



## **THE ARCHITECTURAL PLAUSIBILITY OF AN URBAN PARKING FACILITY PROJECT: A JOS CITY CENTRE SCENARIO**

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### **ABSTRACT**

*This paper is aimed at addressing the car park shortage problem of the Central Business District, CBD, of Jos, the Plateau State capital, Nigeria. The car park dilemma has become a blot in the landscape of the city centre and a negative smear on the tourism destination potential of Jos. A study of the city centre's car park problem revealed a continuing, incremental trend whose actual magnitude is not easily quantifiable. The purpose of this paper is to evince the major causes of this trend and put forward a plausible, sustainable solution which would address the parking problem such that it is contained as the need arises irrespective of the developmental stride of the city centre. This was achieved by undertaking a field investigation using field observation, physical field survey and enumeration. Through this process, a first hand vista of the problems and challenges was obtained. Consequently, an Outline Architectural Design proposal of a prototype car park facility that has the potential of add – on – module to address the exigencies of sustainability and adaptability was developed. The proposal also sought to address the unpredictable but surely increasing future car park space needs. Through this means emerged a blueprint for addressing the present car park problems and also the future requirements within the framework of socio - economic, environmental and sustainability needs.*

**Keywords:** *Architectural Design, Car Park, Central Business District (CBD), Planning, Sustainability.*

## **INTRODUCTION**

Jos is a town that its background and growth dates back to the early 19<sup>th</sup> century and also its commercial and cosmopolitan ascendancy is as a result of the mining activities in Tin and Columbite in its general area. These have also led to its importance as a key city in the following geo – political era in Nigeria namely, the four – region structure of the late 1950 to early sixties, the 12 - state structure of 1967 – 1975, the 19, 21 and 30 state structures era and the the present 36 state structure of Nigeria.

During the four – region era of Nigeria, Jos was the 3<sup>rd</sup> most important town in Northern Nigeria, after only Kaduna and Kano. In the 12, 19, 21, 30 and 36 – state structures, Jos retained the position of capital of the benue plateau, new and the present Plateau state. The town is also a terminal for the railways and has an international airport - the Yakubu Gowon International Airport at Haipang. Through all these periods there have been steady and continuous increase in businesses, human population, buildings and other paraphernalia of urbanization indices including cars, busses, trucks and articulated vehicle as major means of transportation within and across the city.

Consequently, traffic congestion and car park shortage became a major problems in the city especially from about 2004. This was mainly as a result of increase in the volume of activities in the Nigerian economy and the enhancement of workers' salaries by the introduction of the Eighteen thousand naira (N18,000.00) minimum wage by the federal government of 1999 – 2007 which was in turn, facilitated by the appreciation of the global oil price. The visible effects of these developmental indicators were the expansion of businesses increment of building stock, exponential increase in the population of the inhabitants of the city and consequently the number of cars and other vehicles city of Jos. This came with severe burden of traffic congestion and acute parking space shortage especially within the city centres. These problems were aggravated by the fact that there was neither provision of commensurate road networks expansion, addition nor parking spaces to address this increase in the number of vehicles in the cityscape.

### **1.2 The Problem Statement**

With plenty vehicles in the CBD of Jos, several of the streets were always clogged with cars as a result of dearth of good road network and parking spaces. As at the time of this research (February 2021) only a few banks and other

commercial premises had designated very limited car park spaces which have become grossly inadequate as result of the vehicular population explosion. In order to secure a parking space a driver would have to maneuver for an unreasonable length of time with the attendant loss of man hour and patience. Sometimes after several attempts and securing no parking space some irate drivers and car owners (out of exasperation or frustration) leave their cars with a good part of it blocking a portion of the road or blocking other parked cars. This shortage of parking spaces also compelled car owners to engage in “double” parking which usually led to the nuisance of traffic congestion. Even if space were secured, parking was usually done in haphazard manner as a car could be placed awkwardly in a position that could accommodate two cars. This problem was usually as a result of absence of order and direction in the parking process and location. These difficulties usually compelled vehicle owners to park their cars at locations remote from their destination. This scenario had led often times to car owners falling victim to car part pilferers, car thieves and burglars.

There is currently a situation in Jos town (as of 2021) whereby young boys and girls go about collecting fees from car owners who park at some locations (especially, Ahmadu Bello Way, Beach road and Rwang Pam street, Murtala Mohammed way) in the CBD in the name of car park charges. In as much as this study does not denigrate the Internal Revenue Generation (IGR) efforts of the State Government, there appears to be great moral deficit in the practice, in that nothing whatsoever was done by the government or its agency collecting this revenue to add value to the space that the cars are being parked. The spaces were neither kept clean nor designated for that function and despite the fact that revenue was being collected, cars were parked there were at owners’ risks. As if foreseeing this type of anomaly, Fadamiro and Fadairo (2000) had maintained that in some Nigerian urban settings, interventions of the government in urban management and administration has been fragmentary and uncoordinated creating overlaps and conflicts, thereby hindering the successful management of the urban growth.

The value of land is very high in the Central Business District (CBD) of Jos. This factor usually constrains developers to use up their land leaving little or nothing for parking spaces and other ancillary facilities. Although many architects are aware of their duty and the requirement to provide commensurate

and adequate parking spaces for designed facilities, they are usually encumbered by the land value factor (coupled with pressure from clients), making them acquiesce to schemes that short change the provision of adequate car park spaces. The development regulatory agency for the metropolis, the Jos Metropolitan Development Board, (JMDB) does not seem well enough alive its responsibility of enforcing statutory parking space provision requirement for old, on – going or new projects. It is very common to see commercial buildings whereby 70% to 90% of the land area built – up, making no provision for car parks – an anathema to eclectic design process.

The situation whereby cars litter every available space does not only constitute eyesore in the cityscape, it is also casts an aesthetic slur on the environmental vistas thereby jeopardizing the government’s effort of making tourism a major item in its political and developmental agenda. To compound the menace of the haphazard parking in Jos, is the contemporary danger of insurgents using bomb laden cars as means to perpetrate their nefarious activities. In an on the 20<sup>th</sup> May 2014, twin car bombs went off within 10 minutes of each other claiming the lives of about 120 people. All these factors necessitate the need for a proposal to resolve the acute shortage of parking spaces in Jos, the Plateau state capital.

### **1.3 Aim and Objectives of research**

The aim of this study is to propose the resolution of parking space problem by providing through architectural and planning precepts the plausibility of prototype commercial parking facilities for the CBD of Jos.

In order to achieve this, the following objectives were considered:

- (i) To determine and quantify the average parking time or turnover of vehicles per parking space within the Jos city centre.
- (ii) To categorize parking spaces and users based on parking duration.
- (iii) To provide outline architectural design of a suitable prototypical, modular parking facility.

This study therefore focused on parking space shortage and how it could be ameliorated within the Jos city centre by developing a justifiable and plausible facility from the design, planning and economic angles. Alluding to this approach to resolution of social and environmental challenges, Fadairo and Ogunduyile (2010) maintained that to the planner and architect, the urban land

is a resource to be used to achieve coherence and conforming land use pattern, hence they allocate land for efficient, harmonious and integrated usage.

#### **1.4 The Study Area**

The CBD of the Jos was taken to be the general area, demarcated or circumscribed by the following roads and land marks: Mango Street, Enugu road, up to the Polo Field, Joseph Gomwalk Road, Standard Building, Masallachi Juma Road, Tafawa Balewa Way, West of Mines Junction, Zoo Area, Central Bank/ Bank Street Area, Sharia Court of Appeal, Constitution Hill Road, Murtala Mohammed Way, Gangere Road, through Yam/ Potatoe Market, Dilimi Road, Nasarawa Road, turning left to cross Bauchi Road at Zololo Junction, and back to Mango Street. The following roads, areas and land marks were included in the CBD:

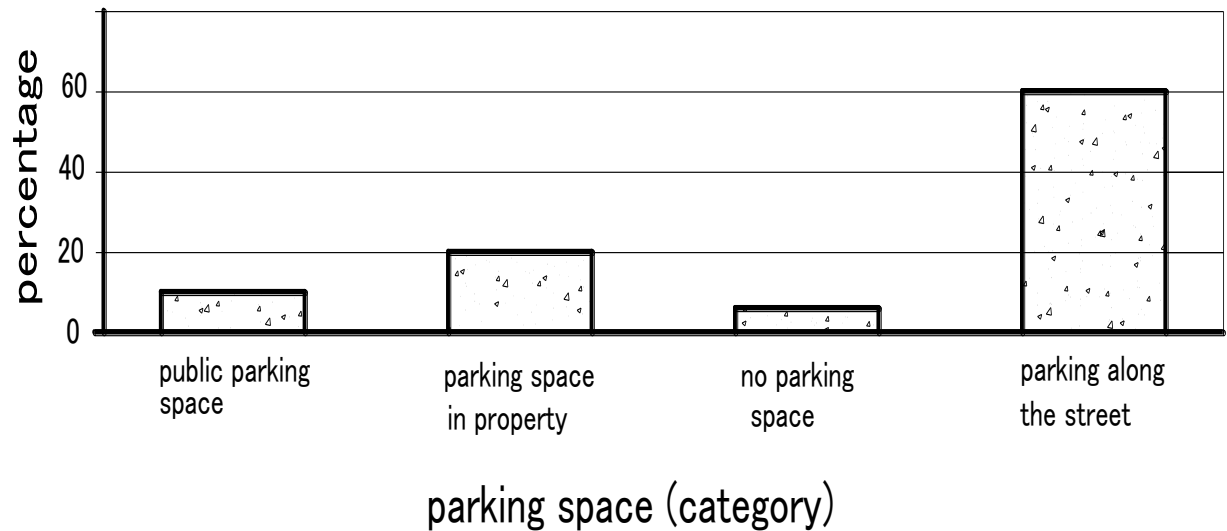
1. The Masallachi Juma Street
2. Old Bukuru Park
3. Tafawa Balewa Way
4. Rwang Pam Township Stadium
5. West of Mines Junction
6. Rwang Pam Street
7. Langtang street
8. Shendam street
9. Panyam street
10. Church street
11. Ahmadu Bello way - beach road
12. Murtala Mohammed Way
13. Old Jos University Teaching Hospital
14. The Jos Main Market and Precincts
15. Bauchi road, from terminus rotary interchange to Zololo junction.
16. Constitution hill road up to *British America insurance* junction

In this area there were 28 banks including the Central Bank, Jos, a total of 65 commercial buildings of over two storeys, over 30,000 stalls, stores, shops of small and big time traders and merchants, dealing on sundry items like building materials, clothes, books/ stationery, computers, accessories and repairs, restaurants, household items, mobile traders and hawkers. It was the existence and patronage of these businesses that were responsible for the influx of cars and persons into the Jos city centre that in turn caused the car park problem.

## **1.5 Justification**

The provision of a dedicated commercial parking facility apart from solving the chaotic urban parking problem would ensure the provision of reasonable security as the cars are parked would be under the care and watchful eyes of security guards. Ameh and Oko (2001) citing Becker and Sims (1992) elucidate that managing and using space has become a major pre occupation of many organizations in major metropolitan areas such as New York, London and Tokyo. Additionally, the provision of such facility contributes to urban aesthetics and harmony. Alluding to this fact, Fadairo and Ogunduyile (2010) pointed out that the objects produced by the architect are relevant to more than one of the senses – the senses of sight, touch (feeling), or movement since the architect creates boundaries in space. They further opined that in architecture, there is the need to walk through a building or the space created or even touch some of the materials to be able to fully appreciate them.

A purposefully designed car park facility project, if properly executed and managed does not only generate money for the entrepreneur (thereby attracting investors) it also solves the socio – economic and environmental problem by generation of employment and presentation of aesthetically pleasing and orderly environment. A situation whereby most cars in the urban centre are neatly parked in such facilities would help to promote the image of Plateau State of Nigeria as a tourism destination. consistent with the idea of sustainability the potential of expanding The car park facilities as and when the need arises thereby ensures that no matter how the cbd develops or expands, viable commercial parking facilities such as this could easily be added on from the smallest or single module to sustain the orderliness engendered by the facility. This would mean a sustainable, continuous and continuing solution to present and future parking problems. Figure 1 shows that parking spaces in property and designated areas constitute only about 30% as at 2008. At the time of this study (March 2019), it was discovered that parking spaces provided were less than 5% in public buildings and facilities. Even at that, parking spaces in property like banks and shopping malls were greatly reduced as cars were no longer allowed to park in such premises for security reasons.



**Figure 1:** Parking Facilities Distribution in Central Area of Jos

Source: Socio-Economic Survey, Greater Jos Master Plan, February, 2008.

## MATERIALS AND METHODS

### 2.1 The Research Design

This study used a combination of field survey and Descriptive research to obtain information concerning the current status of problems and also to describe "what existed" with respect to the conditions in particular situations. Supporting this approach to problem solving, Awotunde and Ugodulunwa (2004) averred that this type of study makes descriptive assertions about some population after discovering the distribution of certain traits or problems. In this research, the problems and purposes were described and then the proposed solutions proffered in descriptive form (and Outline Architectural Design, which is a product of research in its own right).

In the field survey process, to actually determine the number of vehicles so that the figure could be used for planning was a bit difficult in that the number varied greatly from day to day as a result of variation in days of the week and the cosmopolitan nature of Jos. Similarly, events / celebrations (national or religious) greatly influenced the influx of cars into the city. This made it necessary to use average figures as estimates for planning and even at that, the future number of cars that would visit the city centre still remains largely



unpredictable. In order to overcome this unpredictability, the proposal by this research was to have a prototypical and modular design in which, based on the arising needs, parking facility units could be added on to sustainably meet unfolding parking exigencies.

## **2.2 Procedure**

Trained enumerators were used to obtain information like duration and category of parked cars, sites with most vehicular concentrations and what periods of the day or week, etc. The process involved the use of eight trained enumerators to note these vehicular information and locations in the CBD of Jos city. Their locations were: Rwang Pam street, Ahmadu Bello Way, Beach Road and Murtala Mohammed way, part of Bauchi road and Tafawa Balewa Way with two enumerators respectively. Each of the eight enumerators was in a particular location for two days and later moved to other. This was done unobtrusively as the vehicle owners did not know that they were being watched and logged. Concurrently, all the travails of the drivers underwent in order to find parking spaces were noted and logged. Architectural design standards and precepts of car park facilities were examined to be able to make a proposal for the study area. Some of the precepts appraised were such parameters as cars turning radiuses, average car length, width, spacing between cars, suitable parking space dimensions, orientation, configuration and relevant facilities for the design of standard city parking facility amongst others. .

## **RESULTS**

The information garnered from the field included the following:

### **A. A summary of the most observed challenges**

The prevalence of car clogged streets, near absence of provision for parking spaces, double parking habits by drivers, haphazard parking of cars, remote location of parking space openings from destinations, theft of /from parked cars, unkempt places used as car parks, the non provision of commensurate parking spaces in facilities, absence of guard or security watch on parked cars amongst other findings. These observations were all pervasive in the CBD of Jos.

### **B. Three distinct types of parking duration by users were observed:**

- (i) Those that parked for a very short duration - dash to a shop, pick up an item or two, return to their car and leave all within five minutes. This group constitute 70% of the matrix



- (ii) Those that go for shopping that take from about 30 minutes to three hours - this constitutes 20%.
- (iii) Those that leave their cars for the whole day, say from about 8am to 5pm – especially shop owners. This group constitutes 5% of the population.
- (iv) Another 5% constitutes a combination of these categorization.

### **C. Necessity of an *Outline Architectural Design Prototype*.**

If the proposed facility is to be undertaken as a life project, following the *Outline Architectural Design*, any qualified Architect, could easily produce the comprehensive Working Drawings that would bring the project to reality if there is a with a developer.

## **DISCUSSION**

### **4.1 The Functional Analysis and Architectural Design of the Car Park Facility.**

A car park facility is a project designed and constructed to cater for the parking of cars while the car owners go about their businesses. Emmitt and Gorse, (2010) indicated that the functions of such a facility include providing: Shelter, security, safety, ease of use and operation, ease of maintenance upgrading, adaptability and durability. In order to achieve success in such a venture, it is necessary to diligently work out the constructional requirements so that there would be no room for ambiguity in costing. Reasoning along that line, Okpala, (2000) explained that financial risk (including cost overrun) is directly related to the ability of the client to fashion out and execute an adequate financial plan. This financial plan can only be obtained from the costing of a fairly detailed Architectural Design and Details.

### **4.2 Necessity for the Automatic Number Plate Recognition Technology.**

The Automatic Number Plate Recognition Technology (ANPR) capture the plate number of any car that comes into the facility and as the need arises, could relate it to other relevant information in the Car Registration Data Base. Ching (2011) asserted that it is a technology ideal for facilities with high capacity car parks as it is fully automated and operates 24/7, 365 days a year. The ANPR is attractive and is hereby recommended for application in such a facility.

### **4.3 Outsourcing the Management of the Facility**

In order to achieve successful and smooth operation of this facility, it is recommended that the funding for the facility be facilitated by the State

Government and its management outsourced to specialized outfits. Shika, Abdulsalami and Sagada, (2010) citing Behara et al, (1995) elucidate that outsourcing (also called third party contracting) concentrates an organization's resources on its core competences allowing the organization to achieve a definable preeminence and provide a unique value for customers. This is more poignant when viewed against the backdrop of antecedents of mismanagement and failure of Governments (State and Federal) to efficiently run and profitably maintain commercial facilities.

#### **4.4 Ingress/egress, elevated security post and ATM points**

The proposed parking facility as designed is to have one point of ingress and one for egress. This is for security reason as it would ease monitoring of vehicles and also make for better and neater circulation. In a module of the proposed facility there are eight automated teller machines ATM to ease accessibility to cash for shoppers. It is also proposed that they be sublet to two different banks – four each at the points of ingress and egress. There are two security posts, the inlet post being where payments are made and receipts issued for parking fees. At this point also, the car type, registration number, arrival time and date are noted and a security plastic tally issued. This is to enhance the security of the car as the tally is produced at exit point. This is in addition to the use of the ANPR technology earlier mentioned.

#### **4.5 Parking Space for Single Module of 172 Car Capacity**

The parking spaces are for a wide range of conventional cars. Chiara and Callender, (1987) have elucidated that Parking spaces should be built to accommodate the larger cars frequently used, although not necessarily the largest. They further pointed out that Planning with the hope that just medium and small size cars would be used, invites difficulties, consequently, the parking lot size is uniform - 5000mm x 2500mm which are rectangular in rectilinear orientation. The parking spaces proposed in this facility are not for articulated vehicles, Lorries, tippers or busses. Upon alighting from the vehicle, there are 100 mm thick concrete kerbs that bound pedestrian walkways, separating the vehicular from the pedestrian traffic – for safety and protection of pedestrians from vehicular traffic. This therefore leaves a strip of 1200 mm for pedestrian movement upon alighting from the car (see figures 3-6).

#### **4.6 Drainage**

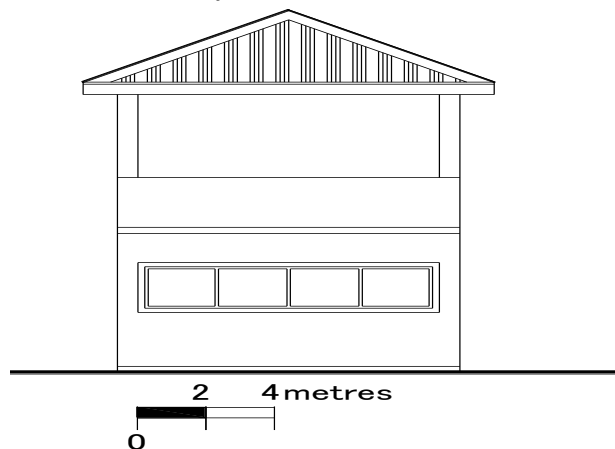
The drainage of water in the facility is in the form of open channel running at the four perimeters of the site. The object of this is to direct all surface water away from the vehicular and pedestrian paths depending on the topographical disposition of the site. The open channel nature of the drainage ensures easy, periodic clearing, cleaning and washing to prevent unpleasant smell. The dimensions of the channels on the sides are 500mm X 600mm and average of 600mm depth. The fence and the kerbs continue from the drainage channel walls (figure 11).

#### **4.7 Hard Surfaces for Cars and Pedestrians.**

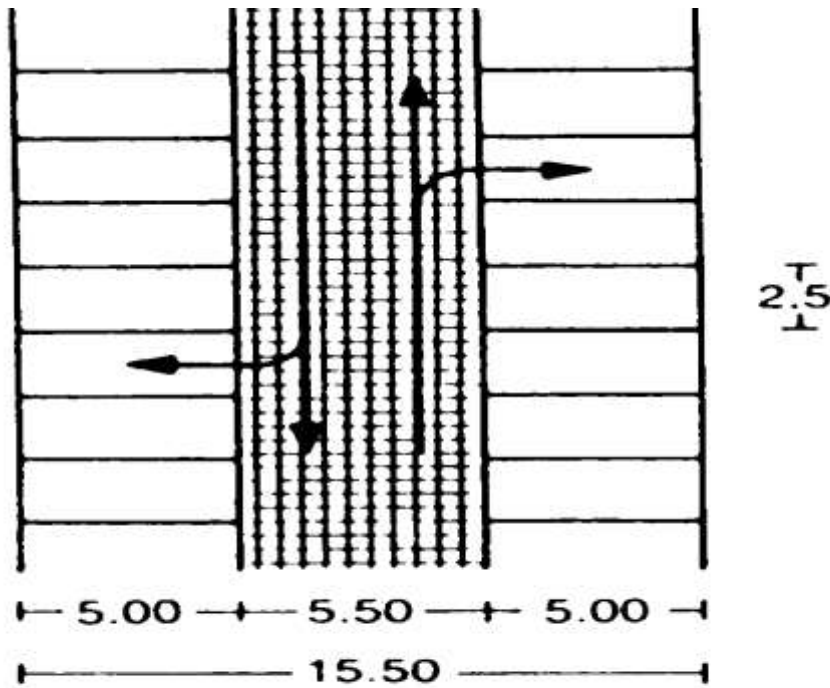
The hard surface for cars and pedestrians is made of durable inter locking tiles of 50mm thick precast concrete on a 100mm dry bed of stone base and stone dust. The interlocking tiles are bounded at the edges by precast concrete kerbs of 100mm thick x 500mm long x 300mm high. The width of the walkway is 1200mm to permit simultaneous movement of two persons abreast.

#### **4.8 The fence**

Fence which is provided for demarcation and security is made up of 225 mm sandcrete blocks of 1500mm height at all four sides and takes on a design at the approach elevation for reasons of greater visibility, aesthetics and security. On top of the fence on all sides are secured helical, inter twined barbed wires for enhanced security.

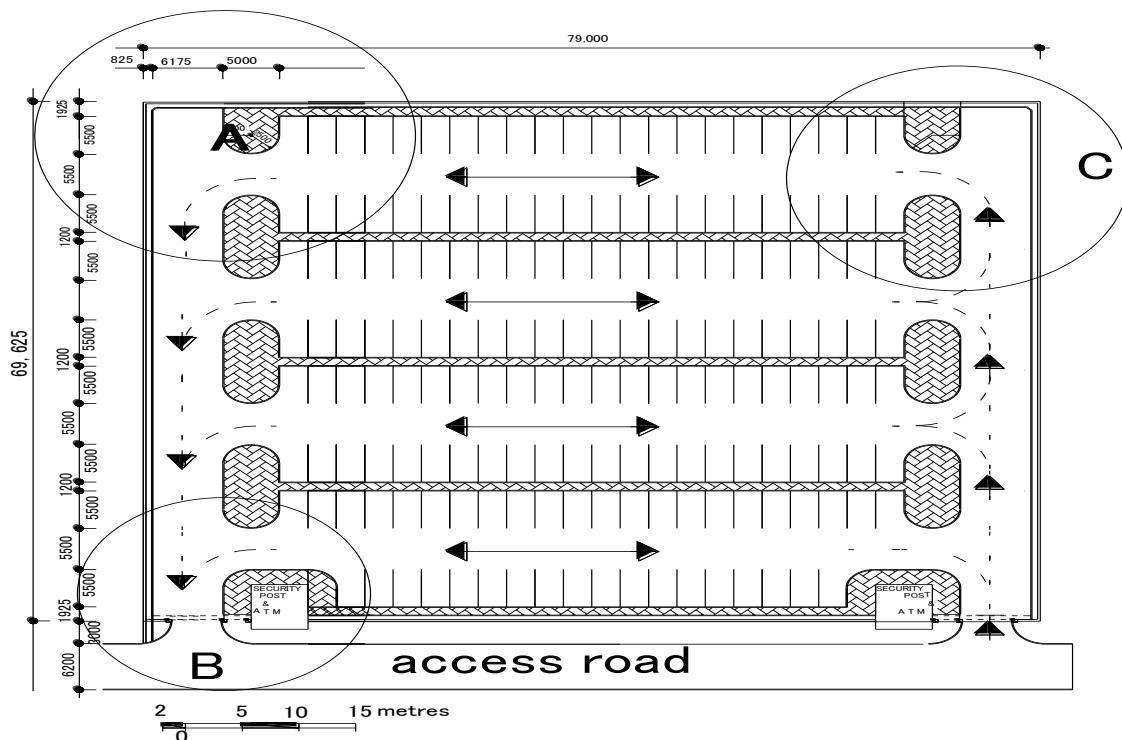


**Figure 2:** Approach View of the Security post with Elevated Monitoring Post.  
Source: author's design

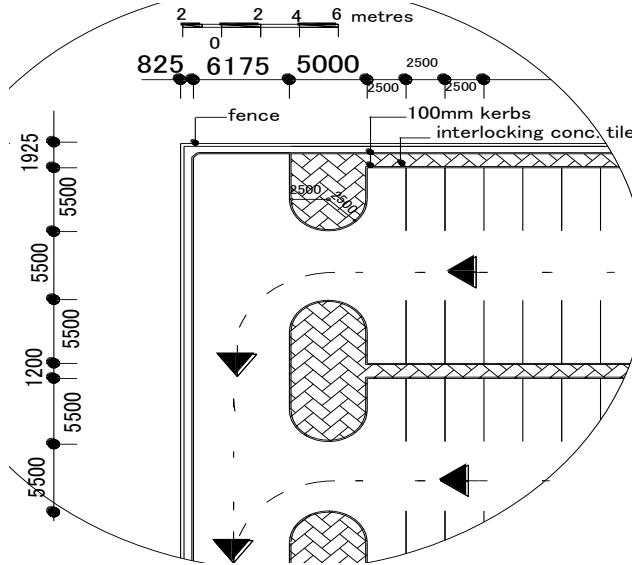


**Figure 3:** 90° Exit/Entry, Two – Way Traffic Parking Space 2.5 m Wide - The Adopted Format.

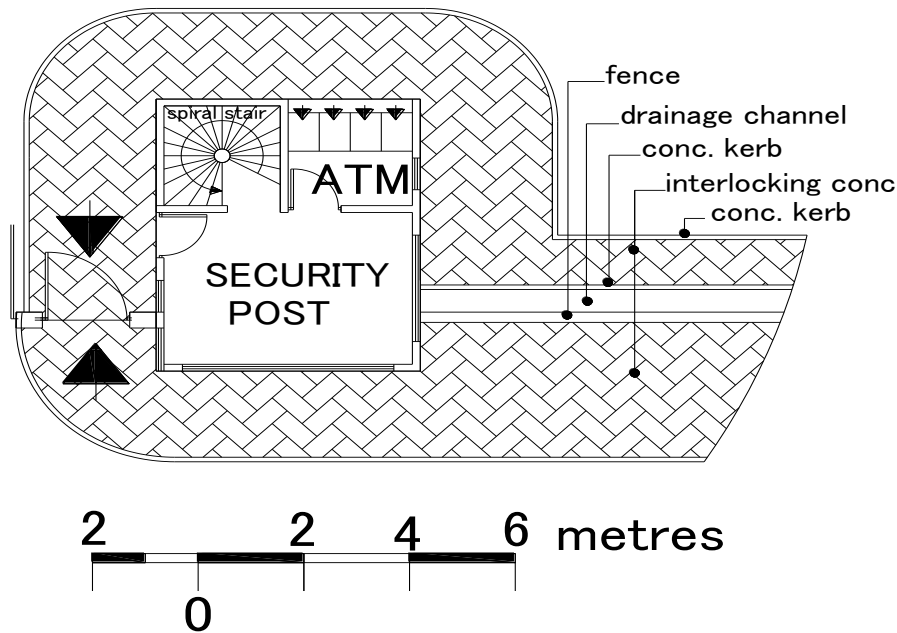
Source: Neufert, E. & P. Architects Data (1987)



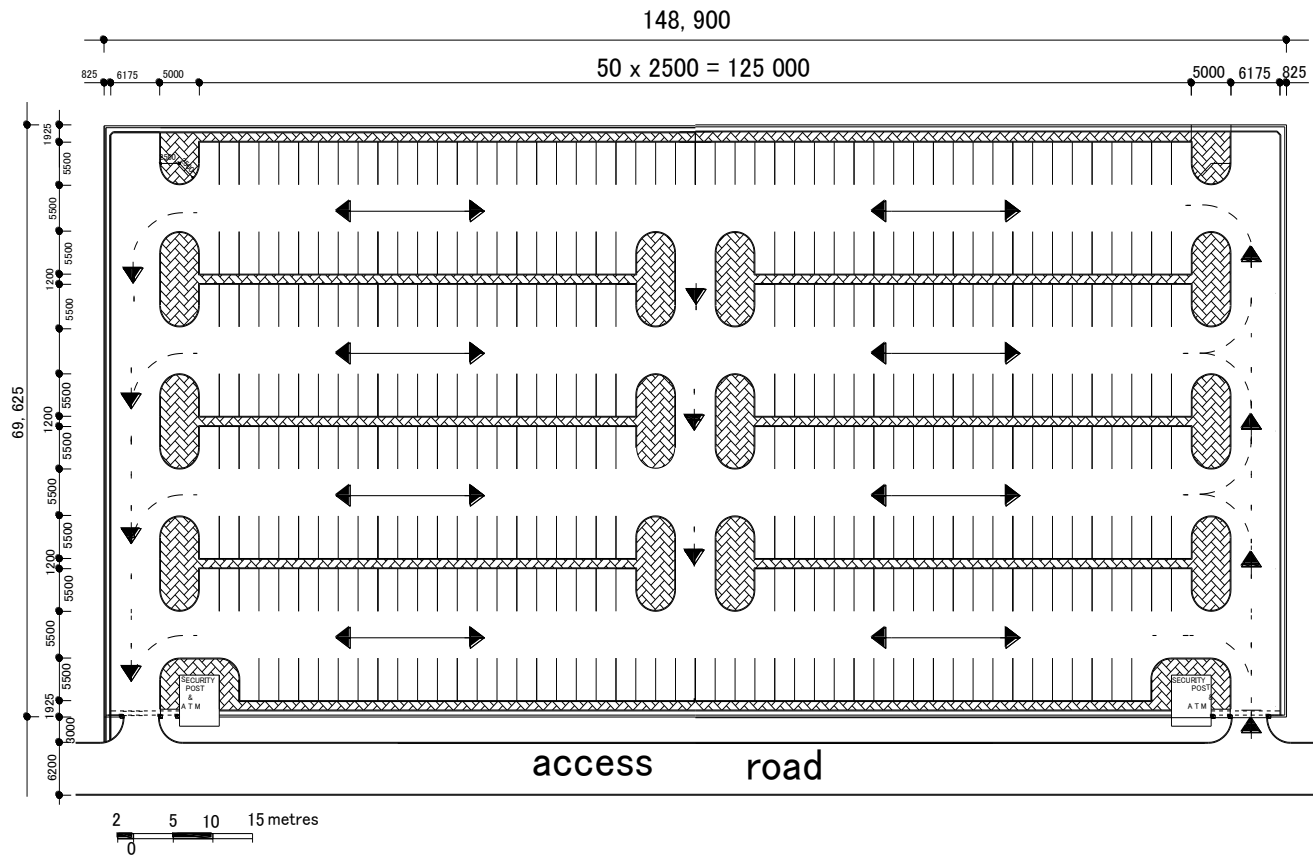
**Figure 4:** The vehicular and pedestrian Circulation Plan - (single or basic module – for 172 car capacity). Source: author’s design



**Figure 5:** Infrastructural Detail at A. Plan. Source: author’s design

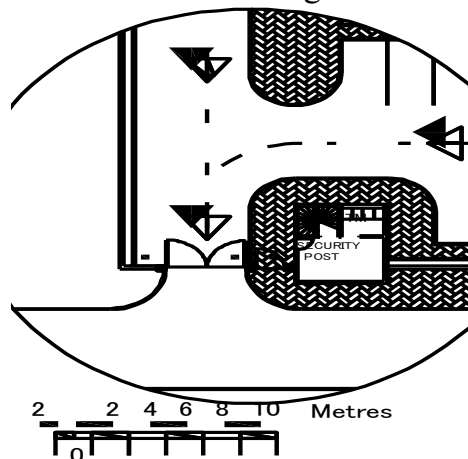


**Figure 6:** Ground Floor plan at security post showing the Surrounding setup. Source: author’s design

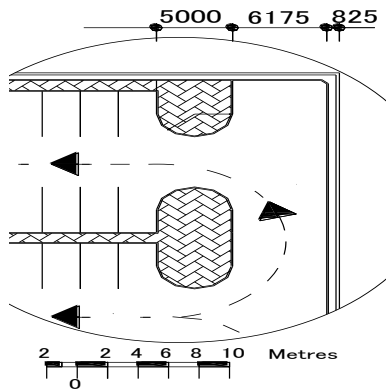


**Figure 7: The vehicular and pedestrian Circulation Plan - (double module - 358 car capacity).**

Source: author's design

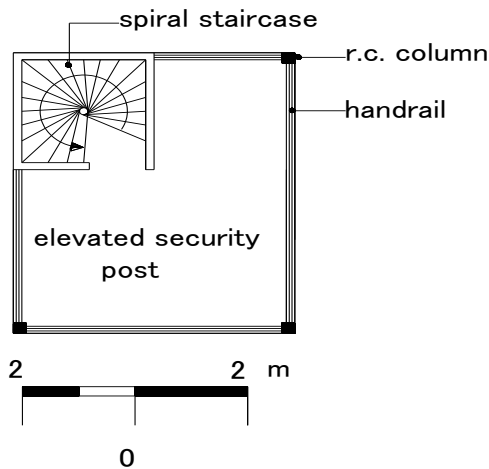


**Figure 8: infrastructural Detail at B (PLAN).** Source: author's design



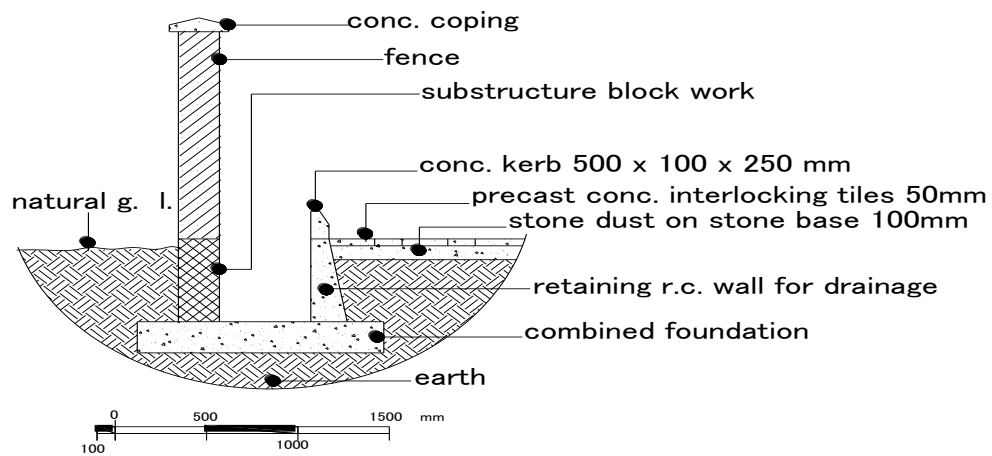
**Figure 9:** infrastructural Detail at C (PLAN).

Source: author's design



**Figure 10:** Upper Floor Plan of Elevated Security monitoring Post.

Source: author's design





**Figure 11:** Section through the Combined Foundation base, Fence, Drainage Channel and retaining wall Source: author's design.

#### **4.9 Lighting for Security and Aesthetics.**

There are provided lighting points from all the two security posts and on the fence walls. The wall mounted fittings are at horizontal intervals of 6000 mm and at a height of 1200mm from the ground on the interior of sides, front, and rear walls. The street side fence has wall mounted fittings at the exterior side.

#### **4.10 Closed Circuit Television CCTV for security.**

In order to guard against theft, pilfering from cars, mugging and general security, closed circuit television cameras and monitors are provided. The cameras are located at the fascias of the two elevated security posts. A total of six closed circuit television cameras, (CCTV) or video cameras are provided for security.

#### **4.11 Vehicular Turning Radius.**

In order to effect smooth and convenient navigation and circulation an outermost turning radius of 7.5m was used. Neufert and Neufert (1987) give the minimum range as between 5.3m and 6.5m for short and long cars respectively.

#### **4.12 Automatic Number Plate Recognition (ANPR)**

The ANPR is a fixed camera controlled system designed to detect parking abuse such as unauthorized use of parking areas, or to enforce limited waiting regimes. There is the need to provide this gadget in different parts of the CBD and especially within the parking facility.

### **RECOMMENDATIONS AND CONCLUSION**

For effectiveness and sustainability, the need that the recommendations of this study be strictly adhered to unless there emerge other extenuating circumstances beyond the purview of this study. The concept of modular incremental parking space based on exigency is sustainable socially, economically and environmentally. Solution to the car park quagmire in the CBD of Jos, the plateau state capital of Nigeria would be resolve by the adoption of the provisions of this study

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