For the Northern Corridor Transit
Transport Coordination Authority

NORTHERN CORRIDOR INFRASTRUCTURE MASTER PLAN:

FINAL REPORT
Executive Summary

Louis Berger

MAY 2011

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OBJECTIVES OF THE STUDY

The overall objective of the study is to develop a comprehensive infrastructure master plan for the Northern Corridor as a long term program for strategic development of the corridor's infrastructure.

More specifically the Northern Corridor Infrastructure Master Plan aims to:

1. define transport infrastructure development needs in the Northern Corridor area through 2030;
2. determine the requirements for missing links in order to cover the (Northern Corridor Transit Agreement (NCTA) member countries, including extending the Corridor to the Atlantic Ocean;
3. proposals to improve the efficiency of the facilities along the Corridor;
4. Advise on the appropriate institutional framework to coordinate and manage the Northern Corridor;
5. Coordinate with other regional organizations to establish an integrated regional network.

THE STUDY AREA

The study area covers the five Northern Corridor Transit Agreement member countries: Kenya, Uganda, Rwanda, Burundi and the Democratic Republic of Congo (DRC), as well as the whole of Ethiopia, Northern Tanzania and the states which make the Southern region of Sudan.
The study area is as shown on the map below.

Study Area

In order to also consider the corridors which complement, or compete with the Northern Corridor, the ports of Dar es Salaam and Pointe Noire are also reviewed. The Lamu Corridor and the connection between the Northern Corridor and the port of Banana on the DRC Atlantic coast are also considered in the study.

PRESENT TRANSPORT DEMAND AND FORECASTS

The analysis of all available statistical data about trade and traffic using the Northern Corridor, and the traffic surveys and interviews carried out by the Consultant, allowed the estimation of the transport flows in 2007, the last year for which data are available for the whole study area, A total flow of 28.116 million metric tons, including 19 million metric tons of transit traffic and 9 million metric tons of Kenyan domestic traffic is estimated for that year. Road freight accounts for 72% of this traffic, pipeline for 13%, and railways for 6%[1].

The importance of the Northern Corridor for the NCTA member states varies with their location as shown in the table below which shows that except Uganda, all other NCTA member states rather use the Central Corridor and the port of Dar es Salaam for their transit traffic.

Share of NCTA member states 2009 transit traffic using the Northern Corridor

	Uganda	Rwanda	Eastern DRC	Burundi
Imports	99%	43%	32%	6%
Exports	98%	35%	18%	2%

Three scenarios were defined to forecast transport demand on the Northern Corridor at the 2015 and 2030 horizons as follows:

1. A **Basic scenario** which extrapolates the present trends of the Northern Corridor study area in terms of production, consumption and trade. It is based upon the analysis of the present traffic, on a detailed Surplus-Deficit analysis for 13 major commodity groups and uses the following future Kenya GDP growth rates estimates: 3.7% between 2007 and 2010 which takes into account the global economic crisis, 5.2% between 2010 and 2015 and 4.7% beyond 2015.

2. A **Strengthened scenario** takes into account the traffic induced by the progressive improvement of the Corridor's infrastructure including the economic development it will generate. It assumes that this induced traffic will be 10% of the present traffic in most of the region, and 25% in the regions where unrest prevailed until recently (Eastern DRC and South Sudan).

3. A **Whole transit traffic scenario** in which it is assumed that the entirety of the transit traffic of the NCTA member countries goes through the port of Mombasa. This scenario aims to test what would happen in case the Central Corridor cannot carry for any reason the foreign trade of these countries, which would then divert to Mombasa.

In the "Whole transit traffic scenario" which is used to identify additional infrastructure needs, the total traffic between the different zones will reach 42.4 million metric tons in 2015, and 87.5 million metric tons in 2030. The growth in the total flow of traffic is 51% from 2007 to 2015, and 211% from 2007 to 2030.

[1] The remaining 9% concern the traffic between the port and the city of Mombasa.

PRESENT TRANSPORT SUPPLY

1. Roads

The main Northern Corridor arterial road is 2,038 km long. It links the four capitals of the original North Corridor Transit Agreement (NCTA) signatories (Burundi, Rwanda, Uganda and Kenya) and terminates at the port of Mombasa on the Indian Ocean. Seven major connector roads representing 5,017 additional km are listed in this agreement as being part of the Corridor network.

Based upon a road condition survey carried out by the NCIMP Consultant in early 2010, the following observations could be made on the Northern Corridor main road and connectors:

a. Only 9.72% of the total corridor road length is in bad or very bad shape, requiring urgent rehabilitation/reconstruction works, and none of those sections are on the main arterial road.

b. The majority of the road sections are in good or very good condition (48.28 %, or 65.54% taking into account the sections presently under construction).

c. Of the seven connector roads, there is still a considerable length of gravel roads (24.19% of the total or 901 km), but most of those roads are within one country, the DRC (about 780 km).

d. There are presently 1,023.4 km of roads (17.25%) under rehabilitation or reconstruction which represents a considerable effort from the member countries. It is worth noting that Uganda alone includes almost 40% of the total length of road under construction.

The width of the main Northern Corridor road is distributed as follows:

- dual carriageway (2 x 7m): 104 km (5.1%)
- 7 m single carriageway: 1,186 km (58.2%)
- 6.5 m single carriageway: 393 km (19.3%)
- 6 m single carriageway: 355 km (17.4%)

The narrower carriageway widths of 6.5 and 6.0 m are generally associated with less heavily trafficked sections of road. However, it is advisable that a uniform standard of 7 m plus 2 m shoulders be adopted throughout. Carriageways of less than 7 m are clearly sub-standard for an international trunk road.

The main corridor arterial road has an estimated capacity of about 40 thousand Private Car Units (PCU) per day, or about 19 thousand vehicles per day. Some sections of this road might reach capacity before 2030 especially in areas where steep grades reduce the capacity. Areas near cities will need to be four laned well before 2030.

2. Railways

1) Kenya and Uganda

The total length of Kenya railway network is 2,210 km. It runs from Mombasa through Nairobi, Nakuru, to the Uganda border at Malaba, a distance of some 1,083 km. A branch line of 217 km is going from Nakuru to Kisumu, where it links with a ferry service on the Lake Victoria. There is a set of additional branch lines, 618 km long in total, to Magadi, Taveta (Tanzania border), Nanyuki, Kitale, Butere, Nyahururu and Solai.

The main line of the Uganda rail network runs from the Kenyan border to Kampala, a distance of 251 km with a 9 km line linking Kampala to the ferry terminals on Lake Victoria at Port Bell. The Uganda railway also includes inactive lines, the two main ones being: the 507 km Tororo-Pakwach line and the 333 km Kampala-Kasese line. The total length of the Uganda Railway network is 1,241 km.

The operation of the Northern Corridor main railway network has been privatized through a concession agreement in 2006 with the Rift Valley Railways (RVR). The concession's duration is 25 years. The results of this arrangement were disappointing because the concessionaire did not invest in infrastructure and rolling stock as specified in the agreement.

Freight traffic on the Kenya and Uganda's railways in 2008 was only 1.65 million metric tons. Nearly 60% of the total tonnage has Mombasa as its origin. Traffic has dramatically dropped over the past twenty years. While the traffic of Kenya Railways only was 4.5 million in the early 1980s, the current Northern Corridor rail traffic represents one third of that tonnage now. At that time, the railway market share of freight transport exceeded 40%. Now, this share is about 6%.

In its present condition, the capacity of the Northern Corridor main railways could be estimated at less than 5 million tons a year. With significant infrastructure investments it could be increased to 15 millions.

2) Democratic Republic of Congo

The 5,096 km of the DRC Railway network, is operated by three different public owned companies. The largest, SNCC ("Société Nationale des Chemins de Fer Congolais"), operates 3,641 km in South-Eastern of Congo, of which 858 km are electrified. The large part of the SNCC network is Cape gauge, only the small section between Kisangani and Ubundu, is meter gauge. However, only 20% of the SNCC network is commercially operable today.

SNCC carried about 1 million tons of freight in 2006. The SNCC traffic dropped from 3 billion ton-kms in 1974, to 189 million in 2009. Half of the tonnage of this traffic is mining products. The SNCC passenger's traffic also decreased, from 1.0 million in 1988, to 0.2 million in 2008.

In early 1980's, the rail freight traffic between Kinshasa and Matadi, was about 1.3 million metric tons a year. Now, ONATRA barely transports 150,000 tons a year. The number of passengers in 2007 for Inter-City services was 42,000, and for Commuter services, 1.5 million, while, in 1998, they were respectively 300,000 and 2 million.

3. Sea ports

1) In Kenya

The port of Mombasa faces the Indian Ocean. It is the largest sea port of Kenya and the entry point to the Northern Corridor. It serves landlocked countries (Burundi, Uganda, DR Congo, Rwanda, Sudan), as well as regions of neighboring countries which have their own sea port (Somalia, Tanzania).

The port traffic growth rates since 2002 have been very high: 8.8% per year on average for the traffic as whole, with a sharper growth of containerization (14% of growth for imports), as well as significant development of dry bulk traffic (23% of growth for imports). Growth of export traffic has been much lower (0.4%). The Consultant estimates the traffic for year 2010 as 17.05 Million tons for imports and 2.63 Million tons for exports, a total for year 2010 of 19.68 Million tons. This would be a 3.8% increase from last year traffic. The total transit traffic estimated for 2010 in the Northern Corridor study amounts to 5.3 Million tons which represents 27% of the traffic going through to the port.

The transit traffic is made up of imports for more than 90%. Uganda is by far the first destination, accounting for more than three quarters of the total transit traffic. The other countries (Tanzania, Rwanda, Sudan, and DR Congo) lag far behind, with shares ranging between 5 and 6% as shown below.

Transit	2008	2009	2010
Uganda	76%	80%	79%
Tanzania	5%	5%	4%
Burundi	1%	0%	1%
Rwanda	6%	5%	5%
Sudan	5%	3%	5%
DR Congo	6%	6%	6%
Somalia	1%	0%	0%
Others	0%	0%	0%
Total	**100%**	**100%**	**100%**

The Consultant estimated that the port of Mombasa traffic will increase to 45.0 million tons in 2030 (compared to the 56 million tons indicated in the Port Master Plan based upon more optimistic economic growth assumptions). The port estimated present capacity is between 15 and 26 million tons a year, depending upon the method and productivity assumptions used. As far as containers are concerned, the capacity is estimated between 4 and 7 million tons a year, compared with a projected 2030 container traffic of 22 million tons.

Even if productivity is improved, the port capacity will remain less than 26 million tons. The Port Master Plan recommends increasing the number of berths from 20 to 36 to meet the projected demand. The largest number of new berths will be associated with the growth of container traffic with six additional berths required. The container terminal planned for in Kipevu West will provide only four additional new berths, which will be insufficient.

The port of Mombasa faces another constraint: the depth and width of its access channel which, even with significant dredging, will limit the size of the vessels entering into the port.

2) <u>In DRC</u>

Currently, DRC maritime trade goes mainly through the port of Matadi, with a small portion going through Boma. The project to build a port in Banana is fairly old and has become more attractive because of the resuming of the bridge project between Brazzaville and Kinshasa. This project met fierce opposition in the Bas Congo region as it would divert the port traffic from Matadi to Pointe Noire.

The potential hinterland of the port of Banana is not limited to DRC. With its location at the entrance of the Northern Corridor on the Atlantic Ocean side, the port can take part in the exchanges of all the countries located along the corridor or depending on it. These include the members of CEMAC, ECOWAS, SADC, and ECCAS regional organizations. Inter-ocean traffic between the Indian and the Atlantic oceans may also be considered, the same way as they may from the other end of the Corridor at Mombasa. However, it should be kept in mind that sea transport is much more economical than land transport. The Northern Corridor extended up to Banana will have to present significant benefits in terms of modern infrastructures, effective procedures, and competitive costs to be able to overcome competition by direct sea services. The land connection through the corridor will also be penalized by the crossing of several borders, the costly changes in transport mode and the total transportation time.

The present scope of the Banana port project includes five berths (one for bulk cargoes, one for containers, and three for break-bulk cargoes). Construction works are expected to begin in early 2011. The cost of the project is currently estimated to be between US$ 460 and 540 million. The project will take five years to complete and will bring the port capacity to 8.5 million tons a year.

The construction of the port must go hand in hand with the setting up of high-performance land connections with the port hinterland (Lower Congo, Kinshasa, DRC, and Northern Corridor). It will be especially necessary to:

- Improve the Matadi road crossing;
- Build a railway between Matadi and Banana going through the tunnel which was already built;
- Pave the road section between Boma and Banana.

4. Inland ports and waterways

Historically, inland waterways played an important role in the Northern Corridor study area. Due to a number of reasons, this mode of transport has been in decline for a number of years. Invigorating this mode could have significant beneficial impacts:

- reduce the dominance of road transport, and the needs for additional road investments by providing a cost effective and viable alternative especially around Lake Victoria (Kenya, Uganda, and Tanzania). To a much lesser degree, improvement of service on Lake Tanganyika (DRC, Burundi, Tanzania and Zambia) would also have some impact on the Northern Corridor;
- potential cost savings in the transport of goods and passengers around Lake Vitoria.

Off-setting these advantages are a number of factors that make it difficult to achieve them; they are:

- requirement for relatively large flows of traffic to off-set high fixed costs;
- years of disinvestment in port facilities and equipment;
- lack of fleet of vessels able to transport goods and passengers;
- lack of support facilities such a shipyards and repair facilities for the vessels;
- lack of trained personnel to operate the vessels and equipment;
- lack of standardized regulations between countries;
- weak institutions and non-physical obstacles or “hassles”;
- introduction of another modal transfer will increase total transport costs.

Lake Tanganyika presents an opportunity to connect four countries, and the transport distances are long enough to make inland waterways competitive with road. Other than Bujumbura in Burundi much of the zone of influence of this lake lies however outside the Northern Corridor, and the lake is more directly linked to the Central Corridor.

The Congo River and its tributaries are long and the opportunity to develop them abound. However, traffic levels need to be sufficiently high to justify large investments in inland waterways. Presently, they are low. ONATRA provides service to Kisangani only once a month. Investments should be tied to increasing traffic levels even if such improvements to navigation and safety may have the highest short term benefits. Several donors support the Governement of DRC and CISCO in their initiatives to develop transport on this river.

5. Pipelines

The existing pipeline from Mombasa is for refined products. It is operated by the Kenya Pipeline Company Ltd since its commissioning in 1978. It currently consists of a 14" diameter 450 km long pipeline. There is also a 446 km Western Pipeline Extension with a combination of 8" and 6" pipelines and a flow rate of 220 m^3 per hour, running from Nairobi - Sinendet - Eldoret and

Sinendet and Kisumu, commissioned in 1994. The present network carries about 4 million m^3 a year, or equivalent to 3.2 million tons of refined petroleum products. Mombasa and Nairobi section carries about 60% of this total volume.

A pipeline project between Eldoret and Kampala was planned as far back as 2004, but it has been postponed several times. In 2006 a 20-year concession agreement was signed to finance and build the 320 km oil pipeline from Eldoret to Kampala, but no works had started by the end of 2009. The need for this connection is now being questioned because of the wave of recent oil discoveries in the Lake Albert region where a total reserve of two billion barrels has been proven, of which about 40% could be extracted. Crude oil production is expected to start in late 2011 – early 2012 at a rate of 10 – 15,000 barrels a day to reach a full production rate of 250,000 barrels a day by 2015.

A refinery will be built in Hoima, Uganda, with an initial capacity of 60,000 barrels a day, eventually increasing to 120,000. It is expected this refinery will begin production in 2014-15. This capacity will leave up to 150,000 barrels a day of crude oil to be exported. This crude oil is "waxy", which means it solidifies below a temperature of 40°C. A heated pipeline would be required to export it, but it is very costly to operate and therefore unlikely to be economical for such volumes. The oil companies considers the most likely option to export it would be rail through the Pakwach to Tororo line and down to Mombasa. However, the Government of Uganda is reluctant to export crude oil and may insist to set production to fit actual demand.

Depending upon the final pattern which will be agreed upon for the distribution of the refined products coming out of this new refinery, it is possible to consider building a new pipeline from Uganda to supply Rwanda, Burundi and the Eastern DRC region with refined products. This project should be the subject of a feasibility study by the company which will develop the refinery, because its viability will depend upon the actual location of the depots to be supplied and of the volumes to be transported.

Southern Sudan currently exports its oil through a 1,600-kilometre pipeline connecting its oilfields to the Red Sea at Port Sudan. Southern Sudan does not wish to continue its dependence on a single pipeline routed to Port Sudan. An oil refinery project with a capacity to process 120,000 barrels of oil per day in Lamu is under consideration, along with a 1,400 km Lamu-to-Juba pipeline. However, much of the oil in South Sudan has high wax content, and so a refinery at the source of the oil may be needed.

International media have recently announced that the Japanese group Toyota-Tsusho Africa with the support of the Japan Bank for International Cooperation (JBIC) has decided to invest 1.5 billion US dollars to build the pipeline for crude oil exports from South Sudan, The pipeline would have a capacity of 450,000 bpd. A second pipeline may also be constructed from the Lamu refinery to Addis Ababa to deliver refined oil products to Ethiopia. A branch pipeline is also being considered to join Lamu to the existing Mombasa-Kampala pipeline to transport oil products to Uganda. If this project materializes, the interest of the projected Lamu – Juba new rail line will be significantly reduced.

6. Intermodal transport and dry ports

Throughout the Northern Corridor, the lack of intermodal coordination has worked to the competitive advantage of road transport since once a shipment is on a truck, the goods can be delivered to final destination. As a result, transport by rail and inland waterways has declined since both modes depend upon intermodal operations and require a high level of coordination. In addition, large investments in infrastructure and equipment, other than trucks, are needed for both these modes.

Considerable opportunities exist in rail transport to extend container operations. This requires that the rail operator provides competitive quality of service and costs to what road transport offers. In theory, container transport by a combination of rail and road (for the first or last 100 km of the journey) is the most cost effective for more than 500 km long haul, if all the systems are in place. There is definitely an excellent opportunity for a rail shuttle using block trains between Mombasa, or Lamu at a later stage, and Nairobi, Eldoret and Kisumu existing ICD's. The later may be linked to a similar service on Lake Victoria to Port Bell in Uganda.

Dry ports can act as multi-modal and logistics centers and not merely as storage areas for containers as they clear customs. They should complement investments made in other modes of transport – seaports, river and lake ports, roads and railways. Kenya has several of them, but they are not generally well utilized. Dry ports assist in the distribution of goods by handling large volumes of traffic, in facilitating multi-modal movements of goods, and in the provision of a variety of logistic services. All these activities aim to reduce costs and to improve quality of services.

7. Border crossings and non-tariff barriers

The main objective of the Northern Corridor Transit Agreement is to expedite the movement of goods in international trade (imports and exports) and between countries and in the process, increase economic integration and synergy for the social and economic wellbeing of their citizens.

How successful has the Agreement been in achieving its objective? In the case of imports, growth has been quite impressive; in the case of exports, much less so. Demand for imports is relatively inelastic and the customer will "pay any price" to get them. On the other hand, exports from the region are quite price sensitive since they are generally semi or unprocessed commodities that compete in international markets. Transport and other "export" costs need to be as low as possible to sell large quantities of these goods to beat out the competition.

While the cost of transport can be addressed by improvements to infrastructure and to other aspects of the transport systems specified elsewhere in this report, border crossing regime can have a serious impact on it. The border crossings are means of capturing revenue for the Northern Corridor governments by the control of goods entering and exiting their territory. Revenue is mainly collected from imports, but also on exports in some cases.

Border crossings give inconsistent performance and are bottlenecks in the transport corridor as whole. There are 41 within the study area. Complicating the matter is that some border crossings have a reputation of being more rigorous in processing the paperwork. In this case, truck drivers might seek out one that is less vigorous in applying regulations so the trip route appears to leave the more direct itinerary.

Border crossings require proper infrastructure. The queuing of vehicles as they await clearance requires considerable space that includes:

1. paved parking area should be available for them, especially those ones in which the paper work is not properly completed;
2. additional lanes are needed to handle the queuing vehicles as the pass through the border.

JICA is providing the regional governments with technical assistance in assessing the customs regime and improving the operation and management of border crossings so that regional norms are more closely aligned to international best practices. This effort is recommending One-Stop Border Posts (OSBP) as a means of improving transit times. It requires changes in the legal frameworks and operations, and that customs officials from both countries work together in processing the paper work in a single facility. Emphasis is to accommodate road

transport, but rail transit traffic procedures have to be part of this process. The EAC is planning to implement between 2010 and 2015, a customs area. Having more effective and transparent procedures will facilitate the transition to a free trade area.
The utilization of ICD's for customs clearance may be part of the solution to border crossing problems. If proper rail services are organized as suggested above, customs clearance may be done at once by the concerned countries at the level of these ICD's.

Between Mombasa and the Uganda border there are seven weigh stations to control vehicle loads. In Uganda, there are three. To transit between Mombasa and Rwanda, a truck must stop at 10 weigh stations. This high number seems excessive with several stations located quite close to each other. So many are probably non-productive in terms of controlling overloading.

According to one study[2], whose main purpose was to show the impact of Non-Tariff Barriers on the high cost of transporting goods to and from Rwanda via the Northern Corridor, weigh stations appeared to be the main source of unofficial payments and charges, which are referred to in that study as "bribes". The amounts collected are nearly 25% of the transport cost ($4,300).

8. Summary

The above analysis of transport supply showed that the main infrastructure issues in the Northern Corridor area were related to the lack of space and other physical constraints to extend the port of Mombasa facilities, and to the poor and still deteriorating level of service of the railways linking the port of Mombasa and Kampala. These issues were identified by the Government of Kenya and Uganda for some time and decisions were made to :

- Develop a new port in Lamu, about 300 km north of Mombasa; and
- Build a standard gauge railway to replace the existing one.

Feasibility studies were commissioned for these two major projects at about the same time as the present master plan study and were unfortunately not completed at the time of finalizing this report. Since there was no reason to do as part of this master plan study a pre-feasibility study which would have been superseded shortly after its completion, the Consultant conservatively defined the way these two projects could be implemented taking into account the other existing infrastructures and transport systems, as well as the time needed to implement these two very large and costly projects.

The recommended master plan therefore includes a plan of actions and investments until year 2030, with the option of having one of the above rail and port projects beginning operation sometime after 2020. These actions were carefully selected to avoid unnecessary investments while making all the ones which are necessary to ensure the fluidity of fast growing traffic flows on the Northern Corridor from now until 2030.

NORTHERN CORRIDOR INFRASTRUCTURE MASTER PLAN

The content of the Northern Corridor infrastructure master plan is described below. It includes 38 projects and actions which are the subject of detailed project sheets.

1. Roads

Road transport is the dominant mode of transport in the Northern Corridor. Due to the improved efficiency of this mode, it has seen rapid growth of traffic and has resulted in the congestion of some sections along the Northern Corridor main arterial or trunk road. Eleven major road projects are recommended for the master plan, seven of which involving improvements the main

[2] *Assessment of Non-Tariff Barriers (NTB) along the Northern and Central Corridors*, 2008, Private Sector Federation, Rwanda

arterial corridor road. All seven projects address capacity issues that are likely to decrease its efficiency and stall regional economic integration, they are:

1. Capacity expansion of the access road to the port of Mombasa. The first 10 kilometers of the main arterial road is highly congested and infringes on the circulation of urban traffic of the city of Mombasa.
2. The Eldoret Bypass project the length of which is 30 kilometers, aims at providing speedy access around its urban center. Presently, as the road traverses the city, it is quite congested and it can take several hours to travel 30 or more kilometers.
3. Rehabilitation and widening the Northern Corridor arterial road in Rwanda and Burundi over 334 kilometers will standardize the cross section of the road throughout the corridor to a 7 m width and will improve operating speeds and road safety.
4. Upgrading of Kigali road crossing by dualizing the entrance road over a length of 11 km will resolve the congestion problems which prevail at this level.
5. A multi-year program to construct climbing lanes between Mombasa and Malaba will improve road transport efficiency by lowering vehicle operating costs, reducing travel times for lighter vehicles and improving safety. An initial assessment indicates that 170 kilometers will need climbing lanes over a 15 years period.
6. Due to the ever increasing growth of traffic, sections of the Northern Corridor main arterial road will need increased capacity by the provision of two lanes in both directions:
    - Dualization of the Nairobi to Nakuru section (148 kilometers) by 2020. This project needs to be coordinated with the climbing lane program.
    - Dualization of the Jinja to Kampala section (118 kilometers) by 2017.

In addition, an important and complementary project that is on-going is the construction of the bypass around Nairobi.

All the above capacity improvement projects which are recommended for implementation beyond 2020 will have to be reviewed when the railway improvement program will be completed because this program may trigger a radical change in the modal split which may eliminate the need for some of the road capacity increase projects.

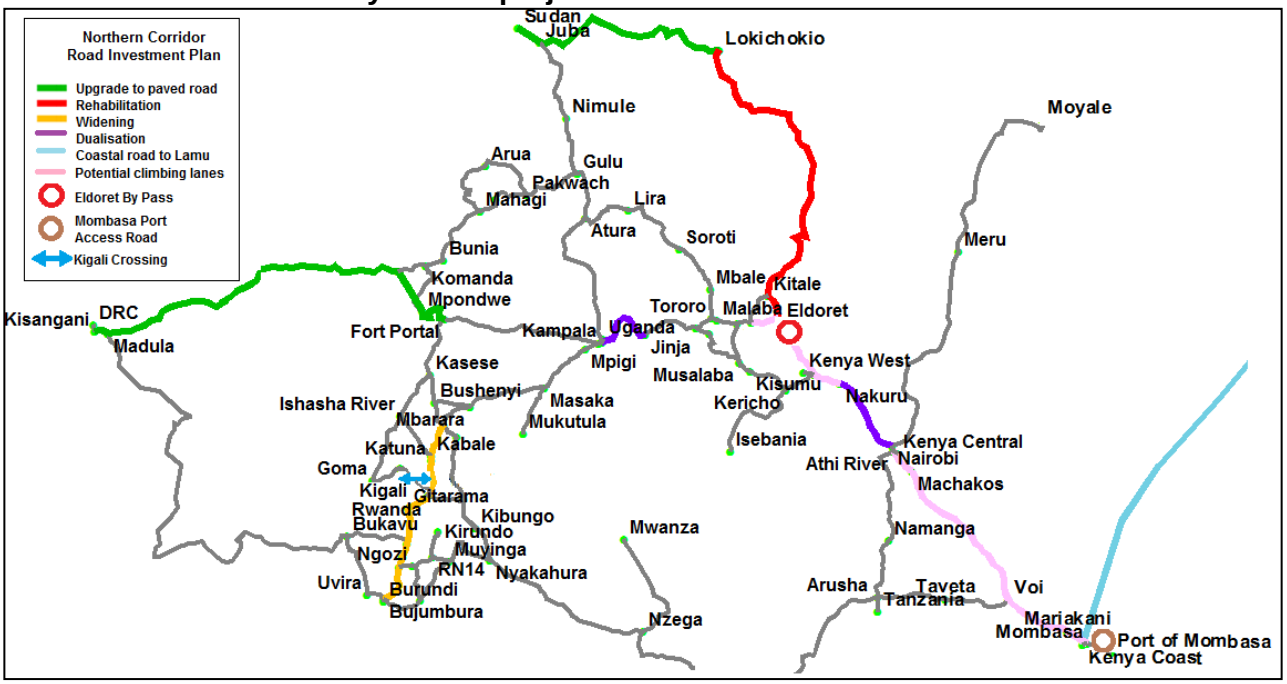
To the above are added two connector road projects:

1. The upgrading and paving the Kasindi to Kisangani road (595 kilometers) in the DRC which will improve the connectivity between this country and all the other members of the NCTA.
2. Connecting South Sudan to the Northern Corridor has taken on a priority and this is being done through on-going projects linking Juba to Nimule and on to Kampala. An alternative road connection to the Northern Corridor is through Kenya with two components:
    - Upgrading and paving the Juba to Nadapal (Kenya border) road for 342 kilometers.
    - Rehabilitating the Eldoret to Lokichogio road to the South Sudan (Nadapal) - Kenya border for 600 kilometers.

As an 11th project, a feasibility study is proposed for the section of the EAC promoted port corridor road between Mombasa and Lamu along a potential, and possibly environmentally sensitive, new alignment.

All these road projects are shown on the map here-after.

Summary of road projects recommended for the Master Plan



2. Railways

The success of the road transport is contrasted by the continued decline in rail transport. The regional decision makers believe that this historic trend needs to stop and to reverse itself so that rail can carry a larger percentage of the Northern Corridor traffic in the future. The NCIMP Consultant agrees with this sentiment which is quite in line with present transport policies which worldwide, tend to encourage the development of non-road modes of transport in order to save on energy and increase environmental sustainability.

Two strategies that will allow this change to happen are in play:

1. Privatization of the operation of the Mombasa to Kampala mainline and branch line between Nakuru and Kisumu by the Governments of Kenya and Uganda and the concessionaire, Rift Valley Railways (RVR), and
2. Conversion of the existing railway from a meter gauge network to a standard gauge along an improved new alignment which would increase the capacity and performance of the railway system and allow it to compete with road transport along this corridor.

Privatization took place in 2006 and has not been considered successful because of the financial and technical weaknesses of RVR. However, the ownership of RVR was recently restructured and RVR agreed to make critical investments in the rail network and is now in the process of implementing a Turnaround Plan.

Off-setting the less than satisfactory results from privatization, the Governments of Kenya and Uganda have undertaken a feasibility study to develop a standard gauge railway with high geometric standards between Mombasa and Kampala. The results of this study are not available at the time of completion of this report, so that the Infrastructure Master Plan cannot reflect its recommendations. If the results are positive, there are a number of issues that will have to be resolved. Among them are:

1. What to do with the meter gauge railway and with its private operator, RVR ?
2. Where will the governments find the funding needed to implement this project which could cost in the order of magnitude of US$ 4.5 billion?
3. If only a portion of the funding is found, what is a realistic completion and transition schedule?

The Infrastructure Master Plan has focused its attention on the existing meter gauge railway network for two reasons:

1. Uncertainty regarding the standard gauge rail project as indicated above;
2. Even if the standard gauge project is implemented in part or eventually completely, the meter gauge railway will need to operate at least until the new railway becomes fully operational which is unlikely to happen before 2020.

If the meter gauge line is to remain in operation for some time, it will need to be brought to a condition of a state of good repair. This will require rehabilitating and even upgrading lengthy sections of the existing mainline track and structures over a period of years to allow the operation of a single train from Mombasa to Kampala. The cost of this program is estimated to be in the order of US$ 788 million.

Likewise, rolling stock and locomotives inherited by RVR will need to be rehabilitated and new ones acquired. To facilitate this process of revitalizing its rolling stock, RVR should allow larger shippers to purchase equipment that best serves their needs, and in return, it would provide them with preferential services at lower costs.

Presently, rail traffic has to transit through downtown Nairobi. Similar to the Nairobi road bypass for the Northern Corridor arterial road which is now being constructed, the railway should also bypass the downtown area of Nairobi. The Nairobi Railway Bypass project is under study by Kenya Railways.

Because the condition of the rail network has deteriorated and traffic has declined, two branch lines in Uganda were closed in the late nineteen nineties. Feasibility studies are underway to reopen them. They are :

- **Tororo to Packwach line:** The feasibility study for the reopening of this line was recently completed. Its potential traffic, over 90 percent, is dependent upon the shipment of the newly discovered waxy crude oil from the Lake Albert region. The study found that upgrading the existing meter gauge line was most cost effective. This feasibility study only looked at shipment of this product as far as Tororo, but the entire meter gauge line to Mombasa would actually have to be improved. To the knowledge of the NCIMP Consultant, the alternative of a heated pipeline has not been evaluated.
- **Kampala to Kasese line:** The feasibility study of this line is being prepared. This line through a short branch line connects to a cement plant and brings the railway network close to both the Rwanda and DRC borders.

Besides these two projects under review, there are a number of longer term railway projects that would extend the railway network into neighboring countries and depend upon the outcome and implementation of all the above projects. They include:

- Railway extension from Pakwach to Kisangani (1,067 kilometers) which goes through some environmentally sensitive areas.
- Railway extension from Kasese to Kisangani (about 1,200 km).

  Either one of these two projects could be implemented and will depend upon which of the railheads, Pakwach or Kasese, is operational and on a feasibility study to be carried out to estimate the traffic potential.

- Railway extension from Gulu (station on the Tororo to Pakwach line) to Juba for a distance of 261 kilometers. This appears to be the more cost effective alignment to Juba.
- New standard gauge railway line from Juba to Lamu via Lokichokio (1,600 kilometers). Presently the traffic levels appear to be too low, especially if a pipeline is built to handle oil products, but this project is part of the on-going Lamu Corridor Feasibility study.

3. Seaports

The principal seaport serving the Northern Corridor is the **port of Mombasa**. As the port is configured, it will run out of space before 2030 and new facilities need to be built to accommodate the rapid growth of foreign trade through the Northern Corridor. The growth of seaborne traffic has been most rapid in containers. To accommodate future growth, the first phase of the Kipevu West container terminal with two berths is planned to be operational by 2015. It is in an advanced stage of preparation, feasibility study and designs are completed and the funding assured. When fully developed, this facility will have five berths and be able to handle up to 1.2 million containers per year. The next two phases of the project are planned through 2025/27. Completion will depend on the growth of traffic.

Of concern is the ability to have sufficient back up space to stack and store the containers, this problem has been addressed by building an offsite Inland Container Terminal (ICT). Access to this new container terminal is identified as a multimodal project since it is planned to accommodate both rail and roadway traffic and provide better access to the ICTs.

Furthermore, two new ports are being considered for the Northern Corridor: the port of Banana in DRC and the port of Lamu in Kenya.

The **port of Banana** is located close to the mouth of the Congo River on the Atlantic Ocean. The feasibility study for its development is completed and envisions that this port will serve as the principal port for the DRC ocean going foreign trade and as a consequence, it will be the Northern Corridor anchor point on the Atlantic Ocean.

Before the port and its land access are completed, it has been decided to set a floating dock in Banana. Its function will be to assist in transferring cargoes from large ocean going ships to barges which could be unloaded/loaded at the Matadi or Boma existing facilities. This way of doing will not require the improvement of the port land access before the completion of the construction works.

The **port of Lamu** which is subject of an on-going feasibility study is located north of Mombasa along the Kenyan coastline. As indicated above there is concern that the port of Mombasa is running out of space to expand and the access channel to the harbor is seen as a long term constraint to serving larger vessels. The port of Lamu is a green field project and would be able to overcome the perceived short comings of the port of Mombasa. The port of Lamu will also serve as a development pole for the underdeveloped north eastern region of Kenya and as an anchor point for a second corridor (the Lamu Corridor) serving South Sudan and Ethiopia. In this respect, an oil terminal is planned in the near future. It will handle exports of crude oil from South Sudan through a pipeline for which funding is already available. This project should be built and operated by the private sector.

Developing the port of Lamu is costly, it should therefore be done in close collaboration with the implementation of projects at Mombasa in order to avoid overbuilding port capacity in Kenya.

4. Inland Waterways

Like railways, this mode of transport has seen a decline in traffic and is now underutilized. The Infrastructure Master Plan recommends revitalizing this mode of transport and provides the opportunity to have the private sector play a relatively large role in its renewal.

Lake Victoria is located at the convergence of the Central and Northern Corridors and could play an important role in the development of the region. The revitalization of transport on Lake Victoria should begin with a thorough understanding of the opportunities available and the options to develop them. Operation of transport services should be in the hands of the private

sector. Constraints to international shipments should be removed and introduction of new services such as tug and barge tows should be considered. As a first step, an assessment and feasibility study should be undertaken which would identify how the revitalization of lake transport could take place and by clearly defining the roles of the public and private sectors.

The Kagera River flows into Lake Victoria. If navigation on this river could be developed, it would increase the hinterland of the lake and would connect Rwanda to the lake transport system. Navigational improvements to the Kagera River are proposed pending the results of an on-going feasibility study.

Navigational improvements on the Congo River are highly desirable because the river provides access to a large portion of the DRC, as follows:

- Multi-modal connectivity to the discontinuous road and railway DRC networks;
- It will provide connectivity to the main foreign trade port planned for the DRC at Banana;
- If properly developed and managed, river transport is cost effective.

Much work needs to be done to rehabilitate and upgrade the river system to make it key to the future economic development of DRC. The issues involved are well known: lack of maintenance, low traffic volumes, high costs, poor safety, and etc… The first phase of a long term program to improve navigation on the river is proposed. The role of the private sector must be given greater importance in the provision of transport services and the existing government agencies must become asset managers and not operators of transport infrastructure and equipment.

The master plan recommends the rehabilitation of the Kisangani port facilities and equipment.

5. Pipelines

Pipelines for crude oil and refined products are part of an industrial process, and are built and financed by the petroleum companies themselves. The government's role is to ensure that the companies and the pipelines satisfy regulatory requirements including issues of competition, safety and the environment. Crude oil pipelines will play a greater role as oil is discovered and produced within the region.

Recent discoveries of oil in the region around Lake Albert present a transport dilemma for the oil companies because of the viscous waxy oil that needs to be heated if it is to be transported by rail wagon or pipeline. Presently, the shipment of crude from this region, if any, is likely to be done by rail. However, this will be a costly undertaking and even a heated pipeline might be viable. As a consequence, the oil will have to be refined near its source. Product pipelines could be used to transport the different fuels to Kampala and distributed south to Rwanda and Burundi, as well as to Eldoret in Kenya where it would connect to the existing pipeline network.

6. Border Crossings

The transport of goods is held up at border crossings, these delays increase the cost of transport and inventory costs. Efforts have been underway to improve the efficiency of border crossing with One Stop Border Posts (OSBP). Establishing the infrastructure for five OSBP located within the Northern Corridor is proposed as a two phase program.

7. Institutional Strengthening

Many of the projects proposed include a component for institutional strengthening. Greater and greater reliance is being placed on the private sector to undertake projects on a PPP basis. To facilitate this effort, having common procedures and regulations among the NCTA countries

would facilitate preparing and tendering PPP projects. Technical assistance is proposed to align legal and regulatory processes to facilitate the implementation of PPP projects.

8. Project Priorities

Project priorities are ascribed to each project based upon: 1) the transport problem that the project is addressing such as lack of capacity to handle traffic, or have an EIRR of more than 12%, and 2) the level of project preparation. For instance, the container terminal requirements at the port of Mombasa and implementation of the port Master Plan are given a high priority because they easily satisfy these criteria.

In terms of road projects, the access to the port of Mombasa, Eldoret Bypass and the rehabilitation of the Eldoret to Lokichogio Road to the South Sudan border are given high priority. For the rail projects, achieving a state of good repair for Mombasa to Kampala railway infrastructure is given priority. Most other railway projects are given medium to low priority. The port of Banana is given a high priority, and a medium priority is given to the Lamu project pending on the outcome of ongoing feasibility studies and the decision to build the crude oil pipeline from South Sudan. Revitalization of the transport on Lake Victoria is given a high priority since transport on the lake has been neglected and the overall cost of the program is not likely to be high. Similarly, navigational improvements on the Congo River and the rehabilitation of the Kisangani port facilities are given high priority since making this a cost effective mode of transport is critical to the economic development of much of the DRC.

9. Project Costs

The table here-after summarizes the costs of the 38 projects recommended in the Northern Corridor Infrastructure master plan.

Northern Corridor Master Plan program cost in million US$ by period

Mode	Total	2011/15	2016/20	2021/30
Road	1,995	825	1,161	9
Railway meter gauge	788	292	455	41
Port of Mombasa	900	600	0	300
Other Ports	593	233	360	
Inland waterways	90	90		
Pipelines	-	-	-	-
Multimodal	41	21	20	
Border crossing	18	12	6	
Institutional Strengthening	2	2		
Total	**4,427**	**2,075**	**2,002**	**350**

Not surprisingly, nearly half the investments (US$ 2.1 billion) are planned to be implemented during the period 2011 to 2015. In the second period, this amount drops just a little to US$ 2.0 billion and the balance is in the last ten years. This points to the need to update the study periodically in order to appraise of the progress made, the growth of demand for transport services and new developments in the region not contemplated in the present master plan. The detailed Investment and Action Plan is given by project in the table which follows.

Northern Corridor Infrastructure Master Plan – Investment and action plan

No.	Project Name	Project Description / Purpose / Status	Location	Cost US$ million	Priority (High, Medium, Low & TBD)	Present Status	Financing Arrange-ments	2011 to 2015		2016 to 2020		2021 to 2030	
								Action	Invest-ment	Action	Invest-ment	Action	Invest-ment
R-1	Access Road to the Port of Mombasa	Build a 4-lane access road to the Port of Mombasa including a grade separated interchange at a roundabout for a total length of 10 km.	Kenya	+/- 18	H	Part of KPA Master	KPA and KURA	Construct the project	18				
R-2	Eldoret Bypass	Build a bypass south of the city, to reduce congestion, operating costs and travel time and improve safety. Costs do not include land acquistion	Kenya	+/- 67	H	New	Govt of Kenya	Feasibility & land acquisiton	2	Construct bypass	65		
R-3	Eldoret to Lokichogio	Rehabilitation and in certain sections upgrade Route A1 between Eldoret and South Sudan border via Lokichogio in NW Kenya over an estimated distance of 600km	Kenya	+/- 400	H	New	IFI to be identified	Design and construct the project	400	Construct road			
R-4	Upgrade the Juba to Nadapal Road	Upgrade existing gravel road from Juba to South Sudan - Kenya Border from a 6m wide cross section to a paved road with a 9m roadway section. Road begins at the intersection of route A43 (Juba to Numile road) about 30 km south of Juba for a disttance of 342km..	South Sudan	+/- 310	M	New	SETIDP Phase 2	Design and construct the project	310				
R-5	Upgrade the Kasindi to Kisangani	Upgrade the exiting gravel to a paved road from Kasindi on the DRC-Uganda border to Kasingani passing through Mambasa and Beni to international standards. Total length of the project is 595km.	Uganda, DRC	+/- 438	L	New	IFI to be identified	Feasibility study	4	Design & construct	434		
R-6	Widening of the NC main arterial or trunk road in Rwanda and Burundi	Rehabilitate and upgrade by widening the NC main arterial or trunk road in Rwanda and Burundi to a roadway section of 10m (2x3.5m paved lanes and 2x1.5m paved shoulders). Estimated length of the project is 334km.	Rwanda, Burundi	+/- 300	M	New	IFI to be identified	Feasibility study and design	50	Continue program	250		
R-7	Upgrade of Kigali crossing	Upgrade to double carriageway standard of a 11 km long section at the entrance of Kigali	Rwanda	+/- 25	M	New	IFI to be identified	Feasibility study and design	2	Construct project	23		
R-8	Program to construct climbing lanes along the NC main arterial or trunk road between Mombasa and Malaba.	The program consists of projects to construct climbing lanes along the NC main arterial or trunk road between Mombasa and Malaba. In the initial assessment prepared by the NCIMP Consultant, the total length of the program is 170 km to be built between 2011 and 2025.	Kenya	+/- 81	M	New	IFI to be identified	Feasibility study, design and construct	30	Design & construct	42	Design & construct	9
R-9	Dualization of the Nairobi to Nakuru section of the NC main arterial or trunk road	Dualization of the Nairobi to Nakuru section of the NC main arterial or trunk road involves the construction of 2 lanes in each direction for approaximately 148k. This project needs to be coordinated with the program to build climbing lanes.	Kenya	+/- 190	L	New	IFI to be identified	Feasibility study and design	4	Construct project	186		
R-10	Dualization of the Jinja to Kampala section of the NC main arterial or trunk road	Dualization of the Jinja and Kampala section of the NC main arterial or trunk road involves the construction of 2 lanes in each direction for approaximately 118k.	Uganda	+/- 165	L	New	IFI to be identified	Feasibility and design	4	Construct project	161		
R-11	Port corridor road project	Feasibility and alignment study for the port corridor road between Lamu and Mombasa with an estimated distance 320km.	Kenya	1	M	New	IFI to be identified	Complete FS	1	Construct project	TBD		
		Sub-Total Roads		**1 995**					**825**		**1 161**		**9**

No.	Project Name	Project Description / Purpose / Status	Location	Cost US$ million	Priority (High, Medium, Low & TBD)	Present Status	Financing Arrange-ments	2011 to 2015		2016 to 2020		2021 to 2030	
								Action	Invest-ment	Action	Invest-ment	Action	Invest-ment
RW-1	Mombasa via Nairobi to Meter Gauge Kampala Railway Line – Achieving a state of Good Repair (Infrastructure only)	Phased program of achieving a State of Good Repair for the meter gauge line. The meter gauge will continue to operate until such time as a switch to the standard gauge is necessary. The RVR concessionaire will be responsible for program, but may require financing from IFI and GoK&U.	Kenya, Uganda	+/- 788	H	Adoption of the Turnaround Plan	RVR principally, IFI, and GoK&U	Undertake priority projects in Turnaround Plan	292	Continue implement-tation of projects	455	Continue implement-tation of projects	41
RW-2	Nairobi Railway Bypass	By using the right of way already acquired, the Nairobi (Embakasi to Kibera) Bypass Railway project would avoid shipping freight now destined to Nairobi to yards outside the city and avoid using the CBD, and trains with destinations north of Nairobi would avoid the city completely. Its length is estimated to be ~15km. The infrastructure could initially be built to accommodate meter gauge but could be easily upgrade to standard gauge at little additional cost.	Kenya	+/- 36,3	M	Preliminary design complete	Unknown	Finalize designs and construct	36,3				
RW-3	Railway extension from Tororo to Pakwach	The feasibility study for the reopening of the line from Tororo to Pakwach provides an ambiguous conclusion. The recommendation depends of the traffic on the shipment of over 90% of the traffic on one commodity, crude oil, in tank wagons. Alternatively, the crude could be shipped by pipeline. Three alternatives are evaluated: minimal upgrading of the line, moderate upgrading including some improvement to the alignment, and standard gauge. The moderate upgrading of the meter gauge is the preferred option. A FS to identify the least cost solution should be undertaken by the oil companies. Recent data indicates that the traffic flows might be 1.7 times those in the FS. The study did not consider the improvements needed to the mainline between Tororo and Mombasa. As a consequence, the schedule for RW-1 and 2 might have to be accelerated. See Project P-1.	Uganda	415	H/M	FS completed; however, if project is to be implement-ed the entire railway line to Mombasa will have to be improved	Unknown at this time. RVR now has a concession to operate the rail and will need to finance its improvement s. The oil company would have to play a lead role.	No action taken to identification if crude oil will be shipped by rail					
RW-4	Railway extension from Kampala to Kasese	An on-going Feasibility Study to reopen this line is being conducted and should be available in 2011. Three alternatives are being evaluated: minimal upgrading of the line, moderate upgrading including some improvement to the alignment, and standard gauge.	Uganda	TBD	TBD	FS on-going	Unknown	TBD based on outcome of FS					
RW-5	Railway extension from Pakach to Kasingani	An alignment study was conducted from Pakach to Kasingani, 1,067km. The estimated traffic levels are low and the costs quite high. The alignment goes through environmentally sensitive areas. A full FS and environmental assessment is required. See Project R-6 below.	DRC, Uganda	2 047	Low	Pre-FS complete	Unknown						
RW-6	Railway extension from Kasese to Kasingani	As an alternative to R-5, the RW extension to Kasingani can begin at the rail head of Kasese. The feasibility of this line will need to follow the completion of RE-2.	DRC, Uganda	TBD	Low	To be done	Unknown			Undertake FS			
RW-7	Railway extension from Gulu to Juba	An alignment study was conducted for two routes from from Gulu to Juba,261 km (the shortest). The estimated traffic levels are low and the costs quite high.	South Sudan, Uganda	487	Low	Pre-FS complete	Unknown			Undertake FS			
RW-8	Standard Gauge RW Line from Mombasa via Nairobi to Kampala	New standard gauge line parallel to existing meter gauge ~1,250 km FS on-going timing is at least 8 to 15 years or between 2018 and 2025.	Kenya, Uganda	+/- 4 500	TBD	FS on-going	Unknown	Timing dependent on output of FS and financing options					
RW-9	Standard Gauge RW Line from Juba via Lokichokio to Lamu	New standard gauge line for potential shipment of exports from South Sudan – crude oil as an alternate to using meter gauge vial Port Sudan. FS is on-going and should be available in 2011.	South Sudan, Kenya	TBD	TBD	FS on-going	Unknown	Timing dependent on output of FS and financing options					
		Sub-Total Railway meter gauge		**788**					**292**		**455**		**41**

No.	Project Name	Project Description / Purpose / Status	Location	Cost US$ million	Priority (High, Medium, Low & TBD)	Present Status	Financing Arrange-ments	2011 to 2015		2016 to 2020		2021 to 2030	
								Action	Invest-ment	Action	Invest-ment	Action	Invest-ment
PM-1	Mombasa New Container Terminal at Kipevu West – Phase 1 - 2 berths	On-going critical project to facilitate handling the growth of container traffic. Note that the costs indicated could be higher.	Kenya	250	H	Design completed	Japanese bilateral assistance	Construct	250				
PM-2	Mombasa container terminal at Kipevu West – Phase 2 & 3 - for additional berths	Incremental increase in container facility by an additional 2 berths required by 2020 – FS should be undertaken by 2015 to determine timing of the expansion of the terminal.	Kenya	+/- 300	M		Unknown			Complete design for Phase 2	TBD	Construct Phase 3	300
PM-3	Mombasa Port Master Plan	Implementation of the other projects in the Master Plan	Kenya	350	H		KPA principally with PPP & IFI	Update the master plan & implement program	350	To be determined			
		Sub-Total Port of Mombasa		**900**					**600**		**0**		**300**
PO-1	Port Banana	Implementation of floating dock and beginning of construction of permanent port	DRC	+/- 593	H	Designs underway	PPP + Korean bilateral	Construct floating dock and Phase 1 of port	233	Construct Phase 2 of port	360		
PO-2	Lamu Port – Phase 1 - Oil terminal	Crude oil terminal facilities – linked to pipeline project connecting South Sudan to Lamu.	Kenya	TBD	M	FS on-going	Oil company or PPP	Phased with pipeline project	TBD	Expansion as required	TBD	Expansion as required	TBD
PO-3	Lamu Port – Phase 2 - Commercial Port	Development of the Commercial Port at Lamu - the cost and timeline for this project awaits completion of the project feasibility study. Financing is still uncertain.	Kenya	TBD	M/L	FS on-going	GoK, KPA and PPP arrangement	To obtain financing	TBD	Expansion as required	TBD	Expansion as required	
		Sub-Total Other port projects		**593**					**233**		**360**		**0**
IW-1	Revitalization of Transport on Lake Victoria - assessment of requirements and feasibility study - Phase 1	An intial assessment and feasibility study to revitalize lake transport including an evaluation of introductingf tug and barge operations is recommended. The need for and cost of port infrastructure will be addressed in this study. The implementation of program would be largely done by the private sector.	Kenya, Uganda, & Tanzania	+/- 2	H	FS to be undertaken	IFI to be determined	Undertake the FS	2	Implement follow on programs	TBD	Implement follow on programs	TBD
IW-2	Revitalization of Transport on Lake Victoria - Improvement of Navigation - Phase 2	Follow on to the feasibility study including a hydrographic survey and navigational aids and other improvements.	Kenya, Uganda, & Tanzania	+/- 5	M	Based on results of FS	IFI to be determined	Wait to completion of FS	5	Implement follow on programs	TBD	Implement follow on programs	TBD
IW-3	Improvements to Navigation on the Congo River	Improvements to navigation on the Congo River including hydrographic surveys, maintenance of the waterway, port infrastructure, and institutional strengthening.	DRC	+/- 80	H	Project under away	EU	Implement first phase	80	Implement follow on phases	TBD	Implement follow on phases	TBD
IW-4	Rehabilitation of Kisangani port facilities	Rehabilitation of infrastructure and repair of equipment of ONATRA and SNCC ports	DRC	+/- 3	H	New	EU or ADB	Design and implement	3				
IW-5	Navigational Improvement on Kagera River	The project will make it possible to navigate the Kagera River from Kagitumba to Lake Victoria connecting to Bukob and Kemondi Bay in Tanzania. The project connects the Northern Corridor with the Central Corridor. The scope of the project needs to be define based on the on-going feasibility study.	Rwanda, Uganda and Tanzania	TBD	M	Project feasibility study under away	IFI to be determined			Implement project if feasible	TBD		
		Sub-Total Inland Waterways		**90**					**90**		**0**		**0**

No.	Project Name	Project Description / Purpose / Status	Location	Cost US$ million	Priority (High, Medium, Low & TBD)	Present Status	Financing Arrange-ments	2011 to 2015		2016 to 2020		2021 to 2030	
								Action	Invest-ment	Action	Invest-ment	Action	Invest-ment
P-1	FS for the transport of crude oil from South Sudan to Lamu	An on-going study of the FS of the pipeline and railway in this corridor should be available in 2011. This project should be financed by the oil companies.	South Sudan & Kenya	TBD	TBD	FS underway	Private sector						
P-2	FS for the transport of crude oil from Lake Albert region	A railway study indicated that it is possible to transport the waxy oil via meter gauge railway. A comparative study needs to be done for pipeline so that a decision can be made to determine which mode to develop. This study should be financed by the oil companies directly involved.	Uganda,	TBD	TBD	FS underway	Private sector						
		Sub-Total Pipelines - 100% Private sector		**0**					**0**		**0**		**0**
MM-1	Multi-modal Access Corridor to the New Container Terminal at Kipevu, Port of Mombasa	Presently road access is being considered for the New Container Terminal to be built along an alignment south of the airport. This would put the railways at a competitive disadvantage in serving the new facility.	Kenya	+/- 41	M	New proposal	To be determined	Start project 2014/15	21	Complete project 2016	20		
		Sub-Total Multimodal project		**41**					**21**		**20**		**0**
BC-1	Border Crossing 1 - OSBP	Implementation of One Stop Border Post Procedures: recommended in a JICA study. According to WB, 75% of the cost distortions are contributed by soft infrastructure deficits. Laws need to allow extra-territoriality between countries. Infrastructure requirements are minimal. Road crossing between Kenya and Uganda are possible	Kenya-Uganda	+/- 6	H	Designs to be prepared & legal and regulations to be set.	IFI and others interested	Construct	6				
BC-2	Border Crossing 2 -OSBP	Same – border crossings between Uganda and Rwanda, Rwanda and Burundi, or Rwanda and DRC.	Uganda, Rwanda, & DRC	+/- 12	M	Feasibility studies completed	IFI and others	Construct 2	6	Construct 2	6		
		Sub-Total Border Crossings		**18**					**12**		**6**		**0**
IS-1	Legal & Regulatory Technical Assistance for PPP Projects	TA to align legal and regulatory processes to facilitate the implementation of PPP projects in the transport sector in NCTA member countries.	Northern Corridor countries	+/- 2	M	New	IFI to be identified.	Implement the TA	2				
IS-2	Participation of large rail shippers in procurement of rolling stock and building of sidings	RVR should seek to have large shippers (bulk and container) purchase their own specialized rolling stock to facilitate the movement of their goods. RVR would provide improved quality of service and lower tariffs. Additionally, siding and short branch lines might be required.	Kenya and Uganda	0	H	New	None needed	RVR to im-plement	0				
		Sub-Total Instituional Strengthening		**2**					**2**		**0**		**0**
		GRAND TOTAL IN US $ million		**4 427**					**2 075**		**2 002**		**350**

ENVIRONMENTAL ISSUES

One of the general objectives of the Northern Corridor Infrastructure Master Plan is to promote "capacity building in policy development and plan implementation," a goal that is particularly relevant to achieving sound environmental and social management of projects. Furthermore any project financed by the African Development Bank needs to be assessed in an environmental and social perspective. Although the terms of reference of the study are not very precise on this issue, Louis Berger felt committed to present this environmental analysis in the study Final Report.

The Environmental Protection Procedures for each mode of transport studied in the Northern Corridor Infrastructure Master Plan demonstrates the redundancy of impacts encountered between transport modes and their recommended mitigation. This is because they include:

- similar development actions (for example, site preparation by way of vegetation removal, earthworks, waste generation, population displacement, etc.),
- similar environmental-impact receptors (surface water, groundwater, soil cover, human health, etc.),
- similar environmental impacts (soil erosion, increased suspended solids in surface-water resources, benthic habitat destruction due to sedimentation,
- increased incidence of Sexually Transmitted Diseases (STDs) and HIV/AIDS, etc.), and
- similar mitigation measures recommended to avoid/reduce or enhance significant environmental impacts affecting equivalent environmental-impact receptors.

In some instances, the identified impacts differ in their significance and will require differing degrees of intervention. For example, the manner in which excavated materials are disposed of will depend upon their contents. For instance, highly contaminated (heavy metals, chemicals, etc.) spoils require permanent containment and isolation from the surrounding environment. Conversely, spoil excavated from a site isolated from industrial activity may not contain harmful constituents and the spoil can be spread on open ground without further treatment. In any case excavated material is not to be piled at the site and left to erode into an adjacent water body, irrespective of the disposal technology required.

Understanding that particular natural (or environmental), human and cultural resources, e.g. soil, water, roadside vendors, unmapped antiquities, etc., are vulnerable to adverse impacts in the course of developing transport infrastructure is fundamental to sustainable development. Recognizing the likely environmental costs of these actions/reactions forewarns project managers about forthcoming mitigation, and its costs, both economic and environmental.

The report presents detailed mitigation measures for each type of infrastructure investment recommended in the master plan.

INSTITUTIONAL RECOMMENDATIONS

Three main series of institutional recommendations are made according to the requirements of the study terms of reference:

- Coordination of planning and development of recommended infrastructure projects;
- Adoption of common standards for design, construction and maintenance;
- Proposal for a monitoring and evaluation framework to review progress;

as well as some general issues.

1. Coordination of the planning and implementation of the recommended infrastructure projects

It is recommended that the Northern Corridor network of transport infrastructure projects be divided into four functional categories for the purpose of coordinating their planning and implementation:

- **Level 1**: Infrastructure of regional importance which provide service to three or more NCTA member countries;
- **Level 2a**: Infrastructure of sub-regional importance which serve only two NCTA member countries and is linked to Level 1 infrastructure;
- **Level 2b**: Infrastructure of sub-regional importance improving connectivity between one member and a non-member country (potentially future member) and/or providing redundancy in the transport networks.
- **Level 3**: Infrastructure of national importance which serves a single member country.

The reasons for proposing such a system of classification are as follows :

- To set priorities among the different projects aimed at improving the performance of the Northern Corridor area transport network. Greater importance should be given to projects serving two or more member countries;
- To assign responsibilities in terms of planning and development of the projects;
- To set design and construction standards for project implementation, and once completed operational and maintenance standards;
- For PPP projects, to set performance targets and identify risk sharing mechanisms, preparation of bid documents, etc;
- To coordinate with those international financial institutions which might want to participate in the funding of projects guaranteed by the beneficiary countries, or as a partner in a PPP project;
- To provide greater connectivity between present members of the Northern Corridor and potential new members of the NCTA with the objective to increasing trade and economic ties among member countries.

Based on the proposed classification system, NCTTCA role in the planning, design and monitoring of implementation of specific projects should vary according to the functional classification recommended above.

- For Level 1 infrastructure, NCTTCA should have the leading role which entails:
    - Setting the design and construction standards and on completion, the operation and maintenance standards,
    - Arranging for the financing of the project, and
    - Monitoring closely the implementation of the project and then its operation.

  Once the investments are made, NCTTCA should be able to require that the maintenance of the infrastructure receives the highest priority in the allocation of the available budgets.

  In terms of operation, NCTTCA should have a policy promoting the most efficient method of managing and operating the infrastructure or related transport system. In the Northern Corridor area, this generally means outsourcing it to a professional private operator.

- For Level 2a and 2b infrastructure, the coordinating role falls mainly under the prevue of the two countries involved in the implementation of the project, and NCTTCA's role will be directed toward monitoring the progress made. The design standards will be set by the two countries concerned, and project financing will also be arranged by them.

NCTTCA will monitor and support the project as needed; it should be kept informed of progress made and difficulties encountered.

Maintenance of the infrastructure and the operation of the related transport systems will be the responsibility of each of the countries responsible for the project. Since these will be primary infrastructure and transport systems, it is anticipated that they will receive priority in the allocation of available budgets.

- NCTTCA will have only limited role for Level 3 infrastructures.

2. Adoption of common standards for design, construction and maintenance

The standards for design, construction and maintenance of Northern Corridor infrastructure will generally be function of the classification of the infrastructure. For the time being, emphasis has been placed on roads since there are large variations among the NCTA member countries. In the case of railways, the standards will vary according to the gauge used. It should be realized however, that for historical and cultural reasons, it is difficult to impose very detailed common standards on all the NCTA member countries even for a ubiquitous infrastructure such as roads. Based on regional experience, the NCIMP Consultant recommends that standards be set corresponding to achieving the desired level of service for which the infrastructure or related transport system will be expected to operate. The recommended standards for roads are therefore as follow:

- **Level 1 roads** :

  - Design and construction:

- A 7 m wide bituminous pavement minimum with 2.0 m shoulders on each side;
- Design speed should be 120 km/h hour for flat terrain and no less than 80 km/h on rough terrain;
- Design axle load should be 8 tons minimum and take into account the COMESA-EAC-SADC October 20, 2008 tripartite agreement;
- Bituminous riding surface should be asphalt concrete of 5 cm minimum thickness.
- Inclusion of climbing lane where required and recommended in the master plan
- 2 x 2 lane roads should have a 2 x 6.5 m wide pavement with a 2 m wide stopping lane or shoulder.

  - Maintenance:

- IRI should not exceed index 5;
- Pavement should be well maintained with cracks repaired within a three month period after their appearance.
- Shoulders should be free of vegetation at all times;
- All drainage culverts should be clear at all times.

  - Operation:

- Speed limit of loaded trucks should be 65 km/h and of 80 km/h for empty trucks;
- Major cities should be bypassed when truck traffic reaches 1,500 vehicles a day;
- A parking or rest area for buses, cars and trucks should be arranged at least every 250 km (which correspond to one stop every 4 to 5 hours of driving).

- **Level 2 roads:**

  - Design

- Standards should be similar to those utilized for primary roads in each concerned country.

- Maintenance :

- IRI should not exceed index 6;
- Shoulders should be free of vegetation most of the time;
- All drainage culverts should be clear at all times.

- Operation :

- Speed limit of loaded trucks should be 65 km/h and of 80 km/h for empty trucks.

3. Some other important institutional issues

Controlling vehicle axle loads: NCTTCA considers the reduction of the overloaded trucks a key issue with respect to the Northern Corridor roads and has spoken out on this subject numerous times. All of its recommendations make sense and are fully supported by the NCIMP Consultant. An additional one is proposed below.

Since a significant part of the road freight traffic originates from the port of Mombasa, it is also recommended that KPA and KNHA cooperate to control the maximum vehicle weight and axle load before they leave the port area with their load. The KRB resources could be used to finance the investment required and to pay for the weighing station operating crews. The cooperation of the port police and of the Customs may be sought to cross check the weight measured, if appropriate.

Ensuring fair modal competition between road and rail is a wise strategic objective. This objective is actually a very difficult one to implement, because this would substantially increase the cost of road transport. Firstly, the road users would have to pay for the whole cost of building and maintaining the road infrastructure, which they use. Secondly, they would have also cover the cost of the “externalities” that road transport creates; this is mainly the cost of the adverse social and environmental impacts caused by road transport. On the other hand, railways are often forced to cover all their capital costs including their infrastructure costs, and are politically weak in comparison to the road transport industry.

Taking all of this into account, the only way to put road and rail on the same competitive basis is to subsidize them in a similar manner. This suggests primarily that the cost of rail infrastructure should not be charged to the railway users and should be borne by the national budget, as it is the case for roads. On the other hand, road and rail maintenance and operation costs would be covered by their respective user charges.

Improving the capacity to implement PPP projects: In all NCTA member countries, those transport planning documents reviewed by the NCIMP Consultant indicate much greater reliance on the use of PPP as a means of implementing a variety of projects, but these expectations are often made without clear understanding of the difficulty of realizing a successful PPP outcome. Based on international experience, most of these types of projects do not achieve their goals for a number of reasons.

Legal, regulatory and institutional structures need to be in place so that they can attract experienced private sector partners who are qualified technically and financially to undertake the project. In addition, the PPP project must have realistic goals and as such, the risks and possibly the costs, will need to be shared between the private and public sector partners. In larger undertakings, this requirement suggests that the Government will have to be a real partner and not a silent one.

Having similar legal and regulatory structures in NCTTA member countries, or more generally at the EAC or COMESA levels, will provide a more attractive regional environment for experienced companies with backgrounds in implementing successful PPP projects. This would also increase the probability of achieving the desired outcomes or goals of the project. A project

sheet for technical assistance directed toward preparing such legal and regulatory documents for the NCTA member countries is recommended as part of the master plan.

Updating the Northern Corridor Infrastructure Master Plan: The Northern Corridor Infrastructure Master Plan covers a period from 2010 to 2030; this does not mean that all its recommendations are valid over this time, nor are all possible projects included in the master plan.

In several instances, the master plan indicates that conclusive recommendations are not possible until on-going feasibility studies are completed especially in what concerns the standard gauge railway projects and the developments associated with the Lamu port and Corridor. From the perspective of the master plan, other projects such as several aspects of the development of the port of Banana and the improvements of the navigation on the Congo River are somewhat uncertain and more time is needed to complete the on-going planning activities. Conclusions of the feasibility studies and other planning studies for all these projects are defining the scope of the various project cycle activities that still have to be completed, their timing, their costs and how they will be financed.

It is good practice to update a transport master plan every five years in order to take into account the actual economic developments in the area of influence that it covers, the changes in policy and political orientations, the technological developments and, above all, the emergence of major and potentially new developments which may have a dramatic impact on the transport demand.

Updating the present infrastructure master plan does not mean redoing the entire study. Firstly, it is advisable to use the same methodology and models as the original one if appropriate. Secondly, a full assessment of all infrastructures might not be necessary if their improvement has been closely monitored during the five years which passed. However, the master plan study should be based upon a revision of the forecast of transport demand. Hopefully, this analysis would then benefit from improvements in the quality of the economic and transport data, especially in South Sudan and in the DRC.

4. Proposed Monitoring and Evaluation Framework

Each member country will be responsible for the implementation of the projects included into the Northern Corridor infrastructure master plan that are located within its territory. However, NCTTCA has a role to play in this, especially for Level 1 projects. For this reason, it is necessary to develop a set of indicators and a Monitoring and Evaluation Framework to guide the member countries in the project cycle and to provide NCTTCA with the information and the procedures it needs in order to follow and support the implementation of the projects. This information will also help in the periodical updating the master plan.

The recommended indicators and monitoring framework are as given in the table here-after.

NORTHERN CORRIDOR INFRASTRUCTURE MASTER PLAN

INDICATORS AND MONITORING FRAMEWORK

Project Ref N°	Project stage	Indicator / Decision / Document	Information to be provided to NCTTCA
	Initiation of the Project		
		Agency in charge	Name and contact
		General project implementation schedule	One copy
		Budget estimate	One copy
		Source of financing	One copy
	Project feasibility study		
		Terms of reference	One copy
		RFP for consultants	One copy
		Task and reporting schedule	One copy
		Submission of reports	One copy of each report
		Comments and approval of reports	Copy of comments and of letters of approval
	Project detailed design and tender documents		
		Terms of reference	One copy
		RFP for consultants	One copy
		Task and reporting schedule	One copy
		Submission of reports, drawings and tender documents	One copy of each
		Comments and approval of documents submitted	Copy of comments and of letter of approval
		Final cost estimate	One copy
		Request for financing of construction	One copy of the request sent
	Construction		
		Pre-qualification	Date of advertisement
		Invitation for tenders	Date of forwarding of invitations
		Award of construction contract	Copy of the letter of award
		Award of supervision contract	Copy of the letter of award
		Total Estimated Cost	One copy
		Physical progress	One copy of progress reports by supervision consultant
		Disbursements	Copies of Estimates to Complete
		Provisional acceptance	Copy of the letter with mention of corrections to be made
		Commissionning/Final acceptance	Copy of the letter of commissioning of the project
	Operation		
		Decision of mode of operation	Information on the decision made and the reasons for it
		Selection of an operator	Name of operator
		Project hand over to the operator	Letter of transfer
SUMMARY BY AGENCY			
		Schedule showing progress of all the projects underway	
		Total disbursements vs Total budgetary allocation of all projects underway	
		Total financing secured vs Total amount needed	
SUPPORT REQUESTED FROM NCTTCA			
		Coordination with other member states	
		For requests for financing	
		Other	