

Conservation and Management of Historic Buildings 2008-2009

Conservation and Urban Planning of Kenya Railway Headquarters

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Abstract

Development inevitably involves changes in the physical environment, which threatens the existence of historic buildings located within city areas. Kenya Railways Headquarters faces such threats, as it is located within the heart of Nairobi's Central Business District

This paper aims to analyze this building by reviewing its contextual form, building configuration, values of the building, materials and the building elements with a view of identifying areas of decay and thereby propose possible and effective remedy actions. The main focus for conservation of this building will be proposing a maintenance program and plan which will ensure sustainability of its functional use value.

The study employed various methodological techniques in the form of review of secondary information, survey and site visits, personal and stakeholder interviews.

The findings derived are that Kenya Railway HQs should be conserved with a view of re-planning the adjacent urban neighbourhood (train station) in order to promote both domestic and international tourism by way of establishing Safari tours to game reserves such as Masai Mara, Tsavo and national parks in line with providing an efficient commuter train system and hotel pick-up tour vans from and to the train station. This will be done in conjunction with management of Kenya Railways Headquarters, Local Authority, Tourism Ministry, game lodges and Central government.

Introduction

Location

- Nairobi is the capital city of Kenya, located within the East African. Kenya borders Uganda to the west, Tanzania to the south and Ethiopia to the north and Somalia to the East. See plate 1.
- Nairobi is the most populous city in East Africa with an estimated population of between 3 to 4 million (1999 Census).
- it is also considered as the most prominent cities in Africa serving as a commercial, political and financial hub to many International companies and organizations e.g UNEP offices.

Climate

Fairly moderate climate, largely because of its high altitude (5,500 ft/1,680 m). The summer months are sunny and warm without blistering temperatures, while winters are mild to cool, with very chilly evenings. Rainfall is also moderate, the wettest part of the year

Kenya Railways Headquarters

History and Function use

- The town of Nairobi was established through a master plan of 1898, with which all land uses were aligned in a linear fashion surrounding the railwaylines (plate 2).
- The current CBD has maintained the same liner fashion and the only change has been the diversion of the line to the south after the 1948 master plan for a colonial town.
- The Kenya Railways Headquarters was constructed in 1924 by Architect Sir Herbert Baker and was open in 1927. It was used as an for the administration of the then East African Railway Corporation (plate 3).
- In august 1989 al-Qaeda carried out near simultaneous suicide bombings against the U.S embassies in Nairobi, Kenya and Dar-er-salaam TZ. More than 300 persons were killed and 5000 injured. The Railway Headquarters' buildings had one wing damaged as a result.
- In 2006, the governments of Kenya and Uganda agreed to take upon a concessioner to manage the railway corporation and named it Rift Valley Railway. The building houses both staff from Rift Valley Railway (RVR) and Kenya Railways.

Architectural Characteristics

a) Context

The Kenya Railway Headquarters is located at the heart of Nairobi city surrounded by modern skyscrapers. See plate 4 &5.



Plate 4 &5 Cooperative House opposite Railway headquarters along Haile Sellasie Avenue, Source: Internet



Plate 1: East Africa: Kenya, Uganda, Tanzania, Rwanda and Burundi
Source: Maps of Kenya, 1999

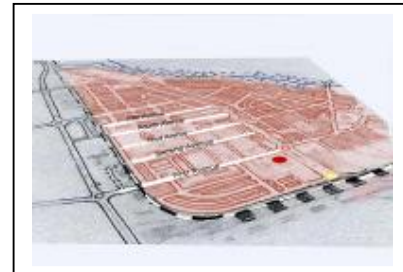


Plate 2: The former boundaries in 1927
HQ red Dot
Source: Phd Thesis, 2008-9



Plate 3: The Railway Headquarters opened in 1927

b) Building configuration

• Form

The form of the building is derived from basic rectangle in plan and elevation.

The style of the building form is borrowed from neo-classical architectural style that dominated the earlier colonial era in Africa . See plate 6

The building is designed around courtyard concept that have soft landscape (greenery). See plate 7



Plate 6: Railway headquarters as completed in 1927. Source: Kenya Railways 1977



Plate 7; Railway Headquarters internal courtyards
Source: Author. 2009

• Scale and proportion

The forms have dominant bilateral symmetry in plan and elevations. The building has a graduer sense of scale as compered to human scale, however the generic proportions are congruous.

The majesty of this building is brought about by the porticos that have six Doric columns a reminiscence of classical architecture. See plate 8



Plate 8; Front Facade, Doric Columns

Source: Internet, 2009



Plate 9: Internal Veranda

Source: Author, 2009

c) Spatial configuration

• Planning

Railway headquarters is composed of four blocks of building; block A,B,C and D. Block A,B and C are two storied structure while block D has four floors, however all the blocks are organized around courtyards.

The spatial arrangement has a dominant bilateral symmetry. The spaces are also organized along internal verandas accentuated by arches and columns (plate 9).

d) The Object

Materials and construction techniques

The following are the inventory of material:

Roof: hipped roof and deep eaves made up of Mangalore clay tiles on steel purlins and steel trusses (plate 10). See Annex 1



Plate 10: construction process in 1926 ; Steel trusses columns and beams (reinforced concrete).
Source: Kenya Railways, 1926

Structure: is composed of reinforce concrete columns and beams.

Porticos columns: are made up of Zanzibar sandstones

Staircases: are made up of reinforced concrete, brass balustrades and terrazzo finish. However the terrazzo has since be covered by PVC tiles.

Floor slab: the veranders were made of terrazzo while the interiors were made of paraque. However much have since been replaced with granito tiles.

Walls: The walls are made up of concrete stones that have a smooth finish. Some walls especially those that face the courtyards have since been rendered in cement screed and painted on oil based paints.

Analysis :Inventory of values of the cultural property

A historic building is defined by Bernard Fielden (1994) as a building that gives a sense of wonder and makes someone know about the people and culture that produced it. The railway headquarters office building stands at the heart of the Nairobi C.B.D. giving a symbol of colonial era and transportation infrastructure that shaped many Kenyan town and cities.

- **Cultural and Symbolic values:** the building presents the colonial administrative era that shape the capital city of Nairobi along linear planning of the railway lines to become the largest East African City.
- **Patina:** the patina of the building can be observed on the walls, staircases, PVC/Terrazzo floors and doors.
- **Authenticity:** the building is an authentic resemblance of neo classical buildings of that time in Africa. Materials used were from local area.
- **Nominal value:** The building is has a high economic value as its in still a good state of use.
- **Use values:** Functionally the building has been the Kenya Uganda railway headquarters to date. However ,it has since concessioned to Rift valley Railways. Since the 20th century the railway has been the most important infrastructure in Kenya and Uganda economies.
- **Economic and Historic values:** the arrival of the Kenya-Uganda Railway increased access to interior parts of the country, which led to settlement by European farmers. Ranches and large mixed farms sprung up in the area, and the

many towns developed town such as Nakuru, Eldoret, Kisumu among others.

- **Aesthetic Value**-the object is still beautiful in its own old fashion, but threaten by towering modern buildings.

Analysis

Inventory of the state of damage and problems

Visual inspection of the cultural property was done to document the state of building especially the level of decay of the building elements. The documentation was done with a view of establishing maintenance plans and financial appraisal for the conservation exercise. Documentation on the state of the building was done following the methodology described by Bernard Fielden (1994).

- 1.0 Analysis of structural actions with regard to loading (dynamic loading).
- 2.0 Analysis of structural elements (beams, trusses, walls and columns and slabs; ground floor and suspended floors).
- 3.0 Analysis of Materials and finishes.



Plate 11: Cracks on the floor are due to ground transmitted vehicular vibration Source: Author, 2009

1.0 Structural actions of historic building

Dynamic loads include: winds, earthquakes and manmade vibrations. In this case manmade vibrations have immensely affected the structural integrity of the buildings: vehicular traffic and bomb tremors caused by explosion by Terrorists attack on U.S Embassy in 1998 in Nairobi.

The Embassy was 100 meters away from the Railway Headquarters. The explosion had devastating effect on the railway headquarters whereby deep cracks were formed. The office building is also surrounded by heavy vehicular traffic; one side by the railways bus stop and the other at Haille Selasie Avenue. See plate 11 and 12.

However much vibrations are from the locomotives (railway) whose proximity is less than 50m away. Cracks have been formed or exaggerated by ground transmitted traffic vibration. (See plate 12 on the next page).



Plate 12: Cracks are due to ground transmitted vehicular vibration

2.0 Analysis of structural elements (beams, trusses, walls and columns and slabs; ground floor and suspended floors).

Structural columns

This cultural property is made of the most elementary form of building construction post and lintel, (column and beam) and slabs made of beams side by side resting on continuous walls in masonry.

However it was found out that some of the structural columns are in a poor state due to tremors of the explosion of 1998 and these threaten the safety of users.



Plate 13: Concrete moulding and blocks have been attacked by plants and algae,

Source: Author, 2009

External walls

It was also noted that the external walls made of concrete block have been attacked by plants and algae, primarily due to the humid climate of the equatorial region and poor maintenance of the cultural property. See plate 13.

The walls have also been discoloured by the vehicular exhaust fumes of the nearby traffic.

Cracks on the wall are due to the impact of bomb explosion in 1998 while open joints are due to thermal movements, aging and vibration damage from traffic along the roads

Foundations

This is the part of the building that distributes the loads from roofs, floors and walls on the earth below.

Ground movements; earthquakes and tremors are common causes of failures in foundation which result in cracks and settlement.

However in this case while earthquakes are rare, the traffic along provide constant ground vibrations that affect the foundation, although no substantial evidence is yet to be made. Bomb blast of 1998 may have caused sudden fracture on the floor finishes; terrazzo, this evidence may be an indication of foundation failure.

3.0 Materials and finishes

Ceiling: It was noted that the state of ceiling in most interior spaces were pathetic. The poor state of interiors spaces were mainly due to the lack of proper maintenance plan (plate 14).



Plate 14: Poor state of ceiling
Source: Author, 2009

Staircase finishes: It was noted that the brass balustrades of the main staircases were maintained through occasional repainting. However terrazzo finishes had since been replaced with PVC tiles. The PVC tiles are unfortunately poorly maintained (plate 15).



Plate 15: Staircase treads have deteriorated
Source: Author, 2009

Floor finish: The interior spaces have paraque finishes while the veranders and corridor have terrazzo finishes. The state of paraque in most of these spaces are poor while the terrazzo floor finishes have few cracks (plate 16).

Drainage and services: The cast iron drain pipes are blocked with matter and some have corroded (plate 17).

Causes of decay and damage to cultural property.

a) Climatic causes of decay

Temperature and thermal expansion

Temperature changes and thermal expansion has caused the joints to loosen in building elements.

It has causes exfoliation of the sandstone on the structural columns.



Plate 16: Cracks on the terrazzo floor

Source: Author, 2009

The action of moisture

Particulates, smoke, dust and sand particles. Particulates or aerosols are solid particles that remains suspended in the air while particulates are from vehicles and factories. These particles contains sulphur dioxide which is acidic and other metallic traces of iron which can cause deterioration, especially through acid rains.

b) Botanical, biological and microbiological cause of decay

Botanical causes of decay

The roots of trees and bushes around the building have caused cracks on the building.



Plate 17: Drain pipe have corroded

Source: Author, 2009

Biological and microbiological causes of decay

Bacteria and lichens have attacked on the building materials by producing acids which react chemically with the structural material. Algae, moss and lichen all grows in stone masonry walls and builds up homes in which much longer and more damaging plants have grown. (plate 18).

Remedy: Toxic washes can be used to kill algae, lichens and mosses. Incipient lichen and algae can be softened and removed by wiping with diluted ammonia. Heavier growth of plants can be killed by spraying with formalin.

Fungi (dry rot fungi) and (wet rot fungi)

There is attack on timber trusses especially in places that are poorly ventilated .

Remedy: Spray of fungicides.



Plate 18: Attack on concrete block and moulding by algae and plants

Source: Author, 2009

Insects and other pests as causes of decay

Variety of insects were identified within the building and the surrounding landscape, however it was not possible to account for the damages sustained by the insects eg Spiders, termites, coackroaches.

Remedy: Spraying of insecticides

Damage by animals and birds

Birds, pigeons have caused damage and disfigure buildings. Their droppings block roof rain water outlets and causes grass and other vegetation to grow in gutters and re-entrants on sloping roofs. Excrements of birds, bats and insects are both alkaline and acidic and promotes decay of the surfaces.

c) Man made causes of decay

Damages from vibration

Damages from vibration of heavy vehicle moving along the road surrounding the building (ground transmitted traffic vibration)

Remedy:

- Repair and maintenance of Haile Sellasie Avenue road to reduce Vehicular vibration.
- Banning of heavy vehicles from the C.B.D.
- Relocate Bus station from the vicinity and plan the site to ensure adaptive reuse and economic viability of the Cultural Property.

Atmospheric pollution

The byproduct of industrial and commercial activities from the industries and factories of industrial area in Nairobi city are one of the main sources of air pollution. The second major pollutant is the vehicular exhaust fumes which causes discolorations of the external surfaces of the building. Pollutants emitted by the industries contains sulphur dioxide that causes acid rains which are destructive to ferrous material like cast iron drain pipes, steel trusses and cast iron manhole covers.

Combating atmospheric pollution

- Reduction of local sources of sulphur dioxide; this can be done by effecting pollution policy on industries, by National Environmental Management Authority (NEMA).
- New industries whose emissions are a threat should not be cited near any historic buildings.

Proposal

Conservation Plan Proposal

An urban design and planning proposal is required for the entire precinct, addressing the railway headquarters, railway station and the surrounding, as well as the vehicular traffic and the pedestrian movement.

Maintenance Program

- Undertake a comprehensive status of the building by a qualified conservation professional and make drawing of the current spaces.
- Evaluate the cost of renovation so as to evaluate the priorities in maintenance.
- Propose for the removal and relocation of the Railway bus stop by the City Council of Nairobi.
- An urban design planning proposal should be undertaken by a qualified town planner so as to integrate the land owned by the Kenya Railways for better use.
- Prepare a landscape design proposal for the open spaces around the building and integrate it with the railway Station so as to provide tourism packages to game reserves.
- Centralise the operations of the Railway management into lesser spaces and lesser the rest.

Maintenance & Repairs

- Roofing tiles that are broken should be replaced regularly to avoid leakage and corrosion of the steel trusses.
- Soft board ceiling material should be replaced with acoustic ceiling tiles that are easy to maintain.
- Gutters and drain pipes should be regularly cleaned to remove clots that lead to blockages.
- Walls should be scrubbed with wire brush to remove soil, dust and smoke.
- Sandstone columns should be scrubbed with wire brush to remove dust.
- Parquet floor finishes should be replaced with new ones in the interior spaces that are dilapidated.
- Most of the electrical cables are old. They should be replaced with new cables and the redundant cables removed.
- A sprinkler system, a smoke detection and fire alarm system should be installed to enhance safety in case of fire.

Table 1
Maintenance program

0 year	1year	2year	3year	5year
Documentation				
Maintenance Program				
Maintenance plan				
Education of the staff				

Source: Author, 2009

Maintenance Plan

1.0 Short term plan

Roof structure:

- Repair and strengthen the steel trusses
- Replace broken mangalore roofing tiles
- Repair and repaint ceiling as well as replacing softboard ceiling materials with acoustic ceiling tiles

Columns and beams

- Repair and strengthen weak columns.
- Repair concrete works on beams that have chipped off.

Walls

- Scrub the walls with wire brush to remove soil and smoke materials
- Replace broken windows and doors. Toxic washes can be used to kill algae, lichens and mosses.
- Incipient lichen and algae can be softened and removed by wiping with diluted ammonia
- Heavier growth of plant life can be killed by spraying with formalin

Floors

- Replace PVC tiles on the staircases. The paraque finish should also be replaced with new ones

Materials and finishes:

- rendering and painting: some interior walls that had their oil paint flaked off, should be scoured and repainted
- furniture: wood paneling in the interior spaces should be repainted and polished.
- Replace the broken sunshading devices.

Table 2
Summary of short term maintenance per block (A,B,C & D)

Building elements	maintainance	frequency	responsibility
Floor finishes	Sweeping the floor.	Daily.	Owner
Ground floor	Polishing and waxing	Weekly	
Upper floors			
RC columns	Scrub the column surfaces with wire brush to remove soil, dust and soot	Four months	Owner
RC beams	Scrub the beam surfaces with dust mat to remove soil, dust, cobwebs and soot	Two months	Owner
Roofing	Dust the ceiling	Monthly	Owner
Trusses and purlins	Surfaces surfaces with dust mat to remove dust, cobwebs and soot		
Ceiling			
Walling	Scrub the wall with wire brush to remove soil, dust and soot.	Four months	Owner
Internal finishes			
External finishes			
Interior Woodworks, Doors and windows	Dust with dust mat to remove soot, cobwebs and soil.	Monthly	Owner
Landscaping	Prunning plant species	Weekly	Owner

Source: Author, 2009

2.0 Long term plan

Adaptive Reuse

- Renovation of the dilapidated office spaces and put them on lease.
- Undertake an urban design and planning exercise that will consolidate the railway headquarter resources into a regional hub for tourism packages for East Africa region.

Table 2 Long term plan

Building elements	0-10year	11-20year	21-30year	31-40year	→
Floor finishes	Seal cracks with epox resin.	Seal cracks with epox resin.	Seal cracks with epox resin.	Seal cracks with epox resin.	Major renovations
Ground floor	Replace worn out wood blocks	Replace worn out wood blocks	Replace worn out wood blocks	Replace worn out wood blocks	
Upper floors	Seal the chipped off concrete with mortar	Seal the chipped off concrete with mortar	Seal the chipped off concrete with mortar	Seal the chipped off concrete with mortar	
RC columns	Seal the chipped off concrete with mortar	Seal the chipped off concrete with mortar	Seal the chipped off concrete with mortar	Seal the chipped off concrete with mortar	
RC beams	Seal the chipped off concrete with mortar	Seal the chipped off concrete with mortar	Seal the chipped off concrete with mortar	Seal the chipped off concrete with mortar	
Walling	Scrub the wall with wire brush to remove soil, dust and soot	Scrub the wall with wire brush to remove soil, dust and soot	Scrub the wall with wire brush to remove soil, dust and soot	Scrub the wall with wire brush to remove soil, dust and soot	
Internal finishes	Scrub the paint and repaint	Scrub the paint and repaint	Scrub the paint and repaint	Scrub the paint and repaint	
External finishes	Replace broken mangalore tiles.	Repaint the steel trusses and components	Repaint the steel trusses and components	Replace worn out steel plates and bolts	
Roofing	Replace the worn out soft ceiling board.				
Trusses and purlins					
Ceiling					
Landscaping	Plan for vehicular parking. Introduce more pedestrian paths to encourage walking from the headquarters to the station as well as other places. Introduce more plants.	Landscape by regular maintenance of soft and hard landscape. Introduce new soft landscape	Landscape by regular maintenance of soft and hard landscape. Introduce new soft landscape	Plan the landscape to enhance the present utility. Replace the worn out hard landscape	
Cost Estimates *	Ksh 12,000,000:00	Ksh 10,000,000:00	Ksh 9,000,000:00	Ksh 7,000,000:00	Ksh 30,000,000:00
Responsibility	Owner and the National Museum of Kenya	Owner and the National Museum of Kenya	Owner and the National Museum of Kenya	Owner and the National Museum of Kenya	Owner and the National Museum of Kenya

Source: Author, 2009

Proposed Source of funds

The stakeholders have to pledge to contribute the following amount of money for conservation exercises of the Kenya Railway Headquarters

- Kenya Railways -25% of the total cost
- National Museums of Kenya - 40% of the total cost
- Ministry of Transport & Tourism- 35% of the total cost

* (rate doller to a Ksh is 1=80)

Method

- This study used visual techniques and site inspections
- Personal and stakeholders interviews
- Secondary information and documentaions

Current Status of Work done

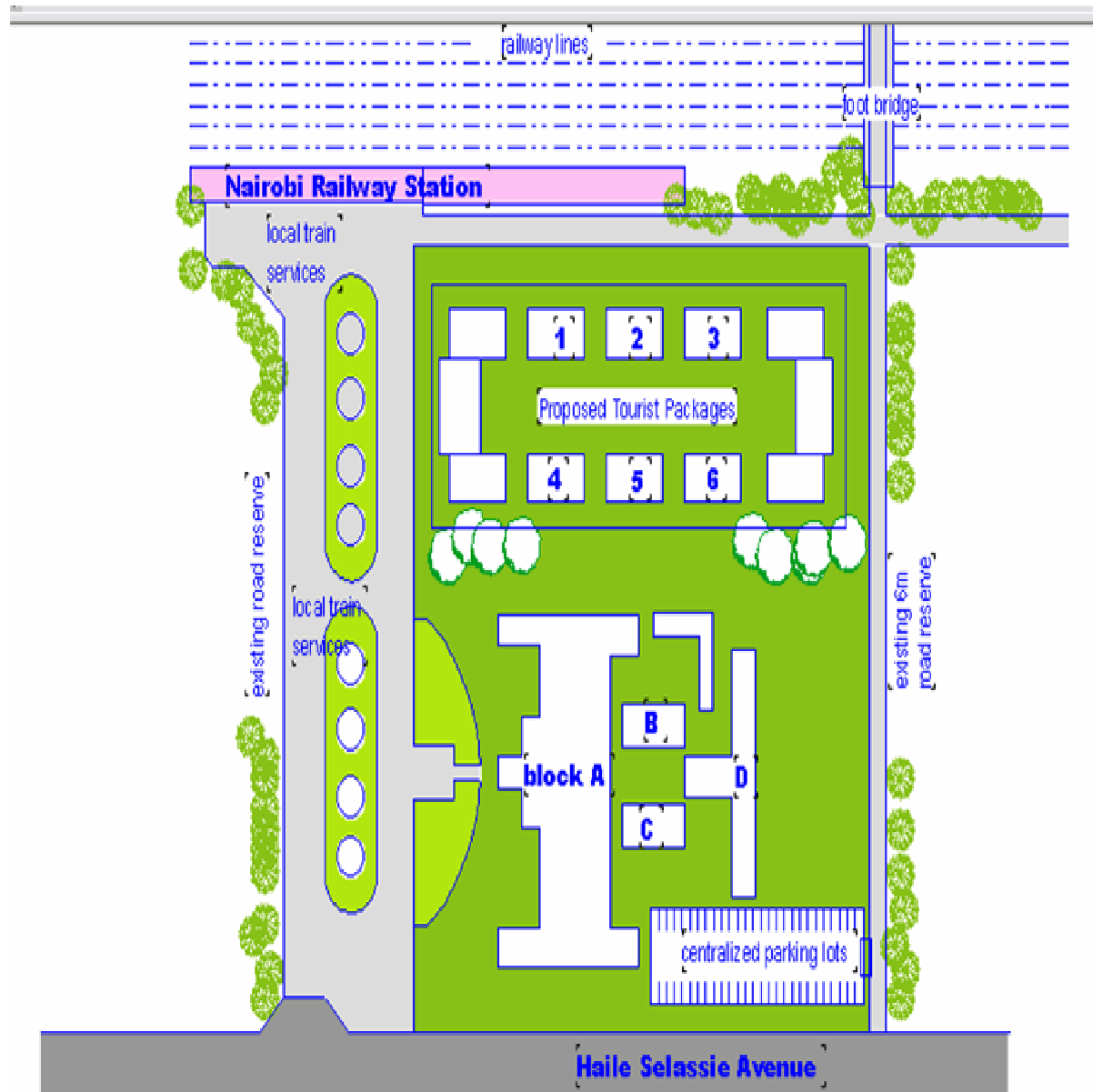
The building under the guidance of both the Chief Engineer and Curator has a maintenance programm that is randomly conducted depending on availability of funds. The following are maintained occasionally: Staircase, floor and walls

Urban Renewal plan for Kenya Railway Headquarters

Renewal urban planning for Nairobi Railway Headquarters

Proposal:

- Centralise the vehicular parking into one parking lot as shown in the diagram above.
- Encourage pedestrian access in the site by pedestrianizing the roads that branch from the Haile Selassie Avenue.
- Separate tourism packaged services from the local train services.
- Add greenery into the site



Discussion and Conclusion

During the study, a number of issues were highlighted through the interviews and study reviews:

- The urban renewal plan might change the functional use value of the building.
- Direct economic interests in land speculations and new constructions, at the moment in Kenya leading to neglect of historic buildings.
- Rapid Urban development should not be encouraged at the expense of historic building in urban centers. It has been a matter of concern for the National Museum of Kenya to otherwise stop private developments on conserved properties sometimes with little success.
- In the case of the Kenya Railway Headquarters it is important to educate the public on the values of this historic building by providing educative seminars, exhibitions and public showcases of the history of railway transport in Kenya.
- The Kenya Railway services should be expanded to serve the public in other aspect of transportation and services so that the public interact with the cultural property and in so doing the management will have enough revenue for conservation.
- The physical planning Act supercedes the The Monument Antiquities Act and alot of emphasis is placed on planning of new developments vis vi conservaton of historic buildings.
- Alot of time was wasted due to buracratic nature of government run organisations in trying to obtain permission to take photographs, conduct interviews and access of information such as buildings plans and old photograps.
- Most of the information of the building is not stored properly (building plans, photographs) and a lot of this will be lost or destroyed over a number of years.
- Emphasis by the administrator was placed on storing information on the tracks and wagons vis vi the buildings' data.
- The numerous policy changes in the transport sector that saw the concessionering of the railway sector by two countries (Uganda and Kenya) has led to retrenchment of it's wokers, disposing off of Kenya Railway's other prime properties to the private sector. This has eventually led to under utilization of office space at the KR HQs building.
- Lack of information on conservation of heritage buildings among policy makers and the general public at large, thus there are very few people who can competently handle the conservation of heritage buildings Kenya.

- Due to the above, there is little funding set apart for conservation purposes either through central government or private sector.
- Lack of past records of maintenance programmes and plans by the administrator made it difficult to obtain any budget spent in the past or types of materials used on the building. This report will be presented to the Kenya Railway HQs to assist them in the conservaton and management of the building in the future.

Lesson learnt from the conservation exercise

- Buildings like people change, and with the passage of time and eventually in the sense of might have no particular value.
- The rate of decay of a cultural property is dependent on several dynamic factors ranging from tectonic movement to negligence from preservation.
- Rapid urban development brings more traffic flow and towering buildings that threat the aesthetic quality cultural properties located in the urban areas.
- Aurgument for conservation practices in developing nations can prove very difficult. This is due to the fact that the larger population do not recognize the values that such building exhibit.
- Manmade forms of decay have been the most destructive in the case of Kenya Railway headquarters. However the modes of preservation ranges from cleaning the floor to legislation on public pollution policies.
- It is important to note that the works of conservation should not only be done by the curators but also by the community. The community should be enducated on the values of the cultural property and importance of conservation.

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Appendix 1 Climate

Although Nairobi is only 90 miles (145 km) south of the equator, it has a fairly moderate climate, largely because of its high altitude (5,500 ft/1,680 m). The summer months are sunny and warm without blistering temperatures, while winters are mild to cool, with very chilly evenings. Rainfall is also moderate, the wettest part of the year being late summer to autumn, when cloudy, drizzly days are common.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Rainfall (mm)	55	50	77	198	159	40	15	19	25	50	129	85
Rainfall (inches)	2.2	2.0	3.0	7.8	6.3	1.6	0.6	0.7	1.0	2.0	5.1	3.3
Min Temp (°C)	11.6	12	13	14	13	11	10	10.7	11	12	13	12
Max Temp (°C)	25	26	26	24	22	21	21	21	24	25	23	23

Appendix 2

