

MAKERERE UNIVERSITY INFRASTRUCTURE MASTER PLAN



FINAL DRAFT DESIGN REPORT

VOLUME-I

SUBMITTED BY:



TECHNOLOGY CONSULTS LTD Consulting in Architecture, Computing, Engineering, Surveying & Planning

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ACRONYM

CAES	College of Agricultural and Environmental Sciences	МАК	Makerere University
CEES	College of Education and External Studies	EIA	Environmental Impact Assessment
CEDAT	College of Engineering, Design, Art and Technology	БКМРА	Greater Kampala Metropolitan Plan
CHUSS	College of Humanities and Social Sciences	GTZ	Deutsch Gesellschaft Technische Zus
CHS	College of Health Sciences	IDI	Infectious Disease Institute
CoVAB	College of Veterinary Medicine, Animal Resources and Bio-Security	NEMA	National Environment Management A
CoCIS;	College of Computing and Information Sciences	MTN	Mobile Telecommunications Network
CoNAS	College of Natural Sciences	UTL	Uganda Telecommunication Limited
NCHE	National Council for Higher Education	08M	Operation and Maintenance
TECO	Technology Consults Ltd.	ASL	Above Sea Level
RTK	Real Time Kinetic	FST	Food Science and Technology
GPS	Global Positioning System	ADT	Average Daily Traffic
KCCA	Kampala Capital City Authority	MISR	Makerere Institute of Social Researc
SWOT	Strengths Weakness Opportunities and Treats	KWh	Kilo Watt Hour
DICTS	Directorate of Information and Communication Technology	ISAE	Institute of Statistics and Applied Ec
РРА	Physical Planning Act	EASLIS	East African School of Library and Ir
Μ	Meters	CREEC	Center for Research in Energy and E
SQM	Square Meters	ECM	Energy Conservation Measures
MUARIK Makerere University Agricultural Research Institute Kabanyolo		USE	Universal Secondary Education
МЦК	Makerere University Kampala	UPE	Universal Primary Education
UTM	Universal Transverse Mercator	AFRISA	Africa Institute for strategic Animal
MOH Ministry of Health		MIENR	Makerere University Institute of Env
MDES	Ministry of Education and Sports	FEMA	Faculty of Economics & Management
MOW	Ministry of Works	IACE	Institute of Adult External & Continui
MLHUD	Ministry of Lands Housing and Urban Development	MDD	Music, Dance & Drama
GIS	Geographic Information System		
UCB	Uganda Commercial Bank		
IS	Instructions to Survey		
ICT	Information and Communication Technology		
80	Acres		
Km	Kilometer		
ha	Hactares		
NWSC	National Water and Sewerage Corporation		
VC	Vice Chancellor		
DVC	Deputy Vice Chancellor		

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EXECUTIVE SUMMARY

BACKGROUND

The current university infrastructure is aged with most of it outside the acceptable economic lifespan. Over the years there has been increased enrolment of students from 22 students in 1922 to over 40.000 currently. The present day population at the main campus is 50,000. This high population is faced with problems of inadequate facilities and lack of circulation space. The satellite campuses also lack facilities and guiding framework for expansion. This situation has resulted in improvising of lecture areas to halls of residences and other buildings not fit for teaching environment, reactive response to operation and maintenance of the aged infrastructure.

Issues regarding space allocation are handled in an adhoc manner without due consideration of the overarching development strategy leading to cluttered and uncontrolled kiosks, business and traffic that does not support the university cardinal business of teaching and research.

The overall project objective of this consultancy is to develop an infrastructure Master plan for the three (3) Campuses of Makerere University thus: The Main campus located on Makerere Hill, 5 km from the City Centre; The 9 acre campus of the College of Health Sciences located on Mulago Hill adjacent to the National Referral Hospital; and the 72D acres Agricultural Research Institute, Kabanyolo located about 19kms from Kampala in Gayaza.

The scope of services for the assignment comprised of Specifically, consultancy services for the preparation of an infrastructure master plan for Makerere University and mainly involved:-

- a. Undertaking a comprehensive inventory of the utilities, roads, land, buildings and other assets;
- Review key documents including the University Strategic Plan (2008/09-2010/19), Physical Plans, Technical advice on investment on University land (2009), Utilities audit report (2010), Master Plan for physical rehabilitation of Makerere University (1993);
- c. Propose master plan for development and maintenance benchmarked with comparable universities in size and rank according to the webometrics reports;
- d. The master plan will include proposals on landscapes/ structures (roads, open spaces, signaling, demonstration sites, galleries, business centers, museums, herbaria and aquaria), academic spaces, electrical, backup power and lighting, water drainage infrastructure.
- e. Carry out infrastructural risk analysis and proposals aimed at mitigating fires, lightening etc;
- f. Prepare costs of implementing the master plan;
- g. Prepare action, activity and indicative project plans;

Report organisation

This report is Volume-1: **Infrastructure Master plan Report**. This is the main report and it's supplemented by separate corresponding volumes (II-V).namely

Volume-II: Mechanical & Electrical Report

Volume-III: Road Design & Drawings Report

Volume-IV: Geotechnical Investigations Report

Volume-V: Bill of Qualities & Cost Estimates

DECEMBER 2013

This Volume-I Infrastructure Master Plan Report It comprised of five (5) chapters namely;

Chapter One: this takes into account the background, project alignment with Makerere University and a review of various reports and documentations

Chapter Two (2): Situation Analysis, Inventory Findings & Needs Assessments represents the critical comprehensive inventory of land, existing detailed land use, environment, utilities (road, transportation and traffic analysis), power (electricity supply and distribution), water supply and distribution network and sewer as well building inventories.

This chapter also take into analysis of the existing space requirements in relation to current and projected students and staff numbers to be accommodated at the campuses. It also gives a reference to national planning standards as well as other key references from universities as far as space requirements are treated. The existing landuse at main campus is dominated mainly with living accommodation and academic use occupying 132.26 acres approximately 44.29% and 76.02 acres approximately 25.46% of the total main campus land acreage. The high percentages of residential /accommodation landuse has led to the decrease in the earlier planned green space, adhoc set up academic building and continual existence of dilapidated residential units. The residential/accommodation use occupy valuable space that is suitable for academic functions and students external study environment. The academic buildings are congested around at the college of education and external studies, and at the ridge.

The building inventory revealed that most of the buildings were set between the 1950 & 60's require complete overhaul especially the residential houses and require high costs in renovations and repairs.

The existing roads network is old and with expired design life, It has a total of 18km with various surface finishes that's tarmac and gravel surfaces, alignment with linear and sharp bends and Junctions with narrow reserves of 4-6m. The roads have blocked /broken and poor drainage, worn-out surfaces, potholes, worn-out sidewalks, road signage, names and lighting and road furniture to meet the current traffic and future road users demands. The existing parking lots have worn-out surfaces, no parking lot markings and unlit. They are over stretched with vehicular volumes and has led indiscriminate parking behaviours on lawn/green spaces, sidewalks and damaged kerblines

Traffic survey findings reveals that the presently Makerere university generates an average daily traffic of 12,875 vehicles per day for both in-bound and out-bound traffic taken at the three vehicular access gates of the university main campus. This is a high traffic volume for any institution the university whose core functions academic & research functions. This has resulted into chocking of traffic flow within the university, high noise levels from running engines and hooting; and increased carbon emissions.

The Origin-Destination traffic surveys for in-bound traffic indicated that most of the in-bound traffic (57.7%) that enters the University has completely no business within Makerere University and use University roads to access other areas while only 42.3% of the total in-bound traffic has purpose for using university roads as their final destination place is Makerere University. The results reveal that the average daily traffic for the in-bound traffic gives a total of 3,894 Vehicles that use the university roads to access other destinations. This also exerts more pressure on the already old and worn-out university roads and makes it degenerate faster .than normal

Water Supply

The university Main campus is entirely serviced by piped water network from National Water and Sewerage Corporation is the sole source of water supply, accessing the campus through six direct entries of bulk metered piped water mains. The six entries are located along Bombo road, Makerere hill road, Jjunju, and Muganzi-Awongererwa roads. Out of the six direct water entry points whose pipe diameters range from 50mm to 200mm; four are fully utilized; while the two are not utilized, leaving the three entries, No. 2. 3 and 4 to supplement the observatory hill central five water reservoirs (entry no. 1) which in turn distributes water to the campus by gravity through pipe interconnections.

The materials to these pipes differ from: Galvanized mild steel pipes, impregnated Bitumen Steel Pipes, Asbestos pipes, HDPE (High density polyethylene), to UPVC (Unplastiside Polyvinyl chloride)

Currently, on average the campus uses 1.700m³ per day, among the population of 40,000. According to the usual water consumption: the capacity to be used per day on campus could have been 4.000m³. Therefore, there is a short fall of 2300m³: necessitating expanding the reservoir capacity as already in the action plan interventions more details in volume-II of the Mechanical & Electrical report.

Fire Hydrants: There are approximately eleven fire hydrants points set up in 1960 & 70's installed near buildings/infrastructures with the aim of collecting water to combat fire outbreak, through motorized vehicles; but most of their functionality is doubted as they covered during road repairs and had never been traced back where as others faulty, this makes the university depend on only one functional hydrant in case of fire breakout.

These could be reviewed, upgraded in line with the expanding facilities and infrastructures in relationship to the campus population growth; and in consideration of modern technology

Sewer: The disposal of sewage from Campus is by means of water borne sewerage system through subsurface main sewer pipe lines and lateral drain of approximately 6000m pipe line. The campus has not approximately seven (7) visible sewer pipe exists: Sections of the sewer lines laid across the Campus towards Bombo Road, other section are located at the slopes of Kasubi View/West Road staff quarters, others towards Makerere hill road; while some flow towards Muganzi-Awongerererwa road which subsequently all discharge their effluent by gravity to the National Water and Sewerage Corporation Conventional treatment plant located at Bugolobi.

The Sewer line is mainly composed of glazed earthen ware, pitch fibre and of the late to the less extent PVC pipes (unplastiside polyvinyl chloride) have been introduced, in all ranging from 160mm to 175mm in diameter.

Lateral drain pipe lines are mostly composed of asbestos, cast iron, earthenware, pitch fiber and PVC pies; (unplastiside polyvinyl chloride) mainly all in 110mm diameter.

Both main sewer line and sections of the lateral drains are believed to have been laid during the inspection of the university status by Kampala Water Board during that time. The above observation, and in relationship to the new infrastructure developed, coupled with population growth, the drainage system needs improvement, expansion so as to be effective.

Energy Use & Power Supply

The Makerere University Main Campus receives Hydro-power supply from two main lines running along the Makerere hill road and Bombo road.

Building Inventory

The main campus has a diversity of buildings with different type, sizes, height and architectural form and building material spread through-out the campus performing various function. The existing building inventory revealed a total of 547 buildings of different architectural form and sizes

Academic Buildings are the core activity of the main campus: these are carried out in various institutional buildings at various colleges and school. They cover a total area of 47205.3 m² about 32.9% of the total area.

Residential Buildings. The current status of residential buildings range from single unit, semi-detached, flats and bungalows spread throughout the main campus. Staff Residential buildings occupy higher proportion of space on building coverage at the main campus with about 55.3% a total of 28871.67m² of the total university area of built-up space.

Students accommodation occupy 8.4 % of the total gross area of built-up space about 22465.45 m² the existing spaces for students accommodation is relatively low making students accommodation sprawl around the outskirts of the main campus boundary in the areas of Kikoni, Wandegeya, Bwaise, Kagugube, Kivulu, Katanga and Nakulabye areas

POPULATION BEHAVIOR & PROJECTION: SPACE REQUIREMEENTS & NEEDS ASSESSMENTS

The student population of Makerere University between 2007/2008 to 2013/2014 is analyzed based on the Makerere University Strateoic Plan 2008/09-2018/19 orowth rate. Under the colleciate structure, the former faculties/schools and Institutes that form the current individual colleges were amalgamated, that make up the nine (9) colleges and school of Law. The results showed that the Average student population growth per annum is 4%. This growth rate was determined as a basis to project student growth rate.

This is on assumption that under the collegiate structure, new courses have been introduced. The trends of the student growth rate are as briefly shown below:

- In the Short Term perspective between 2013/2014 up to 2018/2019 (5 years) this is a period that checks the implementation of the strategic plan. It was assumed that the analyzed growth rate would be maintained and that there would be no expectations of drastic and rapid increase in the student population growth.
- In the Medium Term (2018/2019 to 2027/2028), when infrastructure investments of the short term have been possibly made, the rate of growth was assumed at 4%. The Medium Term, the rate is a steady rise and that at this time, a number of infrastructure and facilities are in place and supportive of a bigger student population.
- In the long term (2028/2029 to 2043/2044) it takes two folds, the population growth continues with a steady growth rate of 4% to 2028 to 2039, and constant population rate between (2039/2040 to 2043/2044) is at its optimal infrastructure utilization and orows steadily for the 30 year master plan period.

The population at Makerere University is currently estimated at 43,431 students and projected under collegiate structure in the next 30 years planning period 90,271 students.

The University is projected to accommodate a student population of 90.271 Students: College of Health Sciences (CHS) 3.979 and College of Agriculture and Environment Sciences at Kabanyolo (CAES) with 8.591 students for the Master plan time horizon of 30 vears

Existing Students Science Laboratory and Lecture Space Facilities By College

The Facilities for Lectures, Laboratories, Workshops, Library and ICT and Conferences, are inadequate to accommodate the current and future university demands.

- The current student to space ratios are below the acceptable with exception of CoNAS and CoVAB with acceptable standards of required Science Laboratory Space of 1 : 2.23 and 1 : 2.05 m² per student respectively but fall short on lecture space 1 : 0.82 m² and 1 : 0.67 m² per student for CoNAS and CoVAB respectively. CEDAT has a ratio 1:1.22 m² per student but fall short on Science laboratory space with 0.8 m² per student.
- Other colleges are even in unacceptable status falling below 0.3m2 per Student with the worst state at CoBAMS 0.16 and CEES with 0.25 m2 per student
- The college of Health Sciences at Mulago with 0.62m2 per student of laboratory space and 0.64m2 per student of Lecture space where as the
- College of Agriculture & Environment Sciences (CAES) has 0.76 m2 per student for laboratory and 0.42 m2 for lecture

The situation on the existing academic spaces is below the acceptable standards as per the NCHE space requirement checklist and standards

The master plan intends to address the academic spaces deficiencies to adequately meet the Makerere university staff and students space requirements. The size of Facilities should be commensurate with their type of use and according to standards specified. For example workshops should be tailored to their use e.g. Mechanical workshops should be designed with large rooms to accommodate specialized equipment for training such as pulley systems, cranes, conveyor belts among others. Electrical workshop too to be equipped with specialized electrical equipment for training

THE REQUIRED SPACE FOR PLANNING

The Space needed for academic use to adequately accommodate students over the successive years through the master plan implementation process, a deep analysis into space requirements for every stage of implementation of the Master plan for all the Colleges and School of Law taking into consideration the increase in the students number from 2013/2014 to time horizon of 30 year plan (2043/2044)

The increase in the students numbers should be relative to the infrastructure and space development to meet academic, research and an ambient environment for students and staff study and work.

In the Short/Immediate term (2013/2014 to 20182019) for 48.365 student population, the required Additional space is 101.277 m^2 taking into account the $lm^2/$ per student inclusive of 33.243 m^2 of current lecture space deficiency to address the current (2013/2014) space deficit: and the **required Science Laboratory space is 19.669 m2**.

In medium term to achieve the Good status (2018/2019 to 2028/2029) for 71.592 students, the **required additional space is 201.414** m² at 2.0 m²/ student for lecture space: and **58.230** m² at 2.5 for science Laboratory

In the Long term phase to achieve the Ideal status (2029/2030 to 2043/2044) for 90,271 students, the required space for the Science laboratory 110,135 m² and 225,677 m² for Lecture spaces. Making a total 335,812 m²space requirement for attaining ideal status as per NCHE standards checklist and quideline

Chapter III: MASTER PLAN CONTEXT AND STRATEGIC INTERVENTIONS

The Master plan has been designed as a collegiate University taking into consideration; the provision of teaching and research spaces within colleges. This is an integral component in the arrangement of spaces for support facilities, recreational, administration as well as students and work environment for staff

The Master Plan responds to the issues in chapter two (2) while maintaining a flexible framework for growth in the future. Although the Master Plan diagrams indicate specific locations, configurations of building and site components, it is more important to understand the key concepts that the Master Plan is attempting to achieve. These are as follows:

- -**ф**-Develop under a collegiate and commercial concept; concentrate departmental buildings and new buildings under same space use and arrangement.
- Re-arrangement of institutional operational spaces and moving some staff accommodation off-campus to increase on the . • institutional spaces for new development and future expansion
- -**ф**-Develop College of Agriculture and Environmental Sciences (CAES) as a complete functional college off-main campus at Kabanvolo
- Re-development and arrangement the College of Health Sciences at Mulago Campus (CoHS) with operational academic, -фresearch and administrative spaces through multi-purpose storey buildings
- -ф-Internal circulation between buildings shall be sufficiently wide to accommodate large volumes of Pedestrian traffic, cycles and vehicular traffic to create opportunities for student life space.
- -. Develop larger, more purposeful multi-purpose buildings, with the exception of specialized laboratories
- -ф-Densification of residential building developments to form apartments and accommodate more staff as opposed to horizontal and bungalow developments at the campus
- Enhance equitably the walking experience across the campus and linkage between the buildings and functional external spaces
- Expand surface parking in a logical manner with common parking facilities rather than on-street and at individual buildings -фthat further stretches the ever diminishing green spaces
- -ф-Beauty and aesthetics of the campus has strongly been considered in the master plan for adequate functionality of spaces between the built -up environment and oreen spaces have to be integrated with a consciously for students out of class reading, relaxation and interaction as well as recreation.

Proposed land-use for the master plan entail The proposed facilities include;

- Administration Blocks
- Academic spaces (Collage arrangement) with central teaching facilities
- 💁 Library
- Laboratories and workshops
- Commercial and Retail Complexes with Banking, privately operated shops (computer accessories), clinics/pharmacies, super markets, fresh food groceries, shopping malls
- 📴 Parking Area, Pedestrian access, Vehicular access. Sheltered walk ways.
- 5 Students Green Parks
- 😰 Staff Residential Housing Apartments
- **10** Sports facilities and Open recreational Spaces
- 😰 Botanical /Herbarium Gardens
- **W**orship centers
- 💶 A five star Hotel
- Museum
- Directorate of ICT
- 🖸 Water hydrant points and fire assembly points at all colleges
- 😰 Facilities to cater for the special needs of the disabled and other groups in the society
- 😰 Solid Waste Holding Bays/Sorting Slab

Academic spaces at the main campus have been expanded based on the space requirements for the 3D year plan horizon. These have been proposed in relation to their constitute colleges of the university for the nine (9) colleges that include; College; College of Business and Management Sciences (CoBAMS); College of Computing and Information Sciences (CoCIS); College of Education and External Studies (CEES); College of Engineering, Design, Art and Technology (CEDAT); College of Humanities and Social Sciences (CHUSS); College of Natural Sciences (CoNAS); College of Veterinary Medicine, Animal Resources and Bio-Security (CoVAB); College of Health Sciences (CHS); and one (I) School of Law (SoL). *Reference to Table and Annex A-9: Proposed Master Plan Zoning Plan*

Academic use has been expanded from 76.02 acres (25.5% of the total) to 117.89 acres (40.00%) . this implies that academic spaces expand to the current staff residential areas along Kasubi view on the western side and residential areas on new avenue road and Livingstone Drive & road of the main campus. See *Annex A-9: Proposed Master Plan Zoning Plan*

The college of Agriculture and Environment Sciences to be fully operational at Kabanyolo Campus and the facilities to be allocated to adjacent colleges of CEDAT and CONAS the relocation should be gradual without necessarily causing disruptions of the colleges administrative and academic activities.

The college of health sciences (CHS) at Mulago with multi-functional buildings; the existing, single old storey buildings to demolished and putting up of new buildings in the phase one and two and with long term to Katalemwa

Administration Use: The main administrative areas for Administration, management and central academic functions such main administration (Main building) and Academic affair areas remain un-changed; the current Estates & works department at the equipment stores will be integrated with new students centre block. at the current location of Estates & works department.

Administrative functional areas are proposed to cover 2.18 acres (0.73%) from the current 14.52 acres (4.9%) of the total land cover on main campus

Residential Use: Densification of the proposed residential developments for students and staff while reduction on the residential areas for staff accommodation from the current 99.601993 acres to 32.481 acres .The residential areas for students have been increased from. 32.66 acres to 44.59 acres at main campus this includes expansion of Africa hall and CCE Complex halls so as to accommodate more students

Commercial Investment: Investment areas at the main campus a have been proposed in four (4) sites these are located strategically at the periphery of the university boundary along the major roads for business and investments block A,B & D. block C along Muganzi-Awongerererwa is recommended for students Accommodation/Hostels

Support Facilities & Special Use: Directorate of Information & Communication Technology (DICT) as an independent section has been at a strategic location at the ridge along University road. In the present location of public relations office, Its proposed to cover 1.26 acres should handle to manage among others network in the university and provision of other related services

The University Museum has been proposed at the current location of the current department of social sciences opposite the freedom square, to cover 1.22 acres. Herbarium has been retained in its current location covering 2.61744 acres along Livingstone road.

Community Facilities (Counseling & Wellness Centre; Kindergarten, Primary, College School): The university supports communities in the neighbourhood through provision of educational institutions at lower level such as Kindergarten, Makerere Primary school and Makerere college school, these have been retained at the university; and proposed a wellness& counseling centre

Waste Management: The waste management facilities should be located as close as practicable to the origin of the waste, subject to acceptable impact on amenity. The handling, treatment, transport and disposal of waste will be carried out to the highest environmental standards practicable.

ENERGY USE: Academic, Commercial and residential development should be designed such that a minimum of 10% of the energy requirement is provided by renewable resources. The use of combined bio-mass similar technology will be encouraged, at Kabanyolo and for all developments in excess of 5,000 sq m floor space should be regarded as the norm.

Conversion overhead electric cable to underground cables as well as extension optical network cabling to un-served areas & new/proposed buildings

Heritage Protection and Conservation: Makerere University's valuable cultural heritage of buildings, sites and landscapes will be conserved and enhanced. Heritage resources are irreplaceable and development affecting them will only be permitted where it has been clearly demonstrated that there is an overriding need for the proposal which outweighs the need to protect the heritage interest, and that no alternative is possible.

a) Landscape

The quality of landscape in its Natural Beauty and Landscape should be conserved and enhanced; development inconsistent with the primary aim of conserving the natural beauty of the landscape to be resisted. Major development will only be permitted where it has been clearly demonstrated that the need for development has no alternative site.

New development will be expected to maintain the existing character of the area particularly within the locations that are adjacent site to be developed and retain the distinctiveness

Development will be expected to contribute to improvements to areas/sites where landscape is becoming degraded, especially on the parking areas and deep excavations could be avoided during constructions.

b) Protecting of indigenous trees

Proposals for new development will be expected to show how new planting and existing trees will be effectively managed and integrated, Development associated with the positive long term management of indigenous tree resources will be encouraged.

c) Tourism Development

The university is a prestigious institution simply due to its rich History and strategically location in Kampala capital city; Tourism development will be encouraged in the university, through small scale tourism in preservation and conservation of Historical building not only based one there history but also as iconic, unique architectural form; others should to be preserved to maintain and preserve heritage. Other site in CoVAB department of wildlife-Gorilla simulation center, university museum at CHUSS are to be introduced and diversification or the retention of buildings contributing to the character of the rich history of the university to be conserved and preserved to last through generations, among these buildings Dosate building at CEES, ivory building, MUINER building, Zoology & Botany department buildings should be preserved.

Road Improvements: on the road network to cater for various road user; improvements on the entrances into the university and provision of common central parking areas; provide pedestrian walking areas and cycle lanes to link between the various institutional buildings.

- a) Entrance/Main Access into the University: The main gate access has been widened, enhanced with canopy, security check points and record shelter; the design can easily integrate with security system such as fixed CCTV cameras that can be fixed at canopy and scanners, the design is enhanced with grandness and unity with rhyming themes of the main ivory tower
- b) Main Access Road: The main university access road have been widened and separated with island; segregation of traffic and cycle lane and pedestrian side-walks with gazatted crossing point at CCE complex hall and University Mosque, parking along street and drop-off is prohibited along the Main Access Road.
- c) University Road The University road from CCE complex round about to Main Building has been maintained as one way and separated pedestrian side-walks with crossing points, and cycle lanes. It has been proposed with drop-off points and parking along the street is prohibited and with tree planting avenue/and landscaping areas of shrubs and bench areas

CHAPTER IV: IMPLEMENTATION STRATEGY AND OPTIONS FOR DEVELOPMENT

The implementation period for the master plan is thirty (30) years. It is thus imperative that development is prioritized over a 30 year horizon through phasing of the implementation at particular stage options.

Phasing

Phasing of developments forms an integral and vital part implementing the master plan. Having development options allows essential the physical infrastructure to be developed strategically, economically and in an orderly manner. The phasing of this master plan shall be based on three development options that is to say short term, medium term and long term as indicated in table below. This turns out to be most viable and feasible alternative as no wholesale development may be possible at once.

Chapter V: Conclusions & Recommendation

The total cost of the road network, parking and excavation to formation levels for houses is 32 billion: Main Campus 13.3 billion; Kabanyolo Campus 17.2 billion and Mulago Campus 1.4 billion. Retaining walls are recommended for fills and cuts above 2m. Other than the vegetable soil fill that shall be stripped, most of the cut soil shall be used as fill material. The vegetable soil should be stock piled and used at a later stage while grassing. Tree planting and grassing is recommended for the entire campuses to reduce on the erosion into the closed/covered drainage to minimize blockage and for beautification.

CHAPTER ONE: INTRODUCTION AND BACKGROUND

1.0. INTRODUCTION AND BACKGROUND

1.1 OVER VIEW

The draft final report is submitted as a partial requirement under the contract for the "Consultancy Services for the Preparation of Makerere University Infrastructure Master Plan".

1.2 BACKGROUND

The current university infrastructure is aged with most of it outside the acceptable economic lifespan. Over the years there has been increased enrolment of students from 22 students in 1922 to over 40.000 currently. The present day population at the main campus is 50.000. This high population is faced with problems of inadequate facilities and lack of circulation space. The satellite campuses also lack facilities and ouiding framework for expansion. This situation has resulted in improvising of lecture areas to halls of residences and other buildings not fit for teaching environment, reactive response to operation and maintenance of the aged infrastructure.

Issues regarding space allocation are handled in an adhoc manner without due consideration of the overarching development strategy leading to cluttered and uncontrolled kiosks, business and traffic that does not support the university cardinal business of teaching and research.

The current practice of project planning is unstructured with discrete contracts with impact only limited to a small extent of the infrastructure and therefore not causing any substantial impact. The University Strategic Plan 2008/2009-2018/2019 emphasises investment in internal income generation especially utilizing the prime pieces of land and property owned by the University to be able to address issues of financing. This can only be achieved by with a master plan in place.

It is against this background that M/s Technology Consults Ltd. was awarded the contract to prepare an Infrastructure Master plan for Makerere University.

1.3 PROJECT ALIGNMENT WITH MANDATE OF MAKERERE UNIVERSITY

1.3.1 Introduction

The requirement to undertake the preparation of the infrastructure Master plan is in line with the Mission. Vision and the Strategic objectives of Makerere University. It is imperative that for MAK to offer quality and equitable education to her students, the teaching, learning and research environment should be in line with the strategic plan of the University.

1.3.2 Project Objectives

The overall project objective of this consultancy is to develop an infrastructure Master plan for the three (3) Campuses of Makerere University thus: The Main campus located on Makerere Hill, 5 km from the City Centre; The 9 acre campus of the College of Health Sciences located on Mulago Hill adjacent to the National Referral Hospital; and the 72D acres Agricultural Research Institute, Kabanyolo located about 19kms from Kampala in Gayaza.

1.3.4 Assignment Scope of Services

The scope of services for the assignment comprised of Specifically, consultancy services for the preparation of an infrastructure master plan for Makerere University and mainly involved:-

- a. Undertaking a comprehensive inventory of the utilities, roads, land, buildings and other assets:
- b. Review key documents including the University Strategic Plan (2008/09-2010/19), Physical Plans, Technical advice on investment on University land (2009). Utilities audit report (2010). Master Plan for physical rehabilitation of Makerere University (1993)
- c. Propose master plan for development and maintenance benchmarked with comparable universities in size and rank according to the webometrics reports:
- d. The master plan will include proposals on landscapes/ structures (roads, open spaces, signaling, demonstration sites, galleries, business centers, museums, herbaria and aquaria), academic spaces, electrical, backup power and lighting, water drainage infrastructure.
- e. Carry out infrastructural risk analysis and proposals aimed at mitigating fires, lightening etc:
- Prepare costs of implementing the master plan: f
- Prepare action, activity and indicative project plans: q.
- Prepare lay outs of proposed infrastructural plans h.

1.4 Historical Background and Development of Makerere University

Makerere University is one of the oldest and most prestigious Universities in Africa. The University was established in 1922 as a humble technical school. The school was later renamed Uganda Technical College. It expanded over the years to become a Center for Higher Education in East Africa in 1935.

In 1937, the College started developing into an institution of higher education, offering post-school certificate courses. In 1949, it became a University College affiliated to the University College of London and in 1963; it became the University of East Africa, offering courses leading to general degrees of the University of London.

With the establishment of the University of East Africa on 29th June 1963, the special relationship with the University of London came to a close and degrees of the University of East Africa were instituted. On July 1, 1970, Makerere became an independent national university of the Republic of Uganda, offering undergraduate and postgraduate courses leading to its own awards.

On 17th December 2010, The Makerere University Council approved the Senate recommendation to transform Makerere University into a collegiate university.

This transformation was aimed at improving service delivery, enhancing quality and effectiveness by dividing functions between the central administration of the university and viable constituent colleges.

The Uganda Gazette of Friday 30th December 2011 Vol. CIV No. 76 containing Statutory Instrument No. 68 - The Universities and Other Tertiary Institutions (Establishment of Constituent Colleges of Makerere University) Order, 2011 officially declared the transition.

The Constituent Colleges that have been established by the Statutory Order No. 68 in accordance with Section 29 (1) of the Universities and Other Tertiary Institutions Act, 2001 are indicated in the Schedule as follows:

- College of Agricultural and Environmental Sciences (CAES) 1.
- 2. College of Business and Management Sciences (CoBAMS):
- 3. College of Computing and Information Sciences (CoCIS):
- 4. College of Education and External Studies (CEES):
- 5. College of Engineering, Design, Art and Technology (CEDAT);

DECEMBER 2013

- College of Humanities and Social Sciences (CHUSS): 6.
- 7. College of Natural Sciences (CoNAS); and
- 8. College of Veterinary Medicine, Animal Resources and Bio-Security (CoVAB).
- The College of Health Sciences (CHS) was established on 1st December 2007 under the "Universities and Other Tertiary 9. Institutions Act (Establishment of College of Health Sciences, Makerere University) Order, 2008.
- 10 The School of Law

1.6 REVIEW OF THE PREVIOUS PLANNING INTERVENTIONS

161Preamble

The University has a rich history and it's imperative to appreciate its diversity and efforts in the development, control, organization since its establishment.

The Infrastructure Master Plan intends to comprehensively address the orderly and development arrangement on the three campuses.

Various documents/drawings and reports have been laid down with a range of recommendations deliberately aimed at meeting and improving the changing institutional challenges on infrastructure, user space requirement and ever increasing student and staff numbers and needs; as well as creating ambience Institutional environment. These include;

1.6.2 Strategic Plan 2008/09-2018/19

The strategic plan 2008/09-2018/19 provides an insight of the university's direction in the next ten (10) years.

It states the main goals and objectives of the university and core functions of teaching and learning, Research and Innovation, and knowledge transfer partnerships and networking

The strategic plan also puts forward measures of achieving its objectives among which ensuring efficient and effective organizational and management environment, as well as developing her infrastructure to match her functions.

The preparation of the Infrastructure Master plan is geared to meet the core functions of the University for the present, and long term development of the university infrastructure to match user requirements.

1.6.3 Physical planning and Space Audit 2007

This is the most recent study, that made the following recommendations:

- a) Recommended urgent need for a Master plan to address the infrastructure demands,
- Intensive use of the existing buildings and land before permission to build elsewhere can be granted b)
- Infill development between and within existing buildings to augment academic space be encouraged and allowed to actively take с) place on the main campus.
- d) Academic and multi-user general buildings be built and concentrated within the center of the campus along the ridge, while residential and recreational buildings be spread along the perimeter.
- e) Zoning of unit-specific areas be done throughout the campus and adopted for their future expansion.
- In places where academic and residential areas are heavily mixed in a disproanized manner, the **later should be remodeled** in f) favour of the former.

- Old and spaciously built junior staff quarters to the west of the campus are **demolished to pave way for more modern** income generating ventures such as residential halls for letting or multipurpose student center.
- b) Certain academic units oradually move to off-campus locations: Agriculture, Veterinary Medicine, and Forestry are examples.
- Initiatives to negotiate and gradually acquire lands to the north and east of the main campus from their present owners on a i) win-win basis be blessed by Council and given a priority.
- Physical planning be considered a **continuous and collective exercise** of foresight in an integrated way in matters affecting i) the long-term future of the university.
- k) The post of **Physical Planner** be created within the Estates Department or Planning and Development Department, and a suitable person appointed.

1.6.4 Road network, traffic management and road signage

The physical planning and space audit report also made recommendations on road network, traffic management and road signage that the infrastructure master plan ought to consider after detailed assessments under this assignment. It recommended that;

- a) A **Technical Feasibility Study** followed by a **Detailed Engineering Design** be commissioned for the upgrading and service life extension of all roads on the main campus.
- b) Presently earth and gravel roads be bitumenised to help protect them and reduce cases of dust which could otherwise be harmful to both people and to sensitive equipment commonly found in university laboratories.
- c) The new road design considers widening all narrow roads to 6m width complete with 1.2m payed shoulders on either side for nedestrian traffic.
- d) To improve **drainage** and protect the roads, the **diameter** of all culverts be increased, with none being allowed to be below 600mm.
- e) Road furniture in the form of signs for guidance, warning, ordering and any others be restored and properly mounted and displayed on all roads, including intersections.
- Guidance or directional signs be consolidated and compressed to cater for the needs of multiple units. One large signpost f) can contain names and arrow directions for multiple units and locations on campus. The use of multidimensional and separate signs is obtuse, confusing, and must be stopped.
- a) **Road names** be provided and appropriately mounted on all roads within the campus. The same applies for other estates such as Katalemwa, Kabanyolo, and Buyana. These should be kept simple and devoid of abbreviations.
- h) A comprehensive road inventory and identification codes be created within the estates department for maintenance ourpose. The inventory should include inter-alia: name, location, length, width, shoulders, surface type, intersections, culverts, speed restrictions, service life, etc.
- Traffic Management Study and Safety Audit for the main campus be commissioned through consultants to examine in greater i) detail the impact of the increased number of vehicles on the campus. These can report on traffic flow issues such a: capacity, speed, density, interruptions, accident prevention, etc.

1.6.5 Master / Action plan for Physical Rehabilitation of Makerere University 1993

The Master/Action plan (1993) prepared for the rehabilitation of Makerere University, specifically covered three faculties, that is, Faculties of science (inclusive of institute of computer science); Faculty of Technology and Department of Science and Technical Education-(DOSATE)

This study denotes the university's building history, ground cover, floor space and infrastructure (sewer, water and road network and parking areas). It highlights some buildings especially the staff housings units past their lifespan.

The Infrastructure master plan will assess and undertake a detailed existing condition of the housing adequate to match the present as well as address the long term objectives of the university

1.6.6 Utilities Audit report of Electricity and Water across Makerere University 2011

This study undertook a comprehensive utilities audit purposely to curb increase in the electricity and water bills in the university.

The study revealed that the faculties (now under various colleges and schools) were the highest power consumers with 60% followed by Halls of residences at 21% over 11 months and staff residences at 9.2% and administration buildings at 8.1%. The Infrastructure Master Plan intends to find a solution to reduce on the expenses on power and water and strategies of reductions in the expenses of power and water

1.6.7 Green Space Development Plan 1971

This plan aimed at utilization of green spaces and general landscaping of the university.

The Green space plan noted that ".the city of Kampala and Makerere University are among the most attractive in the world" and the development space must be provided for the university in such a way as to maintain the beauty and uniqueness of the campus

The Infrastructure Master plan seeks to review the previous plans and pretest it for present and future shaping of the institution without necessarily neglecting the unique history and beauty, but with hope to improve the green spaces at the University

1.6.8 University Farm Master Plan (Kabanyolo) 1971

This university farm master plan (Kabanyolo) 1971 was aimed at addressing the rapid expansion of the university farm between 1969 and 1971.

The objective was to organize the farm areas in an efficient functional relationship which would serve the present academic programs and have flexibility of the concept for future ideas. This plan was designed based on four criteria, as follows;

- a. Building functional relationship
- Pedestrian circulation h
- Vehicular circulation С.
- Animal movement and feed supply d.

The Infrastructure Master Plan intends to design formerly Kabanyolo research farm as a complete institution with supportive infrastructure and facilities to support and meet the College of Agriculture and Environmental Science (CAES) future demands and user space requirements

CHAPTER TWD: SITUATUAL ANALYSIS, INVENTORY FINDINGS & NEEDS ASSESSMENTS

2.0. NEEDS ASSESSMENT AND INVENTORY FINDINGS

This assessment focuses on how far the existing infrastructure and facilities supports the administration, academic, accommodation and related functions of the University. The existing University structure and establishment levels, student population and existing infrastructure are considered a reference point for this infrastructure Master plan. It has therefore, been found necessary to capture all these for the base year 2012/2013.

It also takes into consideration administrative, academic and infrastructural requirements were analysed in the three campuses of the university and findings are provided below the findings;

MAKERERE UNIVERSITY MAIN CAMPUS 2.1

2.1.1 LOCATION

Makerere University is located approximately 5kmsfrom Kampala Capital City; seated on approximately 295 acres of land with access road; Makerere Hill road in the North, Jjunju road in Northwest, Sir Apollo Kaggwa to the south, Bombo road to the West and Muganzi-Awongerrwa to the south west. The locality; is blessed with naturally well drained slopes on either side when viewed from the center of the main administration building (Makerere Main Building). The Figure-1 Below Shows The Location Plan Of Makerere University Kampala Campus.



Source: Analyzed by the Consultant

2.1.2 THE CADESTRAL BOUNDARIES OF THE THREE (3) CAMPUSES

Cadastral survey is a prerequisite to land titling. Therefore, during cadastral surveys the boundaries of the institutions land were visited, reconfirmed and set. The University land extents were identified in close liaison with the Estates and User Departments using the most current Records of Cadastral prints from Departments of Lands and Surveys Entebbe and set pillars at the property.

Makerere University Main Campus A

Main Campus located at Makerere Hill is about 5km from the city centre, stretching over approximately 297.58 acres of land. Many small plots were amalgamated into plot 17DA-174A measuring approx 236 acres with other title deed (see table-1 below). There are other small plots on the northern part forming part of the main campus. The main tenure system is freehold, 20% of which is built up and spaced with big trees. It is made of a number of title deeds (see annex A-2; title deed map of main campus & Mulago college of health sciences) that include:

Table 1: Registered Cadastre Deed Plan of Makerere Main Campus

SR	Location	Description	Tenure	Folio Volume	Block	Plot	Size(acres)	R/P
1	Main Campus	Kibuga ,Mengo	Freehold	59/21		170A-174A	236.00	МЦК
2	Main Campus	Kyadondo,Kampala	Freehold	59/22	28	176	0.30	MUK
3	Makerere North	Kibuga ,Mengo	Leasehol d	352/14	28	75	2.60	MCC
4	Makerere North	Kampala	Leasehol d	418/1	28	99	0.20	MCC
5	Makerere North	Kampala	Leasehol d	418/1	28	100	1.92	MCC
6	Makerere North	Kibuga ,Mengo	Freehold	71/19	28	39,38,49,58,60, 68,74,73,78,76, 82,83,84,85,87.	11.30	MCC
7	Makerere North	Kampala	Leasehol d	773/16	28	46	5.20	ULC
8	Makerere North	Kampala	Leasehol d	6/4	28	47	9.70	ULC
9	Makerere North	Kibuga ,Mengo	Freehold	79/22	28	97	6.04	MCC
10	Makerere North	Kibuga ,Mengo	Mailo	NA	28	50	1.68	MUK
11	Makerere North	Kibuga ,Mengo	Mailo	NA	28	98	2.64	MUK
12	Makerere North	Kampala			28	77,88,103,119,15 6,159,350,364,3 68,371,387,388, 457,458588,59 9,601,602	20.00	MCC
	TOTAL						297.58	
	.Source: Extracted	l from Title Deeds	МШК		Makerere University Kampala			
	MCC					Makerere College Council		
				R/P		Reaistered Propr	ietor	

The property is not well demarcated, its partly fenced and marked with concrete pillars with a quarter (1/4) of the university total property at Main campus is fenced with a 1.2m wall fence and old chain link fence stretching from Estates and Works department to Makerere College School

Makerere University Agriculture Research Institute Kabanyolo (Caes) Campus R The Apricultural Research Institute. Kabanvolo in Gavaza is located about 17km north of Kampala. The land is made up of various Blocks and therefore on various plots as indicated in the table below. Plots 44.45 and 46 are on Block 174 while plots 76 and 85 are on Block 167 (*refer table-2 below*).

SR	BLOCK NUMBER	TENURE	PLOT NUMBER	SIZE OF PLOT ACRES
1	174		44	165.5
		FREE HOLD	45	99.7
			46	67.9
			49	5.4
2	76	FREE HOLD	76	145
			85	68.4
TOTAL			6 plots	551.9

Table 2: Showing cadastral status of Makerere University Agriculture Research Institute Kabanyolo Campus.

There were signs of encroachment on plot 85 along the eastern side, but development was halted. On the southern part of plot 85, the boundary is being destroyed by the CANAN SITES estates developments.

C Makerere University Medical School Mulago Campus

The College of Health Sciences is located on Mulago Hill surrounded by Mulago Hospital. The College occupies a narrow strip of land 9.06 acres. Approximately 80% of the area is built up. Galloway House, a hostel for Medical students, is across the road on a separate plot. Plots M5D for Medical school, plot M36 for Galloway Hostel, and plot M.37 (*refer to table-3 below*) having the Pharmacology department, Bio-chemistry labs, and Nursing. While Galloway House is distinctly fenced with chain link, the CHS is partly fenced making it difficult to put a hand between the Hospital land and that of the CHS.

Table 3: Showing cadastral status of Makerere University Medical School Campus.

SR	BLOCK NUMBER	TENURE	PLOT NUMBER	SIZE OF PLOT ACRES
1			M36	0.61
		FREE HOLD	M37	0.89
			M50	7.56
TOTAL	•		3 plots	9.06

2.1.3 ASSESSMENT OF TOPOGRAPHIC SURVEY AND COMPLEMENTARY GROUND SURVEYS

Topographic surveys for Makerere University Main Campus. During the surveys all existing buildings, fences, hedges and social infrastructure facilities such as roads, walkways, drainage channels, culverts relectric lines, sewerage and water lines, ponds, recreation facilities such as playgrounds and open spaces were captured and plotted on the cadastral and topographic maps.

The topographical surveys entailed the following;

- Confirm the project extents and adjacent surroundings and Geo-referencing
- Collection of coordinates X,Y,Z for production of contour plan
- Mapping of existing natural and man-made features such as existing infrastructure; road network, water network, electricity network , existing structures, trees and any other significant feature
- Production of around profiles along sections of the project area. This was to aid in sitting of the different land use and infrastructure such as water supply systems, water reservoirs and network infrastructure
- Extending controls by setting out benchmarks for the project execution to aid in updating of existing topographic surveys and production of a base plan which was crucial in preparation of the Master Plan
- All drawings and maps were done in AutoCAD.

Topographic surveys were aided with use of Geographical Information Systems (GIS) to produce a Topographic map, setting out Benchmarks and a Base Map. The team produced the Topographic Map and Existing Land Use Map and Report of the existing Physical and man-made features.

The terrain at Main campus is hilly with the highest peak at Nyanjarabe peak at 1270 meters above sea level and it's a site for Water Reservoirs and Telecommunication masts and as it descends downhill forming a ridges between 1248 meters A.s.I at Chemistry Department at CoNAS and the second highest peak at 1254 meters A.s.I at the Edge Vice chancellors Lounge. It gently slopes from the centers on either sides Makerere hill, with steep slopes recorded at northern part near department of Food Science and Technology (FST) to Sir Apollo Kaowa road

The lowest point at the campus is recorded on Bombo road below Makerere Primary School playfield with 1174 meters ASL.

The main campus is built-up approximately 20% with mainly institutional buildings located around the ridge and spread out residential buildings at entirely throughout the Main Campus. *See annex-1 Topographic Map of Makerere Main Campus*

The main campus is sparsely built-up with institutional buildings concentrated mainly along the ridge with administration and institutional buildings in "*a park like environment*" vegetation cover and tree canopy. The ridge also drains the campus onto two sides that's eastern and western side towards Bombo road and western side towards Sir Apollo Kagwa Road.





	NOTES.
TAC	TECHNOLOGY TRANSPERCENTER
C.C.E	POMPLEX HALL
HIC'S .	FARLING SPACE
DVX.	DEPUTY VICE-CHANCILORY RESERVED.
SLAUG	SLAUGISTING CHAPM.
SLAUGS	ST. AUGUSTINE STUDIATS/CENTRE
SLUG SLY	SUPRANCISCHAFAL
STARS	SI, FRANCIS STUDESTSCENTER
FRSI	PORISTRY DUPARINDST.
51 10 52	KI TRACKED STERVIST STERVIST
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The property boundary main campus is consolidadated /amaloamated forming the boundary of the Main campus. In the north east of the property, it's crossed with a public road and there is clear evidence of encroachment along the Muganzi-awogerwa road. Temporary and parmanet structures and along Bombo road- border with Shell fuel station encrotchment of furniture workshops & motor caraces

2.1.4 LANDUSE INVENTORY AT MAIN CAMPUS

Existing landuses at the main campus entail the following;

2.1.4.1 Administration Use

These entail the buildings for the various colleges and the administrative buildings like the lvory tower. Senate building and Lincoln Flats. The administrative functions of the University are housed at the lvory tower building constructed in 1938, located at centre ridge of Makerere hill between Saint Francis church and Saint Augustine church. It accommodates offices of the Vice chancellor; university Secretary, University Bursar with the main hall at the back and the senate building that handles all academic related functions of the University.



Main Administration building (Ivory Tower) Building) Figure 3: Administrative Units In Makerere Main Campus Source taken from the field by the Consultant



Senate Building –(handles academic affairs)

2.1.4.3 Religious facilities

These are located along the ridge of Makerere hill at the main campus. These include the St. Francis Church with students' chapel, St. Augustine Church and students' chapel and Makerere Mosque near the Main gate





St. Francis Church St. Augustine church Figure 4: Religious Institutions at Makerere University Main Campus

2.1.4.4 Residential land use

This land use comprises of all residential accommodation the students (Halls of residence) and the staff housing to include the senior staff and the junior staff quarters at the Campus as shown in the figure below;







Students Hostel-Lumumba Hall

2.1.4.2 Academic Use

The areas earmarked for academic use include; The Main Library and the buildings that house the following colleges

- College of Agricultural and Environmental Sciences (CAES) a)
- College of Business and Management Sciences (CoBAMS); b)
- College of Computing and Information Sciences (CoCIS); с)
- College of Education and External Studies (CEES); d)
- College of Engineering, Design, Art and Technology (CEDAT); e)
- College of Humanities and Social Sciences (CHUSS); f)
- College of Natural Sciences (CoNAS); and g)
- College of Veterinary Medicine, Animal Resources and Bio-Security (CoVAB). h)
- The College of Health Sciences (CHS) was established on 1st December 2007 under the "Universities and Other Tertiary i) Institutions Act (Establishment of College of Health Sciences, Makerere University) Order, 2008.
- i) The School of Law.



Timber structure past its service life

Girls Hostel-Mary Stuart hall



Dilapidated structures that occupy valuable space on main campus Figure 5: Residential housing at the Makerere University main Campus

Source taken from the field by the Consultant

2.1.2.4 Recreational

The recreational facilities at the main campus comprise of Ceremonial grounds (Freedom square), students rest areas, gardens, sports grounds courts and University Guest house. The figure below shows the main recreation areas in the university.



Ceremonial arounds-Freedom square Soorts Comolex Figure 6: Soorts Recreation Grounds at Makerere University Main Campus

2.1.5 ENVIRONMENTAL ANALYSIS OF MAKERERE UNIVERSITY

The environmental analysis presented herein covers the current environmental conditions and management at Makerere University campuses of Makerere Hill, Mulago and Kabanyolo. The report also assesses the planned activities under the proposed master plan. For the master plan covers demolition, construction and operation of the facilities, Impacts have been indentified and mitigation measures to miticate the socio-economic and environmental have been successed. For the master plan and the associated activities to be a success, the mitigation measures suggested in this report should be followed by the contractor(s), the University Management and the beneficiaries during the construction and operational phase.

2.1.5.1 CURRENT ENVIRONMENTAL CONDITIONS OF MAKERERE UNIVERSITY

The current ne environmental conditions cover Makerere University Main Campus, Mulago (College of Health Sciences) campus and Kabanyolo campus. It highlights the current status of environmental management at these campuses. The areas covered include waste management within and outside buildings, status of drainage, roads, parking yards, utilities, housing/buildings and greening of the campus.

Rnads

Some of the formerly tarmac roads in the Main campus and Kabanyoro campus have become murram roads and very muddy and dusty during the rain and dry seasons respectively (figure 11).



Figure 7: Eroded tarmac road behind the School of Statistics and applied Economics with pools of water

Figure 8: A standing post along University road with no sion

The roads are not well maintained and the pot holes which have developed along most roads hinder safe driving. Signages for example for speed limits and directions along most of the roads have been vandalized and have not been replaced (figure 12). Major roundabouts have signages indicating directions to the different offices, Halls of residence and other facilities within the Main Campus, though the labeling is not standard in some cases words are congested and difficult to read.

Some roads do not have speed humps, Zebra crossings, walking pavements for pedestrians posing hazards to them. All roads have narrow widths while others have been eroded by storm water particularly in areas without drainage channels (figure 13). As a result pedestrians and vehicles competing for the same space.

The relatively poor conditions of the roads increase chances of accidents especially during rush hours when there is a large volume of traffic flow and people crossing roads to access different facilities.

Parking vards

Most of the parking yards have lost the tarmac and have now become murram with ditches which get filled with storm water (figure 14), get dusty during the dry season, have no marked parking control lines/, have no security lights and have no clear signages for entrances and exits. The parking space is not adequate for the increasing number of vehicles and parking along the roads and pavement is common (figure 15). Kabanvolo campus has no established parking vards.



Figure 9: A road damaged by storm water



Figure 10: A parking yard at JICA building, College of Natural Sciences

Waste management

Non-hazardous solid and liquid wastes

Solid waste management at the Main campus and at College of Health Sciences in Mulago is done by Bisons Solid Waste Management Division Limited (figure 16). At Kabanyolo campus, wastes from different units are collected to a central place where they are incinerated (figure 7)



Figure 12: A truck loading wastes at one of the collection centers



Figure 11: Vehicles parked along University road

Figure 13:: An incinerator at Kabanyolo

At the University Hospital waste management is done by Nabugabo Updeal Waste Management Limited. The main collection centers at the main campus are located at Mitchell Hall, in front of Infectious Disease Institute (IDI), Complex Hall, Mary Stuart Hall, Lumumba Hall, Nkurumah Hall, Nsibirwa Hall, Livinostone Hall, Africa Hall, Guild and Staff canteens.

General solid waste management is not effective because some wastes are left behind, some days wastes are not collected and left to accumulate at collection centers which rot and create bad smell (figure 18).

Some wastes are dumped in non collection centers resulting into environmental degradation (figure 19) while in some areas wastes are disposed off by burning (figure 20). Burning emits toxic smoke and more so when the wastes contain plastic and metallic substances. It is worth notino that in most cases these wastes are burnt when students are in lecture rooms and Academic Staff in their offices.



Figure 14: Waste collection with nnint uncollected wastes near Mitchell Hall

Figure 15: Wastes dumped behind Staff ranteel

Majority of the workers involved in waste collection do not put on recommended Personal Protective Equipment (PPE) like gum boots, overalls, masks, gloves which put their health at risk. Some of the waste bins in leisure/resting parks and along roads are bottomless. Sorting of wastes at the source is not done while only plastics are recovered from the wastes for recycling by vendors.

Liquid waste management at the main campus is also ineffective as raw sewerage flows on the ground in some parts of campus (Plate 11). This is caused by blockage or busting of sewage pipes. In some areas, open sewage inspection manholes are filled with solid wastes and hence obstruct flow of sewage leading to frequent overflows on the ground.

Hazardous solid and liquid wastes (Hospital and Laboratory wastes)

Used syringes, cotton wools, gloves, needles, bandages and other medical wastes are disposed off by incineration. The incinerator used produces a lot of smoke which also creates health hazards. Liquid wastes from theatres, laboratories is collected into sluices and then flushed off into the National sewerage system. No pretreatment is done and therefore exposes those who come into contact with it to health risks. Unclaimed bodies and foetuses are taken to the police mortuary in Mulago.

Drainage system

Some of the existing drainage channels are clogged with soil and solid wastes (figure 21) which makes water to flow on the surface during heavy rains. The widths of some drainage channels are not sufficient enough to carry excess water during heavy rains. Open drainage channels along some roads can cause accidents to pedestrians and motorists. Poor disposal of soil and vegetation by compound cleaners affects the drainage system at campus (figure 22 & 23).





with solid wastes and soil

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Figure 16: Waste site hehind hurning Mathematics Department





Figure 17: Leaking sewage system behind Figure 18: Drainage channels clogged Figure 19: Soil and vegetation heaped in front of a drainage channel

Security

Absence of a fence around the Main and Kabanvolo campuses gives free access to them by any person at any point of convenience in addition to encroachment on the land. The police posts at these campuses carryout regular patrols. However some parts of the Main campus are not patrolled due to the limited number of police officers and financial constraints. Daily security checks are done at the oates of entrance and so any one is allowed to access the University. Entrances of halls of residence, lecture halls, laboratories and many other facilities do not have security (metal) detectors and with no active security personnel. Most roads do not have street lights. Some of the existing street lights are nonfunctional. Some halls of residence, colleges/departments have no security lights despite the high population hence threatening public security. The number of security personnel employed by campus to detect crimes does not much the high population at campus which has resulted into increase in crime rates including car theft, though the situation has of recent improved.

Utilities

The utilities include electricity, water, medical services, housing units, recreational services (sports, bars, restaurants and hotels among others) and telecommunication services

Electricity

All the three campuses have connection to the national power grid with hydro electric power (HEP) being the major source of energy. Biogas energy is also being tapped at Kabanyolo campus for cooking and lighting though on a small scale (figure 24). Power is extended from one facility to another by electricity poles which poses accident threats (electricity shock) especially when poles fall as a result of strong winds. Power supply is inconsistent due to load shedding or sometimes due to technical failures which affect work in offices, kitchens and experiments in laboratories and all other works which depend on electricity. Standby power generators to provide power during times of load shedding exist at some colleges/departments but many of them are nonfunctional while halls of residence do not own them. Some electricity gargets are neither enclosed nor labeled as dangerous to protect the public from risks of electricity shock (figure 25).



Figure 20: A biogas digester at Kabanyolo

Figure 21: An electrical gadget along Mary Stuart road

Some of the University buildings leave the lights on even when there is sufficient day light. In some cases lights are not switched off during the night. There is also uncontrolled use of electricity for cooking at the University for example in canteens and offices. All these result in either power wastage or unsustainable use of electricity which increase the electricity bill to the University. Since some of the connections are illegal, they pose hazards e.g fire outbreak in some buildings of the University.

Water and sanitation

The Main Campus and College of Health Sciences are connected to National Water and Severage Service Corporation, Kabanyolo campus gets its water supply from underground which is pumped to tanks and supplied to different departments/units by gravity (figure 26). Water is sometimes limited or not available at all hence affecting the quality of live including personal hygiene and ceneral sanitation. The university has some water reservoirs to supply water during times of water shortages. However the capacity of the reservoirs installed at these campuses cannot supply water sustainably given the high water demand (figure 27). Some water pipes at campus are leaking (figure 28) while water taps in some departments and halls of residence are left open while others are faulty and therefore cannot be closed. All these result into water loss and unnecessary water bills.

The sanitation of the main campus is generally poor; dirty smelling toilets/pit latrines, house flies around uncollected solid wastes and overflowing sewage together with poor smell create poor sanitation which puts public health at risk. However poor sanitation in the water-borne toilets is mainly due unstable water supply. Some of the pit latrines in Kabanyolo campus have become very old and present health hazards to the users (figure 29).





Figure 22: Tanks used to Figure 23: Jerricans lined up Figure 24: A leaking Water Figure 25: A dilapidated pit latrine supply water by gravity at at a water tap in Kabanyolo Kabanyolo

oice near Lumumba Hall

Telecommunication services

Telecommunication services at campus are provided by MTN, Airtel, Warid, Orange and Uganda Telecom. Some of these companies have established their network-booster masts at campus.

Recreational services, bars, restaurants and hotels, soorts, general shopping and other services

Sports and recreational activities like swimming, football, netball, basket ball, rugby, tennis, volley ball, hockey, among others are provided at campus. Foods and drinks at the Main campus are provided by the University quest house, restaurants including quild canteen, staff canteen, Food Science and Technology Canteen, alongside many other food kiosks. Kbabanyolo and College of Health Sciences also have Canteens. However the number of these restaurants/canteens does not much the high number of customers as it can be seen by the concestion during lunch hours.

Some of these restaurants/canteens and food kiosks have leaking roofs, dirty floors, dirty fridges, limited space and muddy environments. Places where food is prepared are in most cases not cleaned to appropriate standards. This affects the quality of foods and drinks served and the comfort of customers. The general sanitation around some of these restaurants is poor as solid wastes are dumped within the vicinity.

Medical services

The University owns a hospital (Makerere University Hospital) located outside but close to the Main campus, a teaching hospital at the College of Health Sciences and a dispensary at Kabanyoro campus. These facilities provide medical services to its students and staff. This facilities offer Counseling and Guidance services to University staff and students through Makerere University Guidance and Counseling Centre located opposite Mary Stuart hall. However, the University hospital has only one 24 hours service operational





still in use at Kabanvolo

ambulance, twenty (20) beds most of which are in poor conditions yet the population it serves is big. The mattresses and blankets provided to the admitted patients are also in poor states which also worsen the health of the patients. The location of the hospital outside the Main campus also makes its access by students and staff difficult. Kabanyolo campus dispensary also suffers shortage of staff, drugs and enough operation space.

Housing units

Some poor housing units exist at these campuses (figure 30). These housing units pose a health and sanitation threat to the occupants and neighborhoods as they are not connected to national water and sewerage services, have no toilets/pit latrines, poorly ventilated and general poor waste management practices by the occupants. Most buildings were constructed with no design to allow free access by the disabled (lame) yet they are members of the University community who have a right to access any facility. This fact creates a sense of segregation among the disabled. Unpainted buildings present an old look, spoiling the beauty of the campuses. In addition to these, some of the old buildings were roofed using asbestos (figure 31). Asbestos have been proved to have health risks associated with cancer.



Figure 26: Poor housing units behind Mitchell hall



Figure 27: A girl's hostel in Kabanyoro roofed using asbestos

Laboratories

Many expired chemicals are still kept in the chemical stores and they have been there for a long time. The reason for this is because the University lacks an absolute chemical disposal mechanism. This has created occupational hazards to the laboratory staff and the oeneral public around the University area as some of these chemicals are carcinocenic.

Gas chambers (fume cupboards) in many laboratories are non functional because of failure to repair leaking gas pipes. Many laboratories do not have air conditioners, no lamination in microbiology labs while many laboratory equipments have become non functional because of old age and mechanical breakdown. However sometimes faulty equipments are supplied and are never used Some laboratory structures are in poor conditions with cracked walls and damaged roofs in addition to poor ventilation.

Fire Management

Most departments and halls of residence do not have fire fighting equipments. The existing fire extinguishers are not serviced while most members of the University community do not have fire fighting skills. Fire escape routes are not labeled in most building. Some of the buildings do not have lightening conductors and therefore they can easily be struck by thunderstorm.

Working conditions

Some staff / students do not use Personal Protective Equipment while engaging in risky works. Some laboratories are poorly ventilated or sometimes windows are left closed while kitchens in halls of residence have damaged smoke pipes and their general design and ventilation does not allow easy escape of the generated heat. All these conditions put the health of the people working in these areas at risk. For example some workers have lost fingers.

Greening the environment

Green fields have been established and maintained in various parts of these campuses. However, trespassing and car parking have destroyed many of them (figure 32). Ornamental plants/ flowers have been planted in some parts of these campuses and make these areas appear attractive (figure 33). The campuses have trees which provide shade, firewood, timber, break winds in addition to creating a green look. However, a number of trees have been cut down. Some trees are very close to the roads, parking yards and buildings and therefore present chances of accidents especially when they are broken down by winds while their strong roots can crack buildings, parking yards and roads. Power lines are affected by branches of overgrown trees.



Figure 28: A vehicle parked in a green field at the Department of Figure 29: Road sides of University road appear beautiful Pharmacy, besides the University Police Post

EXISTING INFRASTRUCTURE AND UTILITIES 716

Infrastructure includes transport facilities (including roads, access, on-site circulation and servicing, cycle paths, footpaths and public transport), water supply (including water supply for the fire services and fire sprinkler systems), utility services, land drainage, surface and foul water sewerage, sewage treatment, and Electricity and energy use. These

2.1.6.1. ROAD NETWORK, TRANSPORTATION AND TRAFFIC FLOW IN MAIN CAMPUS

The existing transport and circulation plan for the University includes routes for vehicular and pedestrian traffic as well as mass transit around the University.

2.1.6.2 RDADS, PARKING AND PEDESTRIAN WALKWAYS

A. Vehicular circulation includes a hierarchy of roadways, including major arterials such as the University Main Road is the main access into and out of the Main University and link to the core areas of the university. The University Road is main access designed as one-way traffic flow road though often been used as two-way by motorists and on-street parking on

the sides especially for areas surrounding, the social sciences building former faculty of arts, the Main Building and the Main Library. It has relatively new surface, paved shoulders and well drained. It's inadequate with road furniture such as signage and road markings with command signage, warning (no-overtaking, speed limit, vehicle tonnage and height, among others) and informative signage as well as street lights.

- **B.** Pedestrian Traffic and access; the university has no mass transport for student and staff. The alternative is walking, pedestrian walking is the cheapest mode in terms of cost to investment but it's the less facilitated at the university. The existing pedestrian tracks within the campus haphazard and not deliberately developed. These originate from entry points into the university, academic buildings within the campus and develop as a result of demand but intentionally planned and as such they traverse through green spaces and degrade the green spaces, edges and fences. The main campus has 18 pedestrian access points into and out of the university main campus with only five (5) are gazatted as pedestrian small gates., Pedestrian entry points into the university in very bad state unpaved, unlit and security threat to the university students, staff and property
- **Parking areas**; The parking studies carried out at central parking areas per hour at the main Campus revealed the following as C. the major Parking areas at the University with the highest number of vehicles at time, include;
 - Technology/CEDAT Parking Space; This parking space serves the old Faculty of Technology Building, the new CEDAT building, Food science and Technology, environment and Natural Sciences.
 - JICA parking; JICA parking serves the JICA building, the Main Library, Department of Agriculture and the Main Building



Figure 32: On-Street parking Along University Road at CHUSS

Table 4:: Illustrating Capacity of Existing Parking lot at Main Campus on Institutional Buildings

	PARKING LOT	CAPACITY	STATUS/REMARK
1	JICA (Conas)	95	Shared with Agriculture, Main building, Students Hostel Vans, Library and CoNAS
2	CoNAS-Satistics	83	Shared with Agriculture, Main building, Students Hostel Vans, Library and CoNAS
3	Library-Extension	40	Serves Library, CoBAMS and Gender
4	Arts-CHUSS	65	Serves CHUSS, Department of Forestry and Nature Conservation, St. Francis and St.Augustine Chapels and Main Building
5	Technology-CEDAT (Old Parking)	40	Serves CEDAT, CoNAS and department Food Science and Technology

- E Statistics Parking; The parking at Statistics serves the college of Natural sciences, statistics, Environment and the Department of physics.
- Faculty of Arts Parking (CHUSS); This serves the college of humanities, St Francis and Augustine Chapels, the Main Building and Department of Forestry.

The existing parking facilities do not meet the vehicle parking demands/ standard of the University as clearly illustrated in figure ... below hence more parking spaces need to be considered in the design.





driveway	into parking yard	iang with bit	Lincoln Close
6	CEDAT Block (New)	34	Serves CEDAT
7	Forestry Parking	5	Serves Department Forestry and Nature Conservations
8	Agriculture Block	2	Serves College Agriculture and Environmental Sciences
9	CoBAMS parking	31	Cobams
10	Social Sciences	8	Senate Building and CHUSS (social sciences building)
11	Senate Block Parking	27	Senate Building and Stanbic Bank
12	Main Library parking	36	Main Library and CoBAMS & Freedom Square
13	Main Building (Front)	43	Main Building, Library and the chapels
14	CHUSS (Arts Block) Front	5	Serves CHUSS, and social sciences
15	Computer Sciences Blocks	94	Serves CoCIS
16	CoVAB –(Veterinary Parking Lot)	57	Serves CoVAB
17	St.Augustine chapel and Students centre	40	Serves St. Augustin Chapel and students centre
18	St. Francis Students centre	35	Serves Students centre
19	Mosque Parking	30	Mosque
20	CEES at CCE shared parking	11	Shared and serves CEES and CCE students hall
21	Food Science Block	23	Serves Department of Food sciences and Technology and CEDAT
	TOTAL	804	

These parking lots exist with warn out surface, kerb line, unmarked parking spaces, no signage and lack lighting.



Figure 20. Depling at the New Library building with blocked Figure 21. Depling plane drive way and an should are st

2.1.6.3 TRAFFIC SURVEY METHODOLOGY AND APPROACH

The intent was to present representative traffic data for the project roads and junctions; and be in a position to make an analyzed transport planning and a good engineering judgment for the road design reviews / updates and new designs. The results of the traffic surveys also informed the traffic forecasts. The survey results were useful in establishing Cumulative Equivalent Standard.

The traffic survey stations/locations were selected such that they are representative of the traffic flow patterns along the study roads and the entry points (Main Gate, Eastern Gate, and Western Gate) to the University.

During the entire exercise, every effort was made to avoid disruptions in the normal flow of traffic. Any unusual occurrences, which could have lead to unrealistic traffic numbers were avoided, and in some cases confirmatory counts were done.

The field staffs were equipped with reflective gear (as a safety measure), introductory letters, a watch, clip board, pencil, umbrellas and adequate survey/count forms. Enumerators, overseers, supervisors and other field staff were provided with allowances and transport. Training and re-equipping of enumerators took place at the Technology head office.

Traffic counts

The traffic counts were conducted for four days (4), comprising of two week days and two week end days for 12hrs a day with an hourly counting interval The following vehicle types constituted the vehicular categories.

Motorized traffic

- 1. Motor-cycles (Boda boda or motorcycle taxi)
- 2. Car (sedan, saloon, estate);
- 3. Utility vehicle (pick-up, four wheel drive);
- 4. Minibus or *"matatu"* (having a capacity of not more than 14 passengers);
- 5. Medium size bus or "coaster" (2 axle, 6 rims, capacity up to 30 passengers);
- 6. Large bus or "coach" (2-3 axle, 6-10 rims, capacity >30 passengers, typically 60-70);
- 7. Light-medium goods vehicle (2 axle rigid, GVW up to 5t, 4-6 rims, payload typically 2t);
- 8. Medium goods (2-3 axle rigid, 6-10 rims, GVW 5-19t, payload up to 10t);
- 9. Heavy goods (3-4 axle rigid, 10-14 rims, GVW≥20t);

Each traffic count station was adequately operated by enumerators, overseers and supervisors for both directions A and B. The rationale behind the spread of the enumerators was to facilitate their ability to get accurate numbers of each vehicle type.

Each study road had one supervisor, who on top of quality assurance, was to make available the required logistics. The supervisors were answerable to the traffic team leader, who was answerable to the Project Team Leader and other specialists

Traffic Survey Findings

The University Main Access Routes

A survey conducted on the University's Main access routes revealed that Makerere University generates an average daily traffic of about **12,875** vehicles per day for both the inbound and out-bound traffic. The study further identified that of the three vehicular access routes of the University, the Main-Gate had the highest level of traffic with an ADT of **5,114** vehicles, followed by the Eastern

gate that had an ADT of **4,915** vehicles while the Western gate had the least with an ADT of only **3327 vehicles. See table 3 below**. The figure below shows the traffic volumes generated at the three main vehicular access routes of the University.

Table 5: Showing the Average Daily Traffic (ADT) of the University

No	Vehicular access Points	In- bound ADT	Out- bound ADT	Total ADT Traffic
1	Main Gate	2157	2957	5114
2	Eastern Gate	2700	2215	4915
3	Western Gate	1938	1389	3327
Total		6795	6561	13356

Traffic Peak Hours

The traffic peak hours at Makerere University were analyzed based on the three existing access gates of the University thus the main Gate, the Eastern gate and the western gate. The findings are subsequently presented below;

Main Gate

The study on the traffic peak hours at Makerere University Main Gate established that the morning peak hour for the inbound traffic was between **11am to 12:00** noon and the hour between 7 **am to 8:00** am formed the Morning peak hour for the out-bound traffic. The evening peak hour for the in-bound traffic was established between **15 to 16** hours with an hourly traffic of about 228 vehicles where as the hour between 16 and 17:00 pm was established as the evening peak hour peak hour for the out bound traffic at the main Gate with a total volume of 278 vehicles see figure below for the peak hour details (see figure 37 below)





Eastern Gate

The survey findings established the hour from 10:00 to 11:00 am as the morning peak hour for the eastern with a total traffic volume of 384 vehicles while the hour of 16:00 to 17:00 pm was identified as the evening peak hour at the gate with a total traffic volume of 558 vehicles (refer to figure below). The figure below shows the traffic peak hours for the eastern gate.



Figure 34: Traffic Peak hours at the Eastern gate



Figure 35: Western Gate-(Technology Access) by direction

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The traffic surveys at the western gate revealed that the morning Peak hour for the western gate was identified as 7:00 am to 8:00 am for the inbound traffic with a total volume of 363 and the evening peak hour was observed in the hour of 17:00 to 18:00 pm with a traffic volume of 372 vehicles refer to the figure below. The figure below shows the traffic peak hour at the western gate.







Figure 37: Traffic Peak hour at the Western gate by direction

Survey of Roads at the University

Survey s were conducted at the major roads of the university to include University road, Mary Stuart road, Pool road, North-cote road, Living stone road, New Avenue, and link road as indicated in the table below. The surveys on the afore mentioned roads of the

University exposed that, New Avenue had the highest level of traffic with an ADT of **3,943**, followed by Link road with an ADT of **3,641**, pool road with an ADT of **3,600**, Acacia road with an ADT of 2784, Mary Stuart road with ADT of **2,775**, North-Cote Rd with an ADT of **2,603** and the University road had the least ADT (**2,519**). The table below shows the ADT of university roads.

Vehicle Category	Mary	University	Pool Rd	North-	Acacia Rd	New	Link Road
	Stuart Rd	Rd		Cote Rd		Avenue	
Saloon CARS	1651	1241	2109	1596	1727	1825	1742
Pickups & St. Wagon	685	1020	1100	769	867	1568	1461
MINIBUSES (< 24 seats)	258	45	167	98	41	416	229
LARGE BUSES (> 24 seats)	3	15	4	9	3	9	24
SMALLTRUCK	24	28	27	13	22	7	5
MEDIUM TRUCK	3	8	7	4	10	1	4
HEAVY TRUCK	1	1	0	0	2	0	0
MOTORCYCLES	150	161	186	114	112	118	176
Total	2775	2519	3600	2603	2784	3943	3641

Table 6: Showing ADT traffic Volumes of Selected University Roads

Percentage Composition of Motorized Traffic

The Survey of the university roads further revealed that the most dominant vehicle category was saloon cars (54.38 %), followed by pickups and Station wagons (34.16 %), Minibus, (5.74%), motorcycles (4.6%), Medium trucks (1.7%), small trucks (0.58%), large buses (0.31%), and Heavy trucks are the least category vehicles on University roads with (0.02%) *see figure below*, The figure below shows the vehicle category percentage composition on the University Roads





ORIGIN DESTINATION SURVEYS

The Origin Destination surveys that were conducted at the University Gates for the In-bound traffic that comes in to the University and Out-bound traffic from the University with respective destination within or outside the university.

This was done to ascertain the volume of traffic that use university roads and facilities and has businesses within the University or has completely no business with institution activities.

A. In-bound Traffic and places of Destination

The in-bound of the Origin-Destination traffic surveys that were conducted indicated that most of the in-bound traffic (57.7%) that enters the University has completely no business within Makerere University and use University roads to access other areas while only 42.3% of the total in-bound traffic has purpose for using university roads as their final destination place is Makerere University **(See table below).** The above results when analyzed and compared with the ADT for the in-bound traffic gives a total of 3894 Vehicles that use the university roads to access other destinations

Table 7: Place of Destination Frequency in comparable percentage with ADT at Main Campus

S/No	Place of Destination	frequencies	%age	ADT
1	Within the University	398	42.3	2874
2	Outside the University	543	57.7	3894
Total		941	100	6795

B. Out-bound Traffic

The Out-bound Origin- Destination surveys at the campus gates revealed that most of the vehicles originated from within the university **(70.67 %)** whereas 29.3% of the total out-bound traffic originated from outside the University. These survey results have an implication that 29.3 % of the total inbound traffic uses Makerere University Roads as a way through to access other destinations. The results were further analyzed and a total of 1922 vehicles per day were recognized as undesirable traffic to access the university roads as summarized in the table below;

Table 8: Showing the Outbound traffic Origins

S/No	Place of Origin	frequencies	%age	ADT
1	Within the University	318	70.7	4639
2	Outside the University	132	29.3	1922
Total		450	100	6561

Key Problems affecting University Roads

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Investigations into the problems experienced with the roads users in Makerere University were carried out and the findings revealed that the biggest problem with University roads was portholes and humps (39.6 %), followed by traffic jam with 26.9% (majorly observed during the morning and the evening peak hours), the other problem included; Narrow roads and Junctions (13.4%). Inadequate street furniture (3.8%), delays due to security checkups (3, 2%), Sharp corners and bends (3.1%), inadequate parking spaces, inadequate walkways and poor drainage on some roads. The details about the identified problems affecting the University Roads are indicated in the figure below:



Figure 39: Showing Key identified Problems on using roads of the University

Ways of Improving the traffic and transportation of the University

Suggestions to improve the University road and Transport network were given as follows; Maintenance and repair of roads was highly suggested with (49.5%) followed by reconstruction of roads (23.3%), widening of roads and junctions (8.8%) provision of street furniture (7.6%), redesigning of corners (.5.3%), Provision of more parking spaces (3.0%), issuing of stickers (2.3%) and lastly provision of streetlights (0.3%).





Conclusion and Recommendation

The following can be deducted from study:

Category of Vehicles

The vehicle categories at the university roads generally comprise of Saloon cars (The most dominant Category) pickups and Station wagons, Minibus, motorcycles, small trucks, Medium trucks, large buses (Mainly for the University), and the Heavy trucks (the least dominant category)

Traffic Volumes

It was generally observed that the traffic volumes at the University are generally too high compared to the core functions of the institution. The implication is that most of the traffic is generated is through traffic which has no business in the institutional setup. This therefore calls for restrictive measures for vehicles that enter into the University.

Average Daily traffic

ADT was computed for the vehicles that use the major Roads within the University and a volume of **21,865** vehicles per day was nbtained.

Recommendations

- 1. Heavy truck with over 10 tones should be prohibited from using university roads. In the event of construction of facilities, a transportation and traffic management plan should be prepared by contractor, submitted and approved by management.
- 2. Road Signages and Road markings and furniture & fixtures (litter bins, benches, road labels, names, barriers to segregate traffic such as pedestrian, cyclist and motorists) on all roads should be put at all roads. This can be done with standardized

international command , warning and restrictive signage to guide road users with speed limit (designed 30km/hr on all university roads)Drop off zones should be provided at institutional buildings of the university

- 3. The university Management needs to devise measures to restrict private vehicles to use the university roads as an access to other destinations preferably issuance of placards to university to staff and to students, introduce a paid access control system to through traffic vehicles with the exception of Government and security, emergency& Service (Ambulance, fire truck and service) vehicles
- 4. There is also need to provide pedestrian walk ways at all the roads within the University with gazzated crossing points at institutional buildinos
- 5. The university should be easily navigated by road user to their final destination, the directional map illustrating the various colleges. Road names and key Landmarks with conserved historical buildings should be placed at appropriate locations and Junctions at the university roads.
- 6. Street lighting should be provided on all major roads, access roads and Pedestrian walkways connecting to Pedestrian Gates.
- 7. Bicycle parking yards need to be established at all the gazzeted parking areas of the university, at college Buildings in centralized arrangement and at common support facilities
- 8. Cycle lanes need to be established alongside the existing transport routes of the University
- Centralized Parking areas need to be planned at the University and discourage on street parking 9.
- 10. Paving of all parking lots, marking and lighting up of parking areas with standardized markings with flow /directional markings and replacing of kerb line

2.1.6.4. WATER SUPPLY, SEWAGE AND WASTEWATER

2.1.6.4.1. Water Supply

The university Main campus is entirely serviced by piped water network from National Water and Sewerage Corporation is the sole source of water supply, accessing the campus through six direct entries of bulk metered piped water mains. The six entries are located along Bombo road, Makerere hill road, Jjunju, and Muganzi-Awongererwa roads. Out of the six direct water entry points whose pipe diameters range from 50mm to 200mm; four are fully utilized; while the two are not utilized, leaving the three entries. No. 2, 3 and 4 to supplement the observatory hill central five water reservoirs (entry no. 1) which in turn distributes water to the campus by gravity through pipe interconnections.

The materials to these pipes differ from: Galvanized mild steel pipes, impregnated Bitumen Steel Pipes, Asbestos pipes, HDPE (High density polyethylene), to UPVC (Unplastiside Polyvinyl chloride)

Currently, on average the campus uses 1.700m³ per day, among the population of 40,000. According to the usual water consumption: the capacity to be used per day on campus could have been 4,000m³. Therefore, there is a short fall of 2300m³; necessitating expanding the reservoir capacity as in the action plan interventions more details in volume-II of the Mechanical & Electrical report. (See figure below). The figure below shows the existing water reservoirs of the main campus (refer Annex A-Gexisting Water supply and distribution).



Figure 41: Main water reservoirs (left) at the observatory hill that serves the main campus and the neighbouring areas. Leakage on the Main Valve (right)

2.1.6.4.2. Sewer Services and wastewater management

The major form of sewage and wastewater disposal at the main Campus is through water borne sewerage system connected to National water and sewerage system that subsequently discharge their effluent by gravity to the National Water and Sewerage Corporation Conventional treatment plant located at Bugolobi.

The disposal of sewage from Campus is by lateral drain of approximately 6000m pipe line. The campus has got approximately seven (7) visible sewer pipe exists; Sections of the sewer lines laid across the Campus towards Bombo Road, other section are located at the slopes of Kasubi View/West Road staff quarters, others towards Makerere hill road; while some flow towards MuganziAwongererwa road which subsequently all discharge their effluent by gravity to the National Water and Sewerage Corporation Conventional treatment plant located at Bucolobi.

The Sewer line is mainly composed of glazed earthen ware, pitch fibre and of the late to the less extent PVC pipes (unplastiside polyvinyl chloride) have been introduced, in all ranging from 160mm to 175mm in diameter. Lateral drain pipe lines are mostly composed of asbestos, cast iron, earthenware, pitch fiber and PVC pies; (unplastiside polyviny) chloride) mainly all in 110mm diameter.

Both main sewer line and sections of the lateral drains are believed to have been laid during the inspection of the university status by Kampala Water Board during that time. The above observation, and in relationship to the new infrastructure developed, coupled with population prowth, the drainage system needs improvement, expansion so as to be effective.

Other means sewage management such as Septic tanks are still used located towards west road, part of field man's lane and Makerere University primary school (yellow) staff quarters, where the system is still engaged. These will be eliminated through interventions already proposed under long term interventions *(See Volume II Mechanical Report).*

2.1.6.5. POWER SUPPLY, ENERGY USE & ICT

The university is connected to the National Power Grid and uses Hydro electric power as the main source of energy. However this is supplemented by generator power, solar energy, fuel gas and firewood. (See Annex Power Supply)



2.1.8.2 ICT and Fiber Optic Cable Distribution

The Fiber optic Cable network is distributed throughout the entire Makerere University Main Campus. The optic cable fiber network plan is appended to this report See Annex A-5 Optical Cable Network

2.1.8.2 Telecommunication Masts

The telecommunication masts are located on Observatory hill near the water tanks The communication Masts found at the campus include: MTN Mast 11TL Mast 7AIN Mast WARID Mast and ORANGE Mast

2.1.6.6. SOLID MATTER DISPOSAL

Solid waste management is contracted to private service providers that collect, and deposit the wastes outside the campus by means of motorized skippers to Kampala Capital City Authority waste disposal facility at Kitezi. Other solid waste matters from halls of residences are also collected from buckets by service providers and deposited to designated areas as the directly fired incinerators are in the process of being phased out due to air pollution. Where inevitable, there are incinerators recommended by the Ministry of Health for use in Intuitions for the disposal of municipal and medical wastes.

2.1.6.7. THE SECURITY AT MAIN CAMPUS

The main campus is inadequate in security aspects throughout its property boundary, access to existing academic buildings and available spaces.

The university main campus is only ¼ fenced of the entire boundary with seventeen (17) un-gazatted pedestrian accesses all around the university exposing the campus to free entry and exist. This increase the risks of vandalism and loss of university valuable assets and property, crime within university and threatens lives of its users to students, staff property as well as visitors.

Whereas Security is mainly emphasized at the main access gates with check points into the university with no records, and at key administrative buildings such as the main building and senate, the Safety of users at the campus is insufficient highly illustrated with unlit streets, pedestrian tracks and student's parks, security adversely affect the effective utilization of factional spaces in buildings and around the campus and also mysterious depletion of university assets.

2.1.6.8. FIRE PREVENTION, FIGHTING AND EMERGENCY RESCUE

Fire prevention and protection and fighting mechanism is in limited existent, inadequate and (or) neglected. The university doe not fire hydrant points even in the areas where highly inflammable substances and gases are in use such as laboratories and workshops in the university and in residential area.

There are approximately eleven fire hydrants points set up in 1960 & 70's installed near buildings/infrastructures with the aim of collecting water to combat fire outbreak, through motorized vehicles; but most of their functionality is doubted.

These could be reviewed, upgraded in line with the expanding facilities and infrastructures in relationship to the campus population growth; and in consideration of modern technology.(*refer to volume II-Mechanical & Electricals report*)

In existing institutional buildings, fire extinguishers are used though they are inadequate and few in numbers and past service time, in residential areas firefighting equipment lacking and this puts the university buildings prone to risk of losing valuables in terms of fire breakouts,

NEIGHBORHOOD AND THE SURROUNDING LANDUSE DEVELOPMENT 2.1.7.

The adjacent landuses to Makerere University Main Campus entail commercial and residential landuses. The Commercial landuse developments are found in the areas of Wandegeva, along Makerere Hill Road, and along Sir Apollo Kagwa Road in the south, while the Residential landuses are found along Muganzi-Awongererwa road in the south west inter mixed commercial and residential use.

COMMON SUPPORT FACILITIES AT THE MAKERERE UNIVERSITY MAIN CAMPUS 718

- a. Main Library
- b. Guest house
- c. Estates and works Department
- Guild Student d.
- Nurserv School В.
- Police Post f
- Bakerv ۵.
- h. Makerere University Primary School
- Makerere College School i.

EXISTING LANDUSE MAP OF MAKERERE MAIN CAMPUS 219

The existing land use of Makerere University main Campus is shown in the figure below;







Figure 43: Existing land-use map for Makerere Main Campus

Table 9: Existing Land-use Coverage's in Acres & sq.Meter Landuse Academic Use College of Agricultural and Environmental Sciences College of Business and Management Sciences-CoBAMS College of Computing and Information Sciences College of Education and External Studies (CEES) College of Engineering Design Art and Technology College of Health Science College of Humanities and Social Sciences-CHUSS College of Natural Sciences (CoNAS) College of Veterinary Medicine Animal Resource School Of Law Accommodation Staff Accommodation Students Hall Administration Estates& Works Department Lincoln Building Main Administration Senate Building Commercial Guest House Guild Canteen Green Space Green Space (blank) Herbarium Herbarium Makerere College School Makerere College School Makerere Primary School Makerere Primary School Recreational Playfield Sports recreation Religious Churches Mosque Support Facilities Support Facilities Weather Station

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Sum of Area_sq.M	Sum of Area_ac	% age
307629.32	76.016556	
40653.09	10.045562	
17359.7	4.28965	
18448.71	4.558754	
40564.5	10.0237	
35099.35	8.6732	
16510.44	4.0798	
30736.1	7.59502	
31054.83	7.6738	
65655	16.2236	
11547.6	2.85347	
535229.66	132.257561	
403076.89	99.601993	
132152.77	32.655568	
58727.66	14.511854	
46148.6	11.403519	
3790.7	0.936698	
3704.5	0.915397	
5083.86	1.25624	
11569.44	2.858865	
8586.27	2.12171	
2983.17	0.737155	
97278.081	24.037842	
93499.343	23.104099	
3778.738	0.933743	
10592.4	2.61744	
10592.4	2.61744	
21016.8	5.19333	
21016.8	5.19333	
15273.5	3.77414	
15273.5	3.77414	
64773.47	16.005806	
4208.99	1.04006	
60564.48	14.965746	
22413.06	5.53836	
14045.2	3.47062	
8367.86	2.06774	
16416.672	4.0566413	
16126.64	3.984973	
290.032	0.0716683	

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Transportation	9741.359	2.4071318
Parking area	9741.359	2.4071318
Utilities& Infrastructure	12068.7	2.98224
Water Reservoirs'	12068.7	2.98224
Vacant Space	24935.5	6.16167
Vacant Space	24935.5	6.16167
Grand Total	1208376.742	297.5951579

2.2. MULAGO CAMPUS- COLLEGE OF HEALTH SCIENCES (CHS)

The College of Health Science (CHS) started in 1923 as medical school for Mulago referral Hospital formally beginning operation four years later in 1927. It was merged with Makerere college and controlled by the college council twelve (12) years later. The college exists in a heavily built-up and congested environment with literally inadequate space for expansion. The environment renders the administration, staff and student learning and research inadequate to meet its apparent objectives (see figure 48 below and



Annex-Mulago College of Health Sciences Topographic Map)

2.2.2 Schools at the College

The college has four schools that entail the following;

- School of Medicine
- School of Biomedical • Science

• School of Health Sciences

• School of public health

2.2.3 Support facilities at the campus

The support facilities at the campus comprise the following;

- Galloway Hostel •
- Sir Albert Cook Library and
- the defunct animal house









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The College of Health Sciences (CHS)

The consultations with the College of Health Sciences (CHS) vielded the following suggestions and challenges:

Forthcoming Programs of the College

- Expansion of CHS facilities will necessitate re-location of the College to another site with more land; proposals have included i) construction of a teaching hospital at Katalemwa or in Katanga, but Katanga is too close to Mulago
- CHS intends to introduce 3 new graduate programmes, but these will not necessarily require major space expansion, ii) expansion will be mainly due to increase in undergraduate enrolment
- CHS may increase enrolment by up to 50% over the next 5-10 years yet this expansion must be supported by an increase in iii) physical infrastructure

Landuse

The general land-use for the area is institutional comprising of academic use and parking spaces; accommodation for students at Galloway Hostel. The old dilapidated buildings will be demolished to provide space for new multi-purpose buildings

Long Term Solution

The long term solution is to source for funds to build a teaching hospital at Katalemwa

3.3 KABANYORD CAMPUS-COLLEGE OF AGRICULTURE AND ENVIROMENTAL SCIENCES (CAES)

3.3.1: Background

Makerere University Agricultural Research institute, Kabanyolo (MUARIK) is the arm of the university that interfaces with the National Agricultural research system (NARS). MUARIK farm was established in 1953, and upgraded to a fully-fledged research institute in 1992 under the College of Agricultural and Environmental Sciences' School of Agricultural Sciences. The departments in the school include Agricultural Production, Agribusiness and Natural Resource Economics and Agricultural Extension & Innovations.

3.3.2: Location, Cadastre and Property Boundary

The institute is located 21 Km north of Kampala along Gayaza- Namulonge road in Kyadondo County Wakiso District. The institute occupies a total area of approximately **551.9** acres.



Figure 49: Makerere University Kabanyolo Campus- College of Agriculture and Environmental Sciences (CAES) Note: The dotted outline denotes the boundary extents of Makerere University Kabanyolo Campus - College of Agriculture and Environmental Sciences-(CAES) Source: TECO. Oct 2013

3.3.3: Existing Land-use at Kabanyolo Campus-College of Agriculture & Environmental Sciences (CAES)

The Kabanyolo Campus formerly the Makerere University Agricultural Research Institute (MAURIK) was planned as an agricultural farm and currently the existing infrastructure cannot accommodate College of Agriculture & Environmental Sciences (CAES) functions. The current existing land-use types are typical of a Farm institute of its nature. It was analysed and mapped to provide an understanding of their distribution across the campus, identified and classified as Academic/ Administrative, residential, recreational/sports facilities, Agricultural use, Utilities and the support facilities.

- A. Academic and administrative use, these include the teaching pavilion, the administration office that accommodates the farm managers office.
- B. Residential landuse

These comprise of the student hostels and the staff quarters. The junior staff quarters are obsolete and require demolition to pave way for new and better residential development (see figures below). The senior staff quarters are still in a good condition and are to be maintained in this master Plan while the existing students' hostels require renovations and provision of new ones to cater for the increasing number of students due to other new programs and developments that are to be introduced at the Campus.




Figure 50 Obsolete Junior staff Quarters (labour lines) at Kabanyolo Figure 51: Obsolete Junior staff Quarters (labour lines) at Campus

Kabanyoro Campus

C. Recreational and sports facilities.

The recreational finicalities at Kabanyolo Campus mainly entail the play ground, the basket ball court, Tennis court and the Volley ball pitch.

D. Agricultural use

The agricultural uses for the college include but not limited to the following; Demonstration Gardens, Animal Grazing paddocks, Coffee plantations, Rice paddy fields, Piggery units, Tree plantations, Diary chain unit, Green houses and Aquaria Fish farming ponds

E. Support Facilities at the college.

The supportive facilities at the Kabanyolo Campus include Feed mill house, Agricultural Engineering block, Engineering workshop, Grain Stores, Farm equipment house, Carpentry, plumbing and Mechanical workshop, Drying yard, nursery and primary school; Biotechnological laboratories, canteen, Silage bankers, and community Police Post

F. Existing Utilities and infrastructure

Water Source and supply

A motorized borehole is used harvest pump water from underground which is then pumped to the water reservoirs. The figure below shows the existing water reservoirs at the Campus



Figure 52: Showing the existing Water Reservoirs at the Campus

Roads, The farm has numerous roads serving the different land uses within the campus however most of the roads are gravel roads **Electricity**, The University is connected to the National Power Grid and uses Hydro electric power as the main source of energy.





Existing Land-use Coverage

The existing land-use area coverage of Kabanyolo Agricultural research institute is shown in the table below;

Table 10: Showing Existing Land-use area Coverage

Existing use	Sum of area in acres	Percentage Coverage
Administration	1.2	0.22
Animal Paddocks	66.01	11.24
Banana Plantation	21.8	3.98
Boys Hostels	2.4	0.44
Coffee Plantation	19.5	3.56
Diary Production Unit	5.9	1.08
Equipment Store Area	0.5	0.09
Fallow Land	128.9	23.55
Gardens	223	40.75

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Girls Hostels	2.6	0.48
Goat houses	2.1	0.38
Grain/Cereal Production Unit	1.1	0.2
Green Houses	1.3	0.24
Post Graduate Hostels	4.4	0.8
Junior Quarters	2.5	0.46
Engineering Workshops	3.1	0.57
Nursery School	0.6	0.1
Piggery unit	5.7	1.03
Play Courts	1	0.16
Play Fields	2	0.37
Police Post	0.4	0.07
Poultry Unit	0.8	0.15
Science Laboratories	3.1	0.57
Senior Staff Quarters	9.8	1.79
Telecommunication Masts	0.1	0.02
Tree Plantation	41.9	7.66
Water Reservoirs	0.2	0.04
Weather Station	0.1	0.02
Grand Total	552.01	100

3.1.3 STAKEHOLDERS CONSULTATIONS

The consultant undertook consultative meetings with various key stakeholders of the university. The findings from all the consultations are subsequently discussed; below;

Consultations with the University Secretary

The consultant undertook consultations with the University Secretary and the following were raised for consideration in the preparation of the infrastructure master plan:

- A proposal for provision of modern facilities at the campus to cater Distance learning to address the congestion of the main a) compass needs to be integrated into the master plan of the University.
- The master plan horizon should extend to over 20 years and not 10 years as stated in the terms of reference for the b) assignment.
- The university can expand its facilities to meet the students demand for spaces and user requirement с)
- d) The Need to plan for a students' centre in the University was expressed
- е) Plan for satellite campus, established outside the main campus

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- f) Guest house space should be ecologically landscaped with leisure parks
- a) Removal of residential houses for staff off the main campus, the university to think of staff loans to build private houses for the 4000 staff. Only key university staff could be accommodated on main campus they are too expensive to maintain, occupy big spaces on institutional land.
- h) Provide academic, students halls and supportive facilities with adequate recreational spaces.
- Flats can remain in the short term since they accommodate more staff families i)
- Preservation of historical sites of the campus is necessary i)
- Fly overs to link the students communities of Kikoni and Katanga k)
- Katanga land when cleared should be under College of Health Sciences and sports complex. I)

Consultations with Estates and Works department

Consultations with the Estates and works department yielded the following suggestions for consideration in the master plan: Depository system for the estates and works department for storage of large volumes of important data and information

- а) relating to the university estates
- b) Built-up tunnels for Utilities throughout the campus for power cabling, water and sewer.
- Removal of residential units especially Bungalows and put up high rise blocks that accommodates more staff as well as freeing с) up congested spaces that can be used for academic and institutional expansion
- Removal of overhead power cabling to underground d)
- Traffic flow management at all entrances and exit points to control the amount of traffic entering the campus as well as Е) management of parking lots to generate more income to the university.
- Allocation of land for student parks such as properly landscaped green parks with adequate furniture needs to be considered. f)
- Provision of the students centre at the central location on the university g)
- Removal of club 5 from campus premises and land be used for other institutional use h)
- Makerere Primary school and Makerere college school are part of the main campus i)
- The master plan ensure and suggest recommendations on the reduction of electricity expenses i)
- k) Suggest self sustainable energy use for the institution i.e. hybrid solar and Hydro electric power on buildings Suggestions for rain water harvesting -I)
- Solid waste management, the campus has a poor solid waste management system especially for the hazardous waste from m) laboratories. Management of hazardous wastes especially the effluents from the laboratories needs to be given special attention
- Relocation of the Estates and Works department n)

Consultations with the Director of Planning & Development

The director planning suggested that the Master plan should take into consideration of the following issues:-

- Aesthetics of the entire campus should be critically analyzed and addressed. i)
- ii) Space utilization and user requirements to meet the staff office requirement for 4000 staff and 2300 support who require office space
- Centralized space management with adequate facilities iii)
- Modernization of institutional management system i.e. Efficient on traffic flow and also security control to entries and exit of iv) institutional buildings

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- Demolishing dilapidated housing units and buildings that have past their lifespan on campus to create and free up space for v) oreenery and parks.
- Face lifting of institutional buildings to enhance beauty and aesthetics vi)
- Creation and improve of the international front desk and public relations for especially international students vii)
- Preservation and conservation of buildings with unique architecture viii)
- Some housing units for staff can be removed from campus but maintain a few for key university staff ix)
- Construction of centralized teaching facilities to address the deficit of lecture spaces for students x)

Consultations with Deputy Vice Chancellor (Academic Affairs)

The following suggestions were put forward by the DVC (academic affairs), namely:

- National focus is geared at increasing science intake and this as a public university should take it up because of its advantage i) competitiveness to other universities
- Establish centres of excellence rotating on the teaching and research base. ii)
- Increase infrastructure space adequate to the human resource this leads to optimal utilization iii)
- Performing Arts should be taken care of with adequate studios and theatres therefore improving the environment and space iv) adequacy with a modern building for it. This course forms part of protecting identity of Makerere university
- Address the security issues on the entry and exist points of Makerere campus including the institutional buildings v)
- Allow moving of some colleges off the main campus –this should be the way to go for Makerere university vi)
- Suggested for the enactment of policies to adequately manage up country campus after a thorough survey has been done vii)
- Develop the incomplete slabs to create more institutional space for lectures viii)
- Internationalization of the university where by the student population should be looked at with safe and adequate environment ix) and security with an international front desk office handling international student matters as well as special accommodation
- Centralized timetabling to control and manage spaces in the university x)
- Laboratories and facilities be centralized and can be attached to CoNAS xi)
- Distance learning is a way to go for the university as away of decongesting the Main campus xii)
- Provide lecture halls without partition walls to make them flexible to users xiii)

Consultations with the National Council for Higher Education

Consultations with the National Council for Higher Education were undertaken and the suggestions made include but not limited to the following;

- The university should Plan well for the teaching facilities and laboratories, with adequate spaces for library and computer i) laboratories
- The Maximum projection Makerere University should not exceed 60,000 students, at National level and the other universities ii) will take on the surplus, while Makerere maintains its competitive advantage over others and concentrate on research
- Staff housing can be set up outside the campus, the management can set up facilitation measures for staffs to build their own iii) houses outside the Main campus
- Aesthetics of the university should be improved upon. Creation of more green spaces for all users iv)

- v) Security of the university is compromised by through traffic on the university and it comes with its challenges such as accidents on campus and thefts of university property as well as making the environment unsafe for staff and students and even visitors
- Water harvesting at the university should be considered. It can significantly reduce the expenses on water as well as vi) sustainable use of water
- There is need to integrate other power sources at the University for example solar energy can be an alternative energy vii) source for lighting up the buildings and the streets.

Consultations with the University Dean of Students

The dean of students highlighted the following as key issues to be considered in the preparation of master plan,

- The proposals to out-source caterino services in halls of residence was out forward a)
- Students halls of residences will remain under Makerere university management b)
- It is desirable to maintain student accommodation on campus in order to keep the campus alive even at night and holidays г)
- The university should construct some modern hostels for international and local students at the periphery of the main campus d) and on plots near main campus for income generation
- e) A student centre with key facilities, including catering services, reading rooms, internet points, etc should be built at the centre of the campus
- f) Three (3) strategically located small student centers could be developed in premises currently used as dining halls in halls of residence
- A stadium with all sports facilities should be built at the main sports grounds g)
- h) Sports facilities in the halls of residence, including tennis courts should be rehabilitated

The College of Veterinary Medicine, Animal Resources and Bio-Security (CoVAB)

Consultations with the CoVAB administration yielded the following suggestions;

- The College has land in Buyana. Kyankwanzi and Nyakyesasa which should be integrated into the master plan. i)
- ii) The Master plan should fit into the College's future vision and projections that's to say the secretariat remains at the Main campus while other functions move outside the main campus i.e. Kyankwanzi land for Bio-technology; Nyakyesasa as a centre for incubation
- iii) The college also wishes to build specialized labs and animal clinics
- There is a need to plan for social spaces within the campus. iv)
- v) Landscaping and tree planting is a key issue and needs to be considered in the master plan of the University.
- vi) Gorilla eco-system simulation center to act as tourism attraction point, hence generating revenue for the college and University.
- Need for expansion of parking facilities, build students canteen, and conversion of former animal houses to other relevant vii) functions.
- Possibility expansion of the existing college building to accommodate extra floors needs to be explored. viii)

Consultations with the College of Business and Management Sciences (CoBAMS);

Challenges/ Problems of the college

The challenges/ problems faced by the college are numerous and they entail the following:

a) Inadequate Academic Staff establishment: Establishment in the College is small compared to the big student population of 8916. Currently, the College has a staff-student ratio of 71:1 thus not aligned with the NCHE recommendation of having staff: student ratio of 145

b) Inadequate/insufficient space

The space problem at the college is subsequently explained below;

- For Lectures: The College does not have adequate space to accommodate the large student population. A number of i lectures take place in the Main Hall which holds numerous University functions. This leads to cancellation of some lectures due to engagements of the lecture venue (Main Hall). On average, 15 lectures are cancelled in a semester due to unexpected functions. With a student population of more than 8,000, the college has constraints in all spheres: lecture space, library space, computer laboratories, office space, etc. This compromises the quality of instruction.
- For Academic Staff: A number of academic staff are squeezed in small offices ii.
- For Administrative Staff: A number of administrators (i.e. registrars, Communication Officer, Accountants etc) have iii been posted to colleges without adequate facilitation/remuneration and additional space in form of offices.
- c) There is also a problem of Inadequate budget for maintenance of equipment e.g. Maintenance of the video-conferencing equipment.
- d) **Poor internet connectivity:** The bandwidth is not adequate to match the capacity of the College extents. Hence the college has to purchase extra bandwidth to enable some facilities to function e.o. the video-conference facility. The hot-spots are also too few to facilitate the bio student population since few of them can be in the computer laboratories at a given time.
- There are no facilities to enable people with disabilities access the storied buildings in the College with ease. This should be E) considered at the Centre under capital development.

Needs of the college to be considered in the Master Plan

- a) The new buildings to be developed quality to be designed with ramps and escalators to enable free movement of the people with disabilitv
- Enough office spaces need to be provided for both the teaching staff and the non teaching staff. b)
- c) Lecture spaces with the capacity to fulfill the demands of the 8000 students need to be constructed

Consultations with College of Computing and Information Sciences (CoCIS):

The College of Computing and Information Sciences made the following suggestions for the preparation of the master plan:

Challenges faced by the College

The challenges that are currently being faced by the college of Computing and Information Sciences entail the following:

The teaching space is inadequate to accommodate up to 8000 students i)

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- There is acute shortage of office space at COCIS, with up to 20 lecturers sharing one office space ii)
- Inadequate staffing of the college currently operating with 96 staff members compared to the 400 that would be required for iii) the 8000 students
- Currently COCIS has a staff of 96 iv)
- The optimum staffing for the current population is 270 v)

Needs of the college

- There is need to plan for more lecture spaces to accommodate the planned enrolment of 8000 students in the 10 years. vi)
- The optimum staffing for the full capacity of 8000 is 400 vii)
- A total of 150 offices would be adequate to comfortably accommodate the full establishment, with 2 senior staff sharing an viii) office space and 3-4 junior staff sharing
- ix) Three (3) modern student centers need to be built at the big colleges, and should comprise of the following facilities; internet points, restaurants and bookshops

Measures for improvement of the College

Short term measure

As a short term measure, some big rooms in blocks A and B can be partitioned to create more offices for staff, which would oreatly alleviate the current shortage

Long term measure

In the long term, an office block could be constructed between Block A and the round-about

College of Education and External Studies (CEES);

Consultations with College of Education and External Studies yielded the following issues:

- The college has an enrolment of 6000 students and this creates shortage of both lecture space office space for the lecturers i)
- ii) The existing building of the College has a drainage problem and leaks during rainy seasons; it thus requires rehabilitation and remodelina.
- A new building that can accommodate more lecture spaces, college library and office space for the staff needs to be iii) constructed. Some of the existing buildings can be demolished to create space for new multipurpose building.
- The university needs to invest in distance learning as a way to de-congest the university. This therefore calls for an urgent iv) need to adequately equip the University with the necessary technology and other modern facilities required for distance learning.
- The College needs a computer laboratory v)
- Preservation of historical buildinos heritage is key in the master planning exercise; thus there is need to identify buildings vi) with rich architecture that needs to be conserved and preserved at the University
- There is a general need for refurbishment of the old building structures vii)
- Creation of students' parks and oreen spaces with adequate plantinos needs to be given priority in the master plan. viii)

College of Humanities and Social Sciences (CHUSS):

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The following issues were raised during the consultant's meeting with the college head:

- The college has 500 staff and 8,000 students; this has resulted into inadequacy of space for staff and students a)
- The college has no computer laboratory there is need for provision of computer laboratories for students h)
- New courses will be introduced to the school of performing art and department of Art & film as well as at the school of women с) and Gender Studies. These departments have potential on the market and they need to be critically be considered in the master plan with studios and theatres and students laboratories
- Construction of Music Dance & Drama block equipped with music equipment and teaching facilities d)
- Introduction of centralized library to decongest the college library that has no sitting space for student e)
- There is need to set up a university museum under the Archeology department f)
- Need to create designated student parks with trees and flowers and shrubs segregated from them the congested built-up q) environment and movino traffic.
- Full landscaping and beautification of the university to interact with the various uses is paramount. h)
- Hotel could be required at the current quest house with commercial services for the quests i)

College of Natural Sciences (CoNAS):

Student numbers are likely to increase or even double but if the number increase the college of Natural Sciences has enough facilities to handle only rehabilitations and renovations on the existing buildings could be adequate to manage students' numbers

- Research and Analytical Laboratories for professors with specialized analytical sciences i.e. forensic science that are required i) in the country
- The college of Health science should be home for cross-cutting laboratory, set up specialized laboratory with highly specialized ii) laboratories equipment
- The college should exploit international sciences in clean energy nuclear to give opportunities to other international scientists iii) and researchers
- Facility for space science at main campus whereas the Nuclear science facility on another estate outside main campus iv)
- Facility for sports science and ovmnasium after freeing up some space through demolition of housing units, especially Kasubi v) View houses.
- Laboratory for Geology and petroleum should be set up under CoNAS vi)

College of Agricultural and Environmental Sciences (CAES)

The consultant also undertook meeting with the top administration of the College of Agricultural and Environmental Sciences and the following suggestions were made for the master plan;

- i) Re-locating the college to Kabanyolo but some departments can remain on campus such as Geography. Food Science and Technology: and economics department.
- Enrolment of staff to 200 with student population currently at 3700 can grow to even double over the next 15 years ii)
- iii) Set up institutional facilities at the MAURIK and private sector could also be involved
- Accommodation for international students at MAURIK iv)
- Housing of staff with minimum accommodation and the rest can take care of themselves outside Kabanvolo Campus v)
- Provide amenities and create conducive environment for students, demonstration and research laboratories on campus vi)

Challenges/problems being faced with Campus Kabanyolo

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- Land disputes with the neighboring communities
- Dilapidated residential quarters with asbestos roofs •
- Most of the existing pit latrines in the junior staff quarters are almost full
- The water borne toilets in the junior staff quarters are defunct and need complete overhaul
- The wiring system at the teaching pavilion and the diary unit is underground and causes electric shocks during the rain seasons. The farm has of recent lost two animals due to electric shocks.
- The college land is not fenced hence subjecting it to encroachers
- Poor drainage system of the existing buildings •
- The bio-safety mechanism is defunct

Planning needs to be considered in the master Plan

The following were identified as needs to be considered in the Kabanvolo Master Plan:

- Proper fencing of the campus land is required preferably with a boundary wall to curb encroachment on land by the neighboring communities
- Rice paddy fields are needed
- Refurbishment of the existing diary unit •
- Refurbishment of the junior quarters
- The bio safety mechanism which is located at the main entrance needs to be restored •
- Establish a workshop to design and fabricate agricultural implements and tools including simple tractors and low cost irrigation technologies.
- Pulp and Paper production Unit.
- Establish a furniture and crafts workshop. The college requires state-of-the-art carpentry workshop (3000m²) that will produce high quality furniture in addition to facilitating development of small wood products such as toothpicks, wooden crafts, and wooden toys that are currently imported. The workshop will also serve as a vocational training facility.
- Three Star Guest house
- Tourism and hospitality development
- A modern weather station •
- Agro-processing and value addition enterprise development

Consultations with the College of Health Sciences

The management and administration of the college of health sciences was consulted and the issues discussed evolved around the current challenges of the college, the needs and other development interventions to improve infrastructure provision at the college. The results obtained from the consultations are subsequently below discussed;

Challenges/problems faced by the College of Health Sciences

The kev challenges/problems of the college include but not limited to the following;

a) The college generally exists in crowded environment with limited parking space and no clear administrative block. The college lacks identity as there is no proper administration block

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- b) The existing building space for Anatomy is small and cannot sufficiently house the current number of students (200) as it was originally planned to accommodate only 20 students hence more space for anatomy is required.
- There is no space for extension or construction of new building developments at College site с)
- There is currently no space at the college for teaching basic sciences, thus lecture spaces for teaching basic sciences need to d) be considered in the master plan of the college.
- e) The college lacks adequate tutorial rooms thus the master plan ought to cater for tutorial rooms
- The building space earmarked for physiology is small and cannot accommodate the current student number of 350 yet it was f) originally designed for only 50 students.
- There is limited office space at the college for instance the departments of pediatrics, adult medicine, general surgery, q) orthopedic surgery, ENT, Radiology, Gynecology and anesthesia do not have offices at the College and are housed by Mulago Referral Hospital.
- h) The existing skills labs are inadequate to cater for the current student population and hence more skills laboratories need to be catered for in the new master plan of the college.
- The existing animal house is obsolete and a new one with modern equipment needs established. i)

Planning Needs to be considered in the master plan for the college of Health Sciences

The following were identified as the planning needs of the college of Health Science;

- 1. The need for a teaching hospital was expressed by the stakeholders and the proposed site to be at Katalemwa on Gayaza road in the long term.
- 2. A new administrative block needs to be established to symbolize the identity of the college.
- 3. During the assessments, it was also established that the college didn't have enough office space to house its staff, for instance one office space was shared amongst six people. This therefore implies that there is need to plan to adequate office space commensurate to the staff of the college. The office space ratio can alternatively be reduced from 1:6 to 1:2

Table 11: Showing the Challenges and Needs for the master Plan of Makerere Main Campus

- 4. The assessments also revealed that car parking space was largely lacking at the college, it thus calls for a need to provide adequate parking at the College in the new Master Plan.
- 5. Skills laboratories are needed to impart skills to the students
- 6. The existing animal house is obsolete and a new one shall be required to accommodate the animals that are used on medical research
- 7. Lecture Space most especially for teaching basic sciences, needs to be considered in the new design of the college.
- 8. Tutorial rooms need to be considered at least 2 rooms to be considered for each Department.

Suggestions for Short term development Interventions

- 1. The possibility of demolishing some old buildings at the Mulago campus and replacing them with modern high rise buildings may be explored, but the challenge would be space for temporary relocation of facilities
- 2. The physiology laboratory can be remodeled and alternatively changed into administrative block

Summary of the key Issues Identified

A summary of the key issues at all the Campuses of the university is described below

Makerere University Main Campus

The existing challenges and needs that ought to be considered in preparing the master plan of Makerere University Main Campus are shown in the table-11 below:

	Makerere University main Campus					
Method of data collection	Challenges/Problems	Planning Needs				
Field Observations	 Increasing number of student on fixed user facilities. 	A students and commercial centre				
 Field Verifications 	Land disputes with encroachers'	New parking lots close to close to areas with multi functional				
	 Faced with a problem of managing liquid effluents from the laboratories. 	 Green belts, spaces and other recreational Spaces 				
Stakeholder Consultations	 Poor solid waste management especially in the residential areas of the university. 	 Refurbishment of the old Buildings. 				
	Old and Obsolete buildings residential quarters	 Amalgamation of all schools and departments that belong to o 				
	Too much through traffic	Museum and Galleries				
	 Inadequate parking facilities at the Campus. 	 A well coordinated traffic flow plan of the university 				
	Poor maintenance of the existing road infrastructure.	Planning for pedestrian precincts				
	 Limited number of lecture and offices to some colleges especially CoBAM, CHUSS, and CEES 	 The need to develop the slabs of the Former UCB and Social st 				
		 Address Management of liquid effluents from the laboratories 				
		A five Star Hotel				

Source: Compiled by the Consultant

ISES.		
ne college		
iences Slab		

College of Health Sciences Mulago Campus

The existing challenges and needs that ought to be considered in preparing the master plan of College of Health Sciences Mulago Campus are shown in the table-12 below;

Table 12: Key issues/need at the College of Health Sciences Mulago

	College of Health Sciences Mulago	
Method of data collection	Challenges/Problems	Planning Needs
 Field Observations Field surveys and Verifications Stakeholder Consultations 	 The college generally exists in crowded environment with no space for expansion. The college lacks identity as there is no proper administration block The existing building space for Anatomy is small and cannot sufficiently house the current number of students (200). There is no space for extension or construction of new building developments at College site Inadequate lecture spaces for teaching basic sciences. The college lacks adequate tutorial rooms thus the master plan ought to cater for tutorial rooms There is limited lecture space for physiology Limited office space to accommodate the college staff. The college lacks adequate skills laboratories. Inadequate to cater for the current student population. The existing animal house is obsolete. 	 The need for a teaching hospital was express Katalemwa estates. A new administrative block needs to be esta Need Office spaces commensurate to the co A need to provide adequate parking at the C Skills laboratories are needed to impart skil The existing animal house is obsolete and a that are used on medical research Lecture Spaces most especially for teaching of the college. Tutorial rooms need to be considered.

Source: Compiled by the Consultant

Makerere University Agriculture Research Institute Kabanyolo

The main challenges to Makerere University Agriculture Research Institute Kabanyolo campus and the physical planning needs identified during the assessments are expressed in the table 13 below;

Table 13: Identified needs of Makerere University Agriculture Research Institute Kabanyolo

Makerere University Agriculture Research Institute Kabanyolo			
Method of data collection	Challenges/Problems		Planning Needs

ssed by the stakeholders and the proposed site is the

blished to symbolize the identity of the college.

ollege staff.

ollege.

lls to the students

new one shall be required to accommodate the animals

g basic sciences, need to be considered in the new design

Field Observations	Land disputes with the neighboring communities	Proper fencing and demarcation of the campus land is required to curb encroa
Field surveys and	Dilapidated residential quarters with asbestos roofs	Rice paddy fields
Verifications Stakebolden	Most of the existing pit latrines in the junior staff quarters are almost full	Refurbishment of the existing diary unit.
Consultations	• The water borne toilets in the junior staff quarters are defunct and need complete overhaul.	Refurbishment of the junior quarters
	• The wiring system at the teaching pavilion and the diary unit is underground and causes	• Restored of the bio safety mechanism at the main entrance is required.
	electric shocks during the rain seasons. The farm has of recent lost two animals due to	• A workshop to design and fabricate agricultural implements and tools
	electric shocks.	Pulp and Paper production Unit.
	The college lacks adequate fencing	A furniture and crafts workshop.
	Poor drainage system of the existing buildings	• The college requires state-of-the-art carpentry workshop.
	The bio-safety mechanism at the main entrance is defunct.	Vocational training facility.
		A three Star Guest house is needed.
		A modern weather station
		Agro-processing and value addition enterprise development.

Source: Compiled by the Consultant

2.1.12. BUILDING INVENTORY AT MAIN CAMPUS

The main campus has a diversity of buildings with different type, sizes, height and architectural form and building material spread through-out the campus performing various function. The existing building inventory revealed a total of 547 buildings of different architectural form and sizes. *(See Table-14: below Existing Buildings At Makerere Main Campus.)*

Table 14: The summary Table of the existing buildings inventory is mustrated table beit	Table 14: 1	The summary	/ Table of the existing	; Buildings inventor	y is illustrated table belo
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Building Use	Area Sq.Meter	No. Floor	% Of Total Floor Space
Academic	47205.30	110	32.9
Administration	6599.42	19	0.8
Commercial	91.98	1	0.0
Recreation	930.92	4	0.0
Religious	3444.66	11	0.2
Staff Accommodations	28871.67	302	55.3
Student's Accommodations	22465.46	59	8.4
Support Facility	8383.23	43	2.3
Grand Total	117992.62	549	100.0

Administration Buildings

The administrative functions at the main campus are undertaken at the main building (ivory tower building) and the Senate building. The Main Building constructed in 1938 is most historic and iconic structures on the main campus located at the ridge

of Makerere hill and centrally located to perform administrative, finance and management function, whereas the senate building that handles all academic related functions of the University. These two buildings cover a gross floor space of

Academic Buildings

Academic functions are the core activity of the main campus; these are carried out in various institutional buildings at various colleges and school. They cover a total area of 47205.3 m² about 32.9 percent of the total area.

Residential Buildings

The current status of residential buildings range from single unit, semi-detached, flats and bungalows spread throughout the main campus.

Staff Residential buildings occupy the highest number of space at main campus with about 55.3 percent a total of 28871.67m² of the total university area of built-up space.

The building inventory data reveals that accommodation especially for staff is taking the highest proportions of space on building coverage at the main campus, this becomes the main hindrance to expansion of the Academic functional spaces as a result: former students green spaces have continued to deteriorate, and with over 60% of the space under residential the university is more of a residential neighbourhood than its meant to be main purpose.

Students accommodation occupy 8.4 percent of the total gross area of built-up space about 22465.45 m² the existing spaces for students accommodation is relatively low making students accommodation sprawl around the outskirts of the main campus boundary in the areas of Kikoni, Wandegeya, Bwaise, Kagugube, Kivulu, Katanga and Nakulabye areas

Other support Buildings

Main campus has a variety of common support buildings ranging from Generator power houses, Gas, water pump house and reservoir, Police post, security house, Bakery, grain mill, and public students Toilets.

These cover a total area of 8383.23 m² for about 2.3 % of the total built-up space floor area at the main campus LTD Page | 44

achment.

POPULATION BEHAVIOR, SPACE REQUIREMEENTS & NEEDS ASSESSMENTS 7.4

Makerere University is a public institution and transcends above all public universities in the country, it's a focal point as well as an icon in nurturing a wealth of knowledge, research and technology innovations and advancement in the region in various discipline.

At national level, the national policies have a direct influence to Makerere University stretching from national education policies such as Universal Secondary Education (USE) and Universal Primary Education (UPE) to infrastructure development and feed directly into the university.

The current collegiate structure has resulted into a change in the population structures of the university. The previous faculty arrangement that formed the projections of the 10 year Strategic plan of the university revealed that some faculties had a declining rate such as faculty of Arts, School of Education, Institute of statistics, Social Sciences, MIENR, FEMA, IACE, psychology.

The arts courses experienced a decline in the students' enrolments under the former Faculty arrangements; however they still have the highest numbers of students' population. While science and basic sciences courses steadily rise under the collegiate structure, there is almost constant growth in the Arts courses; this could be due to introduction of new courses, government policy i.e. of compulsory science courses at ordinary level of secondary education as well as universal secondary education taking gradual effects on the public universities including Makerere University

In order to provide equitable and efficient infrastructure that meet the current and future infrastructure needs, the trend of the orowth at Makerere University is critically analyzed in the development phases of the implementation of the master plan to match it with the immediate/ short term infrastructure & space requirement; as well as future infrastructure & space demands in medium and long term development phases

Population Projections at Makerere University

The projected populations are based on Makerere University Strategic Plan 2008-2018 as well as from consultations of key stakeholders at the various colleges' principles and university administrative staff

Basis of projections

The student population of Makerere University between 2007/2008 to 2013/2014 is analyzed based on the Makerere University Strategic Plan 2008/09-2018/19¹ growth rate. Under the collegiate structure, the former faculties/schools and Institutes that form the current individual colleges were amalgamated, they have been analysed as colleges considering the former as colleges that make up the nine (9) colleges and school of Law. The results showed that the Average student population growth per annum is 4%. This arowth rate was determined as a basis to project student arowth rate.

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Former faculties that had a negative growth rate have been analysed with a general university rate of 4% per annum. This is on assumption that under the collegiate structure, new courses have been introduced. The trends of the student growth rate are as briefly shown below:

In the Short Term perspective between 2013/2014 up to 2018/2019 (5 years) this is a period that checks the implementation of the strategic plan. It was assumed that the analyzed growth rate would be maintained and that there would be no expectations of drastic and rapid increase in the student population growth.

In the Medium Term (2018/2019 to 2027/2028), when infrastructure investments of the short term have been possibly made, the rate of growth was assumed at 4%. The Medium Term, the rate is a steady rise and that at this time, a number of infrastructure and facilities are in place and supportive of a bigger student population.

In the long term (2028/2029 to 2043/2044) it takes two folds, the population growth continues with a steady growth rate of 4% to 2028 to 2039, and constant population rate of 1.001 between (2039/2040 to 2043/2044) is at its optimal infrastructure utilization and grows steadily for the 30 year master plan period.

The population at Makerere University is currently estimated at 43,431 students and projected under collegiate structure in the next 30 years planning period 90,271 students.

Table 15: Student Population Projection by Planning Phase

College/School	2013	2014	Short term Phase (2018)	Medium term Phase (2028)	Long term Phase (2044)
CEDAT	2283	2347	2626	3888	4902
CoVAB	795	859	1174	1737	2191
CHUSS	8851	8792	8633	12779	16114
CoCIS	5890	6126	7166	10608	13375
SoL	1733	1791	2049	3033	3824
CAES	3783	3934	4603	6813	8591
CoBAMS	8916	9273	10848	16057	20247
CEES	7521	7376	6845	10132	12776
CHS	1655	1737	2132	3156	3979
CoNAS	1553	1678	2290	3389	4273
TOTAL	42,980	43,913	48,365	71,591	90,271

¹ Makerere university strategic Plan 2008/09-2018/19



Figure 54: Students population projection by implementation phases-for (2013/2014 to 2043/2044) Master Plan period

Existing Students Science Laboratory and Lecture Space Facilities By College

The Facilities for Lectures, Laboratories, Workshops, Library and ICT and Conferences, are inadequate to accommodate the current and future university demands.

The master plan intends to address the academic spaces deficiencies to adequately meet the Makerere university staff and students space requirements. The size of Facilities should be commensurate with their type of use and according to standards specified. For example workshops should be tailored to their use e.g. Mechanical workshops should be designed with large rooms to accommodate specialized equipment for training such as pulley systems, cranes, conveyor belts among others. Electrical workshop too to be equipped with specialized electrical equipment for training

Table 16: Existing Students Science Laboratory and Lecture Space Facilities By College

COLLEGE	LABORATORY SPACE	LECTURE SPACE
CEDAT	1817.32	2790.28
CONAS	3469.77	1273.06
COVAB	1759.75	574.8
CAES	2975.77	1653.21
CHS	1031.58	1064.99
CEES	159.02	1686.67
COCIS		3355.45
CHUSS		2504.15
SOL		479.4
COBAMS		1398.62
TOTAL	11213.21	16780.63
COMMON LECTURE SPACES		2,436

Table 17: NCHE Standards and Guideline Checklist

Infrastructure	Ideal	Good	Acceptable	Can be improved	Unacceptable
(i)Classroom/Lect	2.5m²/student	2m ² /student	1m ² / student	1m² / 4 students	1m²/Over 5 students
ure space					
(ii) Library space	2.5m²/student	2m ² /student	1m ² / student	1m ² /4 students	1m² /over 5 students
(iii)Science	3m² /student	2.5m²/student	1m ² / student	1m² /4 students	1m ² / over 5 students
laboratories					
(iv)Computer	3m² /student	2.5m²/student	1m ² / student	1m² /4 students	1m² /over 5 students
laboratory					

Source: National Council for Higher Education Checklist standards and Guideline

Table 18: Current Space to Student Ratios By College

COLLEGE	Student Pop [®] 2014	Laboratory space usage	Lecture Space usage
CEDAT	2283	0.80	1.22
CONAS	1553	2.23	0.82
COVAB	859	2.05	0.67
CAES	3934	0.76	0.42
CHS	1655	0.62	0.64
CEES	7521	0.25	0.25
COCIS	6126		0.55
CHUSS	8792		0.28
SOL	1791		0.27
COBAMS	8916		0.16
TOTAL	43,431		

The current student to space ratios are below the acceptable with exception of CoNAS and CoVAB with acceptable standards of required Science Laboratory Space of 1 : 2.23 and 1 : 2.05 m² per student respectively but fall short on lecture space 1 : 0.82 m² and 1 : 0.67 m² per student for CoNAS and CoVAB respectively. CEDAT has a ratio 1:1.22 m² per student but fall short on Science laboratory space with 0.8 m² per student.

The general analysis of space requirement per students is below the acceptable standands with CoBAMS, SoL, CEES and CHUSS running below unacceptable levels 0.16, 0.27, 0.25 and 0.28 m² per student.

COLLEGE	Student Pop" 2014	Laboratory space deficiency (m ²)	Lecture space deficiency (m ²)
CEDAT	2283	466	-507*
CONAS	1553	-1917*	280
COVAB	859	-901*	284
CAES	3934	959	2281
CHS	1655	623	590
CEES	7521	7362	5835
COCIS	6126	-	2770
CHUSS	8792	-	6288
SOL	1791	-	1312
COBAMS	8916	-	7517
TOTAL	43,431	6,593	26,650

Table 19: Current Space Deficiencies By College

THE REQUIRED SPACE FOR PLANNING BY COLLEGE

The Space needed for academic use to adequately accommodate students over the successive years through the master plan implementation process is discussed in this section, a deep analysis into space requirements for every stage of implementation of the Master plan for all the Colleges and School of Law taking into consideration the increase in the students number from 2013/2014 to time horizon of 30 year plan

The increase in the students numbers should be relative to the infrastructure and space development to meet academic, research and an ambient environment for students and staff study and work.

*In the Short/Immediate term (2013/2014 to 20182019) for 48,365 student population, the required Additional space is 101,277 m² taking into account the $1m^2$ / per student inclusive of 33,243 m² of current space deficiency to address the current (2013/2014) space deficit. The Science Laboratory space required is 19,669 m2 and 48,365 m² of lecture space.

In medium term to achieve the Good status² (2018/2019 to 2028/2029) for 71,592 students, the required additional space is 201,414 m^2 at 2.0 m^2 /student for lecture space and 2.5 for science Laboratory

In the Long term phase to achieve the Ideal status (2029/2030 to 2043/2044) for 90,271 students, the required space is 335,812 m2. The Science laboratory 110,135 m2, and 225,677 m2 for Lecture spaces.

² National Council for Higher Education NCHE, Checklist standards and Guidelines

Required space to achieve Acceptable status, (1st Phase) up to 2018 for 48,366 Students				Required space to achieve Good status, (2nd Phase) up to 2028 for 71,692 Students			Required space to achieve Good status, (3nd Phase) up to 2044 for 90,271 Students				
COLLEGE	Student Pop [®] 2014	Laboratory space required (m ²)	Lecture space required (m ²)		Student Pop [®] 2014	Laboratory space required (m ²)	Lecture space required (m ²)		Student Pop [®] 2014	Laboratory space required (m ²)	Lecture space required (m ²)
CEDAT	2,626	2,626	2,626		3,888	7,776	7,776		4,902	14,706	12,255
CoNAS	2,290	2,290	2,290		3,389	6,778	6,778		4,273	12,820	10,683
CoVAB	1,174	1,174	1,174		1,737	3,474	3,474		2,191	6,572	5,477
CAES	4,603	4,603	4,603		6,813	13,626	13,626		8,591	25,772	21,476
CHS	2,132	2,132	2,132		3,156	6,312	6,312		3,979	11,937	9,947
CEES	6,845	6,845	6,845		10,132	20,264	20,264		12,776	38,329	31,941
CoCIS	7,166		7,166		10,608		21,216		13,375		33,438
CHUSS	8,633		8,633		12,779		25,558		16,114		40,284
SOL	2,049		2,049		3,033		6,066		3,824		9,559
CoBAMS	10,848		10,848		16,057		32,114		20,247		50,617
TOTAL	48,365	19,669	48,365		71,592	58,230	143,184		90,271	110,135	225,677
Additional Space Required		101,277*				201,414				335,812	

Table 20: Required Students Space to Achieve Acceptable Status in The Immediate/Short (phase-I); Medium (Phase-II) and Long Term (Phase-III) of Implementation of the master Plan

NB: Additional Space needed for academic use to adequately accommodate students over the successive years through the master plan implementation process for Laboratory and Lecture space is discussed above;

CHAPTER THREE: MASTER PLAN CONTEXT AND STRATEGIC DEVELOPMENT INTERVENTIONS

3.1 The Envisaged Master Plan For The Three Campuses

The Master plan has been designed as a collegiate University taking into consideration: the provision of teaching and research spaces within colleges. This is an integral component in the arrangement of spaces for support facilities, recreational, administration as well as students and work environment for staff

The Master Plan responds to the issues in chapter two (2) while maintaining a flexible framework for growth in the future. Although the Master Plan diagrams indicate specific locations, configurations of building and site components, it is more important to understand the key concepts that the Master Plan is attempting to achieve. These are as follows:

- Develop under a collegiate and commercial concept; concentrate departmental buildings and new buildings under same space -**ф**use and arrangement.
- Re-arrangement of institutional operational spaces and moving some staff accommodation off-campus to increase on the фinstitutional spaces for new development and future expansion
- Develop College of Agriculture and Environmental Sciences (CAES) as a complete functional college off-main campus at -0-Kabanyolo
- Re-development and arrangement the College of Health Sciences at Mulago Campus (CoHS) with operational academic, -**ф**research and administrative spaces through multi-purpose storey buildings
- Internal circulation between buildings shall be sufficiently wide to accommodate large volumes of Pedestrian traffic, cycles фand vehicular traffic to create opportunities for student life space.
- -0-Develop larger, more purposeful multi-purpose buildings, with the exception of specialized laboratories
- þ. Densification of residential building developments to form apartments and accommodate more staff as opposed to horizontal and bungalow developments at the campus
- Enhance equitably the walking experience across the campus and linkage between the buildings and functional external spaces -**ф**-
- Expand surface parking in a logical manner with common parking facilities rather than on-street and at individual buildings • that further stretches the ever diminishing green spaces
- Beauty and aesthetics of the campus has strongly been considered in the master plan for adequate functionality of spaces -0between the built -up environment and green spaces have to be integrated with a consciously for students out of class reading, relaxation and interaction as well as recreation.

The master plan also cites implementation actions in an orderly phased manner without drastic changes. It's intended to facilitate the continuous flow of the university functions and activities without disruptions of its core functions "*academic*"

3.2. Master Plan Ideas adopted from the previous Plans

There are a number of important studies, and bench marks brought forward from the previous plans and they entails;

- Strategic Plan 2008/09-2018/19: It states the main goals and objectives of the university and core functions of teaching and learning; Research and Innovation; and knowledge transfer partnerships and networking. The strategic plan also puts forward measures of achieving its objectives among which ensuring efficient and effective organization, management of environment, as well as developing her infrastructure to match her functions. This is the main document quiding activities and direction of the university. It's an integral document that has been used in the preparation of this master plan and it forms the first(1) phase of the implementation of this master plan.
- Traffic and transportation previous plans of the university where reviewed and improvements have been made to meet the current and future demands. For instance widening road alignments, sidewalks with cycle lanes, drop-off points and central parking areas,
- Green space master plan 1971; recommended and highlighted areas for preservation and maintained as green areas in • the university as well as future expansion areas for academic and student accommodation area. The preparation of this master plan takes keen interest in the preservation of area reserved as green spaces and recreational spaces
- Physical planning and Space Audit 2007; it made the following recommendations;;-Intensive use of the existing buildings and land before permission to build elsewhere can be granted; Infill development between and within existing buildings to augment academic space be encouraged and allowed to actively take place on the main campus; Academic and multi-user general buildings be built and concentrated within the center of the campus along the ridge, while residential and recreational buildings be spread along the perimeter.; **Zoning** of unit-specific areas be done throughout the campus and adopted for their future expansion; In places where academic and residential areas are heavily mixed in a disorganized manner, the later should be remodeled in favour of the former; Old and spaciously built junior staff quarters to the west of the campus are **demolished to pave way for more modern income generating ventures** such as residential halls for letting or multipurpose student center; Certain academic units gradually move to off-campus locations: Agriculture, Veterinary Medicine, and Forestry are examples; Physical planning be considered a continuous and collective exercise of foresight in an integrated way in matters affecting the long-term future of the university; The post of **Physical Planner** be created within the Estates Department or Planning and Development Department, and a suitable person appointed.

3.3. Proposed land use Development interventions

The zoning and shaping of future land-use categories with taking into consideration expansion requirements of the various institution's needs has been proposed to guide development for the three campuses as given below;

A Makerere University Main Campus

The proposed facilities include;

- ddministration Blocks
- Academic spaces (Collage arrangement) with central teaching facilities
- 🔹 Library
- Laboratories and workshops
- Commercial and Retail Complexes with Banking, privately operated shops (computer accessories), clinics/pharmacies, super markets, fresh food groceries, shopping malls
- 🚦 Parking Area, Pedestrian access, Vehicular access. Sheltered walk ways.
- 🖪 Students Green Parks
- Staff Residential Housing Apartments
- Sports facilities and Open recreational Spaces
- 🖸 Botanical /Herbarium Gardens
- 🖸 Worship centers
- 🚦 A five star Hotel
- 😐 Museum
- Directorate of ICT
- Water hydrant points and fire assembly points at all colleges
- Facilities to cater for the special needs of the disabled and other groups in the society
- 🖪 Solid Waste Holding Bays/Sorting Slab

A. ACADEMIC USE

Academic spaces at the main campus have been expanded based on the space requirements for the 3D year plan horizon. These have been proposed in relation to their constitute colleges of the university for the nine (9) colleges that include; College; College of Business and Management Sciences (CoBAMS); College of Computing and Information Sciences (CoCIS); College of Education and External Studies (CEES); College of Engineering, Design, Art and Technology (CEDAT); College of Humanities and Social Sciences (CHUSS); College of Natural Sciences (CoNAS); College of Veterinary Medicine, Animal Resources and Bio-Security (CoVAB); College of Health Sciences (CHS); and one (1) School of Law (SoL). *Reference to Table and Annex A-9: Proposed Master Plan Zoning Plan*

Academic use has been expanded from 76.02 acres (25.5% of the total) to 117.89 acres (40.00%) . this implies that academic spaces expand to the current staff residential areas along Kasubi view on the western side and residential areas on new avenue road and Livingstone Drive & road of the main campus. See *Annex A-9: Proposed Master Plan Zoning Plan*

The college of Agriculture and Environment Sciences to be fully operational at Kabanyolo Campus and the facilities to be allocated to adjacent colleges of CEDAT and CONAS the relocation should be gradual without necessarily causing disruptions of the colleges administrative and academic activities.

The college of health sciences (CHS) at Mulago with multi-functional buildings; the existing, single old storey buildings to demolished and putting up of new buildings in the phase one and two and with long term to Katalemwa

Table 21: proposed land-use coverage in acres

Proposed Land-use

Academic Use College of Business and Management Science-(CoBAMS) College of Computing & Information Sciences-(CoCIS) College of Design Art & Technology-CEDAT College of Education and External Studies (CEES College of Health Sciences (IDI) College of Humanities & Social Sciences-CHUSS College of Natural Sciences-(CoNAS) College of Veterinary Medicine Animal Resource Makerere College School Makerere Primary School School Of Law-(SL) Accommodation Makerere College School Staff Accommodation Students Accommodation Administration Administration Commercial use Commercial Plaza University Hotel **Common Academic Facilities** Central Teaching Facility Main Librarv Green Spaces & Recreational Parks Green Space& Park Green Soaces & Recreational Parks Soorts Complex Tennis Court **Religious Institutions** Religious **Special Use** Directorate of Information &Communication Technology Museum **Transportation & Utilities**

Sum of Area /	Acre
11	7.89
1	6.55
	4.61
2	0.43
1	0.39
	4.14
	8.38
	19.61
1	6.06
	4.67
	5.26
	7.80
71	8.34
	1.28
3	2.48
4	4.59
	2.18
	2.18
	4.42
	2.12
	2.30
	4.66
	0.72
	3.95
6	i1.76
	5.29
3	8.36
1	6.20
	1.90
	4.53
	4.53
	2.49
	1.26
	1.22
11	0.30

Proposed Land-use	Sum of Area Acre
Central Parking Area	3.96
Green Spaces & Recreational Parks	0.70
Parking Area	5.65
Utilities& Infrastructure	1.33
Utilities& Infrastructure	1.25
Water Pump	0.08
Grand Total	287.90

B. ADMINISTRATION USE

The main administrative areas for Administration, management and central academic functions such main administration (Main building) and Academic affair areas remain un-changed; the current Estates & works department at the equipment stores will be integrated with new students centre block. At the current location of Estates & works department. Administrative functional areas are proposed to cover 2.18 acres (0.73%) from the current 14.52 acres (4.9%) of the total land cover on main campus

C. RESIDENTIAL USE

Densification of the proposed residential developments for students and staff while reduction on the residential areas for staff accommodation from the current 99.601993 acres to 32.481 acres ,The residential areas for students have been increased from. 32.66 acres to 44.59 acres at main campus this includes expansion of Africa hall and CCE Complex halls so as to accommodate more students

D. COMMERCIAL INVESTMENT

Investment areas at the main campus a have been proposed in four (4) sites these are located strategically at the periphery of the university boundary along the major roads for business and investments block A,B & D. block C along Muganzi-Awongerererwa is recommended for students Accommodation/Hostels as detailed in **table below**

S/N	Block_Name	Location	Area_acres	Area_sqM	Recommended Action
1.	Block A	Wandegeya View/Jjunju Road	2.30	9309.76	Commercial
2.	Block B	Bombo Road	2.87	11599.80	Commercial
3.	Block C	Muganzi Awongerwa Road	3.19	12894.70	Accommodation
4.	Block D	Kasubi View/Sir Apollo Kagwa	2.42	9797.81	Commercial
5.	University Hotel	University Road	2.3	9290	Hotel & Recreation
	TOTAL		10.77	43602.07	

Table 22: Commercial investment proposed in acres with location & recommended actions

The commercial investment centers will accommodate compatible uses such office spaces, shopping malls, restaurants, Book shops, stationary and printing; internet café', Computers& Phone accessories;

The university hotel at university road will perform functions of the hotel as well as accommodation of Guest lectures and international students, workshops, recreation (swimming pools, Gymnasiums, & Sauna)



E. COMMON ACADEMIC FACILITIES

These include areas to accommodate the centralized multi-purpose teaching facilities /blocks, the current locations for these facilities at the former UCB and Social sciences incomplete slabs. They are purposely for teaching /lecture spaces and computer laboratories and office spaces. Central Library area remains unchanged; college libraries will be emphasized especially at the proposed new college block.

F. SUPPORT FACILITIES & SPECIAL USE

Directorate of Information & Communication Technology (DICT) as an independent section has been at a strategic location at the ridge along University road. In the present location of public relations office, Its proposed to cover 1.26 acres should handle to manage among others network in the university and provision of other related services

The University Museum has been proposed at the current location of the current department of social sciences opposite the freedom square, to cover 1.22 acres.

Herbarium has been retained in its current location covering 2.61744 acres along Livingstone road.

G. RELIGIOUS USE

н

The current religious areas for Anglicans, Catholics & Islam have been retained unchanged with the respective students' centers covering 5.54 acres.

RECREATION AND GREEN SPACES

Sport and recreation are essential parts of the quality of life of the University for students & staff as a whole. Demand for facilities changes with changing lifestyles and the University will be responsible for assessing needs and auditing the quality and type of provision. There is currently demand for built facilities, such as gyms and fitness centres





Figure 58: Current recreational facilities at the main campus

The master plan has made provisions for recreational and leisure facilities at the current sports grounds with aims to ensure meet the raising university students and staff demand as well as the neighbouring community. Major built leisure facilities are Page | 51 recommended be located in or on the edge of the University at students centre facility. The major recreational sports grounds are located at the centres (Swimming pool & Squash facility; freedom square and other new proposed green spaces), as well as adjacent to a major public transport roads on Sir Appolo Kagwa and Bombo road.

The master plan also provides opportunities for informal recreation, such as walking, and cycling within the university provides lasting memory in people's perceptions of images that makes the university an attractive place to study, live and work.

There need to encourage not just for this reason, but for their potential health benefits and to encourage people to change their lifestyles in a way which supports a more sustainable approach to day-to-day living.

COMMUNITY FACILITIES (Counseling & Wellness centre; Kindergarten, Primary, College School)

The university supports communities in the neighbourhood through provision of educational institutions at lower level such as Kindergarten, Makerere Primary school and Makerere college school, these have been retained at the university.

Community Counseling& wellness center

This has been proposed at CHUSS opposite Lumumba hall, it will provide guidance and counseling as well as recreation center for university staff and students perhaps neighbouring communities.

The centre will provide spaces for individuals trying to overcome certain challenges in life(emotionally and mentally) as well as individuals seeking to simply relax and improve quality of life through more health awareness and physical fitness



Figure 59: Counseling and wellness centre facility

J. WASTE MANAGEMENT

The waste management facilities should be located as close as practicable to the origin of the waste, subject to acceptable impact on amenity. The handling, treatment, transport and disposal of waste will be carried out to the highest environmental standards. practicable.

ENERGY USE K

Academic. Commercial and residential development should be designed such that a minimum of 10% of the energy requirement is provided by renewable resources. The use of combined bio-mass similar technology will be encouraged, at Kabanyolo and for all developments in excess of 5,000 sq m floor space should be regarded as the norm.

Conversion overhead electric cable to underground cables as well as extension optical network cabling to un-served areas & new/proposed buildings

R MAIN CAMPUS MASTER PLAN AND FUTURE DEVELOPMENT INTERVENTIONS

Heritage Protection and Conservation Δ

Makerere University's valuable cultural heritage of buildings, sites and landscapes will be conserved and enhanced. Heritage resources are irreplaceable and development affecting them will only be permitted where it has been clearly demonstrated that there is an overriding need for the proposal which outweighs the need to protect the heritage interest, and that no alternative is possible.

d) Landscape

The quality of landscape in its Natural Beauty and Landscape should be conserved and enhanced; development inconsistent with the primary aim of conserving the natural beauty of the landscape to be resisted. Major development will only be permitted where it has been clearly demonstrated that the need for development has no alternative site.

New development will be expected to maintain the existing character of the area particularly within the locations that are adiacent site to be developed and retain the distinctiveness

Development will be expected to contribute to improvements to areas/sites where landscape is becoming degraded, especially on the parking areas and deep excavations could be avoided during constructions.

e) Protecting of indigenous trees

Proposals for new development will be expected to show how new planting and existing trees will be effectively managed and integrated, Development associated with the positive long term management of indigenous tree resources will be encouraged.

f) Tourism Development

The university is a prestigious institution simply due to its rich History and strategically location in Kampala capital city: Tourism development will be encouraged in the university, through small scale tourism in preservation and conservation of Historical building not only based one there history but also as iconic, unique architectural form; others should to be preserved to maintain and preserve heritage. Other site in CoVAB department of wildlife-Gorilla simulation center, university museum at CHUSS are to be introduced and diversification or the retention of buildinos contributing to the character of the rich history of the university to be conserved and preserved to last through generations, among these buildings Dosate building at CEES, ivory building, MUINER building. Zoology & Botany department buildings should be preserved.

B **Road Improvement Plan**

The section takes into consideration the improvements on the road network to cater for various road user; improvements on the entrances into the university and provision of common central parking areas; provide pedestrian walking areas and cycle lanes to link between the various institutional buildings. (See detailed road design in volume-II) and master plan interventions below

d) Entrance/Main Access into the University

The main gate access has been widened, enhanced with canopy, security check points and record shelter; the design can easily integrate with security system such as fixed CCTV cameras that can be fixed at canopy and scanners, the design is enhanced with grandness and unity with rhyming themes of the main ivory tower.



Figure 60: Main gate access improvement impressions

e) Main Access Road

The main university access road have been widened and separated with island; segregation of traffic and cycle lane and pedestrian side-walks with gazatted crossing point at CCE complex hall and University Mosque, parking along street and drop-off is prohibited along the Main Access Road.





f) University Road

The University road from CCE complex round about to Main Building has been maintained as one way and separated pedestrian side-walks with crossing points, and cycle lanes. It has been proposed with drop-off points and parking along the street is prohibited and with tree planting avenue/and landscaping areas of shrubs and bench areas



Figure 62: University road improvements maintained as one –way traffic flow with segregation , side-walk & drop-off areas

g) Ring Roads (Mary Stuart New Avenue, Link & Pool roads) These are major distributors through-out the university accessing various sections university; it distributes traffic from the main university access Gates to accommodation areas.

Figure 61: Main Access from main gate to CCE Complex Road about with usable spaces of cycle lanes, pedestrian side walks

It has been widened with separated pedestrian sidewalks, cycle lane, drop-off points as greening areas for tree planting and shrubs and grass area



Figure 63: University ring road, (Mary Stuart, Pool, New avenue and Link roads) improvements with cycle lanes, separated side-walks, drop-off points and greening/ landscape areas for shrubs & tree planting

h) Eastern & Western Gates

These are access points into the University and they have been proposed to take of security facilities, as well as ease management of traffic in bound and out bound of the university.

It's designed with uniform canopy and security units/house with similar features of the main access gate.



Figure 64: Typical Eastern and Western Gate Access; integrated with the boundary fence, secondary access roads into & out of the university

The existing parking areas with current capacity of 804 vehicles has been retained and common central parking areas been proposed at strategic location to accommodate 1,000 vehicles at various areas throughout the university such as

- Western part to service the proposed Science & innovation complex, the Sports Science & Sports Complex along Kasubiview roads; to accommodate 510 vehicles at any given time
- 2 At the current Quarry quarters and Garages; to service the Library, the new development at CoBAMS extension and Central Teaching Facility at the former UCB slab as well as serving CoNAS proposed for 136 vehicles; this parking lot can be storyed car parking with connection from guarry road and New avenue
- 3 At the current Guild Canteen to serve the Central Teaching Facility at CHUSS former social sciences slab, the current Senate building, the proposed Museum and Social sciences and Lincoln Building, proposed to accommodate 64 vehicles
- 4 Nsibirwa Grounds to serve the sports ground and the proposed students and commercial centre at the current Estates department to accommodate 207 vehicles
- 5 CEES parking lot; this is to serve College of Education & External Studies area and the School of Law areas to accommodate 184 vehicles
- 6 Extension of Main Library parking to cater for 81 vehicles
- Other access roads to departments and accommodation areas; and Cul-de-sacs i)

The small access roads and cul-de-sac that connect the various departments, accommodation areas has been recommended for tarmac, paved and drainage improved as well as labeling and signage and street lightings along all the roads

COLLEGES INTERVENTIONS & DEVELOPMENT С

This section takes into consideration the various interventions to be undertaken at college levels as far land use considerations are concerned and supportive facilities

College of Business and Management Sciences (CoBAMS); a)

The college of Business & Management Sciences (CoBAMS) with a ¼ of the current students' population at university has a current student spaces ratio 0.16 with deficiency 7,517 sgm; require interventions that include

i) Parking Areas improvements

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- The central teaching facility to improve on the student space ratio in the short term phase at the former UCB slab
- Medium &Long term intervention college to expand to adjacent site between Livingstone road, Lane & New avenue road; one extra building at the Livingstone lane replacing the senior staff bungalows, its to accommodate the following:-
 - College library of 1.000 som
 - Lecture Space to supplement the central teaching spaces
 - Computer ICT Laboratory
 - Office spaces for college staff
- Parking should be restricted to gazatted central parking facilities along New Avenue, library and permit only staff vehicles & persons with disable to at CoBAMS parking lots
- Reclaim green spaces for students external recreational & study environment

Figure 65: The proposed CoBAMS interventions and extension to adjacent location between Livingstone road, Lane & New avenue; proposed central teaching facility at former UCB slab

b) College of Humanities and Social Sciences (CHUSS):

CHUSS current students' population at 8.633 with space deficiency is 6.288 so.m. at a students' space ratio of 0.28. This will require the following interventions that include:-

Central teaching facility at CHUSS social sciences slab and New building for performing art as well as Counseling and wellness center at Mary Stuart road







- The CHUSS central teaching facility to improve on the student space ratio in the short term phase at the former Social Sciences slab
- New Building for Department of Liberal & Performing Arts-MDD opposite Mary Stuart students hall, it will accommodate;-
 - Acoustic studios labs
 - Auditorium/spaces
 - Lecture rooms
 - Computer laboratory
 - Office rooms and
- a College library of 1.000 sq.meters
- Counseling & wellness center, The design is to have the following spaces:
 - Counseling rooms/private and group sessions
 - Library, Conference hall
 - Restaurant, Lounge
 - Outdoor interaction and private spaces ie. Outdoor child play area, relaxation
 - Primary health care facilities e.t.c

The college has a current space deficiency of 2770 sq.meters; and required spaced of 33,438 sq.meter in the master plan period: the interventions entail the following



senior staff quarters at pool road



The college with the current space deficiency of laboratory space of 7,362 and lecture space 5,835., the required space of 31.941 so.m for the next 30 years.

The college also accommodates some of the oldest buildings at the university with great historical importance like the former administrative building, and architectural forms proposed (DOSET, Library and lecture space & Fine Art) to be conserved and preserved for their purpose. Renewal and demolition of some buildings has been proposed at this college (refer to the implementation phases for the various actions to be undertaken)



- - students snaces

e) College of Engineering, Design, Art and Technology (CEDAT); CEDAT has currently the minimal threshold students space to accommodate 507; however this is need for more space in the short term of 2,626 sq.m , medium term 7,776 sq.m (Laboratory and lecture) and long term (14,706 sq.m for Laboratory & 12.255 so.m for lecture space)

c) College of Computing and Information Sciences (CoCIS);

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The College shall utilize the central Teaching facilities especially at CHUSS Future expansion shall be at Adjacent site after the University mosque at the Current

> The college gets a new building in the medium and long term phase Central shared facility will be utilized in the short term

Demolition of current institute of psychology old buildings,, continuing education buildings for the new 6 level block with lecture spaces, laboratory spaces and offices

In the long term the Margret trowel School of Fine Art buildings should be remodeled and occupied by the college. School of fine art shifts adiacent to CEDAT

Demolition of CCE student hall annexes to create space for modern teaching & learning college block as well as open up space for green

The college will also annex the current CCE students hall, be remodeled and utilized for college office spaces/lecture spaces

Central common parking facility is proposed for this college to be shared with the school of Law

Due to the space requirement for department specialized Laboratory and mechanical workshops & Fine art studios. Galleries: kiln place and exhibitions the college would require an extra 3 acres to move the incompatible use with lecture such as workshop and laboratory to a large enough separate and easily accessible with provisions for emergency access site



The intervention will include:

- In the short term building of the mechanical workshops along technology access road
- Medium term interventions construction of new Laboratory block to accommodate lecture spaces and offices
- Long term annex the existing space of the School of Food Technology, Nutrition and Bio-Engineering (FTNBE). Buildings
- The infrastructure improvements will include
 - changing the Access Gate to further down 200 m; and close-off the existing western gate access from access through college.
 - To a well aligned with the link road& Technology access Junction and remove the twisting access to gate from the Link road Junction to Gate
- Great attention to landscaping due to steeper level/terrain

f) College of Natural Sciences (CoNAS); and

The college is currently covered with laboratory and fall short of lectures spaces for 280 sq.metre, however with the introduction of new science and research based courses, and the increase of students' numbers necessitates additional space for science & Innovation complex to accommodate specialized research based studies in a such as forensics & investigative studies,

The college also gets block for department of Sports sciences near the proposed sports stadium, as well as petroleum science at senior staff terrace on Quarry road



Expansion of the college to the current location of Kasubi view senior /Junior quarters for college expansion



 college of Veterinary Medicine, Animal Resources and Bio-Security (CoVAB) The college main focus is to foster sustainable community development and economic growth though transformative research, knowledge, teaching & learning;

CoVAB with currently 1,174 sq.m need for the short term interventions, and long tern space requirement of 6,572 & 5,477 so.meters for Laboratory and lecture spaces respectively will undertake the following interventions The secretariat will remain at main campus while departmental demo-centre spreads out to other University estates in Nvakvensasa, Kvankwanzi and Buvana livestock centre and Kibooa.



- - offs
- Proposed Gorilla simulation centre to be encouraged as Tourism centre in Makerere
- fence



- Demolition staff quarters flats for department of Snorts Sciences
- Widening of the existing West road/Kasubi view road to form a loop on Mary Stuart road
- Landscaping and green spaces to be given top priority especially at areas of specialized laboratories

- The collae requires renovation on the existing building
- Re-construction of the Animal Clinic
- New specialized laboratory Building to accommodate
 - Bio-security laboratories
 - Molecular laboratories
 - Bio-technology and Bio-security laboratories
- Adequate Landscaping is required for laboratory and parking area seal
- Restrict pedestrian through access the college with adequate seal off

h) The School of Law.

The school of Law gets a new facility in the medium and long term with the following



- 200 seater Multi Purpose Lecture Halls 2.500 seater Auditorium& Staff offices
- 4. Mock Court Rooms
- 5. Computer Laboratory & Reference Lib
- 6. Stores & Lavatories
- 7. Eco-friendly roof top

Figure 66: Proposed New Block at School of Law

KABANYOLO CAMPUS-COLLEGE OF AGRICULTURAL AND ENVIRONMENTAL SCIENCES (CAES) i)

The University underwent the transformation into a collegiate system. Consequently, the Faculty of Agriculture, the Faculty of Forestry and Nature Conservation, the Institute of Environment and Natural Resources and the Department of Geography were merged and re-organized to form the College of Agricultural and Environmental Sciences (CAES). The College is constituted by three Schools:-

- School of Agricultural Sciences (SAS). (i)
- School of Food Technology, Nutrition and Bio-Engineering (FTNBE). (ii)
- (iii) School of Forestry, Environmental and Geographical Sciences (FEGS).

The collegiate system has enabled the University to re-align its processes, bring together units that are relevant hence harmonizing resources, and provides adequate levels of autonomy to enable the College undertake its mandate at national, regional and international levels.

The new College is in position to handle issues of sustainable development in a holistic way. This involves integrating increased productivity, processing and sustainable utilisation and management of natural resources (including biodegradable waste) through tourism and application of mechanised/automated processes to meet the future needs of our people. To achieve this, the College is undertaking institutional transformation and a paradigm shift in the way technologies; skills and services are developed, packaged and disseminated. The transformation will enable the College to provide innovative teaching, learning, research and outreach services that are responsive to the needs of her clientele.

The College has been designed off-campus at Kabanyolo Campus in the respective implementation phase of the Master plan

The college with the current students population of 4,603 students, currently require 4,603 sq.m for Laboratory & lecture spaces; in the short term; 13,626 sq.m in the medium term and 21,476 sq .meters for long term (refer to implementation phase of Kabanyolo Campus Master Plan) and *(refer to Annex-B Kabanyolo campus Master Plan)*



Figure 67: Proposed Zoning plan at Kabanyolo College of Agriculture & Environmental Science



Figure 68: Proposed Master plan at Kabanvolo College of Agriculture & Environmental Science

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COLLEGE OF HEALTH SCIENCES MASTER PLAN 2014-2029

Figure 70: Proposed interventions master plan for college of Health Sciences at Mulago

Figure 69: Proposed Land coverage for Kabanyolo CAES Campus Master Plan

i) THE COLLEGE OF HEALTH SCIENCES (CHS)

The college of Health Sciences located at Mulago hill adjacent to Mulago Hospital is heavily built-up; current student population of 2,132 students, it has the current space usage of 0.62 and 0.64 laboratory and lecture space per student respectively. Its below the required standard³, the proposed intervention at the college of Health Science would include the following measures for the shorter & medium term interventions. For the college to realize and achieve its long term objectives, the long term interventions for the college would be relocation of some schools to Katalemwa currently under staff accommodation to establish a University Teaching Hospital

The short/medium term interventions of the college will entail:-

- Demolition of existing & dilapidated structures to create space for proposed New multi-purpose block to cater for space deficiencies and also address medium term space requirements
- Renovations & remodel of existing buildings



The intended interventions include:-

Renovations on the existing buildings

 Demolition of old dilapidated buildings that include:-

Department of Nursing

- Old pharmacology building
- Department of Bio-chemistry & Medical illustrations
- Department of pediatrics
- Administration building and
- Animal house

 Construction of Multi-purpose Buildings to accommodate most of the college's department, and administration as well as staff offices

³ National Council for Higher Education checklist

CHAPTER FOUR: IMPLEMENTATION STRATEGY AND DEVELOPMENT RECOMMENDATION

IMPLEMENTATION STRATEGY AND OPTIONS FOR DEVELOPMENT

Introduction

The implementation period for the master plan is thirty (3D) years. It is thus imperative that development is prioritized over a 3D year horizon through phasing of the implementation at particular stage options.

Phasing

Phasing of developments forms an integral and vital part implementing the master plan. Having development options allows essential the physical infrastructure to be developed strategically, economically and in an orderly manner. The phasing of this master plan shall be based on three development options that is to say short term, medium term and long term as indicated in table below. This turns out to be most viable and feasible alternative as no wholesale development may be possible at once.

Table 23: Phased intervals for development

S/No	Phase of development	Period
1	Phase ONE Short Term	2014-2018
2	Phase TWO Medium Term	2018-2028
3	Phase TREE Long Term	2028-2044

Source: Compiled by the Consultant

A. MAKERERE UNIVERSITY MAIN CAMPUS

The implementation of the proposed developments at Makerere University main Campus shall observe the following procedure;

MMEDIATE/ SHORT TERM (I) IMPLEMETATION (2013/2014-2018/2019) **I**)

The short term development interventions for Makerere University Main Campus comprises of the following;



Figure 71: Development interventions for the Immediate& short term period of the implementation of the main campus master plan





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Table 24: Short /Immediate Phase-(I) Implementation Recommendation (Floor Space In Sq.M)				
Demolished	24,316.6			
Existing Building	87,454.0			
New building	13,355.8			
Refurbishment & Renovation	42,841.9			
TOTAL	167,968.2			

Immediate/short term phase, there is more renovation and refurbishment than new buildings to extend the service life of the existing buildings as immediate interventions and to address the space deficit of **101,277 m**².

The mater plan recommendations for intensive use of academic buildings and the new Academic buildings to be constructed should be minimum 5 levels and 7 levels maximum

The new buildings include; the development of Central teaching Facilities at former UCB slabs at CoBAMS & Social Sciences Slab at CHUSS; development of Mechanical workshops at CoNAS, Development of Specialized Laboratory Block at CoVAB and development of CEES New block as well as development of New block at CHUSS for liberal & Performing Arts studios, lecture spaces, auditorium, office space and college library

MEDIUM TERM PHASE-II: IMPLEMETATION (2018/2019-2028/2029) II)

The medium term development interventions for Makerere University Main Campus comprises of the following;

Demolished	Existing Building	👅 New Building	Refurbishment	
Refurbishment	10,461.33			
New Building	37	,744.84		
Existing Building		_	112,	237.21
Demolished	32,56	0.73		

Figure 73: Development interventions for the Medium term period of the implementation of the main campus master plan (2018/2019-2028/2029)

In the Medium term, there is increase in the existing buildings and new buildings spaces. We observe a reduction in refurbishments and demolitions. At this stage no new residential accommodation for staffs shall raised at main campus emphasis is on addressing students' academic spaces

Academic buildings to be constructed should be minimum 5 levels & maximum 7 levels, with college based Library min. 1,500m² and computer labs of 2,700m²



Figure 74: Medium term development intervention plan for the main campus Makerere university (2018/2019-2028/2029)



Table 25: Medium Phase-(li) Implémentation Recommandations (Floor Space In Sq.M)					
Demolished	32,560.73				
Existing Buildings	112,237.21				
New Buildings	188,724.21				
Refurbishment	10,461.33				
TOTAL	343,983.47				

There is significant Increase in the new buildings for the required projection students' population increase of 71,592 for time frame of (2018/2019-2028/2029)

III) LONG TERM PHASE-III: IMPLEMETATION (2028/2029-2043/2044)

The long term development implementation of infrastructure at Main campus will entail the various activities for it to achieve her long term objectives of adequate infrastructure that match the required population at (2028/2029-2043/2044), with projected students' population of 90,271



Figure 75: Development interventions for the Long term implementation of the main campus master plan (2028/2029-2043/2044)

Recommendation	Floor space (at 5 87leve) for new Buildings
Demolished	47,271.26
Existing Building	105,787.55
New Building	326,292.69
Refurbishment	1,511.29
TOTAL	480.862.78

In the long term phase, there is significant increase usable space in forms of the existing buildings from phase-II and new buildings. The increase in demolished buildings is purposely to create /avail spaces for new development and students green spaces at main campus;

Academic buildings to be constructed should be minimum 5&7 levels



Figure 76: Long term development intervention plan for the main campus Makerere university (2028/2029-2043/2044)

B. MAKERERE UNIVERSITY AGRICULTURAL RESEARCH INSTITUTE KABANYOLO (CAES) CAMPUS

The former MAURIK has been designed and the proposed as College of Agriculture & Environmental Sciences (CAES) Campus at Kabanyolo.

This section illustrates the mechanism for implementation of the CAES Campus at Kabanyolo with fully functional academic, administrative, accommodation and other support facilities for the day to day activities of the college off-Main Campus.

The development interventions have been phased for the implementation time frame of the master plan as illustrated in table 27 below as follows:

 Table 27: Kabanyolo (CAES) Campus Phased intervals for development

S/No	Phase of development	Period	Student population
1	Phase ONE Short Term	2014-2018	4,603
2	Phase TWD Medium Term	2018-2028	6,813
3	Phase TREE Long Term	2028-2044	8,591

I) IMMEDIATE/ SHORT TERM (I) KABANYOLO (CAES) CAMPUS IMPLEMETATION (2013/2014-2018/2019)

The immediate/ short term interventions at the Kabanyolo campus will entail the following action/activities as illustrated below:





Figure 78: Short term development intervention plan for the Kabanyolo CAES Campus for (2013/2014-2018/2019)

Figure 77:Development interventions for the Immediate& short term period of the implementation of the Kabanyolo master plan

Refurbishment and renovations at the Campus will take lead in the short term with 12,099.8 sqm and New buildings to 7,362.73 sqm; more buildings will be retained in the short term period with minimal demolition as short term/immediate interventions.

The New development of buildings has been proposed for lecture spaces as well as departmental offices for the three (3) schools of the college that include:-

- (i) School of Agricultural Sciences (SAS).
- (ii) School of Food Technology, Nutrition and Bio-Engineering (FTNBE).
- (iii) School of Forestry, Environmental and Geographical Sciences (FEGS).

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INTERVENTION PLAN Campus for (2013/2014-2018/2019)

II) MEDIUM TERM (I) KABANYOLO (CAES) CAMPUS IMPLEMETATION (2018/2019-2028/2029)

The medium term of the implementation of CAES campus at Kabanyolo increasing of more academic spaces; and students' accommodation with support facilities



Figure 79:Development interventions for the Medium term period of the implementation of the Kabanyolo master plan

More specialized laboratories and mechanical workshops will be constructed at the college,



Figure 80: Medium term development intervention plan for the Kabanyolo CAES Campus for (2018-2028)

III) LONG TERM (I) KABANYOLO (CAES) CAMPUS IMPLEMETATION (2028/2029-2043/2044)

This phase involves the development of more academic spaces for the college inform of new buildings with extra 28,668.16 sqm with minimal renovation as and demolition



Figure 81:Development interventions for the long term period of the implementation of the Kabanyolo master plan The long term phase more construction of academic (Lecture & laboratory) buildings as well as accommodation for students and staff. There is also more construction of support facilities for the college these include the shifting of the diary unit and production units to the western block; expansion of mechanical and engineering departments.



Figure 82: Long term period of the implementation of the Kabanyolo master plan (2028/29-2043/44)

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CHAPTER-V: CONCLUSIONS AND RECOMMENDATIONS

5.1 Recommendations

The Infrastructure Master plan of the three (3) Campuses of Makerere University have been critically analyzed and development recommendations put forward of the various infrastructure components that will facilitate the university to achieve her long term development objectives

This section takes into account the development recommendations factors related to technological, environmental, economic, legal, operations and maintenances among others.

ACADEMIC

The university

- The construction of new departmental buildings in turn releases existing, the university should assess alternative uses for these properties, and demolish the dilapidated archaic buildings, including the granting or longer term commercial leases that would generate income and capital receipts
- Introduce flexible work spaces likely to impact on space needs where staff work in shared office accommodation
- 🖪 Increase awareness of environmental responsibilities amongst the staff and students
- A renewable energy strategy of 10% of the energy requirements of new buildings over 1,000 sq.m should be provided onsite not only to reduce on energy cost but also reduction carbon emissions from generators

There is need to formulate a memorandum of understanding between Makerere University and Mulago National Referral Hospital to smoothen the operation of the College of Health Sciences.

The university should construct some modern hostels for international and local students at the periphery of the main campus and on plots near main campus for income generation

The plan should fit into the CoVAB's future vision and projections that's to say the secretariat remains at the Main campus while other functions move off the main campus i.e. Kyankwanzi land for Bio-technology; Nyakyesasa as a centre for incubation.

CoCIS As a short term measure, some big rooms in blocks A and B can be partitioned to create more offices for staff, which would greatly alleviate the current shortage

Long term Measure for CoCIS In the long term, an office block could be constructed between Block A and B the round-about

Circulation Plan

The recommended circulation plan for the University includes routes for vehicular, bicycle and pedestrian traffic as well as mass transit in and around the University. Vehicular circulation includes a hierarchy of roadways, including major arterials such as the University road. To cul de-sacs and access roads should be tarmac, lit, labeled and road furniture fixed

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ANNEXES

A-MAKERERE UNIVERSITY MAIN CAMPUS

A-1: MAIN CAMPUS TOPOGRAPHIC MAP

A-2: CADASTRE PLOT OF MAKERERE UNIVERSITY LAND AND MULAGO COLLEGE OF HEALTH SCIENCE

A-2: EXISTING LANDUSE MAP OF MAKERERE UNIVERSITY MAIN CAMPUS

A-3: EXISTING TRANSPORT & TRAFFIC DISTIBUTION AT MAIN CAMPUS

A-4: EXISTING POWER SUPPY AND DISTIBUTION AT MAIN CAMPUS

A-5: OPTICAL FIBRE CABLING AT MAIN CAMPUS

A-6: EXISTING WATER SUPPLY AND DISTRIBUTION AT MAIN CAMPUS

A-7: EXISTING SEWER LINE DISTRIBUTION AT MAIN CAMPUS
A-8: EXISTING BUILDINGS INVENTORY AT MAIN CAMPUS

A-9: PROPOSED MASTER PLAN ZONNING PLAN

A-10: PROPOSED LANDSCAPE AND GREEN SPACE

A-11: SHORT/IMMEDIATE TERM DEVELOPMENT OPTION (PHASE-I)

A-12: MEDIUM TERM DEVELOPMENT OPTION (PHASE-II)

A-13: LONG TERM DEVELOPMENT OPTION (PHASE-III)

B-COLLEGE OF AGRICULTURE & ENVIRONMENTAL SCIENCES (CAES) KABANYOLO CAMPUS

B-1: MAKERERE UNIVERSITY AGRICULTURAL RESEARCH INSTITUTE (KABANYOLO CAMPUS) TOPOGRAPHIC MAP

B-2: EXISTING LANDUSE MAP COLLEGE OF AGRICULTURE & ENVIRONMENTAL SCIENCES (CAES) KABANYOLO CAMPUS

B-3: EXISTING WATER SUPPLY AND DISTRIBUTION AT COLLEGE OF AGRICULTURE & ENVIRONMENTAL SCIENCES (CAES) KABANYOLD CAMPUS B-4: EXISTING BUILDINGS INVENTORY AT KABANYOLO CAES CAMPUS

B-5: PROPOSED MASTER PLAN ZONNING PLAN FOR KABANYOLO CAES CAMPUS

B-6: PROPOSED MAKERERE UNIVERISTY COLLEGE OF AGRICULTURE & ENVIRONMENTAL SCIENCES (CAES) MASTER PLAN

B-7: SHORT/IMMEDIATE TERM DEVELOPMENT OPTION (PHASE-I)

B-8: MEDIUM TERM DEVELOPMENT OPTION (PHASE-II)

B-9: LONG TERM DEVELOPMENT OPTION (PHASE-III)

C-COLLEGE OF HEALTH SCIENCES-(CHS) MULAGO

Annexes-D-1

LECTURE SPACES IN THE VARIOUS COLLEGES AND SCHOOL OF LAW IN SQ. METERS				
Colleges/ School	Department	Description	Level/No. Floor	Total Area m ²
	Physics	lecture Theatre	Ground Level	127 90
		Lecture Room	First Level	59.20
	Zaalaav	Lecture Theatre	Ground Level	86.40
		Lecture Theatre	Ground Level	85.36
	Rotany	Lecture Room	Ground Level	37.20
College of Natural	Mathematics	Lecture Room	Second Floor	88.00
2CIEUCE2		Lecture Room	Second Floor	64.00
		"	Third Floor	64.00
		н	First Floor	53.20
	Bio-Chemistry	Lecture Theatre	Second Floor	199.92
		"	"	199.92
	Chemistry	Small Seminar Rm No. 316	Second Floor	39.96
		Lecture Theatre	Second Floor	168.00
CONAS				1273.06
College of Agricultural	Agric Main Block	Lecture Room	Ground Level	67.89
and Environmental		Lower Lecture Theatre	Ground Level	120.00
Sciences		Upper Lecture Theatre	First Floor	120.00
	Extension of			יחר חר
	Economics &	Seminar Koom I	bround Floor "	الات. مربع
	management	26WIU9L KOOW 7		٦٢.٢٢
		Seminar Room 1	First Floor	125.35
		Seminar Room 2	"	57.20
		Seminar Room 3	п	60.03
	MUARIK Crop			
	Science	Lecture Hall	Ground Level	128.40
		Lecture Room 1	"	21.60
		Lecture Room 2		22.00
	Danantmaat of	Lastura Room 1	Ground Loval	70 00
	Food Science and	Lecture Room 7		נ.ם/ קר עק
	Technology	Lecture Room 3	11	78.32
			1	, 0.0Z

		Lecture Room 4	п	78.32
		Seminar Room	First Floor	43.61
		Conference Hal	Ground Level	157.30
	Forestrv	Lecture Room No. 101	Ground Level	78.00
	/	Lecture Theatre No. 216	First Floor	78.00
		Conference Room No. 307	Second Floor	78.00
CAES				1653.21
	Soc Sci Main			
	Block 1	Lecture Room	Upper Level	91.00
	Soc Sci Block 2	Lecture Room	Ground Level	64.60
		Conference Room	Ground Level	20.00
		Lecture Theater	Second Floor	99.75
	Gender	Lecture Room/	Ground Level	86.00
		Conference Hall	First Floor	100.00
		Seminar Room 1	First Floor	50.40
		Seminar Room 2	First Floor	50.40
		Lecture Hall	Second Floor	160.00
College of Humanities	Languages	Block A (Lecture Room)	Ground Level	199.50
and		н	н	30.00
Social Sciences		н	н	63.00
		н	н	63.00
		Block B (Lecture Room)	Ground Level	131.25
		н	н	63.00
	Arts	Lecture Room (East Wing)	Ground Level	99.00
		Lecture Room 2	н	99.00
		Lecture Room	First Level	72.60
		Seminar Room	Ground Level	24.00
		Lower Lecture Theatre	п	88.20
		Lecture Room (West Wing)	п	125.35
		Seminar Room	II	24.00
		Lecture Room	н	99.00
		Lecture Room	First Floor	92.00
		Seminar Room 3	II	24.00
		Lecture Room 25	п	22.00
		Lecture Room 5	"	127.60
		Lecture Room 1	"	121.00
		Upper Lecture Theatre	"	88.20
	Psychology	Lecture Room 8	Ground Level	60.00
		Lecture Room 13	"	50.00
		Seminar Room 23	"	16.30

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CHUSS				2504.15
				200
	Faculty of			
	Computing and	Lecture Theatre G 1	Ground Level	85.00
	Information			
	Technology	Lecture Theatre 1	First Level	85.00
	(Phase 1)	Lecture Theater 12	Second Floor	85.00
		Lecture Theater 3	Third Level	85.00
College of		Lecture Theater 3A	Third Level	63.45
Computing and		Lecture Theater 3B	Third Level	102.00
Information Sciences	Faculty of			
	Computing &	Lecture Room G. 02		400.00
	Information			
	Technology			
	Phase 2	Lecture Room F 1.02	First Floor	400.00
	(New Building)	Lecture Room F 1.08	"	225.00
		Lecture Room F2 . O2	Second Floor	400.00
		Lecture Room F2 . 08	"	225.00
		Lecture Room F3.02	Third Floor	400.00
		Lecture Room F4.02	Fourth Floor	400.00
		Lecture Room F5	Fifth Floor	400.00
COCIS				3355.45
	DOSATE	Seminar Room	Ground Level	61.10
		Resource Centre Room	п	50.05
	Education	Main Lecture Hall	Ground Level	380.00
		Lower Lecture Theatre		
		No.1	Ground Level	80.10
		Lecture Room No.1	First Floor	105.02
College of Education		Lecture Room No. 2	First Floor	80.10
and		Lecture Room 4	Second Floor	105.00
External Studies		Lecture Room 5	Second Floor	80.10
		Main Lecture Hall	Ground Floor	380.00
		Lecture Room 126	First Floor	84.00
		Lecture Room 127	н	96.00
	Distance			
	Education	Lecture Theatre	Lower Ground	95.20
		Conference Room 1	Upper Ground	48.00
		Conference Room 2	н	42.00
COEES				1686.67

	Fronomic Main			
College of	Block	Lecture Theatre 11	l evel 1	191 16
Business and		Lecture Theatre 17	"	191.16
Management		Lecture Theatre 7.1	level 7	
Sciences		Seminar Room 3.3	level 3	42.35
	Economics &			
	Economic & Policy	Lecture Room	First Floor	90.39
	Research Centre			
	Statistics &			
	Applied	Lecture Room	Ground Level	54.00
	Economics			
	FEMA (Former			
	U.C.B	Lecture Room 1	Ground Floor	264.10
	Uncompleted) at			
	Faculty	Lecture Room 2	"	136.80
	of Economics &			
	Mana	Lecture Koom 3	"	237.50
000440	gement			(000.00
CURAW2				1398.62
	Mechanical	Lecture Koom B1	Ground Level	154.00
	.		5 , 5 ,	
	Engineering	Lecture Koom 14U	First Floor	141.UU
		Lecture Koom 141	"	124.00
		Lecture Koom 142A	"	87.00
College of		Lecture Koom 143	"	53.30
Engineering		Lecture Koom 144	"	32.20
Design		Lecture Koom 146	"	52.00
Art and		Lecture Koom 149		112.00
Technology		Lecture Koom 158	"	99.20
		Lecture Koom 160		112.00
	T		5 5	
	lechnology	Lecture Koom 161	First Floor	116.80
		Lecture Koom 165		48.00
		Lecture Room 168		49.02
		Lecture Room 2408	Second Floor	81.60
		Lecture Koom 219		43.20
	Г			
	Extension to		P	1 <i>/. /.</i> חח
			Canad Class	144.UU 100 00
	и тесплоюду	LECTOLE TUBALLE	υι υπα τισο μ	100.00
			Г ГI	100.00
		Lecture lheatre	First Floor	190.00

				(88.88
		L'onterence Hall	Second Floor	190.00
		Lecture Koom 4	"	96.00
		Lecture Koom 5 & 6	"	96.00
		Lecture Room / & 8		96.00
		Lecture Koom 9 & 10		96.00
		Lecture Koom 11 & 12		96.00
		Lecture Room 13	Third Floor	90.00
		Lecture Room 14 & 15	"	96.00
		Lecture Room 16 & 17	11	96.00 96.00
				00.00
	Fine Arts	Lecture Room	Ground Level	26.00
	Ceramics	Lecture Room	1 st Floor	72.96
CEDAT				2790.28
	Public Health	Lecture Room M3	Mezzanine Floor	48.00
		Lecture Room M1	п	126.00
		Lecture Room M2	п	111.00
		Lecture Room 105		90.00
	School of Public	Seminar Room (No. 317)	3 rd floor	53.70
	Health, Mulago			
Collece		Lecture Room A	4 th floor	53.70
of				
Health		Lecture Room B	4 th floor	53.70
Sciences				
		Tutorial Room 1	4 th floor	23.01
		Tutorial Room 2	4 th floor	23.01
		Tutorial Room 3	4 th floor	23.01
		Tutorial Room 4	4 th floor	23.01
	Physiology	Lecture Theatre	Ground floor	72.96
	Anatomy			
	Department	Lecture Theatre	1 st floor	75.97
	Davis Lecture	Lecture Theatre	Ground Floor	212.40

	Theatre			
	Clinical Building	Lecture Hall	Ground Floor	75.52
College of Health Sciences				1064.99
School of Law	Human Rights &	Lecture Room 1	Ground Level	129.00
	Peace Centre	Lecture Room 2	п	30.40
		Lower Lecture Hall 1	"	160.00
		Lower Lecture Hall 2	п	160.00
School of Law				479.40
V-+	Main Block	Media Hall	Level 2	212.40
Madicina				
MGUIGIIIG				
	Main Block	Media Hall	Level 3	238.40
	Post mortem			
	Block	Amphitheatre	Ground Level	124.00
M . M . I				F7/00
Vet Medicine				5/4.80
	Main Building	Main Hall	1 14	396./2
	Senate Building	Lecture Koom 104	LEVELI "	124.20
Common Spaces				/U.80
			112	04.UU
		Lecture Room 207		1Z4.ZU 77 NN
		Lecture Room 207	11	72.UU DN NN
		Lecture Room 205		54 በበ
	St Augustine			00.70
	Student	Conference Hall		353.50
	Centre			
	St. Francis			
	Student	Conference Hall	Lower Ground Level	173.10
	Centre			
		Conference Hall	Upper Ground Level	923.60
Common Lecture Spaces				2436.12
			TOTAL AREA	19,216.75

ANNEX-E: LIST OF CONSULTED STAKEHOLDER

Name	Designation
Prof. Lillian Tibatemwa-Ekirikubinza,	Deputy Vice Chancellor (Academic Affairs)
PROF. NELSON SEWANKAMBO	Principal CHS
PROF. SAMUEL KYAMANYWA	Ag. Principal CAES
PROF. OSWALD NDOLERIRE	Ag. Principal CHUSS
PROF. JYT MUGISHA	Ag. Principal CoNAS
Dr. Agnes M.N. Ssekiboobo,	Ag. Principal, CoBAMS
DR. JESSICA AGUTI	Ag. Deputy Principal CEES,
Dr. JDSEPHINE NABUKENYA	Dean CoCIS Extension
Mr. CYRIACO KABAGAMBE	University Dean of Students
Dr. Golola Moses	Ag. Deputy Principal NCHE