FEDERAL
REPUBLIC OF NIGERIA

NDDC BOARD AND MANAGEMENT RETREAT

11 - 15 MARCH, 2014

THEME: RE-FOCUSING THE NDDC FOR BETTER SERVICE DELIVERY

MILESTONE ACHIEVEMENTS

ON THE

EAST-WEST COASTAL ROAD PROJECT

PREFACE

This book is intended to give some grounding for people who may require some knowledge on the status of the East-West Coastal Road Project.

The book reveals major accomplishments achieved on the project by the Federal Government of Nigeria through the Niger Delta Development Commission (NDDC).

Two out of the three key milestones towards the actualization of a construction project have been achieved. The pending milestone on the ladder of implementation is the Actual construction work which also involves the funding.

While this effort so far made by the Federal Government is quite commendable & praiseworthy, the book might as well serve as a jolt to our collective consciousness on the urgent need for the road lest the whole idea goes into hibernation or even amnesia.

In the light of feedback received on the earlier edition, this updated edition provides estimated cost of the project and suggestions on funding. Attention has been drawn to the continental perspective & global security attribute of the road.

Environmental Impact assessment, Economic and Hydrological studies are also mentioned.

Furthermore, more progress photographs have been added to offer lucid understanding of the tasks undertaken.

The design of the East-West Coastal Road is one of the most ambitious & sophisticated highway engineering projects ever executed in the world. And because of the peculiar nature of the job, over twenty seven specialist consulting firms were engaged in the areas of Hydrology, Geotechnical investigation, Geophysical studies, Topographic & Bathymetric surveys, Traffic studies, Economic studies, Environmental Impact Assessment studies, Wind tunnel and Aerodynamic studies etc. to ensure highest conceivable industry standard, compliant with international best practices.

The job has been executed with an abiding faith in the "Transformation Agenda" of Mr. President and the overall good of people living in the Nigerians coastal region.

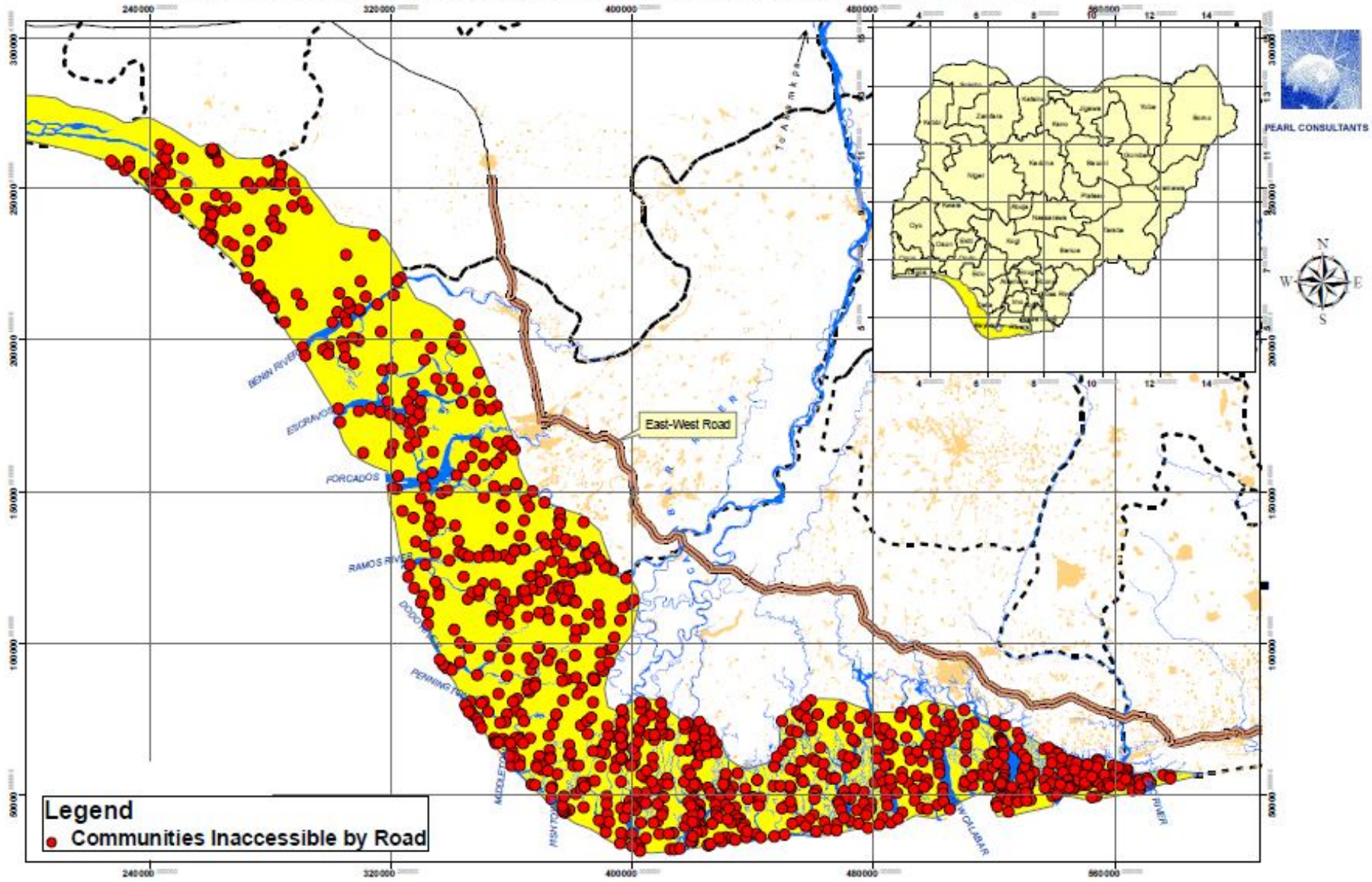
HIS EXCELLENCY **DR. GOODLUCK EBELE JONATHAN** *GCFR*
President, Federal Republic of Nigeria

"One key thing in this part of the country is opening up the whole of the South – South to the rest of the country ……. We have no option. The area must be opened up for development"

President Goodluck Jonathan

8th November, 2011

Map of the Niger Delta Showing Areas & Communities Inaccessible by Road



KEY MILESTONES
IN THE DEVELOPMENT OF COSTRUCTION PROJECTS

"The development of a Construction Project goes through various stages before its physical actualization is achieved. A project is a dynamic system that does not maintain a static state. Its status changes from that of concept to Feasibility Studies and then to the execution of Engineering and Tender Documentation and thereafter to the Actual Construction works. In general, there are three (3) key Milestones or Steps to climb towards the actualization of a construction project, viz:

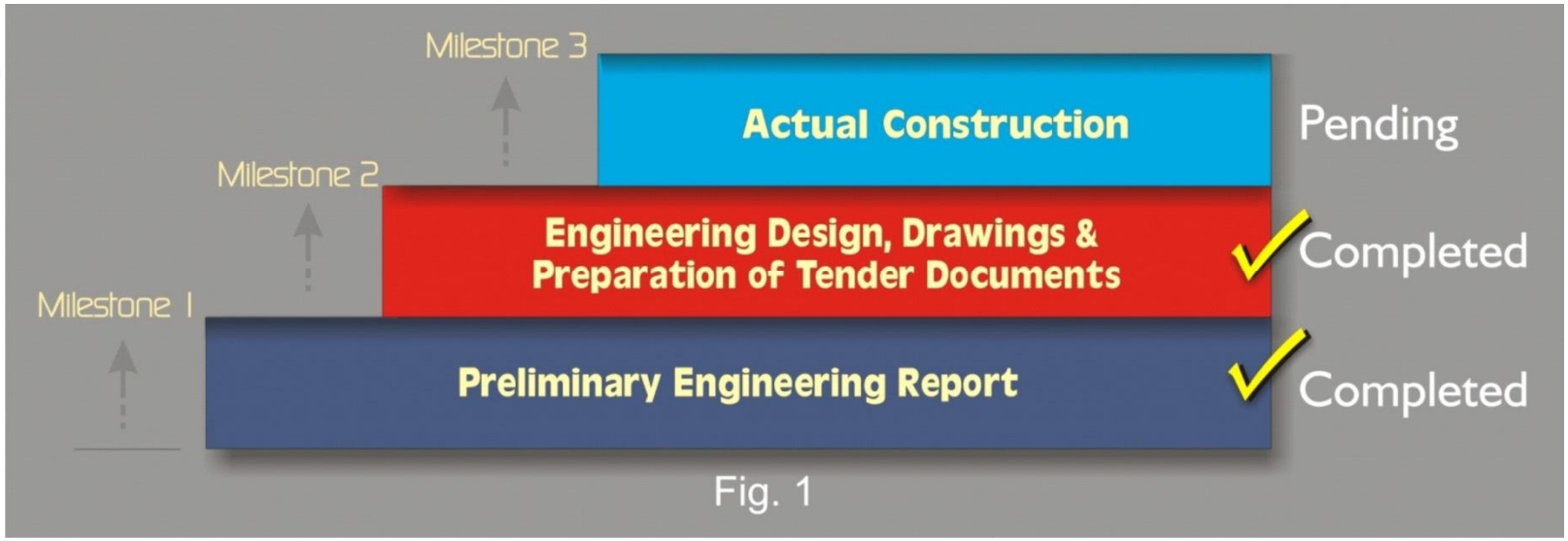
Milestone ONE - Preliminary Engineering Report
(FEASIBILITY AND SCOPE OF PROJECT)

Milestone TWO - Design & Tender Documents Preparation
(DETAILED TECHNICAL STUDIES, DESIGN,
TENDER DRAWINGS & ASSOCIATED DOCUMENTS INCLUDING SPECIFICATIONS)

Milestone THREE - Actual Construction
(PLANS & TIME SCHEDULES FOR THE CONSTRUCTION OPERATIONS)

MILESTONE ACHIEVEMENTS ON THE EAST-WEST COASTAL ROAD PROJECTS AND TASKS PERFORMED

MILESTONE ACHIEVEMENTS
ON THE EAST-WEST COASTAL ROAD PROJECT



Milestones 1 and 2, representing Feasibility Studies, Scope of Project, Detailed Technical Studies, Design, Tender Drawings and Documentation including Specifications have been achieved.

The project is now at the final rung of the implementation ladder (Fig. 1)

That is the Actual Construction work

TASKS PERFORMED

A brief Highlight of the various tasks involved in accomplishing Milestone 1 and Milestone 2 in the East-West Coastal Road Project

The underlisted tasks were diligently accomplished in order to achieve Milestones 1 and 2.

1. Alignment Selection, Feasibility & Scope of Works
2. Inception Drawings
3. Ground Controls – Monumentation & Observations in 167 GPS points X,Y,Z co-ordinates
4. Topographical Surveys from Calabar to Lagos – cutting, alignment stake-out, longitudinal profile, planimetry and cross-sections
5. Traffic Studies
6. Oil & Gas Facilities inventory along the Route

TASKS PERFORMED (CONTD.)

A brief Highlight of the various tasks involved in accomplishing Milestone 1 and Milestone 2 in the East-West Coastal Road Project

7. Surficial Soil Investigation Report along the Alignment
8. Geophysical Investigation Report from Calabar to Lagos
9. Geotechnical Investigation
10. Hydrological Studies
11. Environmental & Social Impact Assessment
12. Economic Studies
13. Aerodynamic/Wind Tunnel Studies & Analysis
14. Vessel Collision Risk Analysis Study for the Main River Crossings

TASKS PERFORMED (CONTD.)

A brief Highlight of the various tasks involved in accomplishing Milestone 1 and Milestone 2 in the East-West Coastal Road Project

15. Tender Drawings (Roads)
16. BEME (Roads)
17. Tender Drawings (Bridges) 180No. Bridges
18. BEME (Bridges)
19. General Specification for Roads & Bridges
20. Particular Specification for Major River Bridges
21. Standard Condition of Contract
22. Particular Conditions of Contract
23. Virtual Reality Iconic bridges and road
24. Animation on the road and minor bridges
25. Animation on 'WATER DIAMOND'

PROJECT DESCRIPTION

PROJECT DESCRIPTION

The proposed East-West Coastal Highway commences from Odukpani junction in Cross River State and terminates at Ibeju on the Lekki - Epe Expressway, connecting over 1,000 communities.

The Proposed East-West Coastal Highway travels some 704km on the main alignment and with about 106km of spurs straddling over barrier Islands, forests, fresh water swamps, mangrove swamps and waterways.

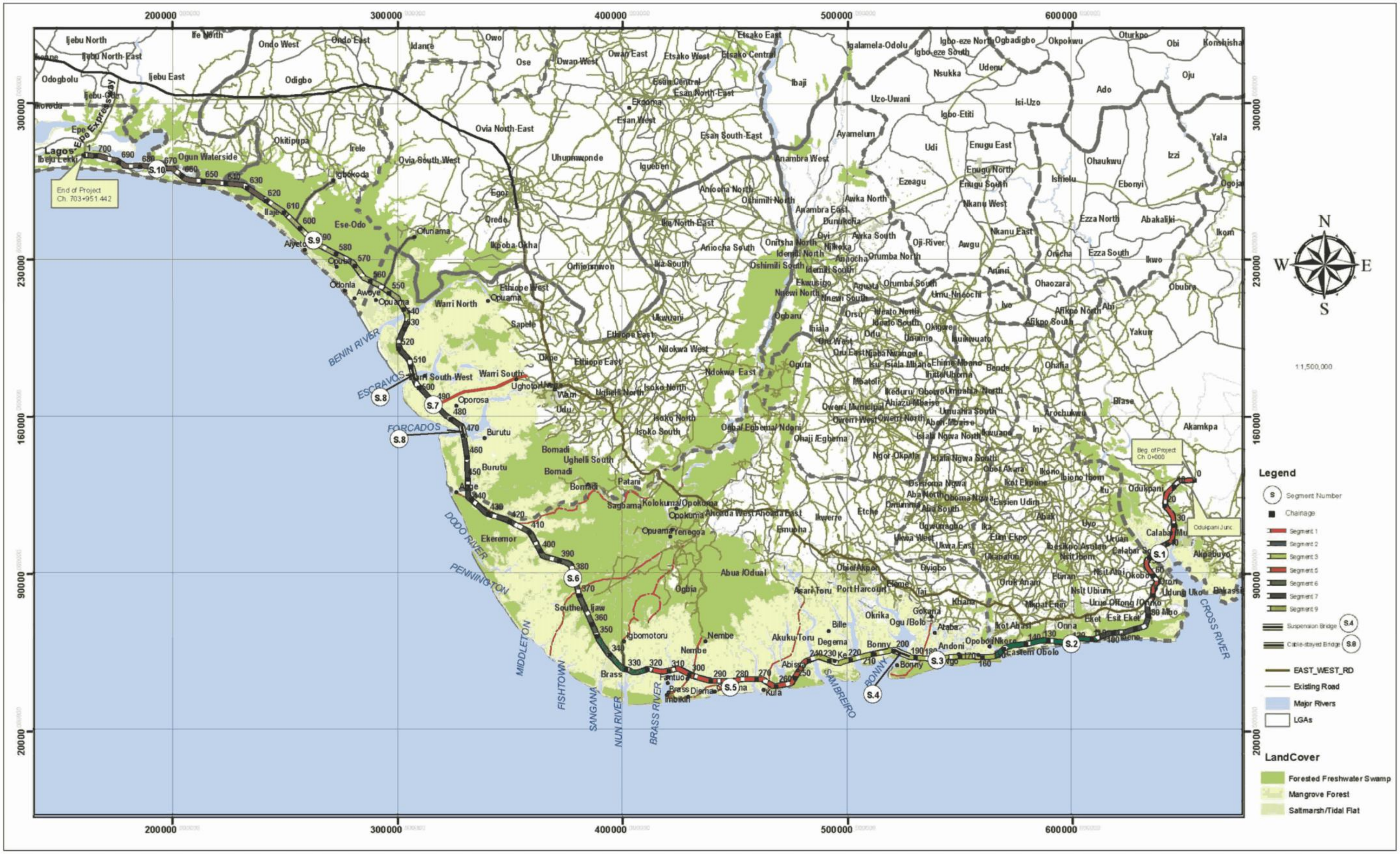
The alignment passes through nine (9) States of the Federation, namely, Cross River, Akwa Ibom, Rivers, Bayelsa, Delta, Edo, Ondo, Ogun and Lagos States.

The spurs are provided to connect the East-West Coastal Highway to centers of economic activities in the northern and central regions of the country, and also to create access to the coastline for maritime industries, tourism and recreational activities.

PROJECT DESCRIPTION (CONTD.)

The road is designed to 2-lane dual carriageway standard with raised median, kerbs and chutes at the outer edges. Each carriageway has a travel way width of 7.3m, flanked with an inner shoulder of 1.2m width and an outer shoulder of 3.65mm width with a 900mm wide paved section provided for future widening.

The road has 180No. bridges which include 3No. Iconic bridges - Suspension Bridge at the Bonny River Crossing ('WATER DIAMOND'), a Cable -Stayed Bridge each at Escravos River Crossing ('ESCRAVOS MARVEL') and Forcados River Crossing ('WONDEROUS FORCADOS').



CLIENT	PROJECT	SHEET CONTENT		REVISIONS	
FEDERAL REPUBLIC OF NIGERIA	EAST - WEST COASTAL HIGHWAY (CALABAR - LAGOS)	MAP 1 (SHOWING ENTIRE ROUTE)	PEARL CONSULTANTS (CIVIL & STRUCTURAL ENGINEERS) 26 ABA ROAD, PORT HARCOURT, NIGERIA. TEL: +234(0)803 3131216 www.pearlconsultantsng.com pearlconsultants1@gmail.com		01
		Drawing No.: EWCR/PEL/LM/01	Prepared: Alabo George / Checked: MDW / Date: January 2011		

CONNECTING

SPURS

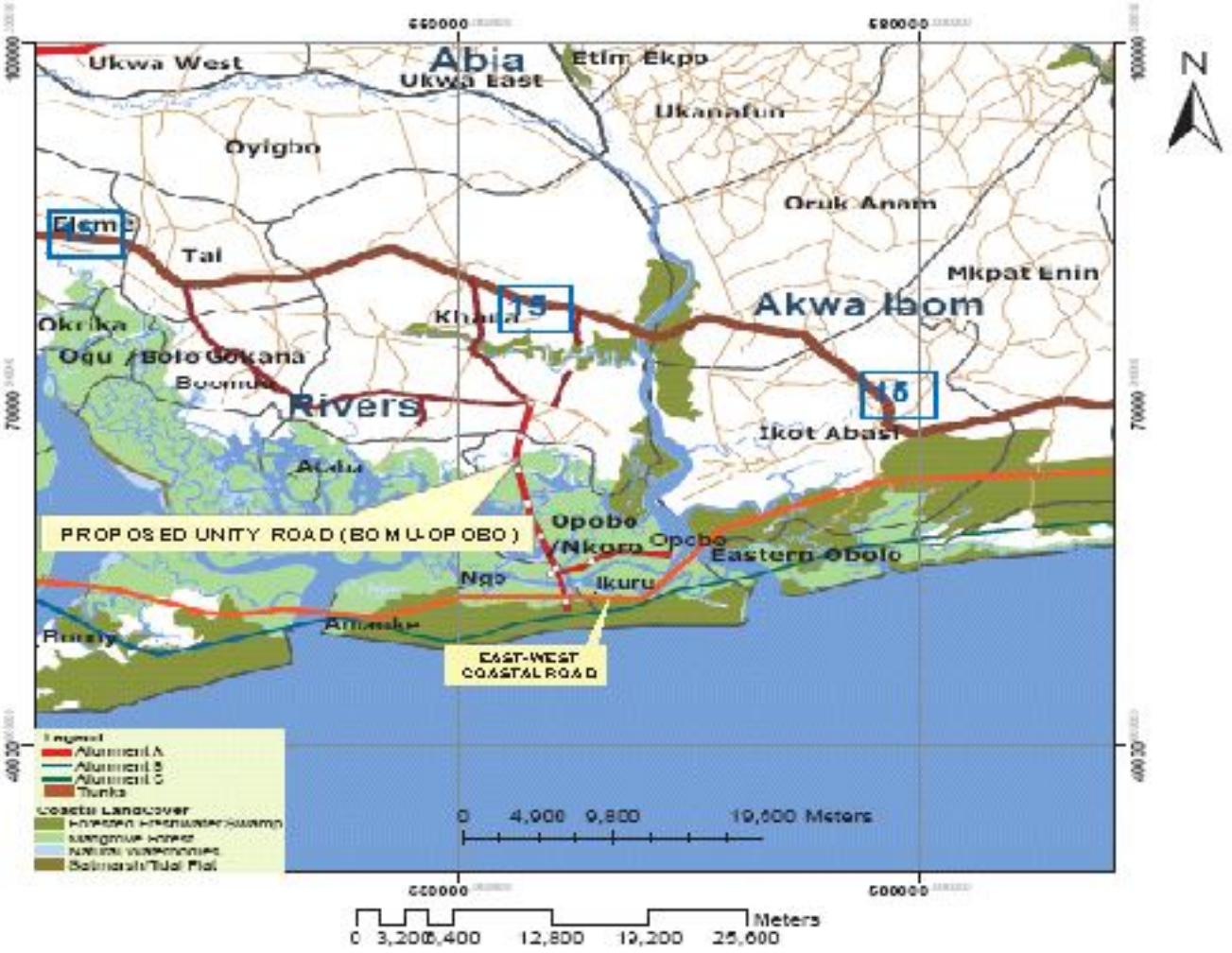
- At Calabar, the East-West Coastal ‘spine' road is linked to the northern Route 90.

- At Ibeno, it is linked to route 15, which is connected to the Northern Route 90

CONNECTING

SPURS

- Linked to the Bomu Opobo/Nkoro Unity Road, which is linked to the East-West Road (Route 15) at Opobo.

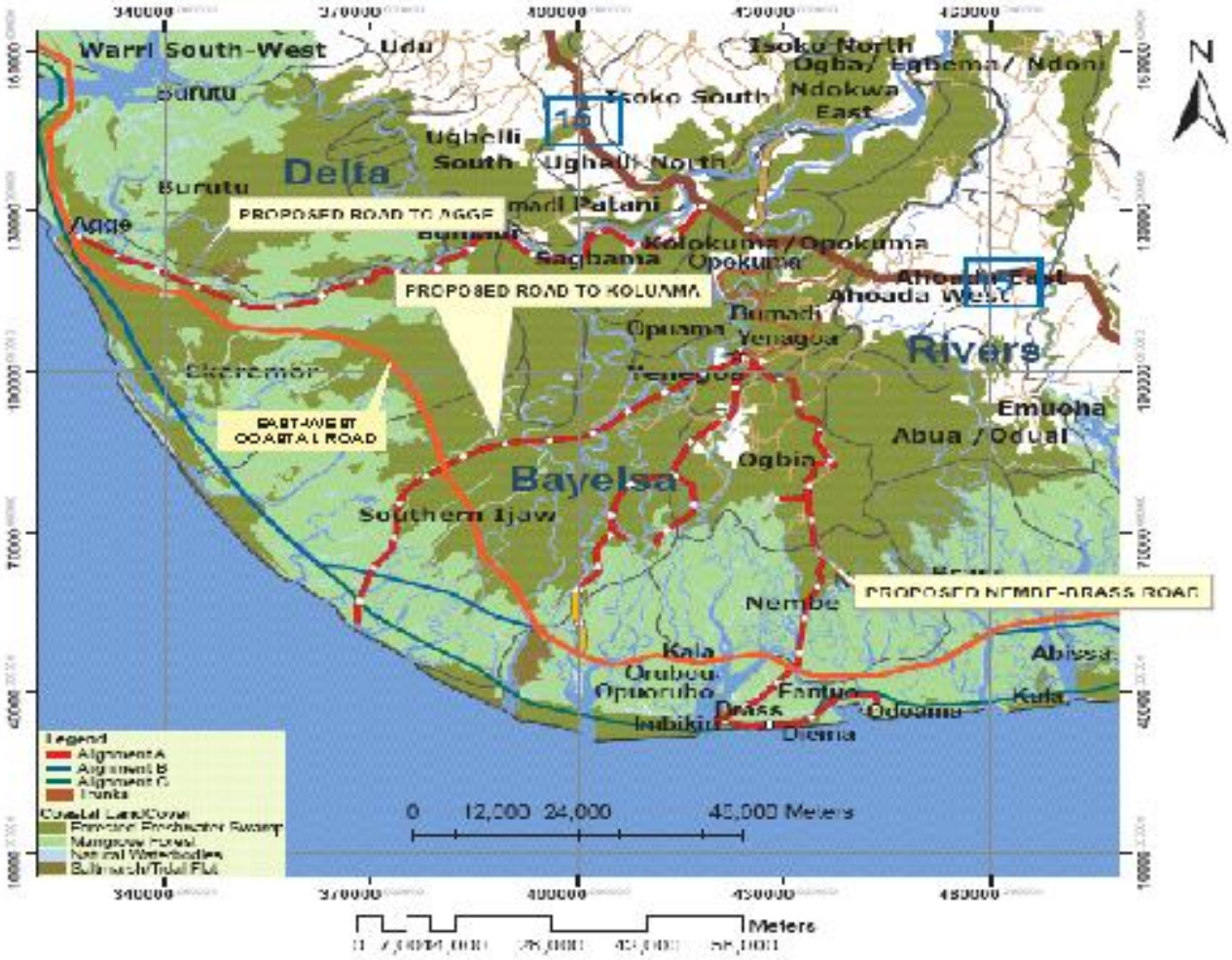


CONNECTING

SPURS

Intersects the Brass Nembe Road at Fantua

- A rib road from Isowegbene to Igbomotoru connects the proposed Yenegoa Peremabiri road which is linked to the East-West Road (Route 15)
- The proposed Yenagoa Oporoma Apoi Loluama Pepeghene Road intersects the Coastal Road at Apoi
- Proposed Agge Sagbama East-West Road connects the East-West Coastal Road at Agge.



CONNECTING

SPURS

- Spur to Ughotor; spur starts from Gbaramatu axis of the Coastal Road, connecting Effurun – Warri and then Route 15 (East-West Road)
- Between Awoye & Odonla, a rib links Ofunama which connects Ugboba, Igo, Oghede, Benin City and Route 25 (East-West Route)
- Ayetitun to Igbokoda in Ilaje, connecting Okitipupa Araromi and Route 25 at Ore, Route 25 is linked to the central and northern regions through Routes 20, 30, 40, 50, 70 and 90.

CONNECTING

SPURS

- The road cuts through Gbarangolor Ogulagha Road

CONNECTING

SPURS

ABOUT THE PROJECT:
KEY FACTS

- The Proposed East-West Coastal Highway measures 704km on the main alignment and has about 106km of Spur Roads.
- The Road has 180Nos. Bridges, including 3nos. Iconic land-mark bridges.
- The coastal region holds the resources which form the main backbone (oil & gas) of the Nigerian economy.
- The East-West Road which is currently the most southerly road running through the Niger Delta, is about 40km on the average from the coastline, leaving a vast section of the region inaccessible by road transport.
- There is generally no road infrastructural links to the Coastal Communities.
- The East-West Coastal Road will open up the Coastal Area and seamlessly integrate the regional economy with the mainstream national economy through opened trade and investment activities.
- Project is economically viable and worthwhile.

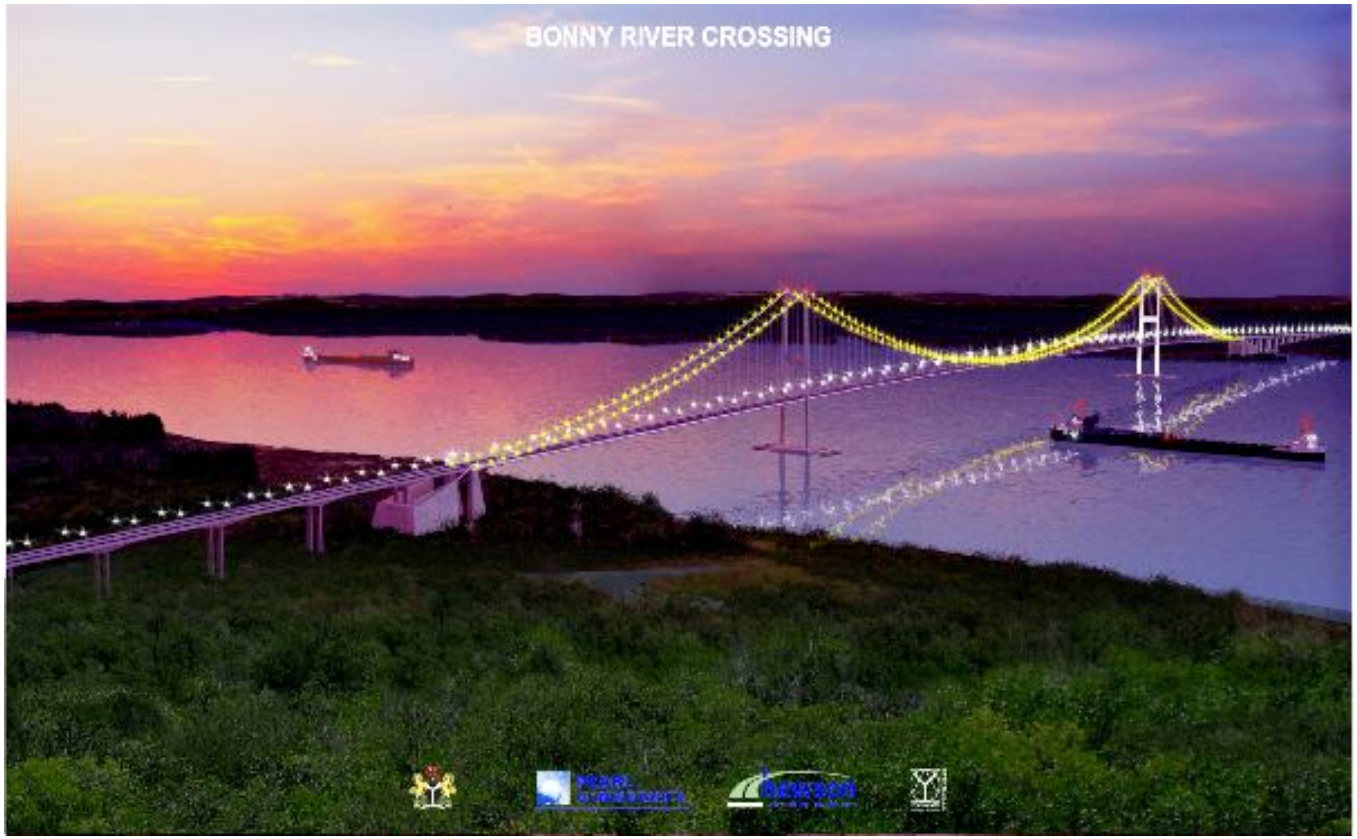
MAJOR RIVER CROSSINGS

.....bridges that will inspire 'sublime feelings' in addition to the primary role of connectivity. Modelled as poetic seascape, literally exploding the beauty of their surroundings, they will stand as the most enduring connection of our history and civilization to the most remote posterity.

FEATURES OF MAIN RIVER CROSSINGS

GENERAL

The proposed Bonny River, Escravos River and Forcados River crossings have been conceived as a family of world class structures, the individual bridge crossings are unique and have been designed in accordance to the specific technical and aesthetic requirements of their location and proposed alignment. They are composed using a palette of common materials and similar details.



The **'WATER DIAMOND'** of Grand Bonny *(Picturesque View at Nightfall)*

At Nightfall the lighting of the bridge expresses the structure as Sculpture, transforming it at once into a celebratory iconic landmark

BONNY RIVER CROSSING

'THE WATER DIAMOND OF GRAND BONNY'

Composition

The proposed 5.9km long Bonny River crossing has as its centre piece a Suspension Bridge with a main span of 1,500 metres and equal side spans of 650 metres and is approached by two 1.5 kilometre long concrete viaducts. The arrangement is symmetrical with only the main bridge spanning the river and the approaches on land.

It will be the 5th longest span in the world for a Suspension Bridge but the longest span of its type on the African Continent.

BONNY RIVER CROSSING

'THE WATER DIAMOND OF GRAND BONNY' *(CONTD.)*

Towers

At 200m high, the towers will have a huge impact on the surrounding flat landscape; accordingly they have undergone a considerable amount of aesthetic refinement and shaping in order to optimize the bridge's aesthetic appearance. Additionally the structure has also been carefully detailed to incorporate recessed feature lines designed to break up their visual mass and safeguard against adverse weathering.

Both legs of the tower taper as they rise and are arranged so that they are slightly inclined together to allow a vertical plane

BONNY RIVER CROSSING

'THE WATER DIAMOND OF GRAND BONNY' *(CONTD.)*

for the support cables whilst still permitting the main deck to pass freely in between. At the top the legs are flared out longitudinally to form a platform for the main cable saddles and to complete the composition the legs are connected by two rectangular sectioned cross beams that are positioned according to the 'golden ratio'. A crossbeam at deck level is deliberately avoided to clearly express the fact that the deck is fully suspended throughout its' length.

BONNY RIVER CROSSING

'THE WATER DIAMOND OF GRAND BONNY' *(CONTD.)*

Main Bridge Deck

Constructed from steel the main bridge deck has been aerodynamically shaped profile for stability and is supported along both edges by vertical cable hangers spaced at 20 metres intervals. The edge of the deck is chamfered to reflect light and give the deck line a crisp definition by contrasting with the rest of the deck structure in shade.

To minimize the visual impact of the deck, wire crash barriers have been specified.

BONNY RIVER CROSSING

'THE WATER DIAMOND OF GRAND BONNY' *(CONTD.)*

Anchorages

To complete the visual composition of the main bridge to a structural conclusion, the support cables are connected to an exposed anchor block 'pinned' in place by the first piers of the approach viaduct. surface of the block is articulated with inclined feature lines, arranged perpendicular to the line of the cable, to visually arrest the tension force.

BONNY RIVER CROSSING

'THE WATER DIAMOND OF GRAND BONNY' *(CONTD.)*

'WATER DIAMOND' of Grand Bonny *(Day time View)*

BONNY RIVER CROSSING

'THE WATER DIAMOND OF GRAND BONNY' *(CONTD.)*

Transition

The transition from the deeper steel min deck and the shallower concrete approaches is masked by the shaped piers that support the splay saddles. The pier is tapered with the back face vertical and incorporates the same detailing features as the towers.

Lighting

Highway lighting will be provided by 14 metre high lighting columns positioned outside of the high containment barriers at regular intervals of approximately 30 metres.

BONNY RIVER CROSSING

'THE WATER DIAMOND OF GRAND BONNY' *(CONTD.)*

Architectural feature lighting is limited to targeted highlighting of the main towers from the base. LED floodlighting units are position adjacent to the tower on the pile cap and at deck level.

Chromatics

Our design philosophy on chromatics is that bold colours should be limited to aesthetically enhancing or depicting carefully selected items. In general we recommend that materials should either be left self coloured, galvanized or painted neutral tones (e.g RAL 7001 Silver Grey). Our preference is for visual expression to be achieved by shaping and articulating elements in order to modulate light and shade.

BONNY RIVER CROSSING

'THE WATER DIAMOND OF GRAND BONNY' ***(CONTD.)***

APPROACH SPANS

Span Arrangement

For technical reasons the approach viaducts will be concrete. Comprising of a pair of variable depth box girders with curved soffits, inclined sides and tapered cantilevers they are arranged in a combination of 5-Span deck units (450 meters 75m: 100m: 100m: 100m:75m) and 6-Span deck units (550 metres 75m:100m: 100m: 100m: 100m:75m).

Piers

Piers for the approaches are rectangular in cross section with chamfered corners and vertical feature lines. Piers supporting the shallower sectioned decks adjacent to the expansion joints incorporate a flared head, angled at the same slope as the structure above.

BONNY RIVER CROSSING

'THE WATER DIAMOND OF GRAND BONNY' *(CONTD.)*

Parapets

Parapets on the approach spans are hybrid in arrangement with a profiled concrete up-stand topped by a single steel rail. This has the advantage of providing high containment whilst still permitting car drivers a view off the bridge.

'WATER DIAMOND' of Grand Bonny *(Deck View at Nightfall)*

BONNY RIVER CROSSING:

KEY FACTS

- Tender drawings and documents, including specifications have been issued to the Client.
- The bridge is 5,900 metres long and has a free span of 1,500 metres, longer than the Golden Gate Bridge of San Francisco, USA.
- The height of the Tower is 200 metres, taller than George Washington Bridge, New York.
- The Navigable height clearance is 60 metres.
- Provides sufficient headroom to allow passage of Ships, Oil tankers, Bulk carriers, Container vessels etc.
- It will be the 5th Longest Span in the World for a Suspension Bridge but longest of its type on the African Continent.

‘ESCRAVOS MARVEL’

ESCRAVOS RIVER CROSSING

'THE ESCRAVOS MARVEL' COMPOSITION

Composition

The overall length of the Escravos River Crossing is 5.2 kilometres, comprising of a Cable-Stayed Bridge with a clear main span of 700m, two side spans of 350m; and two 1.9km long approach viaducts. The composition is not central over the river as the navigation channel runs close to the northern shore at this location.

It will be the 8th longest span in the world for a Cable-Stayed bridge and the longest in the African Continent.

Towers

The 'A' framed towers of the Escravos Bridge are taller than the Bonny River Bridge towers and rise to a height of 241metres. The tower legs are rectangular in section with chamfered corners and taper as they climb. At the top of the tower the legs come together to form a single column which is shaped at the top to complete composition.

ESCRAVOS RIVER CROSSING

'THE ESCRAVOS MARVEL' COMPOSITION *(CONTD.)*

Main Bridge Deck

The main bridge deck is similar in size, profile and construction to the Bonny River Bridge, except that it is supported along both sides by two inclined planes of stay cables in a semi harp arrangement. They are sheathed in coloured PVC RAL 7001 Silver Grey (however other colours are available) and are attached to the deck via specially shaped connections to allow stressing of the stay cables at deck level. All deck furniture and structural steel work is painted RAL 7001 Silver Grey.

ESCRAVOS RIVER CROSSING

'THE ESCRAVOS MARVEL' COMPOSITION *(CONTD.)*

Side Spans

The side spans are supported by two single piers which are rectangular and have a similar detailing to the tower legs. At the transition with the approaches, the wider main deck is chamfered in to align with the angled down-stand face of the concrete approach parapet.

‘ESCRAVOS MARVEL’ *(Bird’s-Eye View)*

'ESCRAVOS MARVEL' *(Deck View)*

ESCRAVOS RIVER CROSSING: KEY FACTS

- Tender drawings and documents, including specifications have been issued to the Client.
- The Bridge is 5,200m Long and has a free span of 700m
- The Height of the Tower is 241m
- The Navigable Height Clearance is 60m
- Provides sufficient headroom to allow passage of Ships, Oil tankers, Bulk carriers, Container vessels etc.
- It will be the 8th Longest Span in the world for a cable-stayed bridge and the Longest on the African Continent.

‘WONDEROUS FORCADOS’

'WONDEROUS FORCADOS' *(Deck View)*

FORCADOS RIVER CROSSING

'THE WONDEROUS FORCADOS

Composition

The focus of the Forcados River Crossing is the cable -stayed bridge with a main span of 350 metres and side spans of 215 metres and connected to 1.35km long approaches. The crossing is symmetrical in composition with the majority of the elevated crossing over water.

Tower

The tower is distinctively formed in the shape of an open

framed diamond with curved members. The frame is tied in the middle and at the base by transverse walls that are profiled to describe a circular cut-out below deck. These walls incorporate vertical ribbing for contrast.

The towers will be highlighted at night with feature lighting. LED flood lights are positioned adjacent to the base and at deck level to wash the tower facades in cool white light.

FORCADOS RIVER CROSSING

'THE WONDEROUS FORCADOS (CONTD.)

Deck

In contrast to the other bridges, the deck for the Forcados crossing is concrete throughout. In cross section the deck soffit is profiled with a smooth shallow taper towards the edge cantilevers. This visually minimizes the perceived depth and bulk of the deck by putting the soffit completely in shade and contrasting with the lighter exposed façade of the concrete parapet.

The main deck is supported by a central vertical plane of twin stay cables in a semi harp arrangement. These cables are sheathed in PVC, colour RAL 7001 silver grey, to reflect the daylight and contrast with the sky (other colours are available).

FORCADOS RIVER CROSSING

'THE WONDEROUS FORCADOS (CONTD.)

The deck of the side spans are supported by piers that are similar in concept and detailing to the lower portion of the main tower, however the overall width is narrower so that the piers are completely below the deck. This design feature also helps to visually mask the differences between the main and approach deck structures.

'WONDEROUS FORCADOS' *(Panoramic View)*

ICONIC BRIDGES:
KEY FACTS

The introduction of these major Bridge types is neither to egotistically seduce nor fascinate but is due to the engineering constraints imposed on the respective locations.

All the three bridges at the crossing points have widths between 1,900m and 2,525m. These rivers have passage of significant sized vessels inland which will pass under these Bridges.

ICONIC BRIDGES:
KEY FACTS

The Nigerian Ports Authority (NPA) and National Inland Waterways Authority (NIWA) gave information on the required vertical and horizontal clearances for the bridges and the designs were carried out in line with international Standards.

The Bridges will be Iconic Landmarks and tourist haven on completion. They will stand as the most enduring and famous symbols of our history and civilization that will convey some knowledge of us to the most remote posterity like the Egyptian Pyramids, the Greek Pantheon and the Arc of Constantine in Rome.

AERODYNAMIC/WIND TUNNEL STUDIES

AERODYNAMIC/WIND TUNNEL STUDIES

The three iconic bridges are located respectively at the mouth of Bonny River, Forcados River and Escravos River on the Gulf of Guinea Coastal region that is associated with strong winds. It is therefore imperative that measures must be taken to safeguard the bridge structures against wind-excited vibrations/oscillations and in the probable event of hurricane.

The wind tunnel studies were carried out to derive a detailed quantification of the aerodynamic stability and static wind loading of the bridge deck by way of section model wind tunnel testing.

The wind tunnel tests were carried out in the aeronautical wind tunnel laboratory of BMT Fluid Mechanics Ltd, United Kingdom, using a 2-dimensional, 1:40 scale section model of the bridge deck for a series of bridge deck arrangements.

AERODYNAMIC STUDIES

The model dynamic properties in terms of natural bending and torsional frequencies and structural damping were measured prior to each set of tests.

The dynamic properties were measured by resonating the model in a natural mode via the deck using a vibrator through a light spring or by hand.

The bending and torsional frequencies were measured by oscillating the model at constant amplitude. The structural damping associated with the rig system was measured in amplitude decay tests.

AERODYNAMIC STUDIES (CONTD.)

For measurement of the static wind load coefficients, the model was mounted across the 2. 74m width of the wind tunnel on a force balance rig. The force balance rig consists of a pair of 3-component strain-gauged force transducers placed on either side of the wind tunnel test section and on which the wind tunnel model is accurately rigged via precision-machined fitting. The model is rotated through the test wind angles on the balances so that the wind loads are measured directly in model axes.

Load balance checks were carried out prior to the experiments over the expected range of forces and moments coefficients.

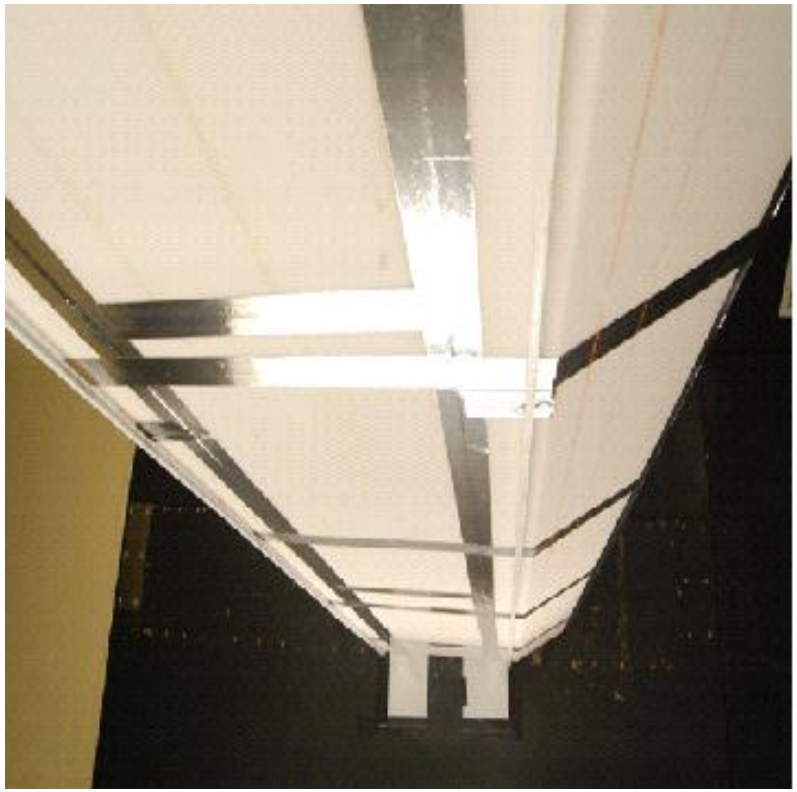
AERODYNAMIC STUDIES (CONTD.)

AERODYNAMIC STUDIES (CONTD.)

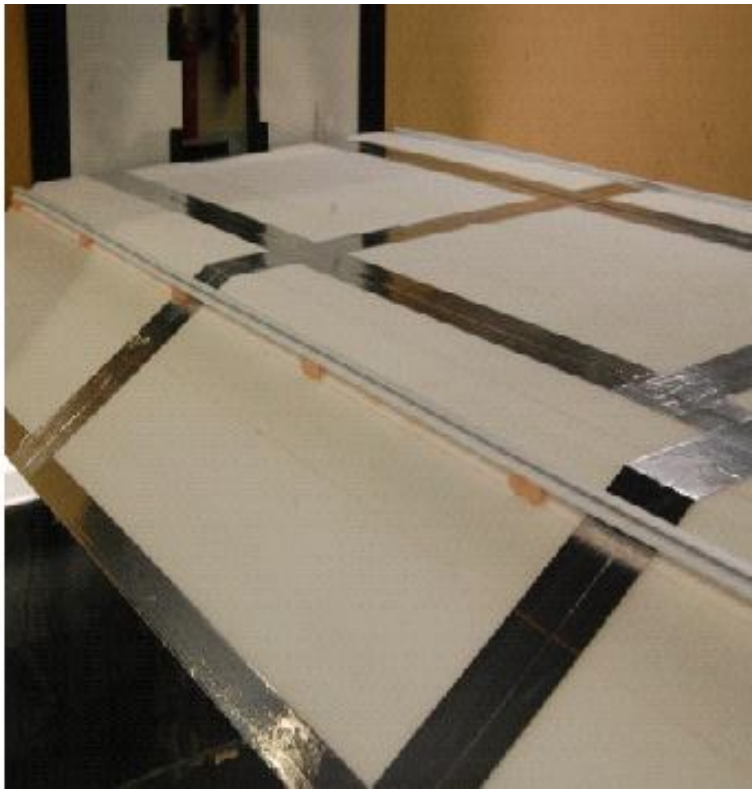
Wind Tunnel Model - General View

Wind Tunnel Model- Original Deck - With Gantries-Close-up view

AERODYNAMIC STUDIES (CONTD.)

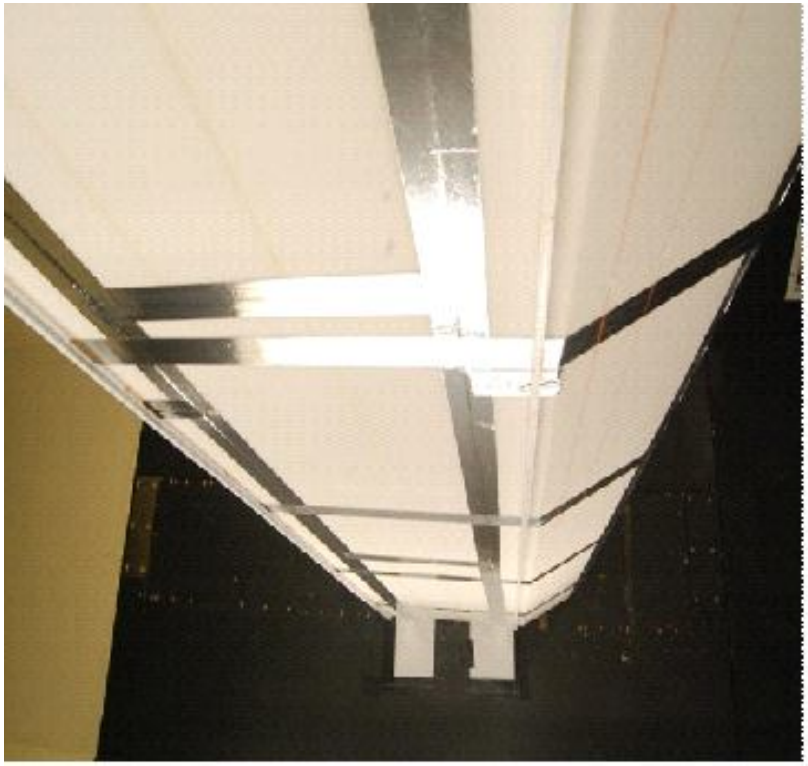


Wind Tunnel Model Deck Option 1 Gantries Configuration 1 - Close-Up View

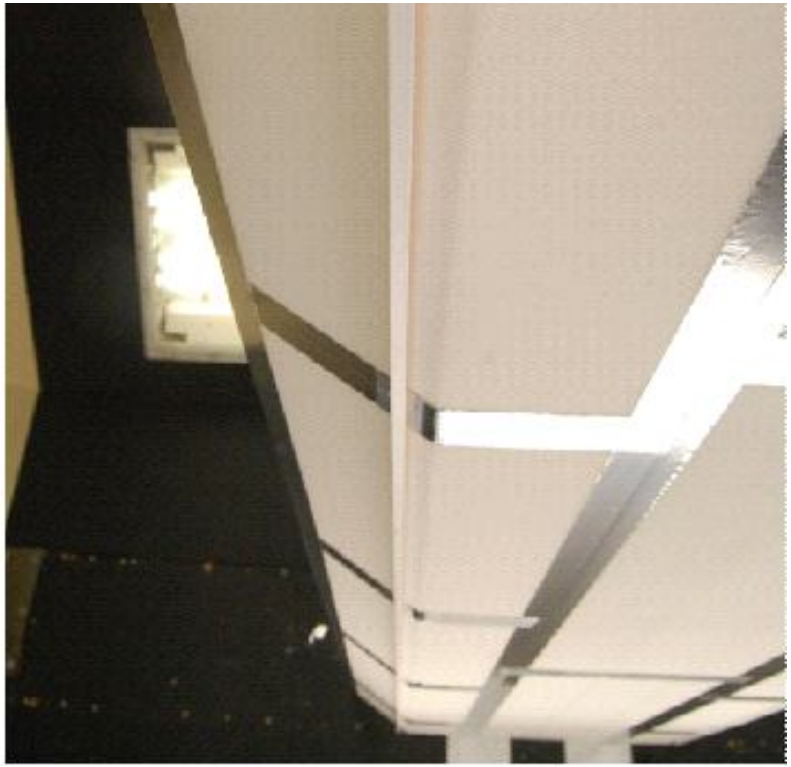


Wind Tunnel Model Deck Option 1 Gantries Configuration 2 - Close-Up View

AERODYNAMIC STUDIES (CONTD.)



Wind Tunnel Model Deck Option 1 Gantries Configuration 3 - Close-Up View



Wind Tunnel Model Deck Option 2 Gantries Configuration 2 Close-Up View

TOPOGRAPHIC CAMPAIGN IN PICTURES

.....through freshwater and mangrove swamps, rivers and rivulets, tidal marshes and mud flats, virgin forests inhabited by wildlife, and complicated by the volatility of the region.

TOPOGRAPHIC CAMPAIGN

The Coastal Mangrove

TOPOGRAPHIC CAMPAIGN (CONTD.)

Topographic Expedition in the Niger Delta terrain

TOPOGRAPHIC CAMPAIGN (CONTD.)

Survey expedition in progress

Drilling on the Alignment in Andoni

A Barge Mounted Drilling Rig

TOPOGRAPHIC CAMPAIGN (CONTD.)

Alignment survey in mangrove swamp in progress about Ch.180 + 700

Alignment survey in mangrove swamp in progress about Ch.244 + 900

TOPOGRAPHIC CAMPAIGN (CONTD.)

Alignment survey in fresh water swamp in progress about Ch. 445 + 110

Alignment survey in mangrove swamp in progress about Ch.537 + 100

TOPOGRAPHIC CAMPAIGN (CONTD.)

Alignment survey in salt water swamp in progress about Ch. 540 + 300

Alignment survey in fresh water swamp in progress about Ch.585 + 300

TOPOGRAPHIC CAMPAIGN (CONTD.)

Alignment survey in fresh water swamp in progress about Ch. 404 + 100

SURVEY:
KEY FACTS

Cutting through the difficult terrain and forests of the Coastal Region inhabited by wildlife was very risky and challenging.

Whereas the mangrove swamps with its soft mud flats inundated diurnally by tidal water was a major challenge to daily work output, the fresh water swamps when flooded in the rainy season makes work almost impossible.

GEOTECHNICAL CAMPAIGN IN PICTURES

.....the 'surficial' depths of the terrain of the Coastal Region are not as much of a blessing as what lies beneath.....

GEOTECHNICAL CAMPAIGN

Soil investigation to 15m depth on Road alignment at Ch. 41 + 200

Deep soil investigation in progress on a JACKUP barge at bridge location of Andoni River at Ch. 179 + 110

GEOTECHNICAL CAMPAIGN (CONTD.)

Deep soil investigations on a JACKUP barge at the suspension Bridge location on Bonny River:Visiting NDDC, Consultant staff and pressmen being lifted on to the barge at Ch. 196 + 250

Deep soil investigations on a JACKUP barge at the suspension Bridge location on Bonny River at Ch.194 + 750

GEOTECHNICAL CAMPAIGN (CONTD.)

Soil investigation team moving equipment to a test location about Ch. 272 + 325

Flooded Mangroove swamp Road alignment about Ch. 361 + 500

GEOTECHNICAL CAMPAIGN (CONTD.)

Soil investigation to 15m depth on Road alignment at Ch. 574 + 300

Soil investigation to 15m depth on Road alignment at Ch. 374 + 500

GEOTECHNICAL CAMPAIGN (CONTD.)

Soil investigation team moving equipment to a test location about Ch.389 + 862.5

Soil investigation to 15m depth on Road alignment at Ch. 41 + 200

GEOTECHNICAL CAMPAIGN (CONTD.)

Digging of Trial Pit

Dutch Cone Penetration Test

GEOTECHNICAL CAMPAIGN (CONTD.)

Recording of disturbed Sample

GEOTECHNICAL CAMPAIGN (CONTD.)

Geotechnical Team on Andoni-Kula axis took time off for Christmas pose
(Christmas day-2010)

GEOTECHNICAL:
KEY FACTS

The Geology of the Niger Delta Region particularly the Coastal areas, where the proposed road traverses requires peculiar geotechnical studies.

On normal road alignment, Hand auger and Trial pits are used to sample soils to 2m depths at 500m intervals, and motorised means to sink boreholes to 20m-30m depths at bridge locations.

GEOTECHNICAL:
KEY FACTS (CONTD.)

But in the case of the East West Coastal Road, Light Borings were utilized to test soils to a minimum of 15m depths and in some cases up to 40m and this is alternated with Dutch Cone Penetration tests.

At Bridge Locations, Borings and Dutch Cone Penetration Tests were generally made to 40m depths, some of which were conducted on Jack-Up Barges that were hired with foreign currency under the surveillance of military gun boats

HYDROLOGICAL CAMPAIGN IN PICTURES

HYDROLOGICAL CAMPAIGN

Screen shot for Data acquisition of shallow sub-surface profiling, using strata box tool at Calabar River

Settling up the ADCP for deployment at the Nun River

HYDROLOGICAL CAMPAIGN (CONTD.)

Mobilization of Marine Survey equipment on marine police security boat in Port Harcourt

Marine police personnel on guard at Cawthorne channel

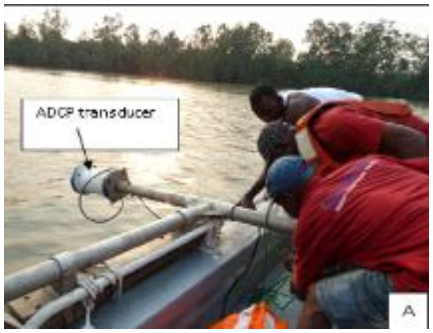
HYDROLOGICAL CAMPAIGN (CONTD.)

The bathymetry, side scan, seismic, ADCP, sediment and CTD casts surveys were implemented using a small boat with shallow draft

HYDROLOGICAL CAMPAIGN (CONTD.)

The bathymetry, side scan, seismic, ADCP, sediment and CTD casts surveys were implemented using a small boat with shallow draft

HYDROLOGICAL CAMPAIGN (CONTD.)



Survey Equipment Mobilsation: Tide Guage

HYDROLOGICAL CAMPAIGN (CONTD.)

Breakfast at Muster Point, Survey Crew and Equipment

HYDROLOGY:
KEY FACTS

- The proposed East-West Coastal Road will traverse all major river systems in the coastal region and will inadvertently be affected or influenced by them. It is therefore imperative to explore the characteristics of these rivers.

- Since the NADECO Report some 50 years ago, no new detailed region-wide river investigation has been carried out. As a result, available data is sketchy, site specific and on project basis.

- The hydrological data collected during the studies provide substantial information that will ensure durable, reliable and well-engineered road and bridges for the socio-economic development of the Coastal Region.

.

HYDROLOGY

- Value-added Benefits of the Study.

The studies seem to be revealing some latent evidence for agricultural and transportation benefits as well as potential for Hydro-electricity generation capabilities which are of immense importance to the project and the nation. Further development and subsequent utilization of these observed value-added potential benefits can be explored and exploited with more investigation and assessment.

ENVIRONMENTAL IMPACT ASSESSMENT

There is always a conflict between Environment and Development.

Environmental Management processes must be carried out to ensure Sustainable Development.

ENVIRONMENTAL IMPACT ASSESSMENT

The environmental impact assessment was carried out, in line with existing national regulatory bodies, with the aim of identifying the possible positive and negative impacts of the proposed East - West Coastal Road project on the sensitive coastal environment of southern Nigeria. The EIA in addition to the field work which covered the dominant wet and dry seasons in the study area also included serious interactive sessions with various stakeholders

ENVIRONMENTAL IMPACT ASSESSMENT (CONTD.)

The study provided information on the quality of the project environment, the interaction of the project with the natural systems in the environment, potential impact positive and negative) and mitigation strategies to minimise significant negative impact or enhance beneficial impact.

Most of the study area is covered by mangrove ecology which posses unique chemical features probably as they are continuously inundated by saline tidal waters with consequent accumulation of salts. There are however also freshwater zones along the stretch of the coastal road.

ENVIRONMENTAL IMPACT ASSESSMENT (CONTD.)

The dominant mangrove plants are Rhizophora racemosa, R. Mangle, Laguncularia racemosa, Avicenna african , Phoenix sp. and Achrosticum aureum. The freshwater/barrier forest Island vegetation essentially comprise continuous bands of vegetation along certain stretches of the study area.

ENVIRONMENTAL IMPACT ASSESSMENT (CONTD.)

Basic infrastructure, such as potable water supply, sanitation, electricity and roads, are generally unavailable in most of the coastal communities. Most houses are constructed of wood and bamboo and have thatched roofs and compacted earth floors.

The study showed that environmental impacts of the construction of East - West Coastal Road will include saline intrusion, impacts on water quality, impacts on sediment and benthos, impacts on hydrology and aquatic habitats, waste generation, ecological impacts, fragmentation and isolation of populations, demographic impacts, employment and income generation, impacts on social structure and norms among others.

ENVIRONMENTAL IMPACT ASSESSMENT

Mitigation measures to minimize the impacts were proposed and an Environmental Management Plan (EMP), a tool to measure and check the efficacy of the mitigation measures was also presented to minimise or eliminate identified adverse impacts.

The study showed that since the project is generally welcomed by the communities, it is envisaged that the implementation of the mitigation measures during the various phases of the project would lead to a healthy and productive life of the people in the communities in harmony with nature.

ENVIRONMENTAL IMPACT ASSESSMENT

Eastern Flank Stakeholders' Forum
(Akwa Ibom - Cross River) At Uyo

Environmental Impact Assessment

CENTRAL FLANK STAKEHOLDERS' FORUM
(RIVERS - BAYELSA - DELTA) AT WARRI

ENVIRONMENTAL IMPACT ASSESSMENT

Western Flank Stakeholders' Forum
(Ondo- Ogun - Lagos) At Akure

ENVIRONMENTAL IMPACT ASSESSMENT (CONTD.)

Collection of Bonga Fish

Drying Process

ENVIRONMENTAL IMPACT ASSESSMENT (CONTD.)

Access way in a Coastal Community

Poor social infrastructure - Pier latrine, common in the study area

ENVIRONMENTAL IMPACT ASSESSMENT (CONTD.)

A Typical Water Front Trading in the Coastal Communities

Field Studies in a Mangrove Communities

ENVIRONMENTAL IMPACT ASSESSMENT (CONTD.)

Wild African Elephant in Andoni, Rivers State

Turtle seen in the study area

ENVIRONMENTAL IMPACT ASSESSMENT (CONTD.)

Fuel Station in one of the Creeks in the Study Area

ENVIRONMENTAL IMPACT ASSESSMENT (CONTD.)

Searching for Potable Water

ENVIRONMENTAL IMPACT ASSESSMENT: KEY FACTS

- Grown Turtle breeds around Akassa. The young ones migrate from Akassa to as far as Australia and return to Akassa for breeding. This round trip takes about 25-30 years.
- The Ilaje axis of the coastal region is a major shrimping ground. Activities associated with the construction of the coastal road will therefore affect the development of shrimps in the area resulting in major socio-economic impact in the affected communities.
- The Andoni area of Rivers State has been proposed as a game sanctuary although no further efforts have been made to provide the necessary legal framework. The presence of species of conservation value such as the African Elephant. Hippopotamus and Nile Crocodile in particular makes the area a biodiversity 'hotspot' that requires immediate conservation attention.

ECONOMIC STUDIES

ECONOMIC STUDIES

The economic evaluation of the project consists of two parts, namely;

i. First part presents the estimates of possible developmental benefits and losses that may emanate from the project to various stakeholders.

ii. The second part presents the economic and financial costs and benefits of the proposed project.

ECONOMIC STUDIES (CONTD.)

The economic and financial analysis performed on the road were for a 30-year analysis period at 5%, 7%, 10%, 20% and 25% discount rates, 10-year construction period, without residual value and with traffic growth rates of 2.5% and 7%. The economic and financial indicators of viability show that the proposed East-West Coastal Road project is very viable and worthwhile investments

ECONOMIC STUDIES (CONTD.)

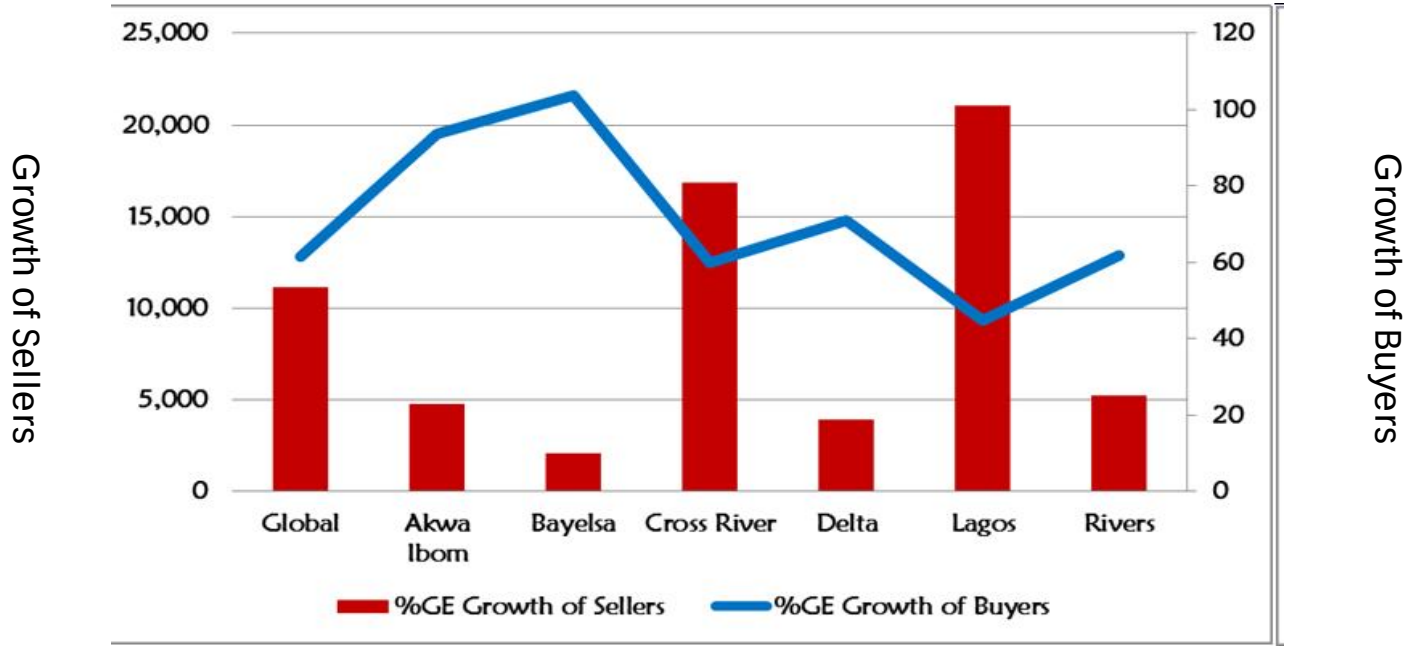
Further constriction simultaneously imposed on the evaluation model:

a. Slowing down the traffic growth rates such that traffic expands by 2% in the first 10 years, 3% up to the 15th year, 4% up to the 20th year and 7% up to the 30th year alongside.

b. The quadrupling of the estimated investment costs. Even with these simultaneously imposed constrictions, the project proved economically viable at 25% discount rate

ECONOMIC STUDIES (CONTD.)

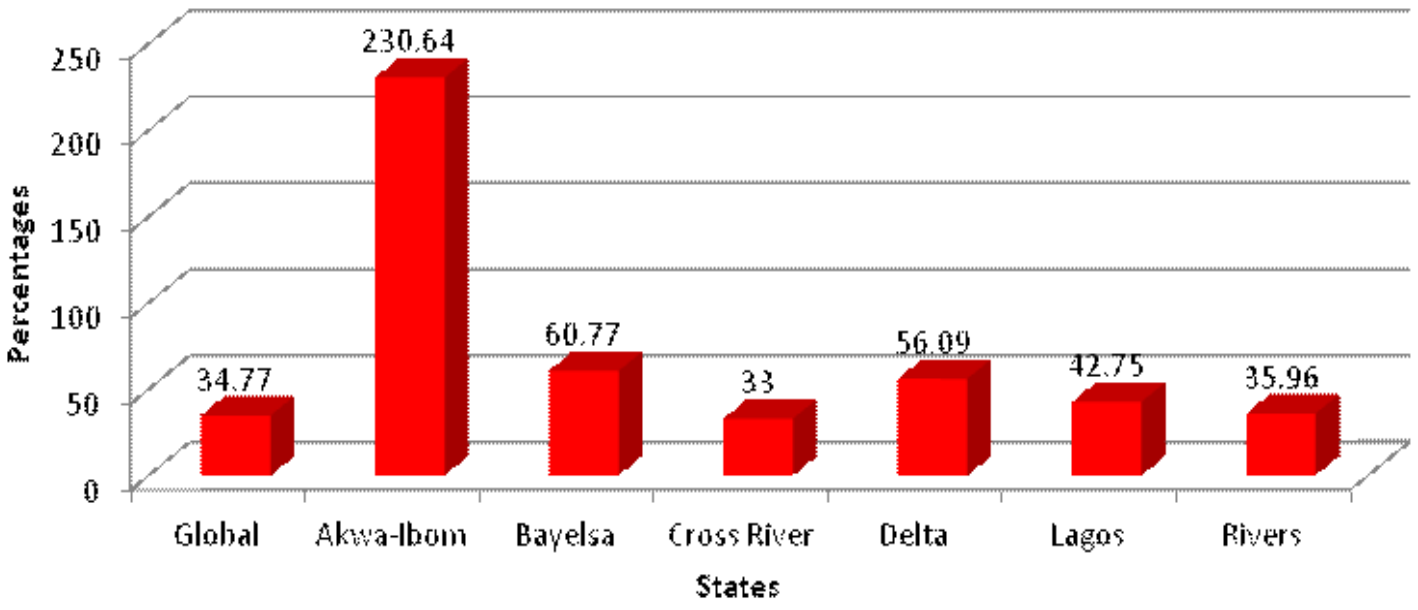
Though the East-West Coastal Road will cost the nation as much as $19.5billion, if it will improve the consition of over 30million Nigerians, it is well within the parameters of Pareto efficiency.



Road will tremendously open up Market access to the region. Involvement in trade(Supply-side) will grow by more than 15,000%

ECONOMIC STUDIES (CONTD.)

6.1.6 Estimated Appreciation of Land Value across States Due to Road (%)



KEY CHALLENGES AND SECURITY INCIDENCES

SECURITY INCIDENCES: KEY FACTS

Personnel Seizure	-	31Nos
Equipment Seizure	-	31Nos
Physical Attack	-	21Nos
Community Stoppage	-	43Nos
Physical Attack	-	21Nos
Boat Accident	-	3Nos
Stolen Boat	-	2Nos
Police Issues	-	3Nos
JTF Issues	-	1Nos
Loss of Lives	-	2Nos

KEY CHALLENGES:
KEY FACTS

Community Interference

Youth Disturbances

Accessibility Challenges (Terrain)

Security – Seizure of personnel, equipment and Physical Attacks

Inclement Weather Condition - Rain

Flood

Funds

KEY PROJECT JUSTIFICATION & BENEFITS

KEY PROJECT JUSTIFICATION & BENEFITS

The most credible justification for the East-West Coastal Road project is to open up the coastal area and provide a boost to socio-economic activities with its resultant benefits to the local communities and the nation as a whole. The road is so strategic that there is absolutely no doubt that it will play the expected role in promoting the development of the coastal region by seamlessly integrating the regional economy with the mainstream economy through opened trade and investment activities.

KEY PROJECT JUSTIFICATION & BENEFITS (CONTD.)

The implementation of the East-West Coastal Road will:

i. assist the individual coastal states to key-in their road network plan to the coastal road and thereby

ii. create more access and link centres of economic activity with their business connections, raw materials and markets

iii. enhance productivity and achieve accelerated poverty reduction.

KEY PROJECT JUSTIFICATION & BENEFITS (CONTD.)

From an economic view point, the project is viable and justified. The economic Net Present Value and the Internal Rates of Return showed positive results (with and without extreme constrictions on the model) and at discount rates of up to 25%. The ratio of benefits to cost at 25% discount rates were robust while the economic Net Present Value covered the Total Investment Cost by more than 1000 times on average for all conditions.

BENEFITS OF THE PROJECT

The planned 704km East-West Coastal Road of the Federal Government will immeasurably help in opening up the Niger Delta Region for development, unlock its economic potentials and assist in dousing the severity which encumber the movement of goods and enable the people to improve their living standards.

From the economic evaluation and other studies conducted, it is identified that:

- It will assist to give direct access to waterways that are currently not utilized and encourage the establishment and growth of maritime industries such as ocean terminals for deep anchorage, ship repair/maintenance and engineering facilities to handle large ocean going vessels, boat building facilities, passenger cruise terminals, fishing terminals etc.

BENEFITS OF THE PROJECT (CONTD.)

- The project will improve fishing activities in the coastal region by at least 27.5%. This is a welcome development because majority of the coastal people engage in fishing.
- It will boost trading activities within the region by 24.4% as it will aid movement of products and goods from point to point.
- Government internally generated revenue drive will be enhanced.

BENEFITS OF THE PROJECT (CONTD.)

- The project will curtail rural-urban drift because the rural people (fishermen, traders) will benefit most.
- It will open up opportunities to the unemployed (skilled & unskilled). Unemployment rate across the region will drop significantly on account of the road project and a sharp drop in youth militancy is therefore expected.
- It will aid investment in the coastal region and encourage the growth of local technology.

BENEFITS OF THE PROJECT (CONTD.)

- The proposed East-West Coastal Road will save time and energy hitherto wasted while travelling to the coastal areas.
- It will improve and intensify the exploitation of the natural resources of the Niger Delta- oil and gas, salt, sand for glass-making, timber etc.
- The proposed road will enhance the security of the region and nation at large.

BENEFITS OF THE PROJECT (CONTD.)

- The East-West Coastal Road will serve as the shortest route linking Lagos to the coastal areas of Ondo, Edo, Delta, Bayelsa, Rivers, Akwa Ibom and Cross River States and also connects the North-South vertical routes (Figure 2.1.2):

  Route 10 Lagos Sokoto

  Route 50 Warri Kaduna Zaria Kano Daura

  Route 70 Port Harcourt Makurdi Bauchi Kano/Maiduguri Road

  Route 90 Calabar Ikom Ogoja Jalingo Numan Maiduguri -

  which will be linked to the Trans-West African Highway (Lagos-Benin-Enugu-Abakaliki Ikom - Cameroon-Mombassa on the East African Coast).

- It will unlock the tourism potentials of the coastal region - ocean viewing, natural beaches, ecosanctuary etc.

FACILITIES ALONG THE CORRIDOR OF THE EAST-WEST COASTAL ROAD

The following are some of the many valued economic facilities along the East-West Coastal Road corridor: Tinapa Free Trade Zone in Calabar, Cross River State; the proposed Ibaka Seaport and Export Terminal in Akwa Ibom State; Bonny LNG and Export Terminal, the proposed Industrial Estate in Rivers State; the proposed Seaport in Agge, Peremabiri Rice Farm, Brass LNG, Brass Export Terminal, proposed Seaport in Forupa all in Bayelsa State; Koko Free Trade Zone in Delta State; Olokola Free Trade Zone and Olokola LNG in Ondo State; the proposed new Refinery and Lekki Free Trade Zone in Lagos State.

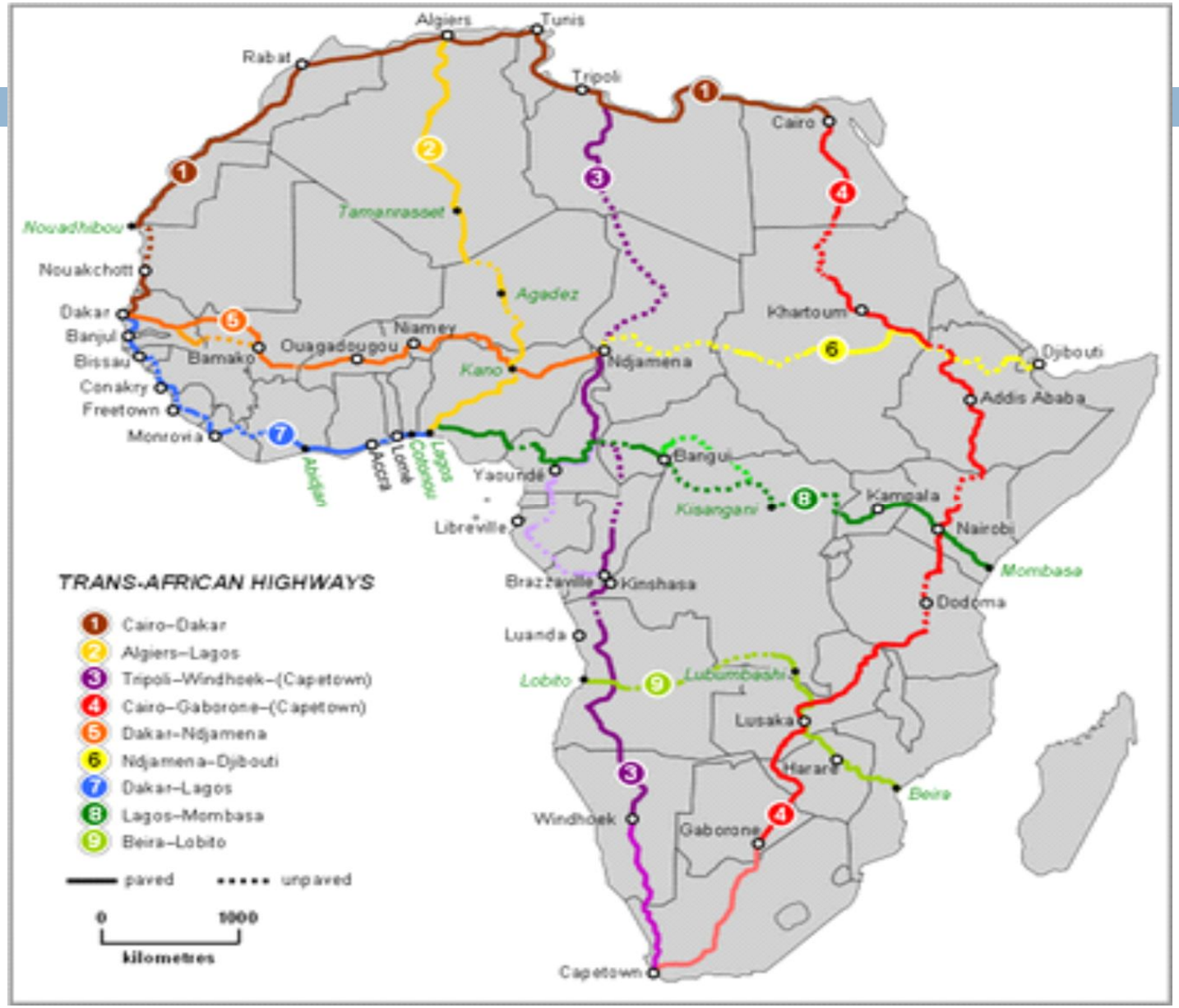
CONTINENTAL PERSPECTIVE OF THE EAST-WEST COASTAL ROAD

The East-West Coastal Road is the natural and authentic alignment of the Nigerian segment of the Trans-African Highway Network. By the way, the Trans-African Highway Network remains the only trans-continental highway network plan in Africa and one of Africa's best strategies for a guided regional infrastructural development program on the continent. The Trans-African Highway Network is being driven by the United Nations Economic Commission for Africa (UNECA), the African Development Bank (ADB), and the African Union in conjunction with Regional international communities. The aim is to promote trade and alleviate poverty in Africa through highway infrastructure development and the management of road-based trade corridors.

CONTINENTAL PERSPECTIVE OF THE EAST-WEST COASTAL ROAD (CONTD.)

The road is, by strategic design, the Nigerian perfect extension of the Trans-West African Coastal Highway 7 (TAH 7), linking Dakar-Banjul-Monrovia-Abidjan-Lome-Lagos. The eastern terminus is linked, through Ikom in Cross River State, to the Trans-African Highway 8 (TAH 8) which links Cameroon, Central Africa and finally terminates at Mombassa in Kenya.

TRANS-AFRICAN HIGHWAYS



CONTINENTAL PERSPECTIVE OF THE EAST-WEST COASTAL ROAD (CONTD.)

With the bountiful natural resources, huge industries and economic facilities (mentioned above) along the alignment, the East-West Coastal Road can deliberately be developed and managed as a sub-regional 'Trade Corridor' on the African Continent, through the employment of the concept of development corridors (DCs) and Spatial Development Initiatives (SDIs). The Niger Delta Development Commission could strategically promote and prioritize the densification of the corridor through the establishment of large scale economic sectoral investment that will promote trade and investment led economic growth. This will enlarge the corridor's catchment area and beneficiaries and deepen resource industries via cluster linkages which will enhance the region's economic competitiveness.

SECURITY ATTRIBUTE

The proposed East-West Coastal Road is situated along the coastline corridor of the Gulf of Guinea; which has become very notorious for its maritime insecurity and has become a global concern of late. This road will significantly address security operations on the Gulf of Guinea when constructed.

Maritime security is essential to maintaining the flow of revenues from oil & gas, which form the main stay of our economy. Maritime resources such as fish, aquaculture and intact ecosystems directly contribute to the livelihoods of many African nations.

PROJECT ALTERNATIVES: 'NO ACTION' OPTION

The development of the East-West Coastal Road is to open up the coastal region of Nigeria for industrialization, tourism, general development and connectivity with other regions of the country. If 'no action' option was chosen, from the economic and social standpoint of view, the following benefits will be foregone:

i. Connectivity to the coastal region

ii. Boost in trading activities and tourism

iii. Employment opportunities for local people in the coastal area

iv. Improvement in fishing.

The 'no action' option was not considered as a viable alternative.

PROJECT ALTERNATIVES: RECONSTRUCTION AND UPGRADING EXISTING EAST-WEST ROAD OPTION

The reconstruction and upgrading of the East-West Road to 3-Lane dual carriageway is essentially for traffic capacity improvement along the East-West Road and will not do more than what it has already achieved in terms of opening up the Niger Delta Region. The East-West road does not carter for the coastal communities that are largely isolated from the national road network and are as a result not opened up for rapid industrialization, tourism and general development.

PROJECT ALTERNATIVES: RECONSTRUCTION AND UPGRADING EXISTING EAST-WEST ROAD OPTION

Majority of the communities and settlements in the coastal communities are separated from each other by the rivers which run in North-South direction and so need East-West bridging to have effective communication between and among themselves on a daily basis.

Therefore, the Reconstruction and Upgrading of the existing East-West Road is no alternative to the proposed East-West Coastal Road.

PROJECT ALTERNATIVES: EAST-WEST RAILWAY

The proposed East-West Railway connects Benin City, Sapele, Warri, Patani, Yenagoa, Port Harcourt etc. The provision of this railroad is salutary and is therefore a welcome development as it will complement the East-West road especially in the transportation of heavy goods and people over long distances.

This route alignment is however outside the corridor of the East-West Coastal Road that provides the needed inter-regional and intra-regional connectivity and accessibility to the coastal region.

Therefore, the East-West Railway is no alternative to East-West Coastal Road.

PROJECT SEGMENTATION

KEY PROJECT JUSTIFICAION & BENEFITS

The most credible justification for the East-West Coastal Road project is to open up the coastal area and provide a boost to socio-economic activities with its resultant benefits to the local communities and the nation as a whole. The road is so strategic that there is absolutely no doubt that it will play the expected role in promoting the development of the coastal region by seamlessly integrating the regional economy with the mainstream economy through opened trade and investment activities.

PROJECT SEGMENTATION

For the purposes of tendering and possible phasing of the project, the project has been divided into ten (10) segments. Each segment constitutes a 'Stand alone contract in order to create ease and flexibility in procurement exercise.

SEGMENT	LOCATION	CHAINAGES	LENGTH (KM)
1	Calabar (Cross River) – Akwa Ibom States	Ch.0+000 – Ch.75+600	75.6
2	Akwa Ibom – Rivers States	Ch.75+600 - Ch151+200	75.6
3	Rivers State	Ch.150+570 – Ch.192+547 & Ch.198+453 - Ch.238+000	81.524
4	Rivers State	Ch. 192+547 – Ch.198+453	5.906
5	Rivers – Bayelsa States	Ch.238+000 – Ch.319+900	81.9
6	Bayelsa State	Ch. 319+900 – Ch.411+600	91.7
7	Bayelsa – Delta States	Ch.411+600 – Ch.467+235 & Ch.470+915 – Ch.502+485 & Ch.507+485 – Ch.534+100	113.62
8	Delta State	Ch.467+235 – Ch.470+915 Ch.502+485 – Ch.507+685	8.88
9	Delta – Ondo States	Ch.534+100 – Ch.618+800	84.7
10	Ondo, Ogun – Lagos States	Ch.618+800 – Ch703+951	85.151

KEY PROJECT JUSTIFICATION & BENEFITS

The most credible justification for the East-West Coastal Road project is to open up the coastal area and provide a boost to socio-economic activities with its resultant benefits to the local communities and the nation as a whole. The road is so strategic that there is absolutely no doubt that it will play the expected role in promoting the development of the coastal region by seamlessly integrating the regional economy with the mainstream economy through opened trade and investment activities.

KEY PROJECT JUSTIFICATION & BENEFITS

The most credible justification for the East-West Coastal Road project is to open up the coastal area and provide a boost to socio-economic activities with its resultant benefits to the local communities and the nation as a whole. The road is so strategic that there is absolutely no doubt that it will play the expected role in promoting the development of the coastal region by seamlessly integrating the regional economy with the mainstream economy through opened trade and investment activities.

COST ESTIMATES

COST ESTIMATES

It is emphasized that these cost estimates give only indication of the actual cost. The actual cost of the project will be known when subjected to competitive tender. The estimates are considered to be adequate for evaluation and comparison of alternatives; however when used for budgetary purposes the estimated cost must be used carefully because:

- No allowances have been included for the increasing rate of inflation
- The figures exclude import tariffs, port expansion augmentation tariffs and administrative charges.
- The estimates include allowance of 5% each for contingencies and variation of material and labour.

COST ESTIMATES (CONTD.)

BILL NO.	DESCRIPTION	TOTAL ($)
	MAIN	
1	SEGMENT 1	1,162,128,227.29
2	SEGMENT 2	1,140,569,432.13
3	SEGMENT 3	2,458,021,039.42
4	SEGMENT 4	2,442,520,666.67
5	SEGMENT 5	2,877,142,514.17
6	SEGMENT 6	1,769,319,115.99
7	SEGMENT 7	2,067,905,483.76
8	SEGMENT 8	2,307,235,333.33
9	SEGMENT 9	1,421,985,323.76
10	SEGMENT 10	963,374,020.42
	TOTAL	**18,610,201,156.95**
	SPURS	
3	UGHOTON	457,922,699.67
2	OFUNAMA	273,931,739.80
1	AROGBO	154,119,735.92
	TOTAL	**885,974,175.38**
	TOTAL COST OF PROJECT	**19,496,175,332.33**

FUNDING

FUNDING

The strategy for the delivery and sustenance of the East-West Coastal Road can be achieved through:

(a) Public-Private Partnership (PPP)

PPP as a viable alternative in infrastructure development is encouraged/forced by the World Bank, ADB, IMF etc. It is in fashion! They are doing it next door. Even Presidents like the idea.

(b) Concessionary Loans.

In the spirit of Pan-African Collaboration and global partnerships through physical integration, the United Nations Economic Commission for Africa (UNECA), the African Development Bank (ADB) and the African Union (AU) can be engaged for concessionary loans.

FUNDING (CONTD.)

(c) Government is urged to device some internal mechanisms that could further assist in raising substantial finance to fund the project. This could come in the form of "natural resources for infrastructure development exchange", deductions from Oil revenues (which are predominantly generated from the Coastal region), Communication Taxes, support from some otherwise idle but large funds, such as Pension Funds, etc.

Thinking 'outside the box' on infrastructure development in Nigeria, a National Infrastructure Equalization Fund (NIEF) has been proposed. This is a funding scheme to assist infrastructure Concessionaires in the country. The fund will be raised by way of national infrastructure dedicated micro levy scheme. Up to #1.7 trillion could be raised yearly with negligible financial burden on individuals.

THE ARTICLE OF FAITH
OF THE EAST-WEST COASTAL ROAD