



## THE ASSESSMENT OF STANDARDS FOR PROVISION OF FIRE SERVICE FACILITIES IN BIDA TOWN

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### ABSTRACT

*Fire outbreaks and their devastating effects in our cities have had grave consequences on our national economy and indeed national wealth. They have assumed another unappreciated major drain pipe to our national wealth and by extension individual citizen welfare. The aim of this study is to assess the standards for the provision of fire service facilities within Bida and make appropriate recommendations for improvement. Data for the study was collected through field survey, interview with various stakeholders and also through secondary data. There are inadequate fire services facilities for both individual and*

### Introduction

Fire outbreaks and their devastating effects in our cities have had grave consequences on our national economy and indeed national wealth. They have assumed another unappreciated major drain pipe to our national wealth and by extension individual citizen welfare. Avoidable or preventable destruction of developed or built environment amounts to wastage of all human and material resources that went into it. Such a trend especially when it is frequent, as is the case with fire outbreak and the huge losses that are associated with it, leaves the people in want and the nation in a perpetual struggle to achieve development. While the natural resources for development are largely finite and non-renewable, the population continues to increase without much hope for the future generation (Atuegu 2015).

Over the years, Nigerians have lost large investment structure and lives to fire. Also, in the study area, residential buildings, institutional buildings in the Federal polytechnic such as SLT Complex buildings, markets (post office market) among others, and private cars (as a result of road accidents) have been engulfed in fire due to unavailability of fire service equipments. This explains the pains and mystery individuals and the government faces each time there is fire outbreak. It is against this background that the need for fire protection and safety in urban areas of the country, particularly, Bida is crucial.

The aim of this research is to assess the standards for the provision of fire service facilities within Bida and to make appropriate recommendations for improvement. Bida is characterized by a number of social, economic and cultural activities. These activities as they exist in space have some form of threat as they relate to urban security in Bida. There have been



public use in the study area, the time to reach the disaster areas due to bad and narrow road among others result to severe accidental loss of lives and properties that may not be recovered. Also the fire service outfits available cannot serve the entire populace of the study area (Bida) in terms of the standard and principle of the establishment of fire service outfits in terms of the location, distribution, and availability of complementary infrastructures such as road, high density residential neighborhoods, etc. It is, therefore, recommended that, there should be provision of fire service facilities and substation, provision of hydrants and communication gadgets/facilities among others. This safety management should be considered as an issue of the government and private sectors, even top individual living in residential layout in order to fight the adverse effects of fire disaster in urban areas.

**KEYWORD:** Fire Disaster, Fire Facilities, Personnel, Standards of Fire Service

several fire outbreaks in time past gulping properties and lives and rendering some people homeless, example of this was the fire outbreak in Bida old market in year 2019. The existing fire service station within the study area appears not to meet the demand for them, thus, this has a serious implication which needed to be addressed by planning intervention. Bida area is characterized by a number of social, economic and cultural activities; the activities as they exist in space have some form of threat such as fire outbreak. This threat relates to safety, since safety is a basic need for individual to be able to function in a society, incessant fire outbreak in the past have destroyed a lot of lives and properties as well as rendered some people homeless. The existing fire service outfits are located without adequate maintenance and guidance on the number of facilities, equipment and even the personnel of fire service outfits are not adequate, therefore, this study findings, therefore, are used to identifying corrective measures to check the problems of fire service facilities in Bida in order to improve safety in the area.

## LITERATURE REVIEW

### CONCEPT OF THE FIRE SERVICE

Fire service is a government establishment with the responsibility of responding to fire incidence and other related emergencies, it could be an individual and collective allied organization that can assist in preventing and combating fire. Fire as defined by David V. Chadderton, (1993) is something burning with flames, light and heat often with smoke that are produced when something burns, fire could be flame that are out of control and its destroy lives, properties and building. Fire in any building and houses are attributable to many causes, prominent among which are: unsafe handling of flammable liquids and gases, faulty electrical wiring, lack of application of available fire protection and engineering expertise among others. There are various types of fire but they are classified into five groups according to CIBSE, (1986) as shown in table 1. All these classifications can be found in houses, markets, hospitals and can cause fire outbreak.

**Table 1: CLASSIFICATION OF FIRE**

CLASSIFICATION	FIRE TYPE	FIRE FIGHTING SYSTEM
<b>A</b>	Wood & Textiles	Water, Cools
<b>B</b>	Petroleum (Liquid)	Exclude Oxygen



<b>C</b>	Gases (Butane Methane)	Exclude Oxygen
<b>D</b>	Flammable Metals(Magnesium Uranium)	Exclude Oxygen
<b>E</b>	Electrical Appliances	Exclude Oxygen, Non-Conducting

Source: CIBSE, 1986

There are certain types of disasters, such as floods, hurricanes and earthquake that can sometimes be forecasted. But destructive ones, such as fire and explosion cannot be foreseen and avoided. However, preventive measures can be employed to avoid subsequent cost or fatal damages and prevent the disaster from turning into tragedy. The preventive measures are grouped into Electrical and Mechanical method of fire protection. These preventive measures include the installation of electrical gadgets made to meet appropriate regulation and standards.etc.

### Method of Fire Fighting

The functions of fire services include saving lives, preventing the destruction of properties and rendering humanitarian services. The efficiency of fire brigade depends on technical ability, practical ability, knowledge and team work, available equipment etc. The method of fire-fighting can be done in two ways which are the Traditional and the Modern methods of fire-fighting. When fire outbreak occurs, a range of facilities may be needed to cope with the disaster. Although Traditional items may not be as efficient as the modern equipment, they can still be used to fight fires. Modern method of fire fighting gadgets used to save lives and properties are grouped into portable fire equipment gadgets (fire blankets, fire sand bucket, fire jacket, fire axes, fire hand gloves etc), portable fire extinguisher (water based, dry powder based, foam based, carbon dioxide based and vapourizing liquid based) and fixed fire fighting (Hose reel, automatic sprinklers, automatic deluge system and automatic drencher system put in place for fire-fighting). Although, each of these methods have both advantages and disadvantages but this depend on factors such as time and location of the fire outbreaks. The equipment could be enhanced by the use of helicopter, spraying jets, life boat, pressure pipes, vehicle mounted pressure tanks with pipes (fire trucks).

Table 2: TYPES OF PORTABLE FIRE EXTINGUISHERS

GROUP	AGENT	TYPES	ACTION	COLOUR
1	Water based	Class A	Cool	Red
2	Dry powder based	All	Flame interference	Blue
3	Foam based	Class B	Exclude oxygen	Cream
4	Carbon-dioxide (CO <sub>2</sub> ) based	Class B and E	Exclude oxygen	Black
5	Vaporizing liquid bases	Small fire(E) motor vehicle	Flame interferences	Green

### Concept of Disaster

Disaster is a serious disruption of the functioning of society causing widespread human, material or environmental losses which exceed the ability of affected society to cope using only its own resources (Abdulhamid and Ibrahim 2011). This notion of disaster has drawn a



distinction between sudden and slow onset of disaster. Amongst the natural disasters, extreme drought is the only one that has slow onset by nature. The causes and effects of drought disaster are far more difficult to ascertain than slides, due to gradual nature of the process, often taking place over months and even years. The causes are more complex and it is often only possible to indirectly identify the effect. However, not every extreme natural event is a disaster.

#### **Principles and standards for the provision of fire service facilities in urban areas.**

**Spatial location principles:** The location distribution of fire service station is a vital principle for effective planning. This is because the location of a station determines to a large extent, the response time for fire men to arrive the scene of fire disaster to deliver their service. Another important consideration is the relationship between the location of the fire service station and the adjacent street, highways and major activities centres.

**Population Principles:** This is one of major principles in determining the demand of fire service infrastructure. This is because the higher the population of an area, the higher their activities patterns increases and spread economically and socially. Areas that are highly populated gave rise to commercial activities operating within limited premises which are incompatible and therefore poses danger to lives and properties.

**Land Use Principles:** This is another major determining principle in the demand of fire service infrastructure- The more use is assigned to a land, the higher the likely risk to fire outbreak. For example, commercial and residential land uses attracts high population and building congestion, thereby stimulating great tendencies of high risk to fire disasters.

**Building Density Principle:** One other principle determining the demand for the provision of fire service infrastructure is the nature of the settlements or town. Areas without proper layout design tend to be areas with uncontrolled buildings development. Also they are characterized by poor or inaccessible roads which place them at high risk to fire disasters.

**Service Radius Principle:** One other significant principle determining the provision of fire service infrastructure is the service radius which take into consideration population, major land uses (residential and commercial), and other major activities areas. The service radius determines to a great extent the accessibility of road and time response for emergency and rescue operators which are the critical factors for all fire service operations.

**Accessibility Principle:** Included in the important principles determining the location of fire service infrastructure is accessibility. This takes into consideration the relationship of adjacent streets, and highways. An analysis of traffic pattern in surrounding area will aid in determining whether the site is suitable for a fire station. The station must be located so that responding apparatus can enter streets and highways as safely as possible and return to the station without disrupting traffic and placing personnel risk. It may be desirable to locate a station on a side street rather than on a heavily travelled street. All these are shown in Table 3.

**Table 3: STANDARDS FOR THE PROVISION OF FIRE SERVICE FACILITIES**

Population to be served in thousand	Distance from commercial office areas (in km)	Distance from residential areas (in km)	Location distance of hydrant (m)	Site area (in hectares)
25,000	– 1.6	2.0	200m	– 0.6 – 0.8
50,000			300m	

Source: Ugbebor, (2015)

One fire service station should serve a population of 25,000 – 50,000 people (Ugbebor, 2015)



The maximum service radii are 2.0 km from residential areas and 1.6 km from office and commercial areas. Hydrants should be located between 200- 300m apart. A fire service station should have a site area of 0.6- 0.8 hectares. 64 staff is required for one fire service station (Bature, 2005). Note that standards vary from country to state and to city.

**Equipments Required For a Standard Fire Service Station:** The equipments include; Six fire service engines, two water tankers, two fire trucks, two emergency ambulances, One dry chemical powder truck and a ground satellite station

**Table 4: Hierarchy of Fire Service Station**

FIRST ORDER	<b>6 fire engines, 2 water tankers, 2 fire trucks, 2 ambulance, 1 dry chemical powder truck, 64 personnel's and a site area of 0.6-0.8hectares.</b>
SECOND ORDER	<b>2 fire engines, 1 water tanker, 1 ambulance, 15personnel, and a site area of 0.3-0.4 hectares.</b>

Source: Uloko and Agbonoga (2005)

However, the use of fire needs to be controlled; because the ability to control fire was a major challenge in the habit of early human. The cost of fire incidents is obviously enormous. It results in pains and death of victims, waste of time, money and materials and damage to equipment and structures. It is therefore, disheartening to know that most of these disasters are not the acts of God but rather the products of human errors and carelessness. Nigerians' attitude to accident prevention is lethargic; some of these fire disasters could have been avoided if we have been more safety conscious. It is only in this part of the world that people can store petrol, a highly inflammable material, in their living rooms, this is sheer recklessness (Ogunmosunle, 2013).

Firefighting is the act of suppressing and extinguishing fire to protect live and prevent the destruction of property and environment. Concerted efforts must be made by all concerned stakeholders to develop operational techniques that will ensure fire safety so as to enables leaders to match resources investment and resources deployed to risks in the community they service (Brillance, 2016). Fire disaster preparedness is one of the four phases of fire emergency management which is aimed at fire disaster risk reduction. It is a continuous cycle of planning, organizing, training, equipping, exercising, evaluating and improving strategies to ensure effective coordination and enhancement of capabilities to respond to fire disasters (NEMA, 2006). Fire disaster preparedness is an essential aspect in both environmental and occupational safety and health. Fires being an example of physical hazards have affected many workplaces and most of them are mainly caused by inadequate strategies in fire prevention, detection and/ or fire control. The potential for loss of life or injury from a fire-related incident is one of the most serious risks an urban area can face; therefore, an urban area should have a comprehensive fire safety program to enhance fire safety. Careful planning, implementation, and maintenance are all essential ingredients of a successful fire safety programme (Florida Atlantic University, 2002). Fire service and management includes availability and effective use of procedures, infrastructure, equipment's as well as knowledge and positive attitude of occupiers and workers towards implementation of fire safety guidelines. For instance, smoke alarms have saved thousands of lives in the United States following their introduction and wide use over the past two decades. The negative consequences of fire disasters are enormous and tremendous based on this; there is a great need to curb the occurrence of fire disasters in our societies. There is need to have better understanding of the nexus between fire outbreak and



the factors that pre-disposes the societies to fire outbreaks. It is equally necessary to ensure better preparation for, as well as rapid and well-coordinated response to complex fire outbreaks. For a long time, the cause and effect relationship between fire disaster and social and economic development was ignored, there is therefore a great need to examine and evaluate the nexus amongst all the intricate factors responsible for fire outbreak.

### Methodology

Data for this study was collected through field survey and interview with various stakeholders and also by the use of secondary data to achieve the work.

### Study Area

The study area, Bida, has a total land area of about 20,263 hectares.( see fig 1 showing map of Bida). Bida is a fast growing town whose population is rising rapidly. The 1991 population census shows that it has an estimate of 102,155, it increased to 188,181 (National Population Commission, 2006).

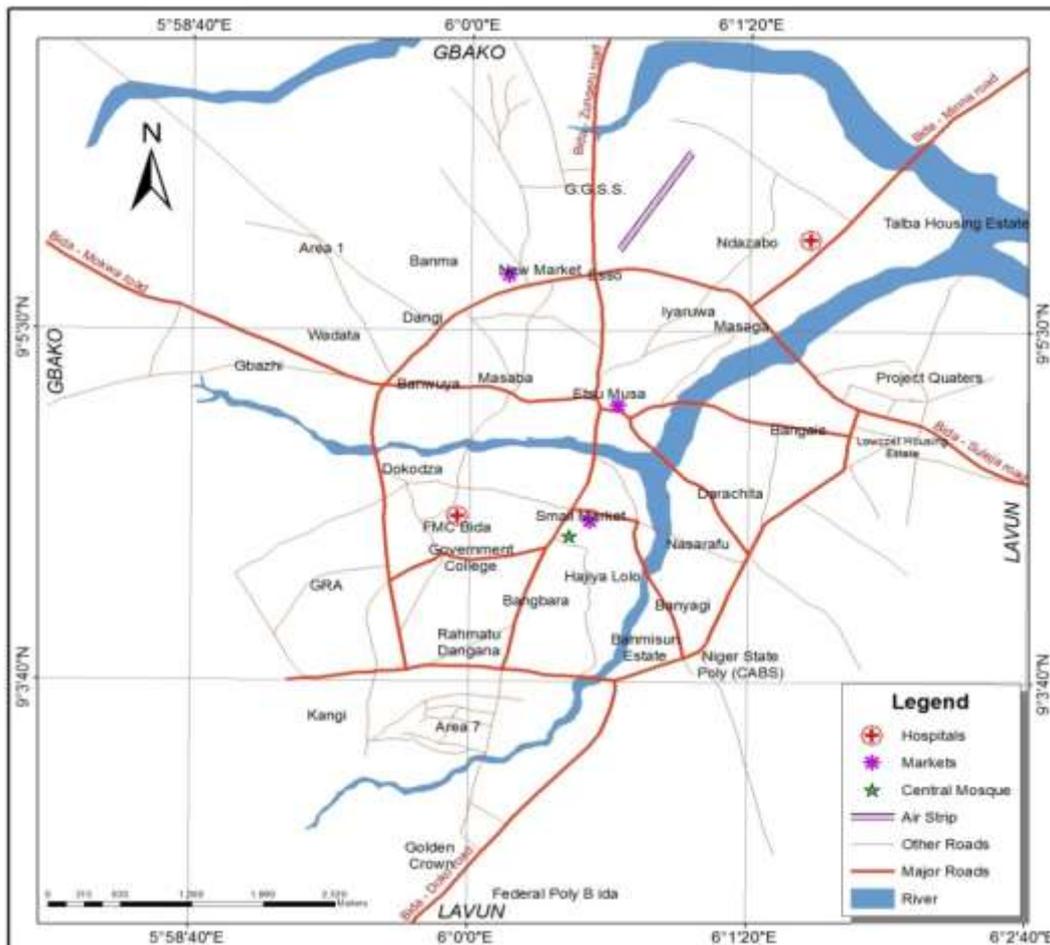
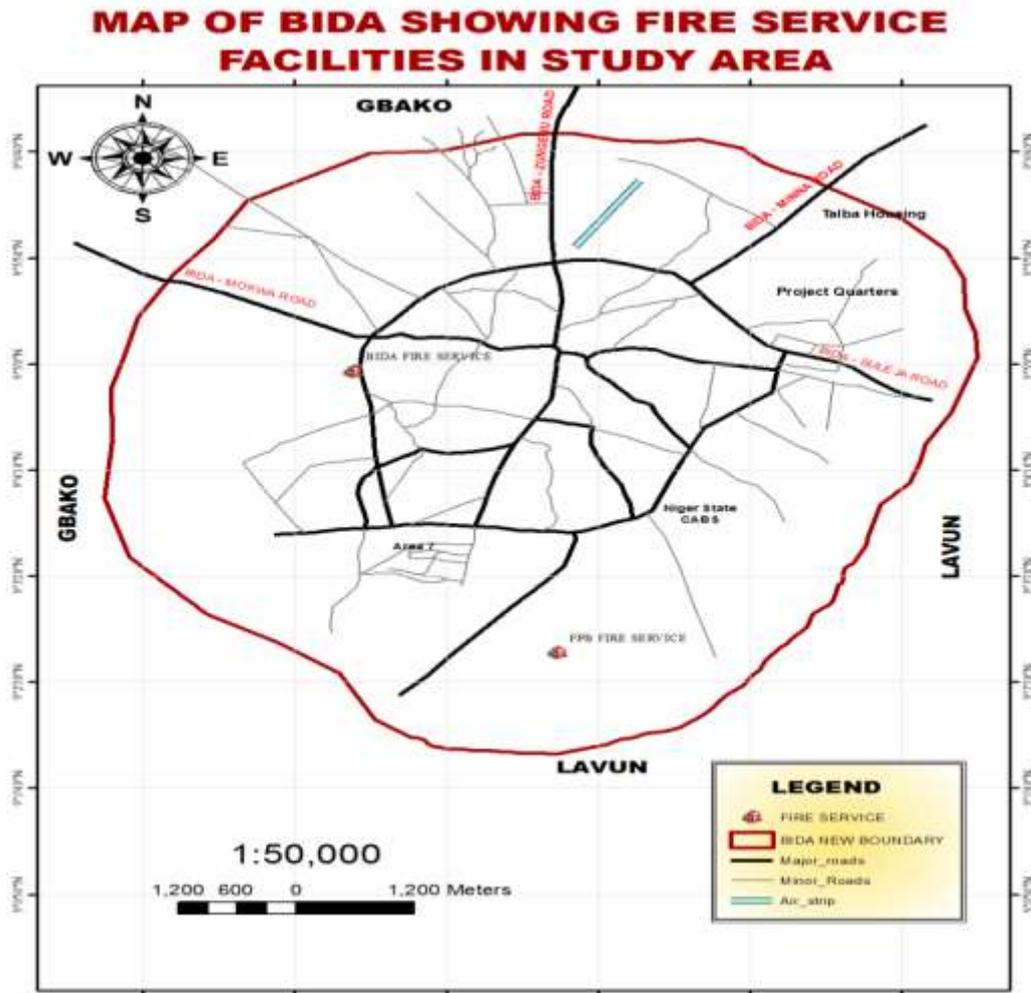


Fig 1: Map of Bida

Source: Ministry of Lands Minna Niger state



**Fig 2. Map of Bida Fire Stations**  
 Source: Field Survey 2022

**EXISTING FIRE SERVICE STATIONS IN BIDA**

The existing fire service stations in Bida Local Government Area are two (2) in number, they include Niger state Fire Service and Federal Polytechnic Bida Fire Service. For the purpose of this study, emphasis will be laid on the state fire service because the second fire service station belongs to an institution (See fig 2).

**Table 5: the Fire Service Station and its Location in Bida**

S/no	Fire Service Station	Location of fire station
1.	Niger state fire service	Dokoza road
2.	Federal polytechnic bida fire service station	Doko road

Field survey, 2022

**Bida Fire Service:** It is located at Dokoza area, the station has site coverage of about 0.6 hectares, and it is also characterized by high traffic running from Esso to BCC linking to the double lined road in front of the Fire Service station. The station has a close service radius of



less than one kilometer to the major hub of Bida urban area. The station has personnel strength of 11 staff. The major reason why the station is located in Dokoza area is because of the proximity to water supply (river) and roads linking to major commercial centre of the metropolis and also the concentration of other activities and densely populated nature of the area.

**Population:** This is one of the main determinants for the demand of Fire Service infrastructure, because the higher the population, the higher the activities of an area and the growth of settlements which tends to increase the risk of fire in an area. Due to the increase in population in the study area there is the need for additional fire service stations to meet their demand following physical planning standard for the provision of fire service, therefore it is absolutely inadequate

**Accessibility:** This is another major determinant for the demand of fire service infrastructure. This determinant was used to check the accessibility of fire fighters to risk areas which ended up not adequate due to bad roads and many roads in the study area are not accessible.

**Land Use:** This is one major determinant for the demand of Fire Service infrastructure. The land allocated to the fire service station in Bida was inadequate.

**Building Density:** This is another determinant for the demand of fire service infrastructure. Settlements with high density buildings stand a very high risk to fire disasters and therefore demand fire service infrastructure around them. There was evidence that development is haphazard therefore will be prone to high rate of fire disaster, because building planning standards were not adhered to.

#### **Discussion on Problems of fire service in Bida urban area**

**Inadequate fire service infrastructure:** Fire service stations are not spatially distributed in terms of populations and service radius standards in physical planning, planning standard specify one fire service station should serve a population of 25,000-50,000 people and the radii coverage from a service station to commercial and residential areas are 2 km and 1.6 km respectively. This has not been achieved in Bida. Therefore, there is inadequate fire service infrastructure to meet the demand of the metropolis.

**Hydrants:** Water hydrants which provide the source of water supply from the public water supply network pipes for fire extinguishing operations have a very limited coverage within the town. Hydrants location cannot be spotted because of uncontrolled nature of development in Bida and also most functional hydrants are dry.

**Inadequate Basic Equipment and Manpower:** There are shortage of personnel and inadequate equipment such as fire engines, water tankers, ambulance etc to service the Bida.

**Management:** Apart from the public fire service which renders service to the general public, Federal polytechnic Bida fire service act based on the authority of the management when called upon for emergency. This is because they are established to provide maximum safety and security to their organization. This makes the contribution of the fire service station minimal in rendering service to the general public.

**Poor Communication System:** There is poor communication system between the public and the agencies; this is because of the absence of a ground satellite station that will aid in determining the location of fire outbreak within the Bida town.

**Low Level of Private Sector Participation:** Private sector participation is very minimal and ineffective. Majority of the industries in metropolis are owned and managed by private organization that are supposed to help the public in the provision of fire service infrastructure



but unfortunately, they are silent in this aspect, leaving government with the full responsibilities.

**Site Coverage:** It was observed during the survey that the fire service station met the required standard for site coverage of 0.6-0.8 hectares.

**Negligence:** Also, there is negligence on the part of planning authorities to enforce the provision of the facilities that will support fire service operations. Development control authorities are silent in the area of fire service provision in Bida; they give little or no attention to the installation of firefighting equipment in residential, commercial and public buildings.

### Recommendation

Consequently, it is recommended that since there is a rise in population growth in Bida which has led to the need for its expansion, as obvious from the increase in number of structural development in the suburbs of Bida, there is need for the provision of more fire service infrastructures such as a functioning hydrants which need to be provided on streets with a 200m-300m distance apart, however, if more service stations cannot be built due to lack of funds, the existing ones need to be rehabilitated. Planning design has been silent in the provision of fire service, that is, most layout design in Bida has not been provided with fire service. Therefore, every layout should be provided with fire service infrastructure to prevent its destructions whenever there is an outbreak of fire.

Communication is the fastest means of linking people and passing information, therefore, more communication gadgets need to be provided and also a ground satellite station that will monitor all the activities within the Bida should be provided.

There is also the need to rehabilitate old roads and construct new ones. Poor access roads in Bida should thus, be tarred or graded in order to enable fire service operate effectively.

In conclusion, the existing fire service station owned by the state need to be improved and also new ones should be provided to meet the needs of the people. The location of the proposed new stations should consider road and terrain, so as to improve in response to time. Government should, thus, encourage private organization and industries to participate in the provision of fire services in order to incorporate both public and institutional fire service during service delivery.

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