville)
F-1-2	New Freight Railway Connecting to Western Part of Adjani Port
Category V (high negative impact (necessity of mitigation measures))	
T-1-1	North-South Rail Project Stage 1: Anyama to Airport

Appendix F

(Page E-1 to F-168)

Project Profiles

No.	Code	Name of Project	Type of Project ¹	Executing Agencies	Relevant Organizations	(1/4)
	V-1-1	Development of Y4 Ring Road Sogon / Autoroute du Nord Section	TA, FA, PP	AGEROUTE	Ministry of Economic Infrastructure	
		Project Description				
	Main Objectives	The V-1-1 is the western section of the Y4 Ring Road between Sogon and Autoroute du Nord, of which prime function will be to reduce traffic congestion by diverting transit traffic from going into the city center. Currently, the Route de Dabou is the only available option for road users travelling between Dabou-Sogon-Jacquerville and Abidjan Center, forcing all the traffic into Yopougon. The new road will also provide a direct link between the future industrial zone of Attingu�� and the western part of the Greater Abidjan (Dabou-Sogon-Jacquerville).				
	Sub-projects Components	The Project consists of the construction of a new expressway: - Project length: 15.5 km 4 traffic lanes - ROW: 35m - At grade intersection with Route de Dabou (the interchange with Autoroute du Nord is part of the V-1-2 project)				
	Expected Beneficiaries	Citizens of the Greater Abidjan				
	Project Location or Coverage Area	The V-1-1 is the western section of the planned Y4 Ring Road between Route de Dabou near Sogon and Autoroute du Nord near Attingu��.				
	Rationales	Relevance to National Policy Freight Transport Network - Policy TI 9: Truck Ban				
	Private Sector Involvement²	PPP D				
	Necessity of External Supports²	Technical Assistance C				
	Resource Allocation for the Project	Financial Assistance B				
	Environmental Considerations³	Resources from the Ministry of Economic Infrastructure (MIE) and its executing agency AGEROUTE will be allocated for the required civil works and resources from the Ministry of Construction, Sanitation and Urban Development (MCLAU) will be allocated for land acquisition and resettlement. 1) Pollution - Air pollution: D - Water pollution : D - Noise and vibration: D - Bottom material: D 2) Natural Environment - Ecosystem: D 3) Social Environment - Resettlement: C- - Poor/Minority/Indigenous people: C-				

Quantitative Analysis and Rationales	Future Daily Average Traffic Volume (2030): V = 6,422 PCU/km (from the traffic model)	
Project Concept, Scheme or Drawings	Start implementation year: 2019 (short to mid-term) Road classification: Primary road Location Map  Typical Cross-Section 	

Project Concept, Scheme or Drawings	(3/4)	
	Plan View of Intersection with Route de Dabou Entire Plan View	

Preliminary Project Economic Evaluation	(4/4)	
	Assumptions	Price: as of 2014 Foreign currency exchange rate: 1 Euro = 144.19 Yen (as of December 24 2013) Standard conversion factor (SCF): 0.80 Project target period: 30 years from completion year Capital opportunity cost: 12%
	Evaluation Indicators ^{*4}	NPV 694.8 Billion FCFA EIRR 69.1%
	Notes	Benefit-Cost Ratio: 10.49 Project Group No. 1

Notes:

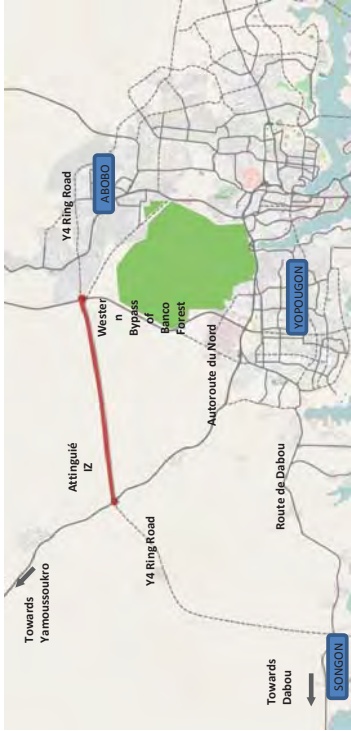
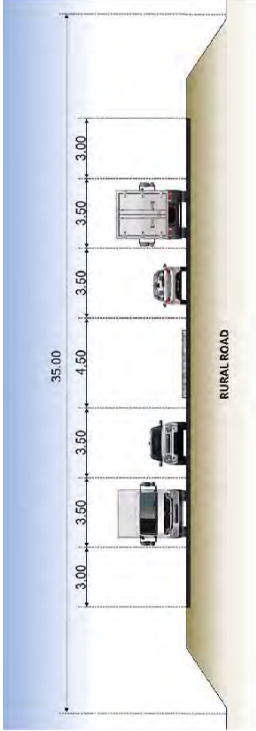
^{*1}: **Type of Project:** types of support to be required are presented:
Technical Assistance (TA); Financial Assistance (FA) and/or Private Participation (PP)
Rated as - **A**: Highly Required; **B**: Highly Advantageous; **C**: Advantageous; **D**: Conditional; and **Non**: Not Necessary

^{*3}: Negative Impact in Environmental Considerations: Rated as - **A**: Serious; **B**: Some; **C**: Negligible

^{*4}: NPV: Net Present Value; EIRR: Economic Internal Rate of Return

No.		(1/3)		
Code	Name of Project	Type of Project ¹	Executing Agencies	Relevant Organizations
V-1-2	Development of Y4 Ring Road Autoroute du Nord / PK18 Section	TA, FA, PP	AGEROUTE	Ministry of Economic Infrastructure
Main Objectives	Project Description			
	Investment Cost (Million FCFA)			
	Preparation			4,484
	Initial Investment			44,842
Sub-projects Components	Recurrent O&M Cost (Per Year)			3,420
	Time Horizon for the Completion			
	Preparatory			1 year
Expected Beneficiaries	Main Work			2 years
	Expected Completion Year			2020
Project Location or Coverage Area	Related/Linked Projects (Project Codes)			V-1-1 to V-1-9 V-5-3, F-1-2
	Citizens of the Greater Abidjan			
	The V-1-2 is the north-western section of the planned Y4 Ring Road between Autoroute du Nord near Attinguè and the Western Bypass of Banco Forest in the PK18 quartier of Abobo. (see Maps attached)			
Rationales		Relevance to National Policy	Relevance to Abidjan Urban Master Plan and/or Existing Policies	
Private Sector Involvement ²	PPP	D	Communities Involvement	Freight Transport Network - Policy TI 9: Truck Ban
	Technical Assistance	C	Other Parties	
Necessity of External Supports ²	Financial Assistance	B	Cooperation with Private Sector	D
	Supports			
Resource Allocation for the Project		Resources from the Ministry of Economic Infrastructure (MIE) and its executing agency AGEROUTE will be allocated for the required civil works and resources from the Ministry of Construction, Sanitation and Urban Development (MCLAU) will be allocated for land acquisition and resettlement.		
Environmental Considerations ³		1) Pollution - Air pollution: D - Water pollution : D - Noise and vibration: D - Bottom material: D 2) Natural Environment - Ecosystem: D 3) Social Environment - Resettlement: C- - Poor/Poor/Minority/Indigenous people: C-		

(2/3)

Quantitative Analysis and Rationales	Future Daily Traffic Volume (2030): V = 3,692 PCU/km (from the traffic model)
Project Concept, Scheme or Drawings	Start implementation year: 2018 (short-term) Road classification: Primary road Location Map  Typical Cross-Section 

(3/3)

Preliminary Project Economic Evaluation	Project Concept, Scheme or Drawings		Plan View of Intersection with Autoroute du Nord			
						
						
			Entire Plan View			
Preliminary Project Economic Evaluation	Assumptions	Price: as of 2014 Foreign currency exchange rate: 1 Euro = 144.19 Yen (as of December 24 2013) Standard conversion factor (SCF): 0.80 Project target period: 30 years from completion year Capital opportunity cost: 12%				
	Evaluation Indicators ⁴	NPV	694.8 Billion FCFA	EIRR	69.1%	
	Notes	Benefit-Cost Ratio: 10.49 Project Group No.1				

Notes:

¹: Type of Project: types of support to be required are presented:

Technical Assistance (TA); Financial Assistance (FA) and/or Private Participation (PP)

Rated as - **A**: Highly Required; **B**: Highly Advantageous; **C**: Advantageous; **D**: Conditional; and **Non**: Not

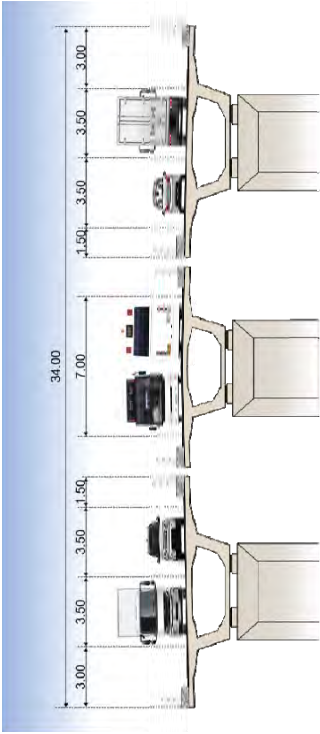
Necessary

³: Negative Impact in Environmental Considerations: Rated as - **A**: Serious; **B**: Some; **C**: Negligible⁴: NPV: Net Present Value; EIRR: Economic Internal Rate of Return

(1/4)

No.	Code	Name of Project	Type of Project ¹	Executing Agencies	Relevant Organizations
	V-1-3	Development of Y4 Ring Road Pk18 / Abobo Baoulé Section	TA, FA, PP	AGEROUTE	Ministry of Economic Infrastructure
Main Objectives	Project Description				Investment Cost (Million FCFA)
	The V-1-3 is the northern section of the Y4 Ring Road, which is planned to reduce traffic congestion by diverting transit traffic from going into the city center. Currently, all transit traffic along the Trans-West African Coastal Road (Dakar-Abidjan-Lagos) coming from or going to the Autoroute du Nord has to go through the city center. The new road, with the rest of the Y4 Ring Road, will divert the transit traffic north of the city and will provide a direct access from Abobo to the future Atlingué Industrial Zone. A BRT line (T-2-2) is also expected to operate on this section.				Preparation
	The Project consists of the construction of a new expressway:				Initial Investment
	• Project length: 10.0 km • 4 traffic lanes • 2 additional BRT lanes in the middle of the road • ROW: 35m • 3 underpasses to let the Q1 Extension (V-5-1) and the Abobo Baoulé Link (V-5-6) go underneath the Y4. • 2 bridges will have to be built to cross thalweg (bridges length: 280m and 430m)				Recurrent O&M Cost (Per Year)
	Citizens of the Greater Abidjan				201,356
Sub-projects Components	• Project length: 10.0 km • 4 traffic lanes • 2 additional BRT lanes in the middle of the road • ROW: 35m • 3 underpasses to let the Q1 Extension (V-5-1) and the Abobo Baoulé Link (V-5-6) go underneath the Y4. • 2 bridges will have to be built to cross thalweg (bridges length: 280m and 430m)				13,914
Expected Beneficiaries	Citizens of the Greater Abidjan				Time Horizon for the Completion
Project Location or Coverage Area	Preparatory				2.5 year
	Main Work				2.5 years
	Expected Completion Year				2020
Rationales	Related/Linked Projects (Project Codes)				V-1-1 to V-1-9, V-5-1, V-5-3, V-5-4, V-5-6, T-2-2, F-1-2
	The V-1-3 is the northern section of the planned Y4 Ring Road between the western bypass of Banco Forest in the Pk18 quarter of Abobo and the Route d' Alépé in the Abobo Baoulé quarter of Abobo. (see Maps attached)				
	Relevance to National Policy				Relevance to Abidjan Urban Master Plan and/or Existing Policies (see Maps attached)
Private Sector Involvement ²	PPP				Freight Transport Network - Policy T1 9: Truck Ban
Necessity of External Supports ²	D				Communities Involvement
	B				Other Parties
Resource Allocation for the Project	Technical Assistance				Financial Assistance
	B				Cooperation with Private Sector
Environmental Considerations ³	Resources from the Ministry of Economic Infrastructure (MIE) and its executing agency AGEROUTE will be allocated for the required civil works and resources from the Ministry of Construction, Sanitation and Urban Development (MCLAU) will be allocated for land acquisition and resettlement.				D
	1) Pollution				D
	- Air pollution: B- - Water pollution : D - Noise and vibration: B- - Bottom material: D				
Environmental Considerations ³	2) Natural Environment				D
	- Ecosystem: D				
	3) Social Environment				
Environmental Considerations ³	- Resettlement: A-				
	- Poor/Minority/Indigenous people: C-				

Quantitative Analysis and Rationales	Future Daily Traffic Volume (2030): V = 10,960 PCU/km (from the traffic model)
Project Concept, Scheme or Drawings	Start implementation year: 2016 (short-term) Road classification: Primary road Location Map  Typical Cross-Section 

Project Concept, Scheme or Drawings	Typical Cross-Section – Bridge Section  Profile of the Bridge  Plan View of Intersection with the Western Bypass of Banco Forest 
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(4/4)

Project Concept, Scheme or Drawings	Plan View of Intersection with the Western Bypass of Banco Forest				
	Entire Plan View				
	Entire Plan View				
Preliminary Project Economic Evaluation	Assumptions	Price: as of 2014 Foreign currency exchange rate: 1 Euro = 144.19 Yen (as of December 24 2013) Standard conversion factor (SCF): 0.80 Project target period: 30 years from completion year Capital opportunity cost: 12%			
	Evaluation Indicators ⁴	NPV	863.2 Billion FCFA	EIRR	20.0%
	Notes	Benefit-Cost Ratio: 3.33 Project Group No.2			

Notes:

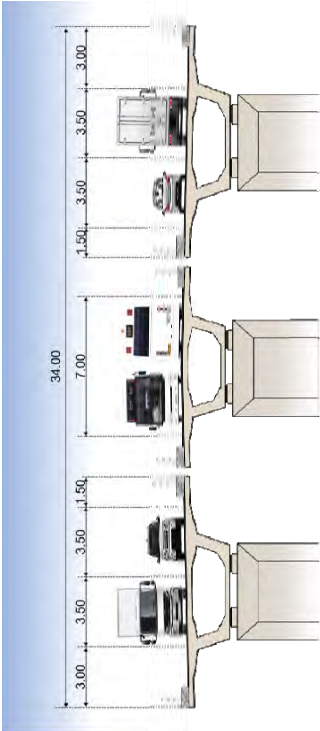
¹: Type of Project: types of support to be required are presented:²: Technical Assistance (TA), Financial Assistance (FA) and/or Private Participation (PP)³: Rated as - A: Highly Required; B: Highly Advantageous; C: Advantageous; D: Conditional; and Non: Not Necessary⁴: Negative Impact in Environmental Considerations: Rated as - A: Serious; B: Some; C: Negligible

NPV: Net Present Value; EIRR: Economic Internal Rate of Return

No.

(1/6)

Code	Name of Project	Type of Project ¹	Executing Agencies	Relevant Organizations
V-1-4	Development of Y4 Ring Road Abobo Baoulé / François Mitterrand Section	TA, FA, PP	AGEROUTE	Ministry of Economic Infrastructure
Project Description				
Main Objectives	The V-1-4 is the north-eastern section of the Y4 Ring Road between the Route d'Alépé and the Boulevard François Mitterrand, which is planned to reduce traffic congestion by diverting transit traffic from going into the city center. This section of the Y4 Ring Road will become the eastern bypass of Cocody, allowing transit traffic to avoid entering the Commune of Cocody. It will also become the main access to the Ile Desiree Bridges. A BRT line (T-2-2 and T-2-3) is also expected to operate on this section.			
	The Project consists of the construction of a new expressway:			
	• Project length: 9.7 km • 4 traffic lanes • 2 additional BRT lanes in the middle of the road • ROW: 35m • 4 new intersections with the future extension of the Boulevard Latrille, with the boulevard François Mitterrand and with the future Northern Bypass (V-2-1) • 1 bridge (length: 800m) is needed to cross a thalweg near Boulevard Latrille			
Expected Beneficiaries	Citizens of the Greater Abidjan			
Project Location or Coverage Area	The V-1-4 is the northern section of the planned Y4 Ring Road between the Route d'Alépé and the Boulevard François Mitterrand in Cocody.			
	(see Maps attached)			
Rationales	Relevance to National Policy	Relevance to Abidjan Urban Master Plan and/or Existing Policies		
		Freight Transport Network - Policy TI 9: Truck Ban		
Private Sector Involvement ²	PPP	Communities Involvement	Other Parties	
Necessity of External Supports ²	D	B	D	
	Technical Assistance	Financial Assistance	Cooperation with Private Sector	
Resource Allocation for the Project	B	B	D	
	Resources from the Ministry of Economic Infrastructure (MIE) and its executing agency AGEROUTE will be allocated for the required civil works and resources from the Ministry of Construction, Sanitation and Urban Development (MCLAU) will be allocated for land acquisition and resettlement.			
Environmental Considerations ³	1) Pollution			
	- Air pollution: C- - Water pollution : D - Noise and vibration: C- - Bottom material: D			
	2) Natural Environment			
	- Ecosystem: D			
	3) Social Environment			
	- Resettlement: B- - Poor/Minority/Indigenous people: C-			

	(3/6) Typical Cross-Section – Bridge Section  Profile of the Bridge  Plan View of Intersection with Route d'Alepe 
Project Concept, Scheme or Drawings	

Quantitative Analysis and Rationales	(2/6) Future Daily Traffic Volume (2030): V = 8,836 PCU/km (from the traffic model) Start implementation year: 2016 (short-term) Road classification: Primary road
Project Concept, Scheme or Drawings	Location Map  Typical Cross-Section – Road Section 

Plan View of Intersection with Boulevard Latrille



Plan View of Intersection with Extension of Boulevard Latrille



Project
Concept,
Scheme or
Drawings

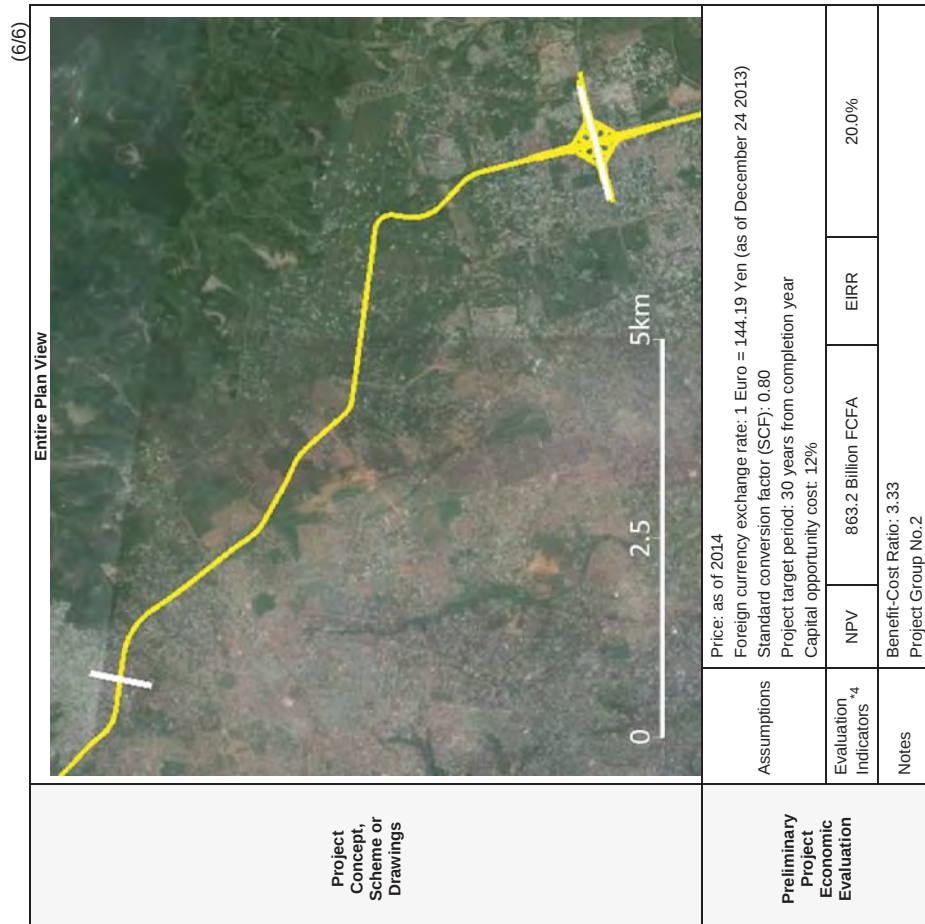
Plan View of Intersection with Northern Bypass of Bingerville Peninsula



Plan View of Intersection with Boulevard Mitterrand



Project
Concept,
Scheme or
Drawings



Notes:

^{*1.} **Type of Project:** types of support to be required are presented:

Technical Assistance (TA); Financial Assistance (FA) and/or Private Participation (PP)

*2. : Rated as - **A**: Highly Required; **B**: Highly Advantageous; **C**: Advantageous; **D**: Conditional; and **Non**: Not

Required, highly advantageous, highly advantageous, advantageous, necessary

*3. Negative Impact in Environmental Considerations: Rated as - A: Serious; B: Some; C: Negligible

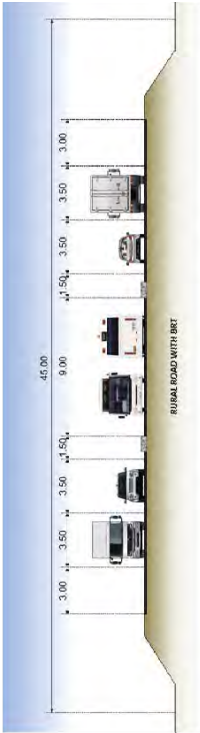
*4. : negative impact in Environmental Considerations rated as 'A';
: NPV: Net Present Value; EIRR: Economic Internal Rate of Return

No.

(1/4)

Code	Name of Project	Type of Project ^{*1}	Executing Agencies	Relevant Organizations
V-1-5	Development of Y4 Ring Road Francois Mitterrand / Riviera 6 Section	TA, FA, PP	AGEROUTE	Ministry of Economic Infrastructure
Main Objectives		Project Description		
		The V-1-5 is the eastern section of the Y4 Ring Road between Francois Mitterrand and the quartier of Riviera 6 in Cocody, which is planned to reduce traffic congestion by diverting transit traffic from going into the city center. The new road can be considered as the access road to the Ile Desiree Bridges which will provide an alternative crossing of the lagoon East to the 3rd Bridge. • The Project consists of the construction of a new expressway: • Project length: 4.5 km • 4 traffic lanes • 2 additional BRT lanes in the middle of the road • ROW: 35m • 1 new interchange with the Boulevard de France Redressé (V-6-5) and the Route de Bingerville (V-2-3)		
Sub-projects Components		Citizens of the Greater Abidjan		
Expected Beneficiaries		The V-1-5 is the eastern section of the planned Y4 Ring Road between the boulevard Francois Mitterrand and the quartier Riviera 6 in Cocody.		
Rationales		Relevance to National Policy Freight Transport Network - Policy TI 9: Truck Ban Relevance to Abidjan Urban Master Plan and/or Existing Policies		
Private Sector Involvement ^{*2}	PPP	Communities Involvement	Other Parties	
Necessity of External Supports ^{*2}	D	B	D	
Resource Allocation for the Project	C	Financial Assistance	Cooperation with Private Sector	
		B	D	
	Resources from the Ministry of Economic Infrastructure (MIE) and its executing agency AGEROUTE will be allocated for the required civil works and resources from the Ministry of Construction, Sanitation and Urban Development (MCLAU) will be allocated for land acquisition and resettlement.			
Environmental Considerations ^{*3}	1) Pollution - Air pollution: C- - Water pollution : D - Noise and vibration: C- - Bottom material: D 2) Natural Environment - Ecosystem: D 3) Social Environment - Resettlement: B- - Poor/Minority/Indigenous people: C			

	Plan View of Intersection with Boulevard de France Redresse 
Project Concept, Scheme or Drawings	Entire Plan View 

Quantitative Analysis and Rationales	Future Daily Traffic Volume (2030): $V = 19,875$ PCU/km (from the traffic model) Start implementation year: 2016 (short-term) Road classification: Primary road
Project Concept, Scheme or Drawings	Location Map  Typical Cross-Section 

No. (1/4)					
Code	Name of Project	Type of Project ¹	Executing Agencies	Relevant Organizations	
V-1-6	Development of Y4 Ring Road Ile Desiree Bridges Section	TA, FA, PP	AGEROUTE	Ministry of Economic Infrastructure	
Project Description					Investment Cost (Million FCFA)
Main Objectives	The V-1-6 is a succession of bridges that crosses the Ebrié lagoon from the quartier Riviera 6 in Cocody to the northern area of Port-Bouet, through Ile Desiree and Koumassi. It is part of the Y4 Ring Road project. Located east of the under-construction 3 rd Bridge, the V-1-6 will provide an alternative option for road users travelling between the Bingerville Peninsula and the Southern area of the District.				Preparation 44,750 Initial Investment 447,505 Recurrent O&M Cost (Per Year) 34,396
Sub-projects Components	The Project consists of the construction of a new expressway:				Time Horizon for the Completion
	• Project length: 6.0 km • 4 traffic lanes • 2 additional BRT lanes in the middle of the road between Cocody and Koumassi • ROW of access roads: 35 m				Preparatory 2.5 year Main Work 3.5 years
	• 1 st Bridge length: 1100 m • 2 nd Bridge length: 910 m • 3 rd Bridge length: 1800 m • 1 new interchange with the Grand-Campement Arterial Road.				Expected Completion Year 2021
Expected Beneficiaries	Citizens of the Greater Abidjan				Related/Linked Projects (Project Codes) V-1-1 to V-1-9, V-7-6, T-2-3
Project Location or Coverage Area	The V-1-6 is the bridges project allowing the Y4 Ring Road to cross the Ebrié lagoon at the Ile Desiree. (see Maps attached)				
Rationales	Relevance to National Policy	Relevance to Abidjan Urban Master Plan and/or Existing Policies			
Private Sector Involvement ²	PPP	Freight Transport Network - Policy TI 9: Truck Ban			
	D	Communities Involvement Other Parties			
Necessity of External Supports ²	Technical Assistance	Financial Assistance			
	A	A			
Resource Allocation for the Project	Resources from the Ministry of Economic Infrastructure (MIE) and its executing agency AGEROUTE will be allocated for the required civil works and resources from the Ministry of Construction, Sanitation and Urban Development (MCLAU) will be allocated for land acquisition and resettlement.				Cooperation with Private Sector D
Environmental Considerations ³	1) Pollution - Air pollution: B- - Water pollution : B- - Noise and vibration: B- - Bottom material: B- 2) Natural Environment - Ecosystem: B- 3) Social Environment - Resettlement: A- - Poor/Minority/Indigenous people: C-				

Preliminary Project Economic Evaluation					(4/4)
Assumptions	Price: as of 2014 Foreign currency exchange rate: 1 Euro = 144.19 Yen (as of December 24 2013) Standard conversion factor (SCF): 0.80 Project target period: 30 years from completion year Capital opportunity cost: 12%				
	Evaluation Indicators ⁴	NPV	228.8 Billion FCFA	EIRR	15.4%
	Notes	Befit-Cost Ratio: 1.60 Project Group No.3			

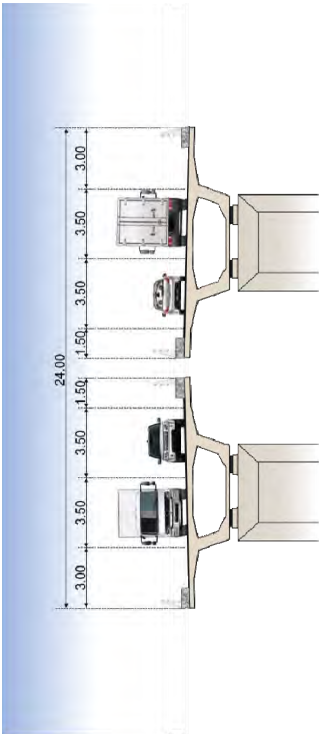
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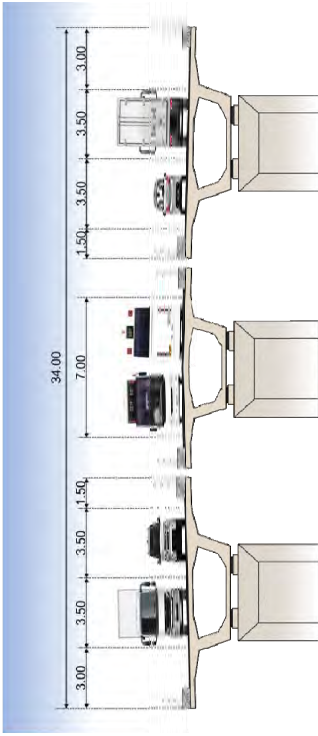
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Technical Assistance (TA); Financial Assistance (FA) and/or Private Participation (PP)
Rated as - **A:** Highly Required; **B:** Highly Advantageous; **C:** Advantageous; **D:** Conditional; and **Non:** Not Necessary

²: Negative Impact in Environmental Considerations: Rated as - **A:** Serious; **B:** Some; **C:** Negligible

³: NPV: Net Present Value; EIRR: Economic Internal Rate of Return

⁴:

Project Concept, Scheme or Drawings	(3/4)	Typical Cross-Section – 3rd Bridge of the Section  ILE DESIREE BRIDGE Plan View of the Grand Campement Interchange 

Quantitative Analysis and Rationales	(2/4)	Future Daily Traffic Volume (2030): V = 32,412 PCU/km (from the traffic model) Start implementation year: 2016 (short to mid-term) Road classification: Primary road Location Map 
		Typical Cross-Section – 1st and 2nd Bridges of the Section  ILE DESIREE BRIDGE WITH BRT
Project Concept, Scheme or Drawings		

(4/4)

Project Concept, Scheme or Drawings	Entire Plan View				
					
	Assumptions	Price: as of 2014 Foreign currency exchange rate: 1 Euro = 144.19 Yen (as of December 24 2013) Standard conversion factor (SCF): 0.80 Project target period: 30 years from completion year Capital opportunity cost: 12%			
	Evaluation Indicators ⁴	NPV	228.8 Billion FCFA	EIRR	15.4%
Preliminary Project Economic Evaluation	Notes	Benefit-Cost Ratio: 1.60 Project Group No.3			

Notes:

¹: **Type of Project:** types of support to be required are presented:

Technical Assistance (TA); Financial Assistance (FA) and/or Private Participation (PP)

Rated as - **A**: Highly Required; **B**: Highly Advantageous; **C**: Advantageous; **D**: Conditional and **Non**: Not

Necessary

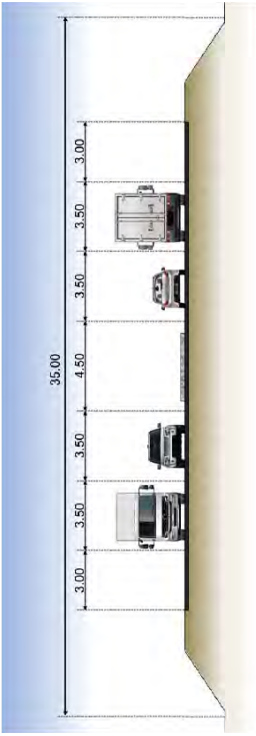
³: Negative Impact in Environmental Considerations: Rated as - **A**: Serious; **B**: Some; **C**: Negligible

⁴: NPV: Net Present Value; EIRR: Economic Internal Rate of Return

(1/3)

Code	Name of Project	Type of Project ¹	Executing Agencies	Relevant Organizations
V-1-7	Development of Y4 Ring Road Aerocite Section	PP	AGEROUTE	Ministry of Economic Infrastructure
Project Description				
Main Objectives	The V-1-7 is the section of the proposed Y4 Ring Road inside the Aerocite, an area surrounding the International Airport that has been conceded to a private developer. The new road is expected to connect the Y4 Ring Road to the Route de Bassam.			Investment Cost (Million FCFA)
				Preparation
				Initial Investment
				Recurrent O&M Cost (Per Year)
				825
				8,247
				449
Sub-projects Components	The Project consists of the construction of a new arterial road: • Project length: 5.6 km • 4 traffic lanes • ROW: 25m			Time Horizon for the Completion
				Preparatory
				Main Work
				Expected Completion Year
				2017
Expected Beneficiaries	Citizens of the Greater Abidjan			Related/Linked Projects (Project Codes)
				V-1-1 to V-1-9, V-3-2
Project Location or Coverage Area	The V-1-7 is the section of the Y4 Ring Road running parallel to the International Airport in Port-Bouet. (see Maps attached)			
Rationales	Relevance to National Policy	Relevance to Abidjan Urban Master Plan and/or Existing Policies		
		Freight Transport Network - Policy TI 9: Truck Ban		
Private Sector Involvement ²	PPP	Communities Involvement	Other Parties	
	A	B	D	
Necessity of External Supports ²	Technical Assistance	Financial Assistance	Cooperation with Private Sector	
	D	B	A	
Resource Allocation for the Project	Resources from the Ministry of Economic Infrastructure (MIE) and its executing agency AGEROUTE will be allocated for the required civil works and resources from the Ministry of Construction, Sanitation and Urban Development (MCLAU) will be allocated for land acquisition and resettlement.			
Environmental Considerations ³	1) Pollution - Air pollution: C- - Water pollution : C- - Noise and vibration: C- - Bottom material: C- 2) Natural Environment - Ecosystem: C- 3) Social Environment - Resettlement: B- - Poor/Minority/Indigenous people: C-			

(2/3)

Quantitative Analysis and Rationales	Future Daily Traffic Volume (2030): V = 10,574 PCU/km (from the traffic model) Start implementation year: 2015 (short-term) Road classification: Primary road
Project Concept, Scheme or Drawings	Location Map  Typical Cross-Section 

(3/3)

Project Concept, Scheme or Drawings	Entire Plan View 						
Preliminary Project Economic Evaluation	<table> <tr> <td>Assumptions</td><td>Price: as of 2014 Foreign currency exchange rate: 1 Euro = 144.19 Yen (as of December 24 2013) Standard conversion factor (SCF): 0.80 Project target period: 30 years from completion year Capital opportunity cost: 12%</td></tr> <tr> <td>Evaluation Indicators^{*4}</td><td>NPV 228.8 Billion FCFA EIRR 15.4%</td></tr> <tr> <td>Notes</td><td>Beit-Cost Ratio: 1.60 Project Group No.3</td></tr> </table>	Assumptions	Price: as of 2014 Foreign currency exchange rate: 1 Euro = 144.19 Yen (as of December 24 2013) Standard conversion factor (SCF): 0.80 Project target period: 30 years from completion year Capital opportunity cost: 12%	Evaluation Indicators ^{*4}	NPV 228.8 Billion FCFA EIRR 15.4%	Notes	Beit-Cost Ratio: 1.60 Project Group No.3
Assumptions	Price: as of 2014 Foreign currency exchange rate: 1 Euro = 144.19 Yen (as of December 24 2013) Standard conversion factor (SCF): 0.80 Project target period: 30 years from completion year Capital opportunity cost: 12%						
Evaluation Indicators ^{*4}	NPV 228.8 Billion FCFA EIRR 15.4%						
Notes	Beit-Cost Ratio: 1.60 Project Group No.3						

Notes:

^{*1}: **Type of Project:** types of support to be required are presented:

Technical Assistance (TA); Financial Assistance (FA) and/or Private Participation (PP)

Rated as - **A**: Highly Required; **B**: Highly Advantageous; **C**: Advantageous; **D**: Conditional; and **Non**: Not

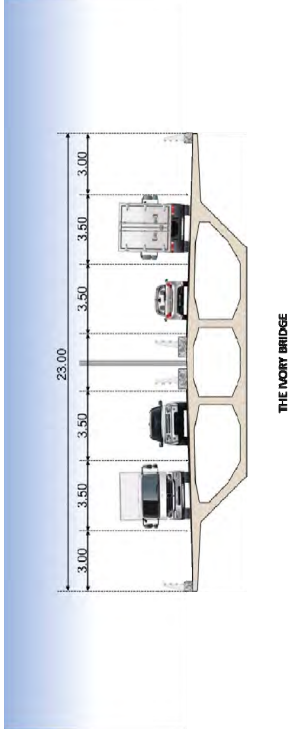
Necessary

^{*3}: Negative Impact in Environmental Considerations: Rated as - **A**: Serious; **B**: Some; **C**: Negligible^{*4}: NPV: Net Present Value; EIRR: Economic Internal Rate of Return

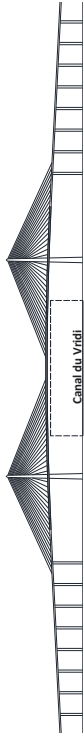
(1/3)

No.	Code	Name of Project	Type of Project ¹	Executing Agencies	Relevant Organizations
	V-1-8	Development of Y4 Ring Road Canal du Vridi Section	TA, FA, PP	AGEROUTE	Ministry of Economic Infrastructure
	Project Description			Investment Cost (Million FCFA)	
Main Objectives	The V-1-8 is the southern section of the Y4 Ring Road, which will allow trucks from the Port or the Industrial Zone of Vridi to avoid the central area of the city. Currently, all the cargo transport generated by the Port and its surrounding industrial area have to cross the lagoon and run through the Plateau. With this new link connected to the future Voie V28 (V-4-7; V-4-8; V-4-9), trucks will no longer have to go through the city center. The Project consists of the construction of a new expressway: - Project length: 6.4 km (new access roads on 2.5 km and widening the existing roads on 0.5 km) 4 traffic lanes - ROW of access roads: 25 m 1 new interchange with the Voie V28 (V-4-8) A cable-stayed bridge will have to be built across the Canal du Vridi with sufficient vertical clearance for ships. - Bridge length: 3350 m - Navigation Vertical Clearance: 60 m Citizens of the Greater Abidjan			Preparation	18,715
				Initial Investment	187,148
Sub-projects Components				Recurrent O&M Cost (Per Year)	13,030
				Time Horizon for the Completion	
				Preparatory	2 year
				Main Work	5 years
Expected Beneficiaries				Expected Completion Year	2030
				Related/Linked Projects (Project Codes)	V-1-1 to V-1-9; V-4-7, V-4-8; V-4-9, V-7-5
Project Location or Coverage Area	The V-1-8 is the southern section of the Y4 Ring Road crossing the Vridi Canal.				
Rationales	Relevance to National Policy		Relevance to Abidjan Urban Master Plan and/or Existing Policies		
Private Sector Involvement ²	PPP	D	Communities Involvement		Other Parties
			B		D
Necessity of External Supports ²	Technical Assistance	A	Financial Assistance		Cooperation with Private Sector
			A		D
Resource Allocation for the Project	Resources from the Ministry of Economic Infrastructure (MIE) and its executing agency AGEROUTE will be allocated for the required civil works and resources from the Ministry of Construction, Sanitation and Urban Development (MCLAU) will be allocated for land acquisition and resettlement.				
Environmental Considerations ³	1) Pollution - Air pollution: C- - Water pollution : B- - Noise and vibration: C- - Bottom material: B-				
	2) Natural Environment - Ecosystem: B-				
	3) Social Environment - Resettlement: B- - Poor/Minority/Indigenous people: C-				

Quantitative Analysis and Rationales	Future Daily Traffic Volume (2030): V = 10,567 PCU/km (from the traffic model)
Project Concept, Scheme or Drawings	Start implementation year: 2024 (mid to long-term) Road classification: Primary road
	Location Map
	Typical Cross-Section – The Ivory Bridge



(3/3)

Project Concept, Scheme or Drawings	Profile	
		
	Typical Cross-Section – Access Roads 	
	Entire Plan View 	
Preliminary Project Economic Evaluation	Assumptions	Price: as of 2014 Foreign currency exchange rate: 1 Euro = 144.19 Yen (as of December 24 2013) Standard conversion factor (SCF): 0.80 Project target period: 30 years from completion year Capital opportunity cost: 12%
	Evaluation Indicators ⁴	NPV 625.4 Billion FCFA EIRR 23.8%
	Notes	Benefit-Cost Ratio: 3.86 Project Group No. 4

Notes:

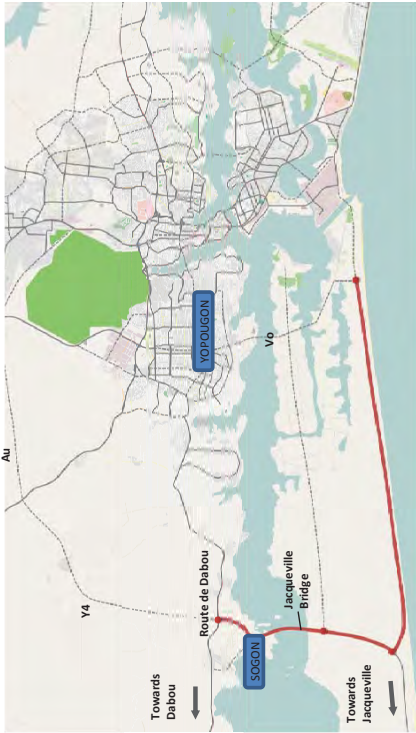
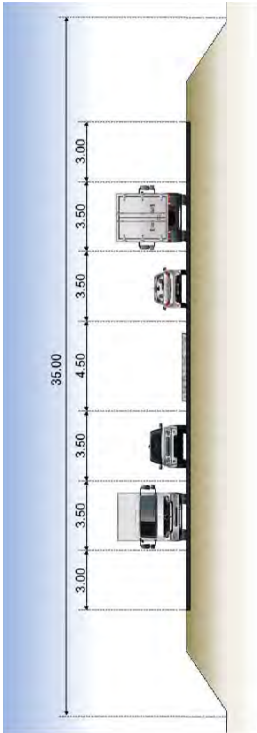
¹: Type of Project: types of support to be required are presented:²: Technical Assistance (TA); Financial Assistance (FA) and/or Private Participation (PP)³: Rated as - A: Highly Required; B: Highly Advantageous; C: Advantageous; D: Conditional; and Non: Not⁴: Necessary

Negative Impact in Environmental Considerations: Rated as - A: Serious; B: Some; C: Negligible

NPV: Net Present Value; EIRR: Economic Internal Rate of Return

(1/3)

Code	Name of Project	Type of Project *1	Executing Agencies	Relevant Organizations
V-1-9	Development of Y4 Ring Road Jacqueville Section	TA, FA, PP	AGEROUTE	Ministry of Economic Infrastructure
Main Objectives	Project Description			Investment Cost (Million FCFA)
	The V-1-9 is the south-eastern section of the Y4 Ring Road, which will allow trucks coming or going to the Port or Vridi industrial zone to avoid the central area of the city by going through Songon. The road will also kick start the industrial development of this coastal area planned as a major oil industry area.			Preparation
				Initial Investment
				Recurrent O&M Cost (Per Year)
Sub-projects Components	The Project consists of the construction of a new expressway:			Time Horizon for the Completion
	• Project length: 33.5 km (new roads on 23.3 km and widening of roads from 2 to 4 lanes on 10.2 km) • 4 traffic lanes • ROW: 35 m • 1 new interchange with the route de Jacqueville The current route de Jacqueville will have to be widened between the route de Dabou and the junction between the Y4 Ring Road and the Route de Jacqueville. In particular, a new bridge will have to be built beside the under-construction one which will only have 2 traffic lanes.			Preparatory
	• Bridge Length: 610 m (2 lanes) Citizens of the Greater Abidjan			Main Work
Expected Beneficiaries				Expected Completion Year
				2030
Project Location or Coverage Area	The V-1-9 is the south-western section of the Y4 Ring Road running along the coastline before heading North up to Songon.			Related/Linked Projects (Project Codes)
				V-1-1 to V-1-9, V-4-10
Rationales	Relevance to National Policy			Relevance to Abidjan Urban Master Plan and/or Existing Policies
	PND – Infrastructure and Transport Services Sector - Action 2.3.33			
Private Sector Involvement ²	PPP			Other Parties
	D			
Necessity of External Supports ²	Technical Assistance			Cooperation with Private Sector
	C			
Resource Allocation for the Project	Resources from the Ministry of Economic Infrastructure (MIE) and its executing agency AGEROUTE will be allocated for the required civil works and resources from the Ministry of Construction, Sanitation and Urban Development (MCLAU) will be allocated for land acquisition and resettlement.			D
	1) Pollution - Air pollution: D - Water pollution: B- - Noise and vibration: D - Bottom material: B- 2) Natural Environment - Ecosystem: B- 3) Social Environment - Resettlement: C- - Poor/Minority/Indigenous people: C-			

Quantitative Analysis and Rationales	Future Daily Traffic Volume (2030): V = 3,841 PCU/km (from the traffic model)
Project Concept, Scheme or Drawings	Start implementation year: 2027 (long-term) Road classification: Primary road Location Map  Typical Cross-Section 

Project Concept, Scheme or Drawings	Entire Plan View 						
Preliminary Project Economic Evaluation	<table><tr><td>Assumptions</td><td>Price: as of 2014 Foreign currency exchange rate: 1 Euro = 144.19 Yen (as of December 24 2013) Standard conversion factor (SCF): 0.80 Project target period: 30 years from completion year Capital opportunity cost: 12%</td></tr><tr><td>Evaluation Indicators^{*,4}</td><td>NPV 178.7 Billion FCFA EIRR 44.6%</td></tr><tr><td>Notes</td><td>Benefit-Cost Ratio: 8.11 Project Group No. 5</td></tr></table>	Assumptions	Price: as of 2014 Foreign currency exchange rate: 1 Euro = 144.19 Yen (as of December 24 2013) Standard conversion factor (SCF): 0.80 Project target period: 30 years from completion year Capital opportunity cost: 12%	Evaluation Indicators ^{*,4}	NPV 178.7 Billion FCFA EIRR 44.6%	Notes	Benefit-Cost Ratio: 8.11 Project Group No. 5
Assumptions	Price: as of 2014 Foreign currency exchange rate: 1 Euro = 144.19 Yen (as of December 24 2013) Standard conversion factor (SCF): 0.80 Project target period: 30 years from completion year Capital opportunity cost: 12%						
Evaluation Indicators ^{*,4}	NPV 178.7 Billion FCFA EIRR 44.6%						
Notes	Benefit-Cost Ratio: 8.11 Project Group No. 5						

Notes:

^{*,1} **Type of Project:** types of support to be required are presented:

^{*,2} Technical Assistance (TA); Financial Assistance (FA) and/or Private Participation (PP)

^{*,3} Rated as - **A:** Highly Required; **B:** Highly Advantageous; **C:** Advantageous; **D:** Conditional; and **Non:** Not

^{*,4} Necessary

Negative Impact in Environmental Considerations: Rated as - **A:** Serious; **B:** Some; **C:** Negligible

NPV: Net Present Value; EIRR: Economic Internal Rate of Return

(3/3)

Preliminary Project Economic Evaluation	Assumptions	Price: as of 2014 Foreign currency exchange rate: 1 Euro = 144.19 Yen (as of December 24 2013) Standard conversion factor (SCF): 0.80 Project target period: 30 years from completion year Capital opportunity cost: 12%			
	Evaluation Indicators ⁴	NPV	1809.3 Billion FCFA	EIRR	163.8%
	Notes	Benefit-Cost Ratio: 17.18 Project Group No. 6			

Notes:

¹: **Type of Project:** types of support to be required are presented:

Technical Assistance (TA); Financial Assistance (FA) and/or Private Participation (PP)

Rated as - **A**: Highly Required; **B**: Highly Advantageous; **C**: Advantageous; **D**: Conditional; and **Non**: Not

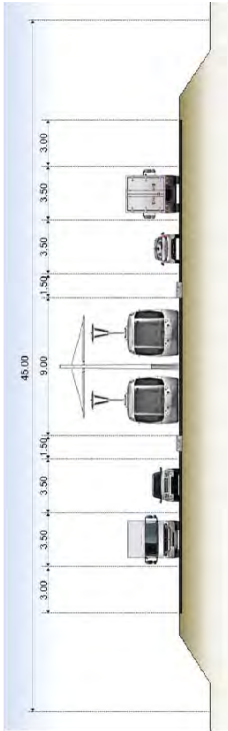
Necessary

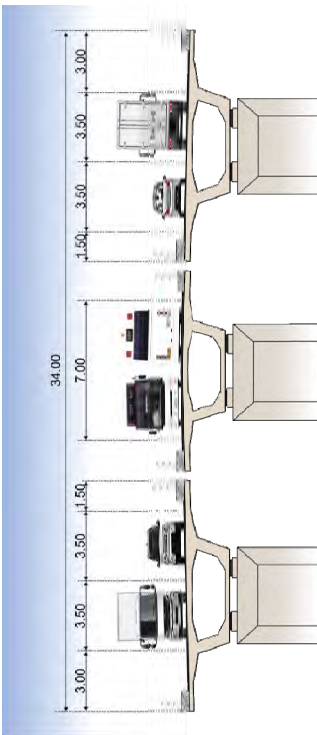
³: Negative Impact in Environmental Considerations: Rated as - **A**: Serious; **B**: Some; **C**: Negligible

⁴: NPV: Net Present Value; EIRR: Economic Internal Rate of Return

(1/3)

Code	Name of Project	Type of Project ¹	Executing Agencies	Relevant Organizations	
V-2-2	Development of Bingerville Peninsula Road Network (BIPRN) Extension of the Boulevard François Mitterrand	TA, FA	AGEROUTE	Ministry of Economic Infrastructure	
Project Description					
Main Objectives	The V-2-2 is the extension of the Boulevard François Mitterrand up to Bonoua. This link will provide an alternative option for road users which are currently using the Route de Bassam to go or come from the East. The V-2-2 will also complete the East-West corridor, by providing the required infrastructure for a BRT line up to Bonoua.			Investment Cost (Million FCFA)	
				Preparation 16,328	
Sub-projects Components	The Project consists of the construction of a new expressway: • Project length: 43.7 km (2.7 km with Tramway/Train and 41.0 km with BRT in the middle of the road) • 4 traffic lanes • 2 additional BRT/Tram/Train lanes in the middle of the road • ROW with Tramway/Train: 35 m (urban area) • ROW with BRT: 45 m • 3 new interchanges: one with the Bingerville BRT Road (V-2-4), one with the Route de Bingerville (V-2-3) and one with the Bingerville Peninsula Northern Bypass (V-2-1) • Bridge length: 700 m and 350 m			Time Horizon for the Completion	
				Preparatory 1 year	
				Main Work 4 years	
Expected Beneficiaries	Citizens of the Greater Abidjan			Expected Completion Year 2024	
			Related/Linked Projects (Project Codes)	V-2-1, V-2-3, V-2-4, T-1-3, T-2-4	
Project Location or Coverage Area	The V-2-2 is the extension of the Boulevard Mitterrand running north of Bingerville up to Bonoua. (see Maps attached)				
Rationales	Relevance to National Policy	Relevance to Abidjan Urban Master Plan and/or Existing Policies			
	PND – Infrastructure and Transport Services Sector - Action 2.3.7	Public Transport - Policy T1 4: High Capacity Public Transport Corridors			
Private Sector Involvement ²	PPP	Communities Involvement		Other Parties	
Necessity of External Supports ²	Non	B		D	
	Technical Assistance	Financial Assistance		Cooperation with Private Sector	
	B	A		D	
Resource Allocation for the Project	Resources from the Ministry of Economic Infrastructure (MIE) and its executing agency AGEROUTE will be allocated for the required civil works and resources from the Ministry of Construction, Sanitation and Urban Development (MCLAU) will be allocated for land acquisition and resettlement.				
Environmental Considerations ³	1) Pollution - Air pollution: D - Water pollution : B- - Noise and vibration: D - Bottom material: B- 2) Natural Environment - Ecosystem: B- 3) Social Environment - Resettlement: C- - Poor/Minority/Indigenous people: C-				

Quantitative Analysis and Rationales	Future Daily Traffic Volume (2030): V = 6,114 PCU/km (from the traffic model)
Project Concept, Scheme or Drawings	Start implementation year: 2020 (short-term) Road classification: Primary road Location Map  Typical Cross-Section – West of Bingerville  Typical Cross-Section – East of Bingerville 

Project Concept, Scheme or Drawings	Typical Cross-Section – Bridge Section  ILE DESREE BRIDGE WITH BRT				
	Assumptions	Price: as of 2014 Foreign currency exchange rate: 1 Euro = 144.19 Yen (as of December 24 2013) Standard conversion factor (SCF): 0.80 Project target period: 30 years from completion year Capital opportunity cost: 12%			
		Evaluation Indicators ^{1,4}	NPV	1809.3 Billion FCFA	EIRR
	Preliminary Project Economic Evaluation	Notes	Benefit-Cost Ratio: 17.18 Project Group No. 6		

Notes:

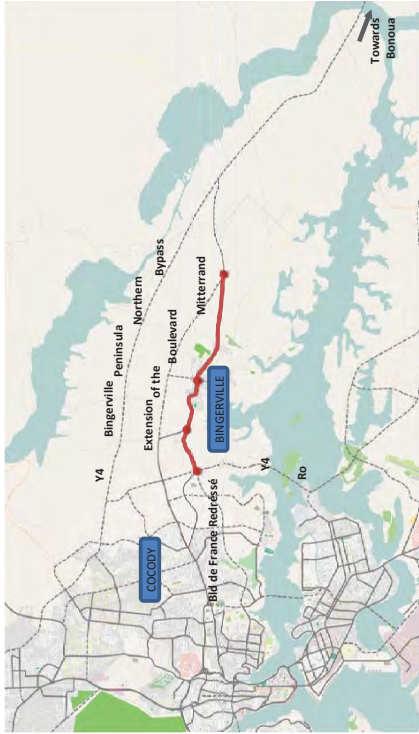
- ¹. **Type of Project:** types of support to be required are presented:
Technical Assistance (TA); Financial Assistance (FA) and/or Private Participation (PP)
². Rated as - **A:** Highly Required; **B:** Highly Advantageous; **C:** Advantageous; **D:** Conditional; and **Non:** Not Necessary
³. Negative Impact in Environmental Considerations: Rated as - **A:** Serious; **B:** Some; **C:** Negligible
⁴. NPV: Net Present Value; EIRR: Economic Internal Rate of Return

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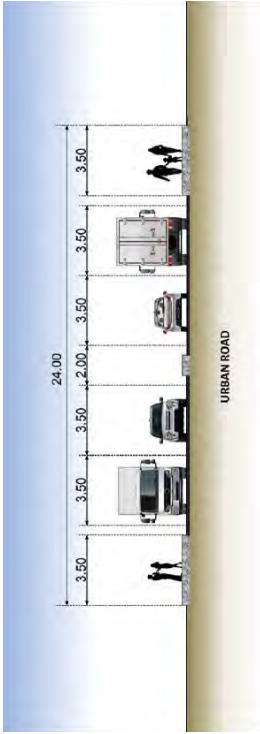
(1/3)

Code	Name of Project	Type of Project ¹	Executing Agencies	Relevant Organizations
V-2-3	Development of Bingerville Peninsula Road Network (BIPRN) Widening of the Route de Bingerville	TA, FA	AGEROUTE	Ministry of Economic Infrastructure
Project Description				
Main Objectives	The V-2-3 is the third arterial road of the Bingerville Peninsula. The project consists of the widening of the existing Route de Bingerville from 2 to 4 traffic lanes up to the extension of the Boulevard François Mitterrand. Located in the extension of the Boulevard de France Redresse (V-6-5), it will provide an alternative to the Boulevard François Mitterrand for road users between Bingerville and Cocody.			Investment Cost (Million FCFA)
Sub-projects Components	The Project consists of the widening of the existing road and the construction of its extension: • Project length: 10.9 km (new roads on 3.2 km and widening of existing roads on 7.7 km) • 4 traffic lanes • ROW: 25 m (rural area)			Preparation
				Initial Investment
				Recurrent O&M Cost (Per Year)
Expected Beneficiaries				Citizens of the Greater Abidjan
Project Location or Coverage Area	The V-2-3 is the southern arterial road running through the Bingerville Peninsula.			Related/Linked Projects (Project Codes)
Rationales	Relevance to National Policy			V-1-5, V-2-2, T-2-3, T-2-4, V-6-5
Private Sector Involvement ²	Relevance to Abidjan Urban Master Plan and/or Existing Policies			(see Maps attached)
	Road Network - Policy TI 13: Road Development			
Necessity of External Supports ²	PPP	Communities Involvement	Other Parties	
	Non	B	D	
Resource Allocation for the Project	Technical Assistance	Financial Assistance	Cooperation with Private Sector	
	C	B	D	
Environmental Considerations ³	Resources from the Ministry of Economic Infrastructure (MIE) and its executing agency AGEROUTE will be allocated for the required civil works and resources from the Ministry of Construction, Sanitation and Urban Development (MCLAU) will be allocated for land acquisition and resettlement.			
	1) Pollution - Air pollution: C- - Water pollution : D - Noise and vibration: C- - Bottom material: D 2) Natural Environment - Ecosystem: D 3) Social Environment - Resettlement: B- - Poor/Minority/Indigenous people: C-			

Quantitative Analysis and Rationales	Future Daily Traffic Volume (2030): V = 13,576 PCU/km (from the traffic model)
Project Concept, Scheme or Drawings	Start implementation year: 2017 (short-term) Road classification: Secondary road
	Location Map
	Typical Cross-Section



Typical Cross-Section



(3/3)

Preliminary Project Economic Evaluation	Assumptions			
	Price: as of 2014 Foreign currency exchange rate: 1 Euro = 144.19 Yen (as of December 24 2013) Standard conversion factor (SCF): 0.80 Project target period: 30 years from completion year Capital opportunity cost: 12%			
	Evaluation Indicators ⁴	NPV	1809.3 Billion FCFA	EIRR
	Notes	Benefit-Cost Ratio: 17.18 Project Group No. 6		

Notes:

¹: **Type of Project:** types of support to be required are presented:

Technical Assistance (TA); Financial Assistance (FA) and/or Private Participation (PP)

Rated as - **A**: Highly Required; **B**: Highly Advantageous; **C**: Advantageous; **D**: Conditional; and **Non**: Not

Necessary

³: Negative Impact in Environmental Considerations: Rated as - **A**: Serious; **B**: Some; **C**: Negligible

⁴: NPV: Net Present Value; EIRR: Economic Internal Rate of Return

(1/3)

No.	Code	Name of Project	Type of Project ¹	Executing Agencies	Relevant Organizations
	V-2-4	Development of Bingerville Peninsula Road Network (BIPRN) Bingerville-BHLS Road	TA, FA	AGEROUTE	Ministry of Economic Infrastructure
		Project Description			Investment Cost (Million FCFA)
	Main Objectives	The V-2-4 is the north-south section of the road connecting the future Water Bus station of Bingerville to the Extension of the Boulevard François Mitterrand (V-2-4) and its multimodal station (Train/BHLS). The existing road will be widened to create sufficient space for BHLS.			Preparation 461
	Sub-projects Components	The Project consists of the construction of a new road wide enough to accommodate traffic lanes and BHLS: • Project length: 2.9 km (new roads on 1.9 km and widening of existing roads on 1.0 km) • 4 traffic lanes • 2 additional lanes • ROW: 24 m • 1 intersection upgrade with the Route de Bingerville (V-2-3)			Initial Investment 4,605 Recurrent O&M Cost (Per Year) 252
	Expected Beneficiaries	Citizens of the Greater Abidjan			Time Horizon for the Completion
	Project Location or Coverage Area	The V-2-3 is the southern arterial road running through the Bingerville Peninsula. (see Maps attached)			Preparatory 1 year Main Work 1 years Expected Completion Year 2024
	Rationales	Relevance to National Policy			Related/Linked Projects (Project Codes) V-2-2, V-2-3, T-1-3, T-2-4, T-4-1
	Private Sector Involvement ²	PPP	Non	Communities Involvement	Other Parties
	Necessity of External Supports ²	Technical Assistance	C	Financial Assistance	Cooperation with Private Sector
	Resource Allocation for the Project	Resources from the Ministry of Economic Infrastructure (MIE) and its executing agency AGEROUTE will be allocated for the required civil works and resources from the Ministry of Construction, Sanitation and Urban Development (MCLAU) will be allocated for land acquisition and resettlement.			
	Environmental Considerations ³	1) Pollution - Air pollution: D - Water pollution : D - Noise and vibration: D - Bottom material: D 2) Natural Environment - Ecosystem: D 3) Social Environment - Resettlement: C- - Poor/Minority/Indigenous people: C-			

Quantitative Analysis and Rationales	Future Daily Traffic Volume (2030): V = 4,023 PCU/km (from the traffic model) Start implementation year: 2023 (mid-term) Road classification: Secondary road
Project Concept, Scheme or Drawings	Location Map Typical Cross-Section

Preliminary Project Economic Evaluation		Price: as of 2014 Foreign currency exchange rate: 1 Euro = 144.19 Yen (as of December 24 2013) Standard conversion factor (SCF): 0.80 Project target period: 30 years from completion year Capital opportunity cost: 12%			
	Assumptions				
	Evaluation Indicators ^{*4}	NPV	1809.3 Billion FCFA	EIRR	163.8%
	Notes	Benefit-Cost Ratio: 17.18 Project Group No. 6			

Notes:

- ^{*1}: **Type of Project:** types of support to be required are presented:
Technical Assistance (TA); Financial Assistance (FA) and/or Private Participation (PP)
Rated as - **A:** Highly Required; **B:** Highly Advantageous; **C:** Advantageous; **D:** Conditional; and **Non:** Not Necessary
- ^{*3}: Negative Impact in Environmental Considerations: Rated as - **A:** Serious; **B:** Some; **C:** Negligible
- ^{*4}: NPV: Net Present Value; EIRR: Economic Internal Rate of Return

Project Profile

No.	Code	Name of Project	Type of Project ¹	Executing Agencies	Relevant Organizations
	V-3-1	Development of BaARN - Abidjan-Bassam Expressway (under construction) 64 Billion FCFA	TA, FA	AGEROUTE	Ministry of Economic Infrastructure
		Project Description			
		Main Objectives			
		The V-3-1 is the currently under-construction expressway between Abidjan and Grand-Bassam. This new road running in the middle of the Bassam Peninsula will keep the trucks away from the existing Route de Bassam, which will help preserve the tourist potential of this coastal area.			
		Sub-projects Components			
		The Project consists of the construction of a new expressway: - Project length: 28.0 km (upgrading of the existing road on 8.5 km and new expressway on 19.9 km) 6 traffic lanes			
		Expected Beneficiaries			
		Citizens of the Greater Abidjan			
		Project Location or Coverage Area			
		The V-3-1 goes from Akwaba Intersection in Port Bouet up to the quartier Moossou in Grand-Bassam. (see Maps attached)			
		Rationales			
		PND – Infrastructure and Transport Services Sector - Action 2.3.4			
		Private Sector Involvement²			
		PPP			
		Non			
		Necessity of External Supports²			
		Technical Assistance			
		C			
		Resource Allocation for the Project			
		Resources from the Ministry of Economic Infrastructure (MIE) and its executing agency AGEROUTE will be allocated for the required civil works and resources from the Ministry of Construction, Sanitation and Urban Development (MCLAU) will be allocated for land acquisition and resettlement.			
		Environmental Considerations³			
		1) Pollution - Air pollution: D - Water pollution : D - Noise and vibration: D - Bottom material: D 2) Natural Environment - Ecosystem: D 3) Social Environment - Resettlement: C- - Poor/Minority/Indigenous people: C-			

(1/2)

Project Profile

		Future Daily Traffic Volume (2030): V = 18,302PCU/km (from the traffic model)							(2/2)
		Start implementation year: 2012 (short term) Road classification: Primary road							
		Location Map							
		Project Concept, Scheme or Drawings							
		Preliminary Project Economic Evaluation	Assumptions	N/A					
			Evaluation Indicators ⁴	NPV	N/A	EIRR		N/A	
			Notes						

Notes:

¹: Type of Project: types of support to be required are presented:

²: Technical Assistance (TA); Financial Assistance (FA) and/or Private Participation (PP)

³: Rated as - A: Highly Required; B: Highly Advantageous; C: Advantageous; D: Conditional; and Non: Not Necessary

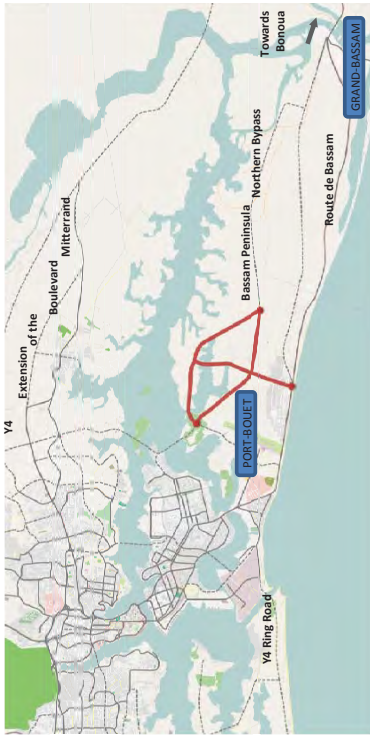
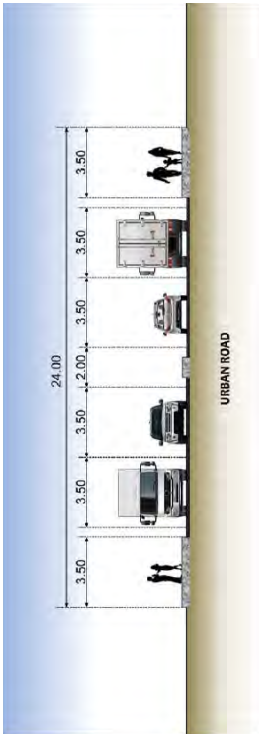
⁴: Negative Impact in Environmental Considerations: Rated as - A: Serious; B: Some; C: Negligible

⁵: NPV: Net Present Value; EIRR: Economic Internal Rate of Return

No.

(1/3)

Code	Name of Project	Type of Project ¹	Executing Agencies	Relevant Organizations
V-3-2	Development of Bassam Peninsula Road Network (BIPRN) Aérocity Area	PP	AGEROUTE	Ministry of Economic Infrastructure
Project Description				
Main Objectives	The V-3-2 is planned as one of the main arterial roads of the Aérocity, a "private city" aiming at attracting international investors in a stable and secure legal and financial framework. The new road will provide a direct link between the Y4 Ring Road and the Route de Bassam.			
Sub-projects Components	The Project consists of the construction of a new arterial road: - Project length: 6.6 km 4 traffic lanes - ROW: 25 m 2 intersection upgrades with the Bassam Peninsula Northern Bypass (V-3-3) and the Route de Bassam (V-3-1) Citizens of the Greater Abidjan		Investment Cost (Million FCFA)	
			Preparation	678
			Initial Investment	6,780
Expected Beneficiaries			Time Horizon for the Completion	
			Preparatory	1.5 year
			Main Work	1.5 years
Project Location or Coverage Area			Expected Completion Year	2017
			Related/Linked Projects (Project Codes)	
Rationales	The V-3-2 is the arterial road connecting the Y4 Ring Road to the Route de Bassam East of the International Airport in Port-Bouet. (see Maps attached)			
Private Sector Involvement ²	Relevance to National Policy	Relevance to Abidjan Urban Master Plan and/or Existing Policies		
	PPP	Road Network - Policy TI 13: Road Development		
	A	Communities Involvement	Other Parties	
Necessity of External Supports ²	Technical Assistance	B	D	
	D	Financial Assistance	Cooperation with Private Sector	
Resource Allocation for the Project	D A Resources from the Ministry of Economic Infrastructure (MIE) and its executing agency AGEROUTE will be allocated for the required civil works and resources from the Ministry of Construction, Sanitation and Urban Development (MCLAU) will be allocated for land acquisition and resettlement.			
Environmental Considerations ³	1) Pollution - Air pollution: C- - Water pollution : B- - Noise and vibration: C- - Bottom material: B- 2) Natural Environment - Ecosystem: B- 3) Social Environment - Resettlement: B- - Poor/Minority/Indigenous people: C-			

Quantitative Analysis and Rationales	Future Daily Traffic Volume (2030): V = 13,124PCU/km (from the traffic model)
Project Concept, Scheme or Drawings	Start implementation year: 2015 (short-term) Road classification: Secondary road Location Map  Typical Cross-Section 

(3/3)

Preliminary Project Economic Evaluation	Assumptions			
	Price: as of 2014 Foreign currency exchange rate: 1 Euro = 144.19 Yen (as of December 24 2013) Standard conversion factor (SCF): 0.80 Project target period: 30 years from completion year Capital opportunity cost: 12%			
	Evaluation Indicators ⁴	NPV	1.957.5 Billion FCFA	EIRR
	Notes	Benefit-Cost Ratio: 21.61 Project Group No. 7		

Notes:

¹: **Type of Project:** types of support to be required are presented:

Technical Assistance (TA); Financial Assistance (FA) and/or Private Participation (PP)

Rated as - **A**: Highly Required; **B**: Highly Advantageous; **C**: Advantageous; **D**: Conditional; and **Non**: Not

Necessary

³: Negative Impact in Environmental Considerations: Rated as - **A**: Serious; **B**: Some; **C**: Negligible

⁴: NPV: Net Present Value; EIRR: Economic Internal Rate of Return

(1/2)

No.	Code	Name of Project	Type of Project ¹	Executing Agencies	Relevant Organizations
	V-3-3	Development of Bassam Peninsula Road Network (BIPRN) Bassam Northern Bypass	TA, FA	AGEROUTE	Ministry of Economic Infrastructure
		Project Description			
		Investment Cost (Million FCFA)			
		Preparation			3,400
		Initial Investment			33,395
		Recurrent O&M Cost (Per Year)			1,851
		Time Horizon for the Completion			
		Preparatory			1 year
		Main Work			2 years
		Expected Completion Year			2020
		Related/Linked Projects (Project Codes)			V-3-1, V-3-2
		Citizens of the Greater Abidjan			
		The Project consists of the construction of a new arterial road: • Project length: 20.2 km • 4 traffic lanes • ROW: 35 m			
		Sub-projects Components			
		Expected Beneficiaries			
		The V-3-3 is the northern arterial road running through the Bassam Peninsula. (see Maps attached)			
		Project Location or Coverage Area			
		Rationales			
		Relevance to National Policy			
		Road Network - Policy TI 13: Road Development			
		Private Sector Involvement ²			
		PPP			
		Non			
		Communities Involvement			
		B			
		Other Parties			
		D			
		Necessity of External Supports ²			
		Technical Assistance			
		C			
		Financial Assistance			
		B			
		Cooperation with Private Sector			
		D			
		Resource Allocation for the Project			
		Resources from the Ministry of Economic Infrastructure (MIE) and its executing agency AGEROUTE will be allocated for the required civil works and resources from the Ministry of Construction, Sanitation and Urban Development (MCLAU) will be allocated for land acquisition and resettlement.			
		Environmental Considerations ³			
		1) Pollution - Air pollution: D - Water pollution : D - Noise and vibration: D - Bottom material: D 2) Natural Environment - Ecosystem: D 3) Social Environment - Resettlement: C- - Poor/Minority/Indigenous people: C-			

(2/2)		

Notes:

*1. Type of Project; types of support to be required are presented:

Technical Assistance (TA); Financial Assistance (FA) and/or Private Participation (PP)

*2. :
 Technical Assistance (TA), Financial Assistance (FA) and/or Private Participation (FP)
 Rated as - **A**: Highly Required; **B**: Highly Advantageous; **C**: Advantageous; **D**: Conditional; and **Non**: Not

: Rated as - **A**: Highly Required, **B**: Highly Advantageous, **C**: Advantageous, **D**: Contributory

*3. Negative Impact in Environmental Considerations: Rated as - **A**: Serious; **B**: Some; **C**: Negligible

*4. NPV: Net Present Value; EIRR: Economic Internal Rate of Return

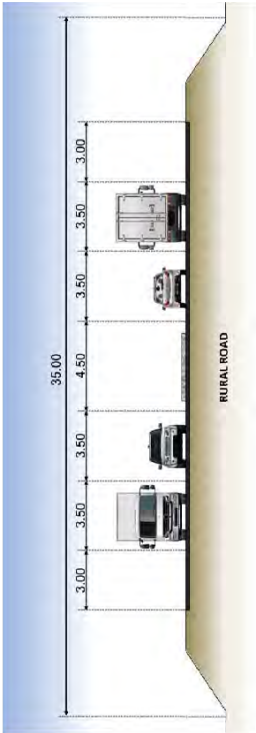
: NPV: Net Present Value, EBITDA: Earnings Before Interest, Taxes, Depreciation and Amortization

No.

(1/2)

Code	Name of Project	Type of Project ^{*1}	Executing Agencies	Relevant Organizations
V-3-4	Development of Bassam Peninsula Road Network (BIPRN) Widening of the Route de Bonoua	TA, FA	AGEROUTE	Ministry of Economic Infrastructure
Main Objectives	Project Description		Investment Cost (Million FCFA)	
	The V-3-4 project consists of the widening of the existing road connecting Bonoua to Grand-Bassam. It is currently a 2x1 traffic-lane road which will have to be upgraded after the completion of the Abidjan-Bassam Expressway (V-3-1). This upgrade will help resolve the bottleneck created by the 2x3 traffic lane expressway ending in front of a 2x1 traffic lane bridge.		Preparation	8,379
			Initial Investment	83,787
			Recurrent O&M Cost (Per Year)	5,540
Sub-projects Components	The Project consists of the construction of a new arterial road: - Project length: 20.2 km - 4 traffic lanes - ROW: 35 m - Bridge lengths: 350 m and 450m		Time Horizon for the Completion	
			Preparatory	0.5 year
			Main Work	1.5 years
Expected Beneficiaries			Expected Completion Year	2030
	Citizens of the Greater Abidjan		Related/Linked Projects (Project Codes)	
Project Location or Coverage Area	The V-3-4 is the road connecting Grand-Bassam to Bonoua. (see Maps attached)			
Rationales	Relevance to National Policy	Relevance to Abidjan Urban Master Plan and/or Existing Policies		
		Road Network - Policy TI 13: Road Development		
Private Sector Involvement ²	PPP	Communities Involvement		Other Parties
	Non	B		D
Necessity of External Supports ²	Technical Assistance	Financial Assistance		Cooperation with Private Sector
	C	B		D
Resource Allocation for the Project	Resources from the Ministry of Economic Infrastructure (MIE) and its executing agency AGEROUTE will be allocated for the required civil works and resources from the Ministry of Construction, Sanitation and Urban Development (MCLAU) will be allocated for land acquisition and resettlement.			
Environmental Considerations ³				
	1) Pollution - Air pollution: D - Water pollution : D - Noise and vibration: D - Bottom material: D			
	2) Natural Environment - Ecosystem: D			
	3) Social Environment - Resettlement: C- - Poor/Minority/Indigenous people: C-			

(2/2)

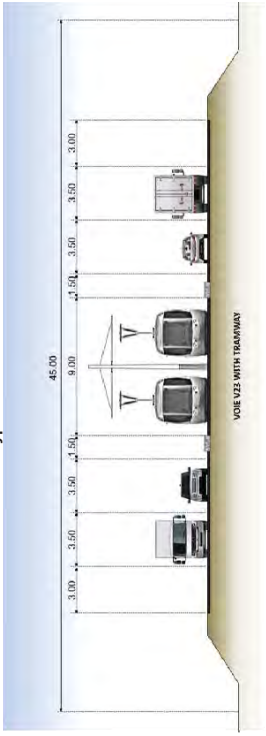
Quantitative Analysis and Rationales	Future Daily Traffic Volume (2030): V = 12,649 PCU/km (from the traffic model)				
	Start implementation year: 2029 (long-term) Road classification: Secondary road				
Project Concept, Scheme or Drawings	Location Map 				
	Typical Cross-Section 				
Preliminary Project Economic Evaluation	Assumptions	Price: as of 2014 Foreign currency exchange rate: 1 Euro = 144.19 Yen (as of December 24 2013) Standard conversion factor (SCF): 0.80 Project target period: 30 years from completion year Capital opportunity cost: 12%			
	Evaluation Indicators ⁴	NPV	1,957.5 Billion FCFA	EIRR	43.5%
	Notes	Benefit-Cost Ratio: 21.61 Project Group No. 7			

Notes:
¹: **Type of Project:** types of support to be required are presented:
 Technical Assistance (TA); Financial Assistance (FA) and/or Private Participation (PP)
²: Rated as - **A:** Highly Required; **B:** Highly Advantageous; **C:** Advantageous; **D:** Conditional; and **Non:** Not Necessary
³: Negative Impact in Environmental Considerations: Rated as - **A:** Serious; **B:** Some; **C:** Negligible
⁴: NPV: Net Present Value; EIRR: Economic Internal Rate of Return

(1/2)

Code	Name of Project	Type of Project ¹	Executing Agencies	Relevant Organizations								
V-4-1	Development of Yopougon Commune Road Network (YoCRN) Voie V23 – Parkway Section	TA, FA, PP	AGEROUTE	Ministry of Economic Infrastructure								
Project Description												
Main Objectives	The V-4-1 is an East-West arterial road running through the center of Yopougon, connecting the Route de Dabou to the Plateau, through the 5 th Bridge (V-4-2). It is expected to help decongest the Autoroute du Nord, currently the only link between Yopougon and the Eastern part of the District. The new road is also expected to become a major mass transit corridor by providing sufficient space for rail train/tramway tracks in the middle of the road.											
Sub-projects Components	The Project consists of the construction of a new arterial road:											
	• Project length: 7.9 km											
	• 4 traffic lanes											
	• 2 additional Train/Tramway tracks in the middle of the road											
Expected Beneficiaries	• ROW: 45 m											
	• 6 new interchanges with the K78, the L1, the Voie Principale, the Voie V28 (V-4-7), the S25 and the Route de Dabou (V-4-10)											
Project Location or Coverage Area	Citizens of the Greater Abidjan											
	The V-4-1 is East-West arterial road running through Yopougon.											
Rationales	Relevance to National Policy	Relevance to Abidjan Urban Master Plan and/or Existing Policies										
Private Sector Involvement ²	PPP	Communities Involvement	Other Parties									
Necessity of External Supports ²	D	B	D									
	Technical Assistance	Financial Assistance	Cooperation with Private Sector									
Resource Allocation for the Project	A	A	D									
Environmental Considerations ³	Resources from the Ministry of Economic Infrastructure (MIE) and its executing agency AGEROUTE will be allocated for the required civil works and resources from the Ministry of Construction, Sanitation and Urban Development (MCLAU) will be allocated for land acquisition and resettlement.											
	1) Pollution											
	- Air pollution: B-											
	- Water pollution : D											
- Noise and vibration: B-												
- Bottom material: D												
2) Natural Environment												
- Ecosystem: D												
3) Social Environment												
- Resettlement: A-												
- Poor/Minority/Indigenous people: C-												
<table><tr><th>Time Horizon for the Completion</th><th>Investment Cost (Million FCFA)</th></tr><tr><td>Preparatory</td><td>1,256</td></tr><tr><td>Main Work</td><td>12,559</td></tr><tr><td>Expected Completion Year</td><td>716</td></tr></table>					Time Horizon for the Completion	Investment Cost (Million FCFA)	Preparatory	1,256	Main Work	12,559	Expected Completion Year	716
Time Horizon for the Completion	Investment Cost (Million FCFA)											
Preparatory	1,256											
Main Work	12,559											
Expected Completion Year	716											
<table><tr><th>Related/Linked Projects (Project Codes)</th><th>Time Horizon for the Completion</th></tr><tr><td>V-4-2, V-4-7, V-4-10, T-1-3</td><td>2020</td></tr></table>					Related/Linked Projects (Project Codes)	Time Horizon for the Completion	V-4-2, V-4-7, V-4-10, T-1-3	2020				
Related/Linked Projects (Project Codes)	Time Horizon for the Completion											
V-4-2, V-4-7, V-4-10, T-1-3	2020											

(2/2)

Quantitative Analysis and Rationales	Future Daily Traffic Volume (2030): V = 24,028 PCU/km (from the traffic model)	
	Start implementation year: 2015 (short-term)	
	Road classification: Primary road	
		
Project Concept, Scheme or Drawings		
	Assumptions	Price: as of 2014 Foreign currency exchange rate: 1 Euro = 144.19 Yen (as of December 24 2013) Standard conversion factor (SCF): 0.80 Project target period: 30 years from completion year Capital opportunity cost: 12%
	Evaluation Indicators ⁴	NPV 679.3 Billion FCFA EIRR 32.0%
	Notes	Benefit-Cost Ratio: 4.23 Project Group No. 8

Notes:

¹: Type of Project: types of support to be required are presented:

Technical Assistance (TA); Financial Assistance (FA) and/or Private Participation (PP)

Rated as - **A**: Highly Required; **B**: Highly Advantageous; **C**: Advantageous; **D**: Conditional and **Non**: Not

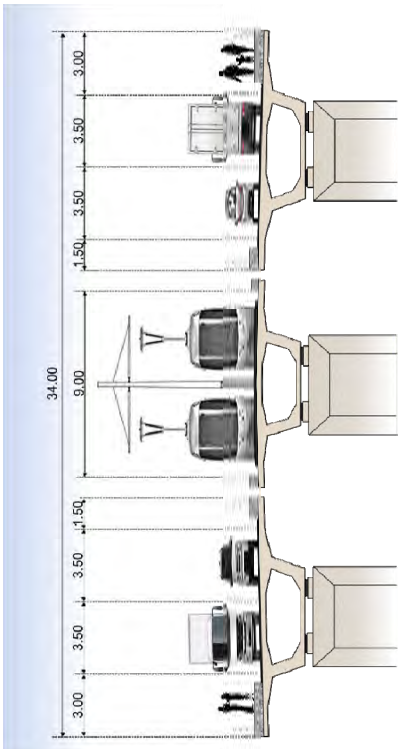
Necessary

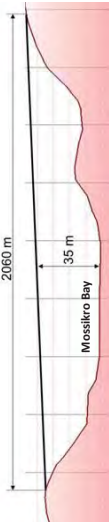
³: Negative Impact in Environmental Considerations: Rated as - **A**: Serious; **B**: Some; **C**: Negligible

⁴: NPV: Net Present Value; EIRR: Economic Internal Rate of Return

(1/3)

Code	Name of Project	Type of Project ¹	Executing Agencies	Relevant Organizations	
V-4-2	Development of Yopougon Area Road Network (YoARN) Voie V23 – 5 th Bridge Section	TA, FA, PP	AGEROUTE	Ministry of Economic Infrastructure	
Project Description					
Main Objectives	The V-4-2 is the link between the Voie V23 in Yopougon and the Rebol Avenue in Plateau across the Mossikro Bay. The new bridge is expected to relieve the Autoroute du Nord which is the only current link between Yopougon and the Eastern area of the District, promoting East-West travel.			Investment Cost (Million FCFA)	
Sub-projects Components	The Project consists of the construction of a new expressway: • Project length: 2.4 km • 4 traffic lanes • 2 additional Tramway/Train tracks in the middle of the road • ROW of access roads: 45 m on Yopougon side and 35m on Plateau side • 1 new interchange with the Boulevard de la Paix at Attécoubé • Bridge length: 2060 m Citizens of the Greater Abidjan			Preparation	24,259
				Initial Investment	242,588
				Recurrent O&M Cost (Per Year)	16,927
				Time Horizon for the Completion	
Expected Beneficiaries				Preparatory	1 year
				Main Work	3 years
				Expected Completion Year	2020
				Related/Linked Projects (Project Codes)	V-4-1, T-1-3
Project Location or Coverage Area	The V-4-2 is the bridge crossing the Mossikro Bay at Attécoubé. (see Maps attached)				
Rationales	Relevance to National Policy	Relevance to Abidjan Urban Master Plan and/or Existing Policies			
	PND – Infrastructure and Transport Services Sector - Action 2.3.31	Public Transport - Policy T1 4: High Capacity Public Transport Corridors			
Private Sector Involvement ²	PPP	Communities Involvement		Other Parties	
	D	A		D	
Necessity of External Supports ²	Technical Assistance	Financial Assistance		Cooperation with Private Sector	
	A	A		D	
Resource Allocation for the Project	Resources from the Ministry of Economic Infrastructure (MIE) and its executing agency AGEROUTE will be allocated for the required civil works and resources from the Ministry of Construction, Sanitation and Urban Development (MCLAU) will be allocated for land acquisition and resettlement.				
Environmental Considerations ³	1) Pollution - Air pollution: B- - Water pollution : B- - Noise and vibration: B- - Bottom material: B- 2) Natural Environment - Ecosystem: B- 3) Social Environment - Resettlement: A- - Poor/Minority/Indigenous people: C-				

Quantitative Analysis and Rationales	Future Daily Traffic Volume (2030): V = 58,772 PCU/km (from the traffic model)
Project Concept, Scheme or Drawings	Start implementation year: 2017 (short-term) Road classification: Primary road Location Map  Typical Cross-Section  5TH BRIDGE WITH TRAMWAY

Project Concept, Scheme or Drawings	Profile 		Plan View of Intersection with Boulevard de la Paix				
							
	Preliminary Project Economic Evaluation	Assumptions	Price : as of 2014 Foreign currency exchange rate: 1 Euro = 144.19 Yen (as of December 24 2013) Standard conversion factor (SCF): 0.80 Project target period: 30 years from completion year Capital opportunity cost: 12%				
		Evaluation Indicators ^{1,4}	NPV	679.3 Billion FCFA	EIRR	32.0%	
Notes		Benefit-Cost Ratio: 4.23 Project Group No. 8					
Notes: 1: Type of Project: types of support to be required are presented: Technical Assistance (TA); Financial Assistance (FA) and/or Private Participation (PP) 2: Rated as - A: Highly Required; B: Highly Advantageous; C: Advantageous; D: Conditional; and Non: Not Necessary 3: Negative Impact in Environmental Considerations: Rated as - A: Serious; B: Some; C: Negligible 4: NPV: Net Present Value; EIRR: Economic Internal Rate of Return							

No.

(1/2)

Code	Name of Project	Type of Project ¹	Executing Agencies	Relevant Organizations
V-4-3	Development of Yopougon Area Road Network (YoARN) Voie V2	TA, FA	AGEROUTE	Ministry of Economic Infrastructure
Project Description				
Main Objectives	The Voie V2 (V-4-3) is the central of three parallel routes that run from west to east across southern Yopougon. 500 meters of this road has already been constructed and 650 meters will require the widening of an existing road. The remaining section will have to be newly built. It is expected to help reduce traffic congestion inside Yopougon.			
Sub-projects Components	The Project consists of the construction of a new arterial road: • Project length: 5.4 km (new road on 4.7 km and widening of road on 0.7 km) • 4 traffic lanes • ROW: 25 m • 4 new intersections with the L1, the Voie Principale, the Voie V1 (V-4-12) and the Voie V6 (V-4-4) • 4 Box Culverts			
Expected Beneficiaries	Citizens of the Greater Abidjan			
Project Location or Coverage Area	The V-4-3 is an East-West arterial road running through Yopougon.			
Rationales	Relevance to National Policy Road Network - Policy TI 13: Road Development			
Private Sector Involvement ²	PPP Non			
Necessity of External Supports ²	Technical Assistance C			
Resource Allocation for the Project	Financial Assistance B			
Environmental Considerations ³	Cooperation with Private Sector D Resources from the Ministry of Economic Infrastructure (MIE) and its executing agency AGEROUTE will be allocated for the required civil works and resources from the Ministry of Construction, Sanitation and Urban Development (MCLAU) will be allocated for land acquisition and resettlement. 1) Pollution - Air pollution: B- - Water pollution: D - Noise and vibration: B- - Bottom material: D 2) Natural Environment - Ecosystem: D 3) Social Environment - Resettlement: A- - Poor/Minority/Indigenous people: C-			

(2/2)

Quantitative Analysis and Rationales	Future Daily Traffic Volume (2030): V = 11,979 PCU/km (from the traffic model) Start implementation year: 2021 (mid-term) Road classification: Secondary road	Location Map
Project Concept, Scheme or Drawings	Typical Cross-Section	
Preliminary Project Economic Evaluation	Assumptions Price: as of 2014 Foreign currency exchange rate: 1 Euro = 144.19 Yen (as of December 24 2013) Standard conversion factor (SCF): 0.80 Project target period: 30 years from completion year Capital opportunity cost: 12% Evaluation Indicators⁴ NPV 358.3 Billion FCFA EIRR 173.3% Notes Benefit-Cost Ratio: 131.52 Project Group No. 9	

Notes:

¹: Type of Project: types of support to be required are presented;

²: Technical Assistance (TA); Financial Assistance (FA) and/or Private Participation (PP)

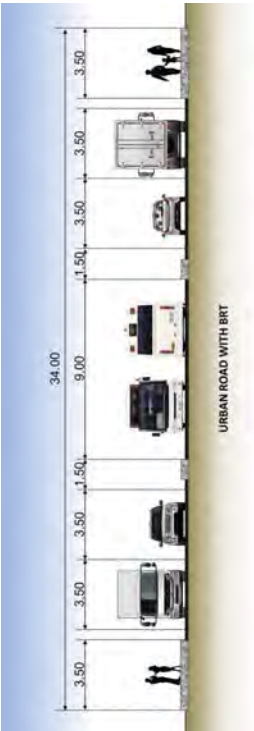
³: Rated as - A: Highly Required; B: Highly Advantageous; C: Advantageous; D: Conditional; and Non: Not Necessary

⁴: Negative Impact in Environmental Considerations: Rated as - A: Serious; B: Some; C: Negligible

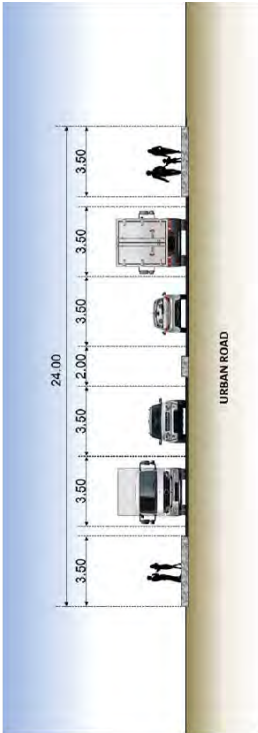
NPV: Net Present Value; EIRR: Economic Internal Rate of Return

(1/3)

No.	Code	Name of Project	Type of Project ¹	Executing Agencies	Relevant Organizations
	V-4-4	Development of Yopougon Area Road Network (YoARN) Voie V6	TA, FA	AGEROUTE	Ministry of Economic Infrastructure
Main Objectives	Project Description			Investment Cost (Million FCFA)	
	The Voie V6 (V-4-4) will create a southern ring road for Yopougon, connecting the future Yopougon Port Area with a direct link to the Route de Dabou. The Western section will be used for the BRT line connecting Yopougon to Dabou (T-2-5). The Voie V6 will be connected to the Yopougon-Treichville Tunnel (V-7-10), giving direct access to the Port from Yopougon.			Preparation	1.307
				Initial Investment	13,065
				Recurrent O&M Cost (Per Year)	785
Sub-projects Components	The Project consists of the construction of a new arterial road: • Project length: 10.5 km • 4 traffic lanes • 2 additional BRT lanes on the western part on 4.0 km • ROW: 35 m for the BRT section, 25 m for the remaining section • 4 Box Culverts			Time Horizon for the Completion	
				Preparatory	1 year
				Main Work	3 years
Expected Beneficiaries	Citizens of the Greater Abidjan			Expected Completion Year	2019
Project Location or Coverage Area	The V-4-4 is the southern ring road of Yopougon.			Related/Linked Projects (Project Codes)	V-4-7, V-4-10, V-7-10, T-2-5
	(see Maps attached)				
Rationales	Relevance to National Policy		Relevance to Abidjan Urban Master Plan and/or Existing Policies		
Private Sector Involvement ²	PPP	Road Network - Policy TI 13: Road Development			
	Non	Communities Involvement	B	Other Parties	D
Necessity of External Supports	Technical Assistance	Financial Assistance	Cooperation with Private Sector		
Resource Allocation for the Project	C	B	D		
	Resources from the Ministry of Economic Infrastructure (MIE) and its executing agency AGEROUTE will be allocated for the required civil works and resources from the Ministry of Construction, Sanitation and Urban Development (MCLAU) will be allocated for land acquisition and resettlement.				
Environmental Considerations ³	1) Pollution - Air pollution: B- - Water pollution : D - Noise and vibration: B- - Bottom material: D				
	2) Natural Environment - Ecosystem: D				
	3) Social Environment - Resettlement: A- - Poor/Minority/Indigenous people: C-				

Quantitative Analysis and Rationales		Future Daily Traffic Volume (2030): $V = 9,667$ PCU/km (from the traffic model) Start implementation year: 2016 (short-term) Road classification: Secondary road Location Map  Typical Cross-Section – Western Section 
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Project Concept, Scheme or Drawings	Typical Cross-Section – Eastern Section				
					
	Assumptions	Price: as of 2014 Foreign currency exchange rate: 1 Euro = 144.19 Yen (as of December 24 2013) Standard conversion factor (SCF): 0.80 Project target period: 30 years from completion year Capital opportunity cost: 12%			
Preliminary Project Economic Evaluation	Evaluation Indicators ^{*4}	NPV	206.1 Billion FCFA	EIRR	71.0%
	Notes	Benefit-Cost Ratio: 19.77 Project Group No. 10			

Notes:

^{*1}: Type of Project: types of support to be required are presented:

^{*2}: Rated as - A: Highly Required; B: Highly Advantageous; C: Advantageous; D: Conditional; and Non: Not Necessary

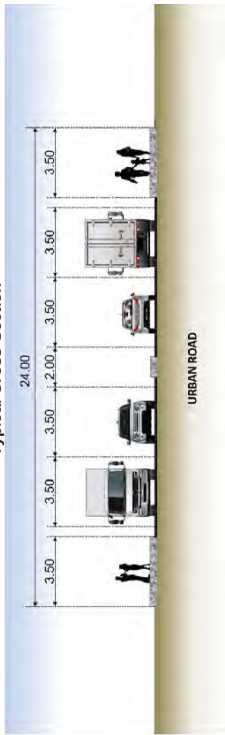
^{*3}: Negative Impact in Environmental Considerations: Rated as - A: Serious; B: Some; C: Negligible

^{*4}: NPV: Net Present Value; EIRR: Economic Internal Rate of Return

(1/2)

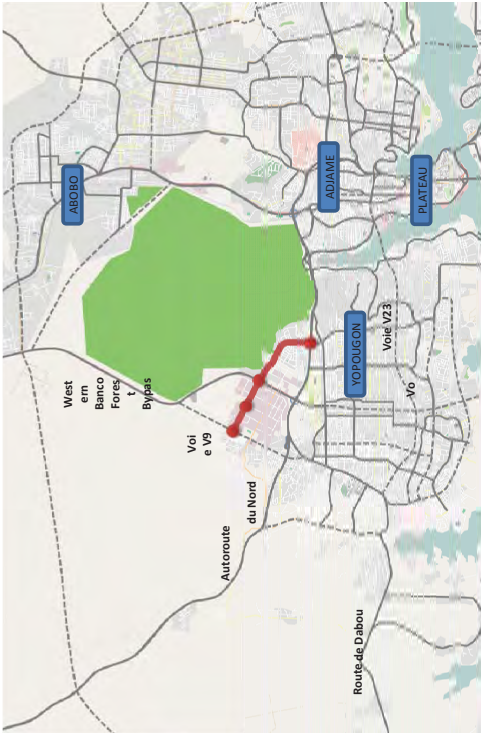
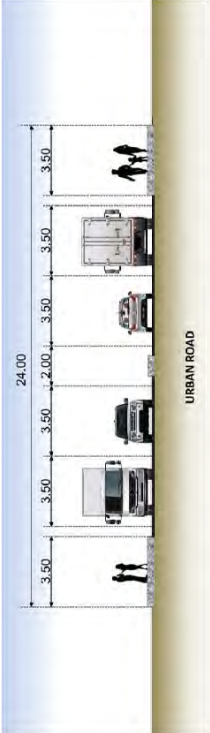
No.	Code	Name of Project	Type of Project ^{*1}	Executing Agencies	Relevant Organizations
	V-4-5	Development of Yopougon Area Road Network (YoARN) Vole V9	TA FA	AGEROUTE	Ministry of Economic Infrastructure
		Project Description		Investment Cost (Million FCFA)	
Main Objectives		The V-4-5 is planned as a new road along the western edge of Yopougon IZ. It will provide an additional access to the industrial area which is experiencing congestion at its two main entrances.		Preparation	
Sub-projects Components		The Project consists of the construction of a new arterial road: • Project length: 4.1 km • 4 traffic lanes • ROW: 25 m • 1 new interchange with the Autoroute du Nord • 4 Box Culverts		Initial Investment	
Expected Beneficiaries		Citizens of the Greater Abidjan		Recurrent O&M Cost (Per Year)	
Project Location or Coverage Area		The V-4-5 is located West of the industrial zone of Yopougon.		Time Horizon for the Completion	
Rationales		Relevance to National Policy		Preparatory	
Private Sector Involvement ^{*2}		PPP		Main Work	
Necessity of External Supports ^{*2}		Non		Expected Completion Year	
Resource Allocation for the Project		Technical Assistance		Related/Linked Projects (Project Codes)	
Environmental Considerations ^{*3}		C		V-4-6, V-4-10	
		Resources from the Ministry of Economic Infrastructure (MIE) and its executing agency AGEROUTE will be allocated for the required civil works and resources from the Ministry of Construction, Sanitation and Urban Development (MCLAU) will be allocated for land acquisition and resettlement.		(see Maps attached)	
		1) Pollution - Air pollution: B- - Water pollution : D - Noise and vibration: B- - Bottom material: D 2) Natural Environment - Ecosystem: C- 3) Social Environment - Resettlement: A- - Poor/Minority/Indigenous people: C-		Road Network - Policy TI 13: Road Development	
		C		Communities Involvement	
		B		Other Parties	
		B		Cooperation with Private Sector	
		B		B	

(2/2)

Quantitative Analysis and Rationales	Future Daily Traffic Volume (2030): V = 3,409 PCU/km (from the traffic model)			
	Start implementation year: 2020 (short to mid-term) Road classification: Secondary road			
Project Concept, Scheme or Drawings	Location Map 			
	Typical Cross-Section 			
Preliminary Project Economic Evaluation	Assumptions	Price: as of 2014 Foreign currency exchange rate: 1 Euro = 144.19 Yen (as of December 24 2013) Standard conversion factor (SCF): 0.80 Project target period: 30 years from completion year Capital opportunity cost: 12%		
	Evaluation Indicators ⁴	NPV	150.9 Billion FCFA	EIRR
	Notes	Benefit-Cost Ratio: 37.11 Project Group No. 11		

(1/3)

Code	Name of Project	Type of Project ¹	Executing Agencies	Relevant Organizations
V-4-6	Development of Yopougon Area Road Network (YoARN) Yopougon Industrial Zone Arterial Road	TA, FA	AGEROUTE	Ministry of Economic Infrastructure
Project Description				
Main Objectives	The proposed V-4-6 is an alternative link between the Autoroute du Nord and the industrial zone of Yopougon, providing an additional access to the industrial area which is experiencing congestion at its two main entrances.			Investment Cost (Million FCFA)
				Preparation
				Initial Investment
				Recurrent O&M Cost (Per Year)
Sub-projects Components	The Project consists of the construction of a new arterial road: • Project length: 3.8 km • 4 traffic lanes • ROW: 25 m			Time Horizon for the Completion
				Preparatory
				Main Work
				Expected Completion Year
Expected Beneficiaries	Citizens of the Greater Abidjan			Related/Linked Projects (Project Codes)
				V-4-5
Project Location or Coverage Area	The V-4-6 is located in the northern part of Yopougon.			
Rationales	Relevance to National Policy	Relevance to Abidjan Urban Master Plan and/or Existing Policies (see Maps attached)		
Private Sector Involvement ²	PPP	Communities Involvement	Other Parties	
	Non	B	D	
Necessity of External Supports ²	Technical Assistance	Financial Assistance	Cooperation with Private Sector	
	C	B	B	
Resource Allocation for the Project	Resources from the Ministry of Economic Infrastructure (MIE) and its executing agency AGEROUTE will be allocated for the required civil works and resources from the Ministry of Construction, Sanitation and Urban Development (MCLAU) will be allocated for land acquisition and resettlement.			
Environmental Considerations ³	1) Pollution - Air pollution: B- - Water pollution : D - Noise and vibration: B- - Bottom material: D 2) Natural Environment - Ecosystem: C- 3) Social Environment - Resettlement: A- - Poor/Minority/Indigenous people: C-			

Quantitative Analysis and Rationales	Future Daily Traffic Volume (2030): V = 5,451 PCU/km (from the traffic model)
Project Concept, Scheme or Drawings	Start implementation year: 2023 (mid-term) Road classification: Secondary road Location Map  Typical Cross-Section 

Preliminary Project Economic Evaluation	Assumptions	Price: as of 2014 Foreign currency exchange rate: 1 Euro = 144.19 Yen (as of December 24 2013) Standard conversion factor (SCF): 0.80 Project target period: 30 years from completion year Capital opportunity cost: 12%			
	Evaluation Indicators ^{*4}	NPV	150.9 Billion FCFA	EIRR	65.0%
	Notes	Benefit-Cost Ratio: 37.11 Project Group No. 11			

Notes:

^{*1}: **Type of Project:** types of support to be required are presented:

Technical Assistance (TA); Financial Assistance (FA) and/or Private Participation (PP)

Rated as - **A**: Highly Required; **B**: Highly Advantageous; **C**: Advantageous; **D**: Conditional; and **Non**: Not

Necessary

^{*3}: Negative Impact in Environmental Considerations: Rated as - **A**: Serious; **B**: Some; **C**: Negligible

^{*4}: NPV: Net Present Value; EIRR: Economic Internal Rate of Return

No.	Code	Name of Project	Type of Project ¹	Executing Agencies	Relevant Organizations	(1/4)	
	V-4-7	Development of Yopougon Area Road Network (YoARN) Voie V28 – Northern Section	TA, FA, PP	AGEROUTE	Ministry of Economic Infrastructure		
		Project Description		Investment Cost (Million FCFA)			
	Main Objectives	The V-4-7 is the Northern section of the Voie V-28, an expressway running north-south through Yopougon, from the Autoroute du Nord to the southern section of the Y4 Ring Road (V-1-9). It is expected to trigger the development of the Boulay Island by allowing the implementation of the expansion of the Port and diverting the generated cargo traffic directly to the Autoroute du Nord so as to avoid trucks from running on Yopougon streets.		Preparation		12,994	
	Sub-projects Components	The Project consists of the construction of a new expressway: • Project length: 6.0 km • 6 traffic lanes • ROW: 60 m • 3 new interchanges with the P208-S584, the Voie V28 (V-4-8) and the Voie V6 (V-4-4)		Initial Investment		129,939	
	Expected Beneficiaries	Citizens of the Greater Abidjan		Recurrent O&M Cost (Per Year)		8,929	
	Project Location or Coverage Area	The V-4-7 is the northern section of a North-South expressway running through the Yopougon. (see Maps attached)		Time Horizon for the Completion			
	Rationales	Relevance to National Policy PND – Infrastructure and Transport Services Sector - Action 3.1.8		Preparatory		2.5 year	
	Private Sector Involvement²	PPP D		Main Work		3.5 years	
	Necessity of External Supports²	Technical Assistance C		Expected Completion Year		2020	
	Resource Allocation for the Project	Relevance to Abidjan Urban Master Plan and/or Existing Policies Freight Transport Network - Policy TI 9: Truck Ban		Related/Linked Projects (Project Codes) V-4-1, V-4-3, V-4-4, V-4-8, V-4-9, F-1-2			
	Environmental Considerations³	Communities Involvement D		Other Parties D			
		Financial Assistance B		Cooperation with Private Sector D			
		Resources from the Ministry of Economic Infrastructure (MIE) and its executing agency AGEROUTE will be allocated for the required civil works and resources from the Ministry of Construction, Sanitation and Urban Development (MCLAU) will be allocated for land acquisition and resettlement.					
		1) Pollution - Air pollution: B- - Water pollution: D - Noise and vibration: B- - Bottom material: D					
		2) Natural Environment - Ecosystem: D					
		3) Social Environment - Resettlement: A- - Poor/Minority/Indigenous people: C-					

(2/4)

Quantitative Analysis and Rationales	Future Daily Traffic Volume (2030): V = 19,846 PCU/km (from the traffic model)	Project Concept, Scheme or Drawings
	Start implementation year: 2015 (short-term) Road classification: Primary road	
Location Map 		
Typical Cross-Section 		

(3/4)

Plan View of Intersection with the Voie V23



Plan View of Intersection with the Voie V6



Project
Concept,
Scheme or
Drawings

(4/4)

Preliminary Project Economic Evaluation		Price: as of 2014 Foreign currency exchange rate: 1 Euro = 144.19 Yen (as of December 24 2013) Standard conversion factor (SCF): 0.80 Project target period: 30 years from completion year Capital opportunity cost: 12%			
	Assumptions				
	Evaluation Indicators ⁴	NPV	625.4 Billion FCFA	EIRR	23.8%
	Notes	Benefit-Cost Ratio: 3.86 Project Group No. 4			

Notes:

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Technical Assistance (TA); Financial Assistance (FA) and/or Private Participation (PP)

Rated as - **A:** Highly Required; **B:** Highly Advantageous; **C:** Advantageous; **D:** Conditional; and **Non:** Not

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³: Negative Impact in Environmental Considerations: Rated as - **A:** Serious; **B:** Some; **C:** Negligible

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