DESIGN PROPOSAL FOR

BEACH GAMES ARENA, LAGOS – NIGERIA

WITH FOCUS ON

Adverse Effects of Salty Environment on Building Materials

By

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M.TECH. / SET / 904 / 2001/2002.

A THESIS SUBMITTED TO THE DEPARTMENT OF ARCHITECTURE, POSTGRADUATE SCHOOL, FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF M. TECH. DEGREE IN ARCHITECTURE.

AUGUST, 2003.

DECLARATION.

I, Samuel Abayomi hereby declare that the thesis titled:

DESIGN PROPOSAL FOR BEACH GAMES ARENA, LAGOS – NIGERIA with focus on ADVERSE EFFECTS OF SALTY ENVIRONMENT ON BUILDING MATERIALS is an original product of my own research work under the supervision of Dr. Zubair, S.N.

20th August, 2003.

Samuel Abayomi,

M. TECH./ SET/904/2001/2002.

CERTIFICATION

This is to certify that the thesis titled: DESIGN PROPOSAL FOR BEACH GAMES ARENA, LAGOS – NIGERIA with focus on ADVERSE EFFECTS OF SALTY ENVIRONMENT ON BUILDING MATERIALS, is an original work undertaken by: Samuel Abayomi of the department of Architecture, postgraduate school, Federal University of Technology, Minna in partial fulfilment of the requirements for the award of M.TECH. degree in Architecture and is approved for its contribution to knowledge and literary presentation.

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DEDICATION.

Having come this far without a reflection of any major setback, it is pertinent to give all the glories first and foremost to God, and then to all those who have helped in making the attainment of this singular fit a reality.

This dedication is also extended to all the great minds of this world who through their past works, have helped to inspire the average handy person of our modern world, thus enabling them to come up with inventions that are world wonders by an apt description.

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ABSTRACT

The quest for recreation entertainment predates recorded history. Man from prehistoric time has devised means of accessing entertainment and recreational venture; better still, this effort persists even to the present time. Often, man explores his natural environment (micro/macro) and its alloyed resources to get entertained and recreated. As much the beach, which is one of such environments, forms the venue for this project. This is because it offers aesthetic pleasure and forms a major recreational resource (Encyclopedia Americana vol. 3 389). This is what this project attempts to explore architecturally. As such, an area is being envisaged where leisure and beach sport can take place as they become expedient.

The whole scheme begins with the introduction/background information on the subject matter at hand. Following this is a thorough review of literature of works of past authors similar to the research under study. Next to this is the research area, through which some environmental problems in a beach environment were identified and hither to solve by giving optional treatment of building materials. After this come documentation of three case study areas, data of the propose location, site analysis. In the last chapter, a technical assessment of the proposed design was given. This ending chapter discusses the design philosophy and concept, materials and construction techniques, space allocation standard and finally design services.

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1.0: INTRODUCITON TO STUDY

1.1: Introduction/Background to Study

The exclusive title of this project is "Beach Games Arena, Lagos-Nigeria". This title which is devoid of any ambiguity connotes first and foremost that the proposed specific location is in Victoria Island by the Victoria beach, in Lagos State of Nigeria; beach games as opposed to other usual and popular games, which is the focus of this project. And Arena – a prerogative selection of building style and type by the designer.

Hence in this context and by definition, a beach games arena is a building type sited by or close to a beach, which has designed facilities for the games spectators and administrators; the focus of the arena being the level playing area often surfaced by beach sand.

An arena style was chosen so that users can have a wide and enhanced range of views. The viewing is not limited to the games taking place, but also the recreational activities happening at the beach side.

Beaches generally offer a wide range of advantages. As deciphered in a book title "Time Saver Standards for Landscope Architecture" – by Charles W. Harris and Nicholas T Dines; the usefulness of beaches include their gradual water depth, their lack of slipper surface or hard edges, and the psychological benefit of an outdoor, natural environment. Additionally, the pleasurable effect of the ocean or sea waves/currents, of the sunlight wildlife, fragrance, spaciousness, and the general ambience of the out-of-doors are qualities of incalculably beneficial valve.

Also in the Encyclopedia Americana, Vol. 3, Page 399, it is categorically stated that the beach offers aesthetic pleasure and forms a major recreational resource. This resource exists in Nigeria (for example, the Victoria beach). It is only when it is harness

and put to proper use that its full potentials/usefulness can be appreciated by man. This is the focus of this project, and it is the intention of the researcher to use architectural alternatives in other to realize set goals and objectives.

The merits of beaches stated in the two preceding paragraphs above can be deductively adduced as the reason why nations world over are gradually moving to the beach side to site recreational sporting facilities. This is even backed by the International Olympics committee, IOC, and other similar bodies; as beach games have hitherto become part of their medal winning games. This is evidenced in the just concluded Olympic Games tagged "SYDNEY 2000" where beach volleyball for instance was keenly competed.

Nigeria as a developing nation should thus be viewed to be growing like her counterparts in the orients and occidents. This is important in bidding to host world sporting events like the Olympics. It is envisaged that one day Nigeria will get there. Hence the time to start preparations is now.

To this end, the Federal Ministry of Sports and Youth Development is thus reminded of one of its objectives of propagating sporting activities, (in this case, beach games), and developing infrastructures for such, (in this context - B–ach Games Arena).

It would be foolhardy to be pretentious about the problems which building sites close to beaches are susceptible. As a result of its closeness to the sea, often there is a movement of salt either through air or ground, to such places as may be close to the sea. As such, the effects of salt water on building materials would be critically examined in the chapter tagged "research area".

It is also recognised that not all games (that is games known before the advent of beach games) are suitable for play on beach sand, as such, only those games referred to as

"listed games" in this thesis would be specifically addressed – as this is the focus of this project. However other types of games/recreational entertainment could be staged in the proposed arena. This is only possible when the arena would not be put to use by virtue of the said ""listed games". At such times, treatments such as resurfacing would suffice. Details of the above are clearly spelt-out in chapter six.

The arena would be made to embrace spectator requirements (seating capacity – 7,000 to 8,000), games requirements, administrative requirements, and ancillary facilities requirements. This is to satisfy the self-supporting status intended for the proposed Beach Games Arena, Lagos-Nigeria.

Additionally, recreational, and other scenic features would be provided in and around the zone of transition hereinafter referred to as "the beach".

Note also that as much as possible, demountable facilities/techniques would be employed for reasons of security, safety and adverse effect of weather. For this reason, an elaborate and carefully designed storage area would be logically integrated into the proposed arena.

Other factors borne in mind as at the time of conceiving this project include: dynamism of the society, modern trends in technology, and tourism development amongst others.

The above are a summed-up view of the whole study, it is meant to gradually bring into focus all that is associated with the proposed Beach Games Arena, Lagos – Nigerian. These are contained in the chapters that follow.

1.2: PROPOSED BEACH GAMES ARENA, LAGOS – AN INSIGHT.

A better appreciation of the themes of this thesis/project can be attained by looking at it beyond the level of an academic exercise. It should be perceived from the practical sense.

The proposed beach games arena, Lagos is intended to meet a wide range of growing needs of a recreational facility of its kind. Thus the core aspects of the arena would be made to concisely address this, while the ancillary aspects would be targeted towards enhancing the operation of the core aspects.

Details of both the core and ancillary aspects are as spelt out in the scope of this research.

The arena will be designed such that at least three (3) games can be played simultaneously. Hence, a "mother arena" and perhaps "twin baby arenas" whose seating capacity at a time would be between 7,000 – 8,000 is envisaged.

Users of the proposed beach games arena would cut across all human types – able and disabled, young and old, and men and women of all races.

For this reason, a carefully thought-out flexible and functional architectural style which offers a number of combinational alternatives would be greatly employed in the design of the aforementioned games arena. Management personnels and their associated space needs would be in the premises of the said arena, perhaps likely to be logically integrated in the arena itself. More facts about this project can be obtained in the chapter tagged "the design".

In a not shell, a grandiose, functional, and attractive beach games arena in a class of its own is hitherto planned for the littoral part of Nigeria in Lagos State.

1.3: AIM AND OBJECTIVES OF THE STUDY

1.3.1: Aim:

The broad aim of this research is principally geared towards a re-awakening on the importance of recreational sporting facilities in Nigeria via the use of architecture. Also, it is the intention of this research to find an architecturally functional and viable design for a cheap, safe, and environment-friendly beach games arena. The design is to inter-alia combine in a manner befitting the location, existing basic amenities, existing recreational sporting avenues, which will produce a beach games arena that is not only functional and attractive but also original.

1.3.2: Objectives:

The objectives with which to accomplish the above broad aim are as enumerated below;

1.3.2a: To identify a suitable site in the littoral parts of the country. This has been found in the victoria beach in Lagos-state.

1.3.2b: To understudy existing modern beach games arena and facilities therein. (dat collation and case studies)

1.3.2c: To identify problems militating against the establishment of beach games arena in Nigeria; vis-à-vis the Nigerian sporting and tourism policies. Such problems should be taken-care of during the design stage.

1.3.2d: To propose beach games facilities which are durable and modern.

1.3.2e: To put in place the necessary supporting facilities necessary for the smooth running of the arena

1.3.2f: To achieve effective natural lighting and cross-ventilation in the arena and its allied supporting buildings.

1.3.2g: To solve the problem of vehicular and pedestrian traffic in and around the arena (provision of adequate parking lots and vormitories).

1.4: RESEARCH METHODOLOGY

The DESCRIPTIVE SURVEY and HISTORICAL METHODS was used in collation of data for this research. The following are the means which the two methods stated above resulted – in:

- Use of case – studies of similar and existing projects.
- Literature materials: Journals, text books, encyclopaedia and News papers were read thoroughly. Relevant extracts from these materials proved handy.
- Website: volumes of relevant materials to the research at hand were down-loaded via the internet and used for this thesis.
- Oral interview/Direct Personal Observation: Experienced hands at the appropriate quarters was contacted, (Federal Ministry of Sports and Youths Development, Lagos State Urban Planning Board, and Tourism agencies were contacted). Additionally, a personal visit to the proposed site was done to allow for proper inventory of it.

1.5: SCOPE AND LIMITATIONS OF STUDY

1.5.1: Scope of Study:

The scope of this research is guided by the general/additional requirements of a beach games arena sited around a coastline. An elaboration of space allocation standards/requirements will be given in the chapter titled "the design"

Nonetheless, the proposed Beach Games Arena-Lagos can be broadly categorized as given below;

1.5.1a: Core Aspects

This shall include but not limited to the following:

- Mother Arena
- Twin Arenas
- Multi-purpose leveled playing ground in the arenas
- Ticketing/Booking unit
- Storage unit

1.5.1b: Ancillary Aspects

This shall also include but not limited to the following:

- Restaurants
- Parking unit
- Locker/changing rooms
- Administrative unit

- Training areas
- Scenic/other recreational landscape features

1.5.2: Limitations of Study:

In compiling this research work a number of hindrances were encountered, important among which are: inadequate time, uncooperative attitude of technical personnels contacted in the course of data gathering, lack of an existing beach games arena in the country, and the usual problem of having so much to select from in the internet.

Additionally, there existed the problem of up-to-date statistical data in terms of those engaged in beach games in Nigeria. It is worth mentioning here that this research work is only presented from an architectural standpoint.

1.6: JUSTIFICATION/IMPORTANCE OF STUDY

1.6.1: Justification

World over, the saying that "variety is the spice of life" is fast gaining acceptance. Nations are beginning to use their gifts of nature (in this context beaches) to optimum advantage not only in social-economic and political sectors but also in the sports and recreation sectors. To this end, countries of the West and East have built grandiose sporting facilities along coastlines to stage recreational sports such as beach games.

Nigeria should thus be seen to be thinking like her counterparts in the West and East, if she must compete favourably in global stakes. Also, the nark for recreational and tourism activities by Nigerian are a phenomenon to be addressed. The summed-up effects of the

above could be cited as the motivational reason for proposing this research thesis titled; proposed Beach Games Arena, Lagos.

1.6.2: IMPORTANCE OF STUDY:

The importance of this research work can be viewed into folds: the importance of the thesis report, and the importance derivable from the building of the said beach games arena.

1.6.2a:

The importance of the thesis report which can be summed up thus;

- Adding up to existing literature materials in general, and in particular in the aspect of the architecture of the littorals.
- Serving as a sound and qualitative theoretical basis/explanations of the design proper.

1.6.2b:

The importance of building the said beach games arena includes;

- Stimulating the development of beach games among young and old sports men and women
- Serving as a potential source of gainful employment for Nigerians – that is those to be recruited to work in the said arena.
- Potential source of revenue to the government: that is gate takings and other benefits accruing from the use of the arena.
- Adding to the tourism catalogue of Nigeria.
- The allied facilities provided could be used by holiday-makers for relaxation and easing-off.

- Adds to the sporting facilities available in the country, and also to the general infrastructure development of the country.

1.7: DEFINITION OF TERMS:

Wherever it may be found in this thesis, it should be noted that the definition of the terms given hereunder are exclusive, technical and as coded by the researcher, except where otherwise stated.

These words/phrases are summed-up thus;

- ARENA:- A central space for contestants or a sphere of action or contest. It could be at any convenient location indoor or outdoor.
- BEACH OR SHOCE:- A deposit of sediment along a lake or ocean shoreline that forms a boundary between the water and the land.
- BERM:- A nearly flat part of the backshore generally fronted by a much steeper slope, which sometimes exist between the foreshore and the actual coastland in back of the beach.
- BABY/TWIN ARENAS:- Alternative sub-arena adjoining the mother arena.
- COBBLE/SHINGLE:- Gravel and rock particles ranging from marble through first size to almost football size, which sometimes form beaches.
- CONCESSION STANDS:- A type of space in the arena required for food, beverages, souvenirs, and coat checking provided at convenient location in the promenade areas.
- DUNES:- An important part of a beach system which serves as a reservoir of sand that can replenish eroded areas during a storm.

- GAMES:- An old Anglo-saxon word "gamen" meaning play or sport. It is an activity engaged in for fun, and lately reward.
- GAMES ARENA/SPORTING ARENA:- A place or architectural edifice where games/other sporting activities are staged, and having spectator areas.
- INTOLERANT ZONE:- Part of an ocean/sea coastline which does not readily allow human encroachment.
- LITTORAL:- This is that part of a country near the coast.
- LISTED GAMES:- These are games in this research which are specifically earmarked for the proposed beach games arena Lagos. They include beach games which the IOC. Recognizes.
- IOC:- International Olympic committee
- LOBBY PROMENADE:- In this proposal, a wide enough walking space.
- MOTHER ARENA:- This is the main arena in the design, supported wholly by the relevant facilities. It is adjoined by the baby arena.
- TOLERANT ZONE:- Part of the coast which permits human encroachment.
- PICKET FENCE EFFECT:- A situation in which viewers behind are blocked by the heads of persons in the row immediately in front in the spectator area in an arena.
- VOMITORY:- Passage way in an arena through which spectators access the seating tiers.

CHAPTER TWO

2.0: Literature Review

2.1: History of Games – General

2.2: General Appraisal – Beaches

2.3: Why an Arena?

2.4: Usefulness of Games

2.5: Usefulness of Beaches

2.6: Future of Beach Games in Nigeria

2.0: LITERATURE REVIEW

2.1: History of Games – General:

Writers on the above subject differ slightly in the submission of facts which can be used in tracing the origin of games. Several reasons can be adduced for this: differing geographical backgrounds, generational question, inadequate knowledge of what goes on in foreign lands, and of course the seeming tendency of claiming the origin of an interesting subject.

Suffice it to assert that games are as old as the human race and as young as the child who plays them. Hence, the history of games is a part of the history of man as a social animal: his interrelations with other individuals and groups, his civilization and culture, and especially his play.

The word, "game" comes from an old Anglo-saxon word "gamen" meaning "play or sport". A game is an activity engaged in for fun. It can be any one of a wide variety, ranging from quiet, sit-down games to very active outdoor sports (The New Book of knowledge, Vol. 7, P10 – 11).

Down through the ages, children have watched adults and imitated them. Out of these imitations came games. Games are seldom invented. They grow, changing to meet the needs and customs of each new generation.

Game equipment evolved along with games. Dice and tops probably grew out of every serious ways of selecting a victim or telling a fortune. The first ball may have been a pebble or the skull of an animal. The first bat may have been a tree limb or the shinbone of a large beast.

As grown-ups invented tools and weapons children made their own versions of them, like small bows and arrows, toy spears, and wooden swords. Today the make-believe cowboy wears a toy pistol, and the junior spacemen has a toy helmet. Children's play is still imitating the work of adults. The tool that is copied may be a bulldozer instead of a shovel, a plane instead of a train, a station wagon instead of a covered wagon, but the principle is the same. Children learn and grow by trying out the things they see the grown-up doing. Games and toys provide a way to do this.

Some games have been played for so many years that their original meaning has been lost. For example, in early times in England it was the custom for young people to go out very early on May Day and bring back big branches of flowering hawthorn to decorate the maypole or the village. A May Day dance grew out of this custom, with the words "here we go gathering knots of May". - (The New Book of Knowledge, Vol. 7, P10-11).

The organization of games for competitive play and the codifying of each game's rules for general acceptance followed the improvement of communications in the 19th century and the growth of towns. Better roads, the railroads, the automobile, and the airplane have fostered national and international association. The towns growing progressively larger, sometimes into conurbations, denied the space for natural play to millions and substituted spectator games. - (The New Encyclopedia Britannica, Vol. 7, P 870 – 874). Additionally, it was asserted in the same book that old ways die hard, particularly in European countries, and it was possible in the 1970s either to find games still being enjoyed that had no more than local significance, or codified games being played with local rules.

The metamorphosis of games from being on organized, undisciplined amusements in villages and small towns into what they became in the second half of the 19th and in the 20th

centuries – sophisticated occupations for thousands and mass amusement for millions – was relatively swift. It followed the pace set by the Industrial Revolution. Before that series of economic and social changes took place, games were simple alternatives to country pursuits. Contests, particularly on holy days, were occasionally arranged between different communities as social occasions or as excuses for violence. In the country, games generally were spontaneous affairs, indulged in on the spur of the moment for an unspecified time. Gambling, of course, was an exception; matches between cocks and even cricketers were arranged for that

2.1.1.: Appearance of the Ball:

The most significant fact in the history of games was the early appearance of the ball. - (The New Encyclopedia Britannica, Vol. 7, P870). The observation that animals enjoy gambols with playthings as much as humans suggests that there may never have been a time in man's evolution when a ball substitute was not chased, batted, or thrown. In historical times the ball has always been present. The Egyptians, Greeks, Persians, and Romans were all familiar with it.

For centuries, the manufacture of balls hardly changed. They were made of strips of leather sewn together and stuffed with hair, feather, or cloth. Sometimes air-filled bladders were an alternative.

2.1.2: Appearance of Playing Areas:

Another important factor in the early development of ball games was the nature of available playing areas. It was easy to appreciate the advantages of the flat surface of a courtyard, for example, and even the smallest boy could under stand that a ball thrown against a relatively large and smooth wall could be made to bounce back to him. Because the bounce of the leather ball was low, only a small area was needed. Many European church walls provided the opportunity, and by using them, hardball games were invented.

Also, Nobles and courtiers found the same kind of opportunity within the walls of castles. The original game of tennis, now known as court tennis in the United States and sometimes as royal or real tennis in England, was played as a recognized pastime in the courtyards of noble establishments in France as early as the 13th century.

2.1.3: Historical Functions of Games:

Looking backward over the centuries, it would seem that there have been three functions for games. The first was to get rid of the participant of animal spirits and excess emotions by playing rough, strenvous, and what are now called physical – contact games. The second was to excite admiration and to give pleasure to the inidvidual and others by demonstrating skill. The third was to offer emotional out lets to large numbers of people by arranging spectacles – the spectator games – compensating for the lack of opportunity for taking part and also satisfying man's undoubted enjoyment in being, on occasion, one of a crowd. To these three functions there was added for a brief period a fourth, the function of bringing men and women together in a social situation, - (The New Encyclopedia Britanica, Vol. 7 P 871).

2.1.4: Types of Games:

Games fall into many classification, games that require a definite number of players, a special playing area, and very definite rules are called HIGHLY ORGANISED GAMES. These are card games, guessing games, and board games.

The longest group in the family of games is made up of those that do not require a certain number of players, special playing areas, or equipment. These are ACTIVE OUTDOOR GAMES – which incidentally is part of what this design proposal is meant to address (beach games). Active outdoor games may be classified in many different ways. One way is by the ACTION they require, such as singing games, tag games, or running games. Another method is to think of them according to the FORMATION they use, such as circle games or line games. Still another is by the EQUIPMENT needed, such as ball games, net games, or bowling games.

Sometimes, games are classified by the REASON for which they are played. For example, lead-up games are simple games that train the players in definite skills needed in some specific sport, such as basketball or soccer. In other words, they lead up to a sport. Games such as court games, water games, snow or ice games, are classified by the type of PLAYING AREA needed. Sometimes games are classified by their ORIGIN – Indian games, Japanese games, Eskimo games – or by PERIOD IN HISTORY – pioneer games, colonial games, Elizabethan games, and the like.

2.2: GENERAL APPRAISAL – BEACHES:

Beaches are a deposit of sediment along a lake or ocean shoreline that forms a boundary between the water and the land. It is defined as the zone of unconsolidated material that extends landwards from the low water line to the place where there is marked change in material or physiographic form or to the line of permanent vegetation.

A beach is a zone of instability, continually changing in response to the varying forces of the waves, tides and currents. But it forms the major natural protection of land in its continuing fight against encroachment by the sea. The beach also offers aesthetic pleasure and forms a major recreational resource. Beaches located near population centers form valuable recreation areas for a range of activities.

The material of a beach and its colour and composition depend upon the parent materials or rocks that have been worn away by the waves in forming it. The finest white beaches are usually formed by the breaking up of coral or limestone formations, or of both. Blackish coloured beaches are formed from volcanic material; green beaches, from rocks rich in olivine crystals. There are also red beaches, but the common sand-coloured beach is usually formed from a variety of tiny rock particles, among which quartz grains predominate. Broken shells and marine skeletons also add colour and texture to beach sands.

2.2.1: Beach Structure and Vegetation:

A beach is divided into a backshore and a foreshore. See fig. 2.2.1a and b for comparisons.

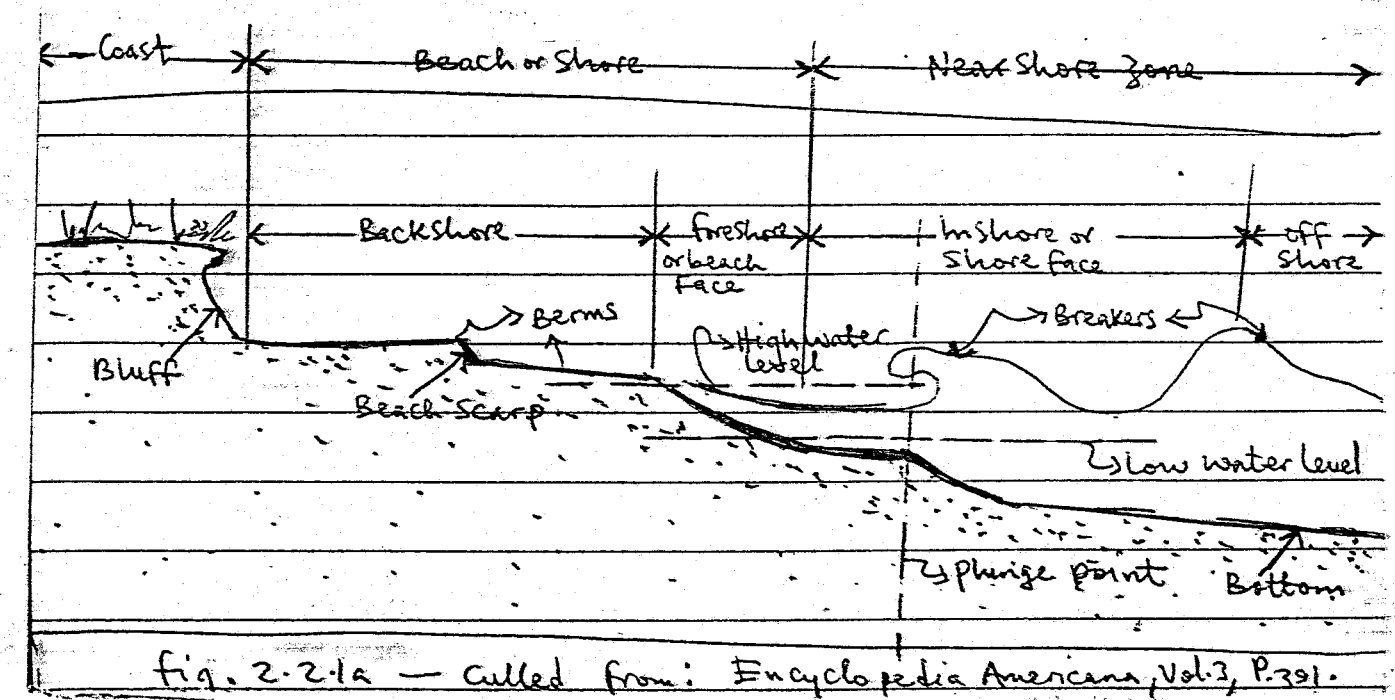


fig. 2.2.1a — culled from: Encyclopedia Americana, Vol. 3, P. 391.

TYPICAL CROSS-SECTION OF A BEACH.

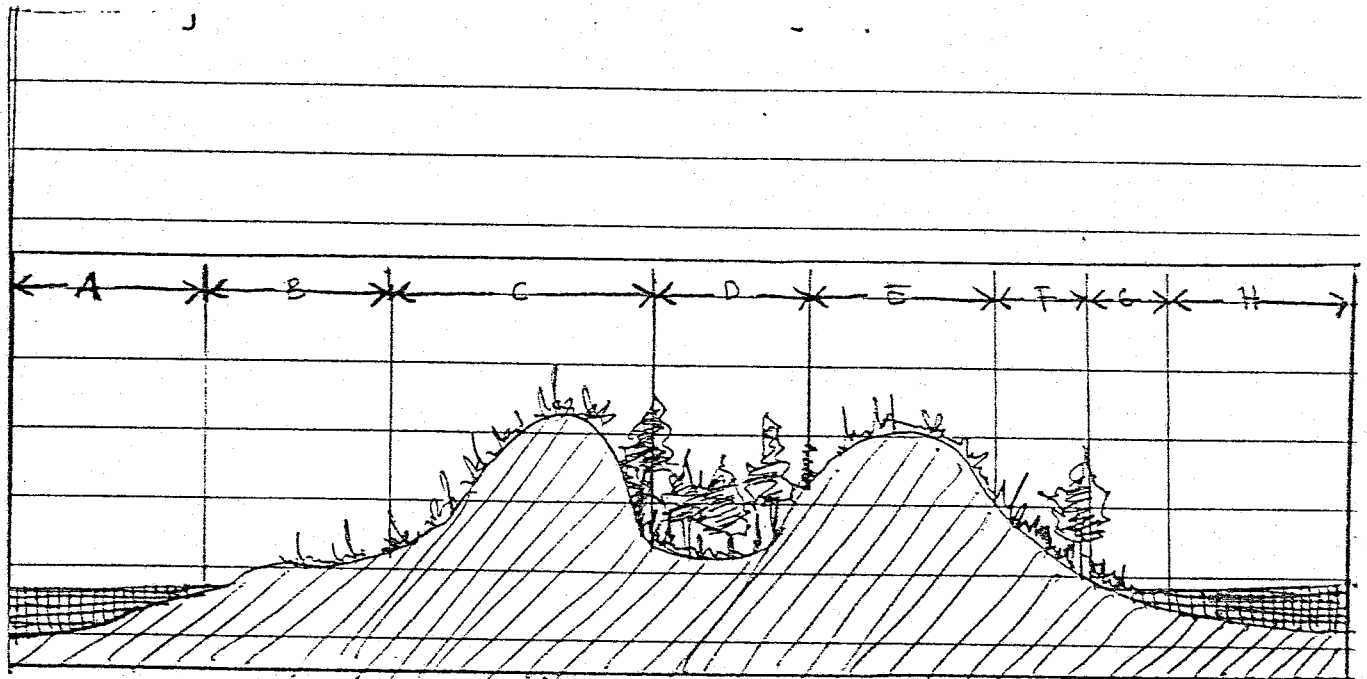


Fig. 2-2.16 — Culled from: Design with Nature by Ian L. McHarg (P. 14-15).

DETAILS OF A COASTAL REGION.

A = OCEAN: (Tolerant zone) Intensive recreation subject to pollution control

B = BEAC: (Tolerant zone) Intensive recreation. No building

C = PRIMARY DUNE: (Intolerant zone) No passage, breaching or building

D = TROUGH: (Relatively tolerant zone) Limited recreation. Limited buildings.

E = SECONDARY DUNE: (Intolerant zone) No passage breaching or building.

F = BACK DUNE: (Tolerant) Most suitable for development

G = BAY SHORE: (Intolerant) No filling.

H = BAY: (Tolerant zone) Intensive recreation.

The foreshore is that part ordinarily covered by the up rush and backrush of the waves as the tides rise and fall. The backshore, higher up on the beach, is normally acted on by waves only during severe storms, and especially when these are combined with exceptionally high tides. A berm, a nearly flat part of the backshore generally fronted by a much steeper slops, may exist between the foreshore and the actual coastland in back of the beach. Seaward from the beach is the nearshore area, which includes the area of breakers and surf, and extends to a depth where no significant movement of sediment takes place. That depth is generally about 8-9 meters.

In terms of vegetation, sand fences and vegetation on the backshore of the beach can result in the creation of dunes that can serve as a protective measure. The ridges and dunes thus formed prevent storm waves from overrunning a low beach or barrier. The cutting down and destruction of these dunes to allow construction close to the shore has resulted in increased damage, both because the buildings are too close to the shore and because the dunes are no longer there; for this reason, adequate set backs are instituted.

Vegetation also stabilizes dunes and holds the sand in the immediate area. Of the various types of vegetation in different climatic areas, all are salt tolerant and many continue growing as the sand accumulates around them.

2.2.2: Formation, Erosion, and Accretion of Beaches:

Beaches have been formed over a long period of geologic time. The materials were broken down by mechanical and chemical weathering of rocks far inland and then carried to the shore by streams and rivers. Another source of material is the weathering of cliffs on the shore. The grinding of the rock base by glacial action and the transport of material in the glaciers have also supplied shore materials.

A beach is a dynamic structure, always changing in relation to wave, current, and tide action. When waves approach a beach at an angle, they pick up material and move it along the shore in the direction of wave approach.

Waves also move material onshore and offshore. This process results in shore accretion or erosion. In general, high, steep storm waves tend to erode a beach by moving material seaward and depositing it in bars, while gentle, long-period waves tend to move material back on shore.

Note that many areas have alternate seasons of stormy weather and relatively low gentle waves and the beaches go through a seasonal cycle of erosion and accretion that may be as much as 30 meters back and forth in a year. Thus in buying a beach cottage, it is wise to inspect the area in the stormy periods as well as in the gentle periods.

2.2.3: Beach Protection:

Along with its opportunities, the shore zone imposes restraints and hazards on man and man-made structures. Enormous energy of storm wave can cut back the shore, undermining buildings and roads. High water levels in time of storm can cause inundation of low-lying areas and bring the force of breaking waves to bear on ground several meters above the normal levels reached by seawater.

For this reasons, protective devices are put in place. For centuries man has been at war with the sea; building fortress like walls to keep-out the sea. Two phenomenal effects – Progradation and Retrogradation needs be borne in mind when discussing beach protection.

When sand is arriving at a particular section of the beach more rapidly than it can be carried away, the beach is widened and built shoreward. This change is called PROGRADATION. On the other hand, when sand is leaving a section of beach move rapidly than it is being brought-up, the beach is narrowed and the shoreline moves landward, a change called RETROGRADATION.

Along stretches of shoreline affected by retrogradation, the beach may be seriously depleted or even entirely destroyed. When this occurs, cutting back of the coast can be rapid in weak materials, destroying valuable shore buildings. Protective engineering structures, such as sea walls, designed for direct resistance to frontal wave attack are prone to failure and are extremely expensive as well. In some circumstances, a successful alternative strategy is to install structures that will cause progradation, building a broad protective beach.

Progradation requires that sediment moving as littoral drift be trapped by the placement of baffles across the path of transport. To accomplish this result, GROINS are installed at close intervals along the beach. A grain is simply a wall or embankment built at

90° to the shoreline, it can be constructed of large rock masses, of concrete, or of wooden pilings – (see below).

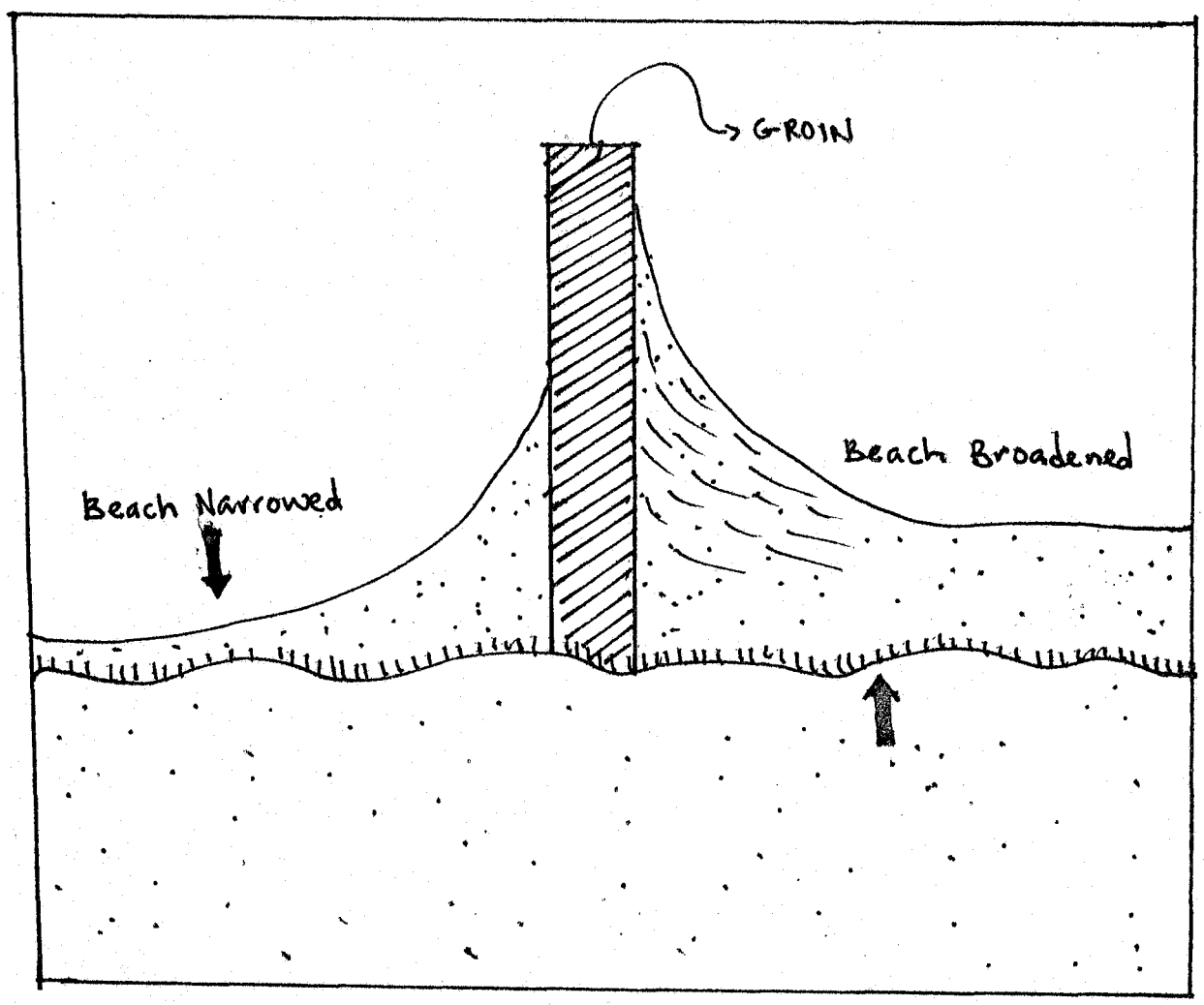


Fig. 2.2.3a: Use of Groins for Beach Protection.

The best protective measure for the shore is a good wide beach. Consequently, a protective measure now often recommended is beach restoration, or beach fill, with periodic nourishment thereafter. Sand is moved mechanically from some distant source and placed on the beach to widen and restore it.

Historically, Lagoons and bays were sources of beach fill, but environmental and ecological considerations now prohibit the use. Consequently, sand now is more commonly obtained from offshore areas. – (Encyclopedia Americana, Vol.3, P391).

2.3: WHY AN ARENA?

Earlier in history, the Romans, Greeks and Egyptians converge their populace in places referred to as Arenas to witness certain activities. The Romans for instance had the amphitheatre through which the gladiators display their prowess.

In modern times, sporting Arenas have hitherto gained grounds. Arenas are specially required for specific games or sporting activities. On the other hand stadia are needed for hosting a wide range of sporting events. As such, it is common to hear of Boxing areas, Hockey arenas, Basketball arenas, Bowling arenas, and so on, as opposed to naming stadia after such sporting events.

In the same light, since Beach games have one thing in common – the playing floor, (finished with clean beach sand), they are also specific in nature. For this reasons, an Arena is hereby suggested to accommodate the proposed beach games specified in this thesis.

2.4: USEFULNESS OF GAMES

Games have very many uses to man. Ultimately games offers man the opportunity to recreate and entertain his fellows. After long stressful hours of work, or shocking experience, man can opt for gaming (an appropriate one at the time concerned) to ease off.

As a result of the above, happiness and joy returns to man thus guaranteeing him long life. Additionally, games can be used in fostering cordial existence of individuals and communities. Through games also, many have made a permanent source of living. Jobs are also created in the process of organising big time sporting events.

Additionally, the contents of section 2.1.3. of this thesis suffices in terms of stating the uses of games.

2.5: USEFULNESS OF BEACHES

The advantages of beaches include their gradual water depth, their lack of slippery surfaces or hard edges, and the psychological benefit of an outdoor, - natural environment. Waves, sunlight, breezes, wildlife, fragrance, spaciousness, and the general ambience of the out-of-doors are qualities of in calculably beneficial value – (Time saver standards for Landscape Architecture P240-n; by Charles W. Haris and Nicholas T. Dines).

Additionally, beaches located near population centres form valuable recreation areas for swimming and sun bathing. Users of buildings located near beaches lend themselves to the above stated uses of beaches.

The proposed Beach Games Arena Lagos is thus seen in this light.

2.6: FUTURE OF BEACH GAMES IN NIGERIA

Till date, very little attention is given to recreational ventures in Nigeria. This is understood on the grounds of the seemingly persistent economic and social problems prevalent In the country. People have less to survive with let alone spending such on getting recreation and entertainment; even when it cannot be helped.

However, it is envisaged that the situation will improve greatly in the future. All that is required is a general reorientation of the populace. People should be encouraged to recreate and relax because of the in calculable benefit it offers. There is light at the end of the tunnel for beach games in Nigeria. This is given the antecedent that Nigerians are game lovers. Already, in their own way, the people of Lagos state engage in beach activities which includes beach games amongst others.

Thus, the siting of this project in Lagos State should not be plagued with questions. The proposed Beach Games Arena, Lagos – Nigeria is only an architectural edifice meant not only to stimulate the recognition of beach games by "Lagosians" but also people from other areas. The future of Beach games in Nigeria is bright as the people and the required site is available in abundance.

Thus, the authorities concerned are hereby challenged to wake-up to their responsibilities to the people; by facilitating processes leading to the building of the said proposal along the coastline of Lagos Nigeria.

3.0 CHAPTER THREE

3.1 General Statement

3.2 A preview into Salinity

3.3 A preview into Sea Water/Sea Salt

3.4 Dynamics of Marine Environment vis a vis Building

3.5 Adverse effects of Salty environment on Building Materials (Metal and Concrete)

3.6 Corrosion prevention

3.7 Other preventive Measures.

3.0 CHAPTER THREE: EFFECTS OF SALT WATER ON BUILDING MATERIALS.

3.1 GENERAL STATEMENT

Most forms of salinity arise as a result of an alteration to local or regional hydrological processes, causing ground waters to rise to the surface, leading to a range of problems.

Pure water is surprisingly non-corrosive. But as soon as impurities are present water becomes to some degree a conductor of electricity so that galvanic cells can be set up which in turn cause corrosion.

Seawater in the oceans and open seas has a high salt content of about 3.5% which does not vary very much around the world except at the mouth of fresh water rivets or in very hut enclosed seas. The "salt" in seawater is sodium chloride (table salt) and it is this that makes seawater such a good conductor of electricity and therefore so much more corrosive than Fresh water.

The corrosive nature of water is very much related to its conductivity, or in the opposite sense to its resistivity. The resistivity of various waters greatly, as shown below;

Pure water	20,000,000
Distilled water	500,000
Rain water	20,000
Tap water	5,000
River water	200
Coastal water	30
Deep sea water	25-25

Tab.3.1a: Comparison of the Resistivity of different waters.

Calcium carbonate and Magnesium sulphate are also present in sea water in small quantities and tend to form a "hard whitish" coating over materials immersed in quiet seawater or those transferred through the air to building facades.

Oxygen is also present dissolved in seawater. Most corrosion can only take place when oxygen is present and therefore the level of dissolved oxygen is important.

In open sea there is about 4-8 parts/million, ample to opal corrode. The level drops in stagnant or oil covered water (canal; and bilges) and also polluted waters. Where as a low level of oxygen inhibits the corrosion of steel, it increases the tendency of stainless steel (and those metals relying on tight adherent oxide films) to pit.

In polluted waters some type of bacteria can create conditions ripe for corrosion at an accelerated rate, often in the form of pitting. Most metals succumb to badly polluted waters, particularly steel and coppers alloys and even Monel. The acidity or alkalinity of the water also plays a part. Seawater is slightly alkaline with a pH value of about 8.2. Polluted waters are usually alkaline with a pH value of less than 7, while a lush river with much plant life is more alkaline.

3.2 A PRE VIEW INTO SALINITY

Many saline areas are the result of entirely natural processes. However, most new salinised areas are the result of changes in land use and land management. Increased salt in soils, rivers and ground water reflects changes in the amount of water falling on certain type of land and the way in which groundwater moves through the subsurface.

It would be quite helpful to identify the major form of salinity in and around Littoral regions. These include:

- DRY LAND SALINITY:

Dry salinity usually comprises three broad processes – groundwater recharge, groundwater movement, and groundwater discharge .All these have one effect or the other on building or developments in Littoral regions, be it on the foundation, superstructure and even the surrounding environment (landscape).

Groundwater recharge occurs naturally, but is often accelerated by excessive clearing of native vegetation throughout the landscape, particularly on hill slopes. Recharge reaches a peak where:

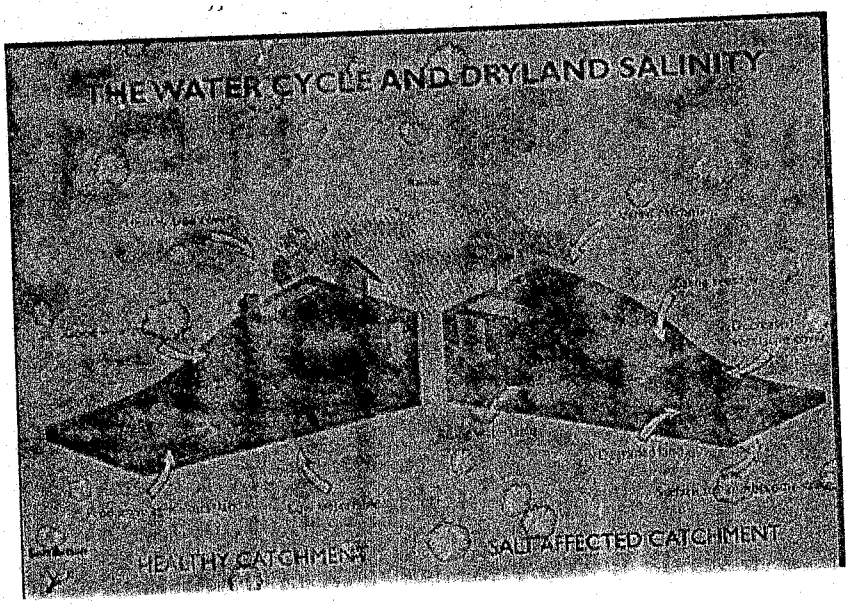
* Soil is shallow, overlying fracture rocks
* Soil or rocks are highly permeable
* Vegetation is shallow-roofed or absent, (as in beach areas), and rainfall is greater than evaporation and plant use for a period of the year (as in Lagos areas).

Groundwater moves through the landscape via acquifers, or porous ends permeable rocks and soil masses. These may be confined (closed to the surface by a waterproof unit- typical of how the playing surface for the beach games should be treated), or unconfined (opened to the surface).the rate of movement through these acquifers depends on how porous the material is and on the resistance to flow .Water movement may occur over a region scale(e.g. several hundreds kilometers) or be highly localized (e.g. a few hundred meters in a near surface acquifer).

A discharge, a seepage, or flow of water (saline) will occur when the water table meets the surface. Frequently, discharge points will first appear where there is a change in slope of the ground, at a change in rock type, or along a fracture.

Where saline water rise to within about two meters, 2m, of the surface, water can be taken up by plant or it evaporates through the soil. Evaporation results in the dissolved salts being left behind and concentrates as deposits at the soil surface.

Surface seepage of water is greatest where the sol is based, highly permeable or has little plant cover. The diagram below illustrates the process of dry land salinity.



Comparison of a natural unmodified catchment with a modified, extensively cleared catchment.

Fig. 3.2a: The water cycle and Dryland Salinity.

-RIVER SALINITY

When running from areas of dry and, irrigation and urban salinity may flow into creeks and rivers, raising their salinity. As salinity in a catchment worsens, the rivers, become more salty over lime.

-Other forms of salinity, which are not discussed in details in this, include: Industrial salinity, Urban salinity and Irrigation salinity.

Having highlighted the forms of salinity, next would be the factors that bring about these identified forms of salinity. They in a nutshell include the following:

- **LAND USE:** This looks at the amount of rainfall in an area viz. a viz the use to which such land is put to. For example, over grazed areas and bear vegetation is prone to high rate of salinity than those under wood land vegetation.

  Hence feasible studies would suggest that only region that are not prone to salinity be used for buildings for the attending problems they later or soon create.

- **VEGETATION:** This reduces groundwater recharge by intercepting water before it reaches the groundwater system. The clearing of trees for littoral region, particularly groundwater recharge areas, is the primary cause of the hydrological disturbances that lead to soil salinization.

- **WATER USE:** Our water use patterns have a direct impact on salinity. The amount and timing of water taken from rivers, the flow of water over saline land, together with the flow and timing of water onto land and into rivers, all impact on salinity, which ultimately have negative effects on buildings located in such areas.

- **SOILS:** The recharge of water into rock mass leads to dry land salinity. This tends to be greatest in areas within soil layers porous sand highly permeable soils.

They typically have less vegetation cover (as is the case with beach areas), allowing significant evapo-transpiration. Soils with a high salt content also contribute to the occurrence of surface salinity.

- **CLIMATE:** Seasonal changes in the extent and severity of dryland salinity relates primarily to climate factors such as rainfall and temperature.
- **SALTS:** All soils contain salt in various concentrations. These salts usually occur in the lower soil profile. The amount varies widely between different areas, but amounts can be quite large in sub surfaces, r a combination of these. Many groundwater bodies are naturally saline, and sometimes saltier than seawater. Hence, soil investigations around littoral region should be conducted before sting classical projects such as a Beach Games Arena.

By and large, in Littoral regions, the issue of salinity is a major problem to be considered amongst others when siting a building such as the one under consideration in this thesis. As would be established in the latter part of this chapter, salts has various effects on building right from foundation to superstructure and even landscape as noted earlier in this text

3.3 A PURVIEW INTO SEAWATER/SEA SALT.

Making successful use of concrete or for that matter any material in marine environment requires a proper appreciation and understanding of such and environment. This is particularly true of the sea with which some of us can claim familiarity.

If an item is wetted with seawater, and then allowed to dry, white salt crystal are left in the surface. These salts are highly DELIQUESCENT; they attract moistur from the air and make the surface damp even on a dry day. This damp is highl concentrated salt solution and even more corrosive than seawater.

Hence it could be seen here that sea salt" is more corrosive than "seawate yet the two affect building components near seashores. Hence, it is worthy to tak note of this fact when designing buildings, which are to be sited at such regions.

3.4 DYNAMICS OF MARINE ENVIRONMENTS VIZ. A VIZ BUILDING COMPONENTS.

Research findings have shown that in a marine environment, one of tl greatest problems of building material or components is corrosion. To this end tl better part of the discussion to follow shall mainly center on this other problems w also be looked in to.

Corrosion (sometimes referred to as rusting) is broadly defined as t deterioration of a "material" due to a REACTION with its environment, He deterioration simply means a change in the structural properties of that material. St and concrete are two building components that are widely used today. Thus th behavior in a marine or corrosive environment requires a closer look.

Steel and concrete offshore structures exist in an environment of Oxygen saturated seawater, which is particularly detrimental to structural st Corrosion will occur if precautions are not taken.

In a marine environment, the most important corrosion problems occur in two types of sub-environment;

(A) The atmosphere and (B) Water: Fresh and salt.

(a) Atmospheric Environment:

Although, atmospheric corrosion is not spectacular, the cost of it is. After much experimentation, corrosion Engineers found three distinctly different corrosion s rates in industrial, marine and rural areas.

The problems in the industrial areas arise from $S0_2$, which leads to H_2S0_3. Salt and other contaminants from roads also lead to acceleration rates.

In marine areas, the chief problem is salt spray as would be seen latter under the effects of salt water on major building materials.

In rural areas, rain and dust cause the principal problems.

(b) **Water: Fresh and salt:**

The attack from fresh water varies widely depending on the dissolved salt and gases. The principal contaminants are Chlorine ion, Sulphide components, and Calcium salts. There is little difference between plain and low alloy steels. Cast iron and ductile iron are widely used for constructions. In general, in cases of dezincification, dealuminization, alloys with over 80% copper are used. Monel, aluminum, some stainless steels, and cupronickel are also employed depending on the application.

Seawater or salt water on the other hand attacks ordinary steel and cast iron fairly rapidly. Add wet salt and heat and the rate of rusting can reach 0.05 inches per year (1mm), as in tropical coasts to which Lagos,

Nigeria belongs. The over riding effects and preventive methods would be subsequently examined.

Additionally, in a marine environment, problems such as salt spray, and a situation whereby certain plastic components absorb small percentage of salt water that then causes a creep in the plastic fibers leading to wrinkling on the surface of such materials in the dry season are a common place.

3.5 ADVERSE EFFECTS OF SALTY ENVIRONMENT ON BUILDING MATERIALS (METALS AND CONCRETE)

The main building components to be extensively treated here are Metals and concrete components. Nevertheless, a substantial time will also be devoted to ceramics components, plastic components, and such other materials hat make up the building fabric.

As noted earlier, the effects of sea salt show themselves every day. Sprays coming onto the deck are the most obvious way in which buildings get covered with sea salt. However, the most known devastating effect is corrosion or rusting.

In terms of salt sprays, the worst condition are a strong wind in combination with hot sunshine, because fine spray that comes aboard is rapidly dried by the sun, sea salt can build up like there is a "white crust" over building surfaces or component surfaces. "Salt caked" is the novelist's pet expression for this phenomenon. The effect of sprays on building surfaces is better appreciated to clean off a window for example, by wiping it with a rag; it only merely result in sneering of the salt. The crystals of which are sharp enough to scratch (defacing factor) a Perspex window.

In Marine environments, very fine sea spray –almost invisible type – comes aboard continuously on a windy day, one can only see it in bright sunlight and feel it's effects for a long time afterwards; hair feels sticky and trousers damp. This fine spray is carried through open windows and hatchways and makes clothes and bedding feel damp. The above shows that salt water does not affect building component but can be detrimental to the interior furniture and persons.

It has been noted earlier that salt water from which sea salt is derived is an important agent of corrosion. Corrosion on it's own ,affects metallic components of buildings if not carefully handled.

Sea salt will normally lead to corrosion when these salts which are highly deliquescent attract moisture from the air and damps. This damp is highly concentrated salt solution, which has been noted to be more corrosive than seawater. The manner in which corrosion occurs has been defiled in section 3.4 of this chapter. However, in terms of the effects of corrosion on the building components, it can only be summarized, that if allowed to occur, corrosion will not discolor or deface a metallic building component but also act in weakening the strength of that material. For that reason, maintenance guidelines should be put in place to prevent it or reduce it. Often, it is advisable to solve this problem from the design stage.

Ceramics are only slowly affected by sea salt in the atmosphere, as shown in the many structures made of bricks and cement that have stood for centuries. The principal dangers in weathering are the effects of water entering cracks or joints and expanding on freezing. Salt in water often aggravates the problem. This leads to leads to sudden cracks.

Plastics are affected slowly by the atmosphere (which is often saturated with sea salt in marine environments) and particularly by sunlight. This makes he plastics loose it's original form or shape.

For concrete, the trend is the same in behaviour as for ceramics under the influence of salt water.

By and large, while it has been established that a salt water causes a number of physical/chemical process which have negative effects in building components, corrosion is by for the worst effect. It happens rapidly and the cost of maintenance is so high compared to other effects such as salt spray., lost of shape as in plastics and expansion of ceramics on freezing.

3.6 CORROSION PREVENTION.

As corrosion happens to pose the most or more dreadful effect, detailed attention would be accorded to how it can be prevented, or where this is not attainable, reduced to the minimum.

Suffice it to say that corrosion in marine structures lends itself to a number of prevention techniques, the details of which are given below: Note that in selecting a metallic building material that would be exposed in a marine environment, the first decision to be taken is whether a shiny metallic surface such as that given by stainless steel is necessary. If not, there are two principal alternatives as:

- **PAINTING/PLASTIC COATING:**

There are numerous ways of reducing or eliminating rusting, some of which are painting, Galvanizing, Zinc or Cadmium electroplating, Zinc or aluminum spraying, Sherardizing, Chinese Galvanizing, Tin or Lead coating, Nickel-chromium plating, Nylon-dipping, sheathing with fiberglass, cladding with sheet metal and weld cladding.

All the above techniques prevent saturated moisture from making direct contact with metal surfaces.

- **CATHODIC PROTECTION:**

This is done either by impressed current or sacrificial anode method may be used. The steel surface in this case is supplied with a surplus of electrons making it more cathodic. The anodic sites become cathodes with respect to the sea-water and corrosion is reduced.

NOTE:

From researchers conducted, when selecting structural steel or metals for building in Littoral regions . special attention should be paid to the following types of metals:

- Cor-Ten Steel – a low alloy steel that rusts slowly and stops after two years
- Monel
- Titanium
- Stainless Steel

3.7 OTHER PREVENTIVE MEASURES

As has been noted earlier, it is not only corrosion that is the bane of building components at sea shores. This is why this section is important. Other problems such as salt spray, loss of shape in plastics, and expansion of ceramics/concrete's on freezing ,and also salinity in land to be used for construction f littoral regions needs to be tackled.

In terms of salt spray, it has been proven that the best solution is by the use of copious fresh water. Attempt should never be made at using a rag to wipe off sprays, as it is only smears the salt. The result of smearing is that the crystal becomes sharp enough to scratch even a Perspex window. Note also that "sea salt" will remain clinging to a surface until washing off by rain or fresh water hose.

In other to keep plastic components in their original shape, they must be coated or clapped with a material that reduces the penetration of direct sunlight and other atmospheric agents .Several coating agents are available ;epoxy resins ,urethanes ,and even some type of paint can be applied.

To maintain and make ceramic and concrete components, last longer, cracks must be discouraged. Joints must also be well fitted. Sometimes, recognised scalant (e.g tar) can be used to fill such cracks or opened joints to avoid further damages.

Where the soil for construction in marine environment has been found to contain high salinity content, one best option is to "dewater" such a site, by so doing, a reasonable quantity of the salt is drained. Also certain addition which are known to neutralize the effect of salt in soil s can be used. Type of additive to be used in this case is a function of the type of salt compound present in the soil. The additive is left for a

given time to allow it neutralize the salty soil properly. With the above done, building foundation would have been greatly protected against the negative effects of salts.

4.0 CHAPTER FOUR

4.1 General Statement on Case Studies

4.2 Case Study One

4.3 Case Study Two

4.4 Case Study Three

4.5 Deductions.

4.1 GENERAL STATEMENT ON CASE STUDIES

The importance of case studies as a method of research in science, environmental sphere cannot be overemphasized.

It is particularly important if subject for research is little known. It demands that similar or same project to the one at hand be understudied. This allows for a better understanding of the research or project at hand, as the success and failure areas of the existing projet can be investigated.

As result of certain limitations, researchers/designers may not be in vantage position in some projects. This does not mean that such person is not competent. For instance, it might be an effort in futility for an Architect who never participated in a project such as "Nuclear Power Station" to propose designs for such; only relevant case studies can bail such an Architect from failing.

In case study exercises, one requires great intuition/ sound predictive ability to be successful at times, as authorities would not readily allow one to investigate all or even part of its building property to detail. It therefore requires great intuition and vigilance on the part of the researcher. Several devices can be used in conducting case studies amongst which are: the use of cameras, questionnaires, measuring tapes, intuition, Personal observation, and interviews. More recently however, browsing of Internet has become popular.

In a nutshell, the case studies presented in this thesis have been formatted to include the title and location of the project, brief description, merits demerits and illustrative devices such as photographs. Three case studies have been carried out and documented in this chapter for the purpose of effectively tackling issues that are bound to arise in the project – proposal Beach Games Arena, Lagos.

4.2 CASE STUDY ONE

TITLE: EKO TOURIST BEACH RESORT

LOCATION: LAGOS – NIGERIA

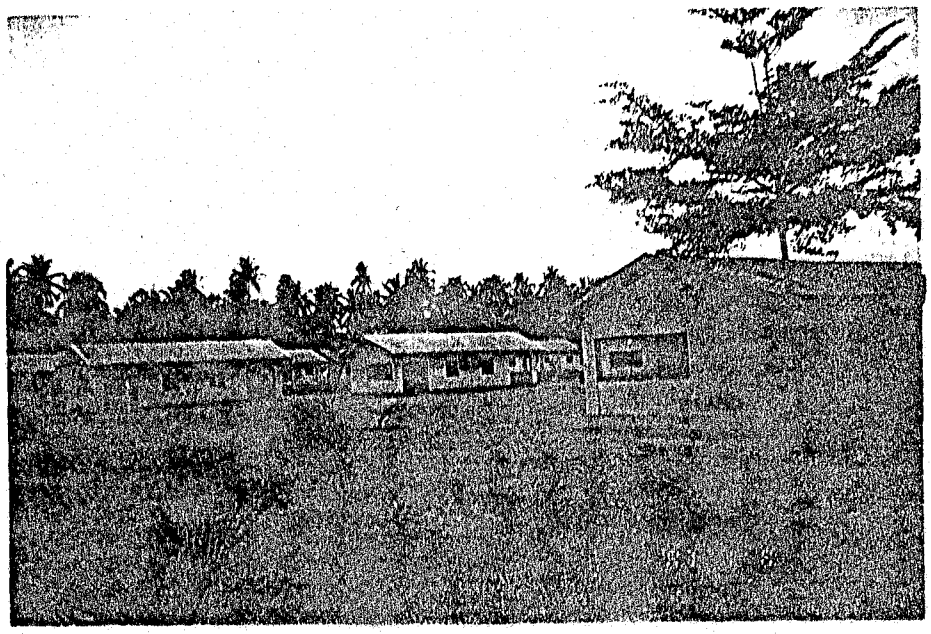
BRIEF DESCRIPTION:

This beach lies very prominently along one of the many beaches in Lagos State – Nigeria.

It is a holiday resort that offers tourists a delight to behold. Its expanse is roughly $1km^2$; mostly linear in planning. Facilities in this resort include relaxation spots, huts, bar/barbeque spots, restaurant and resort management building. Activities thrive most during weekends and public holiday periods. There are quite a number of adjoining chalets to accommodate staying tourists.

Also available are rubber mats, training facilities, rock chairs, swimming equipment among others. The hut-like structures on location are quite open such that out view of the surrounding environment is possible. Landscape is principally characterized by varieties of royal palm trees.

The resort is also open to concert shows and carnival-like activities.



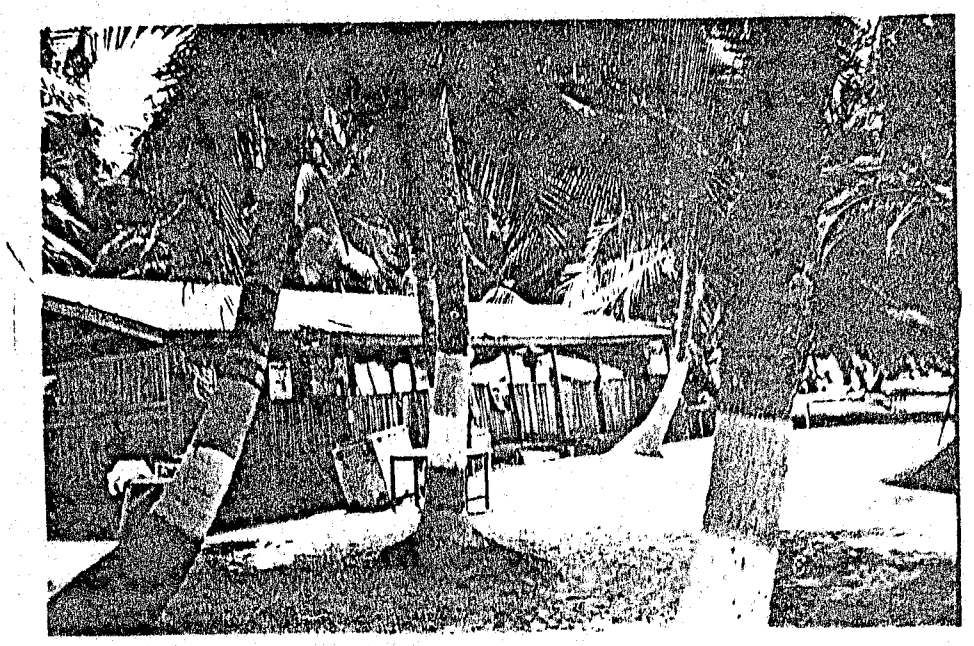


Plate 4·2a: Pictures of Eko Tourist Beach.

Plate 4.26: Pictures of EKO Tourist Beach.

MERITS:

- There are basic resort facilities available on location
- The open huts are well located on site such that a panoramic view of the beach surrounding is possible.
- Landscape is quite satisfactory
- Access roads to this resort is well tarred
- There are also other basic amenities like electricity and pipe borne water on location.

DEMERITS:

- At peak periods, resort facilities are inadequate
- There is no clearly demarcated area for public shows
- There is no provision for sporting facilities (Beach Games).

4.3 CASE STUDY TWO

TITLE: IPANEMA CARNIVAL BEACH

LOCATION: IPANEMA – BRAZIL

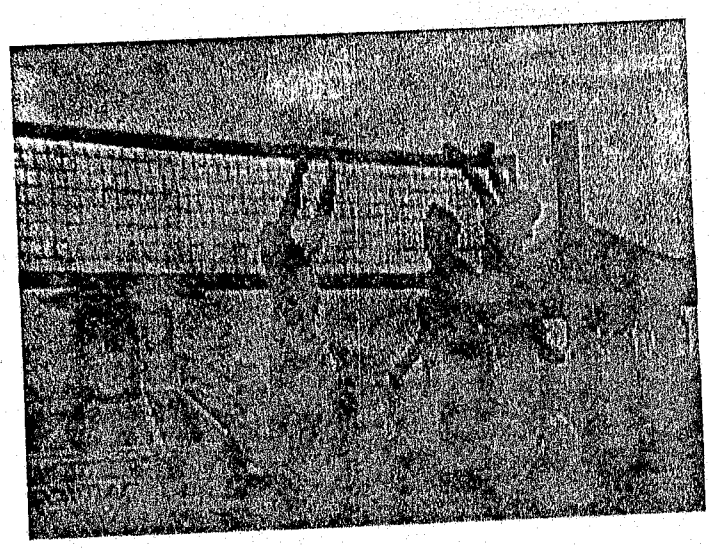
BRIEF DESCRIPTION:

Ipanema Beach is an open beach specifically reserved for hosting beach carnivals. It is used for a wide rage of activities from carnival staging, concert hosting, taming? Purposes, to hosting of beach games such as beach soccer and volleyball.

On busy day, the beach scene is like that of an open "seven day market" Several activities take place simultaneously.

The beach is greatly loved by visitors beach of the nature of its sand. In Brazil, the sand od Ipanema beach is one the best. This is impermanent and demountable. Beach users bring and assemble their huts, tents and other structures on location. At the end of the day, they dismantle them and pack them away.

As a result of its expanse and quality of its sand, the major problem of this beach is that of people stealing the sand. Land authorities have put in place a number of measures to deal with offenders.



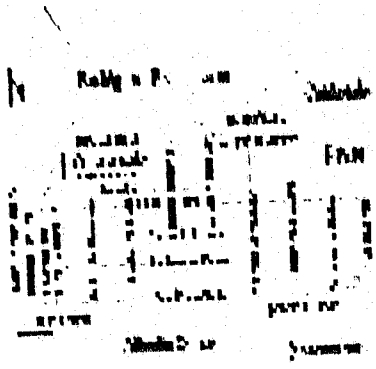
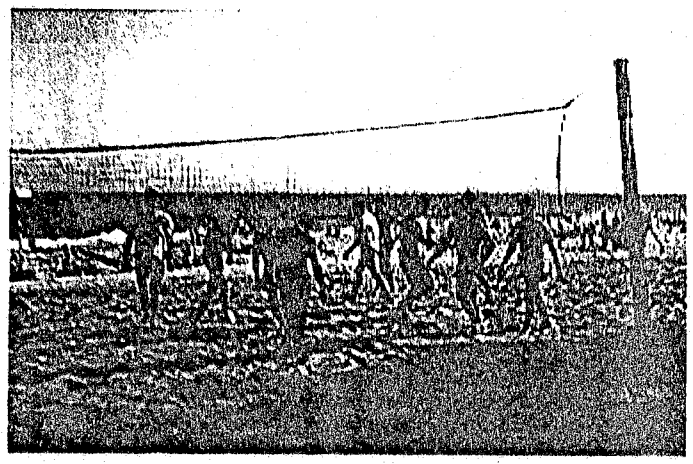


Plate 4·3a: Pictures of Ipanema Carnival Beach – Brazil.



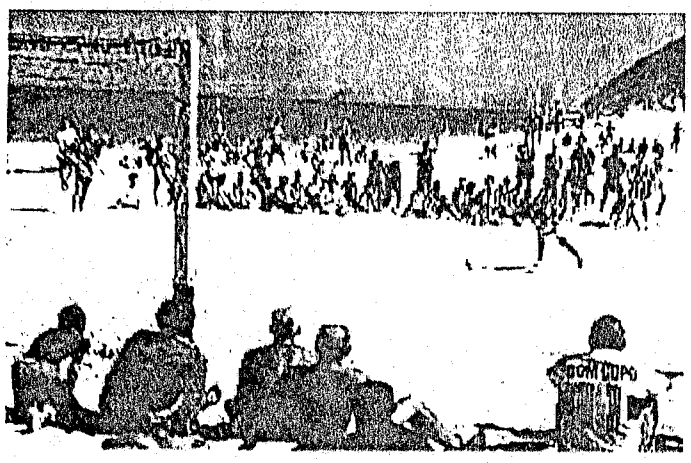


Plate 4.3b: Pictures of Ipanema Carnival Beach - Brazil.

MERITS:

- The most important factor that draws people to Ipanema Beach is that of the superior quality of its sand. Hence, it could be advantage to have quality beach sand.
- It is large and restricted
- It is quite accessible
- It is a free beach as users are allowed to bring in their own impermanent structure. Thus giving users the benefit of displaying their individual architectural styles.

DEMERITS:

- There is no demarcation of the beach, as people can use any where for whatever activity. It is more of a "first come first serve" affair.
- Administration and organization of the beach is quite difficult as there is no building on location for this purpose.
- There are no basic amenities on location.
- Littering is one of the greatest problems of this beach, especially after major carnival activities.

4.4 CASE STUDY THREE

TITLE: SANTA CLARA BEACH

LOCATION: PANAMA

BRIEF DESCRIPTION:

This beach is well designed and structures on site are made to look like that of the local environ. The building on site though constructed of concrete and steel, are claded with thatches, cut stones and trees to make them look very natural. Only the interior of these building looks modern.

There are several huts on location, variously designed to provide catering services, accommodation services and storage services and open huts for out views. Concert facilities are also available at Santa Clara Beach. This beach also has a portion of it specifically designed for Beach games. It has been used to host major beach games tournament particularly Beach volleyball.

Basic amenities such as telecommunication facilities, pipe borne water and electricity are not a problem. In a nutshell Santa Clara beach was specifically designed to provide a wide range of recreational and sporting services. This beach is quite popular in Panama for its concept of Architecture, which is that of blending the structures on site to their natural environment.

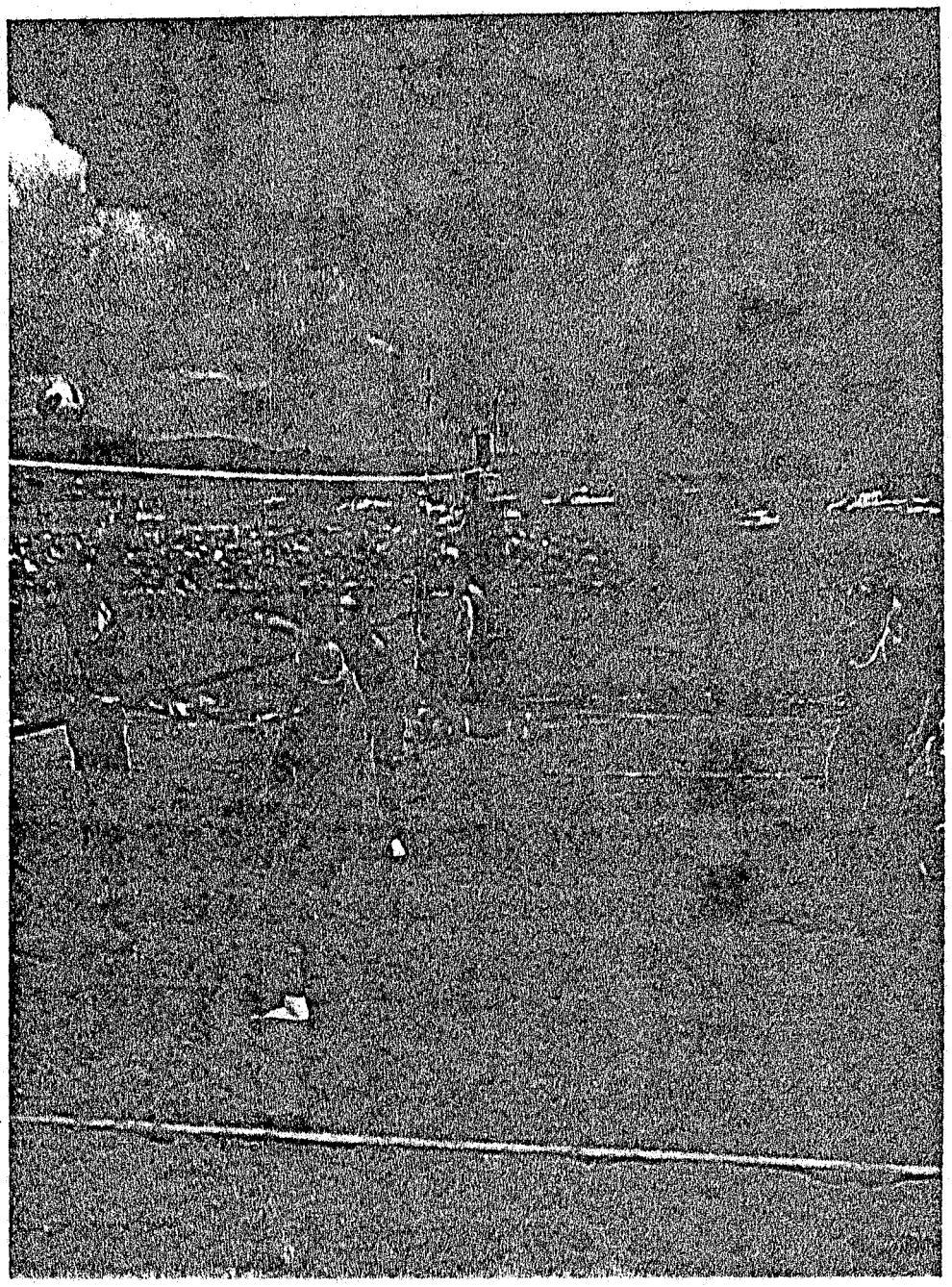
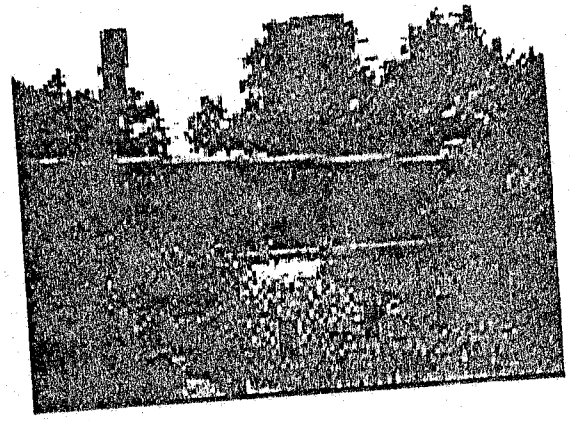
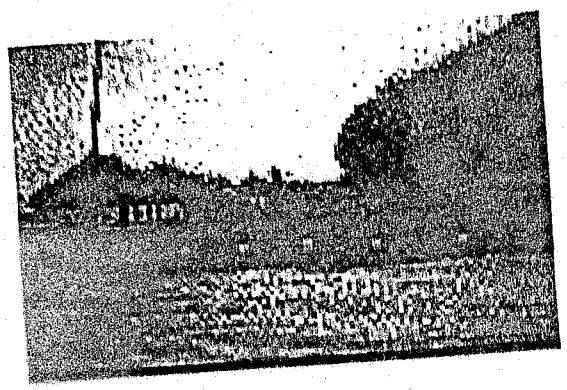


Plate 4.4a: Pictures of Santa Clara Beach – Panama.





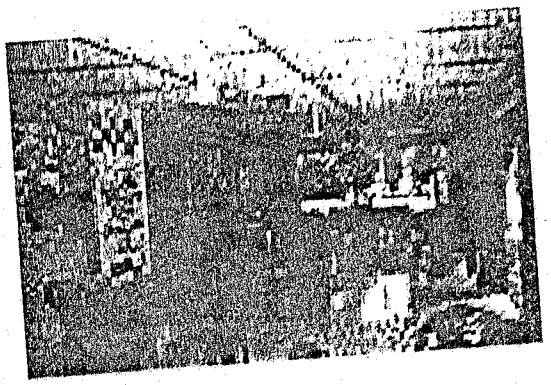


Plate 4.46: Pictures of Santa Clara Beach - Panama.

MERITS:

- There are basic recreational/sporting facilities on location
- The structures on site are designed to blend with their natural environment. It is a master piece of resort designed in its own class
- The beach is well serviced with basic amentias
- The landscape is quite satisfactory (informal landscaping)
- Structures are located in the inland such that a panoramic view of the beach line can be seen.
- Access to Santa Clara beach is quite satisfactory.

DEMERITS:

- At peak periods facilities (accommodation/concert ground) are over stretched
- The area reserved for beach games is not well designed. As there are no seating areas for spectators. The modern trend is to have seating areas for spectators.

4.5 DEDUCTIONS

Having finished the analysis of the case studies here, the high and low marks of these case study area have been noted. Thus in the design proposals for the beach Games Arena in Lagos – Nigeria, the high marks would be given high priority, while the low marks in the case studies would be solved and incorporated in the proposed design.

Finally, other important design criteria identified or observed during the course of conducting these case studies shall be made a pivot in addition to the ones above, in order to really make the proposed Beach Games Arena, Lagos – Nigeria what it should be in the twenty first century.

5.0 CHAPTER FIVE : DATA COLLECTION

5.1 Brief History – Lagos State.

5.2. Geophysical Setting.

5.3. Climatic Conditions

5.4. Temperature.

5.5. Humidity

5.6. Wind.

5.7. Sunshine

5.8. Topography.

5.9. Demography

5.10. Economy And Commerce

5.11. Transportation Data

5.12. Socio – Cultural Existence

5.13. Existing Land Use And Future Trends

CHAPTER FIVE

5.0 DATA COLLECTION.

5.1 BRIEF HISTORY – LAGOS STATE.

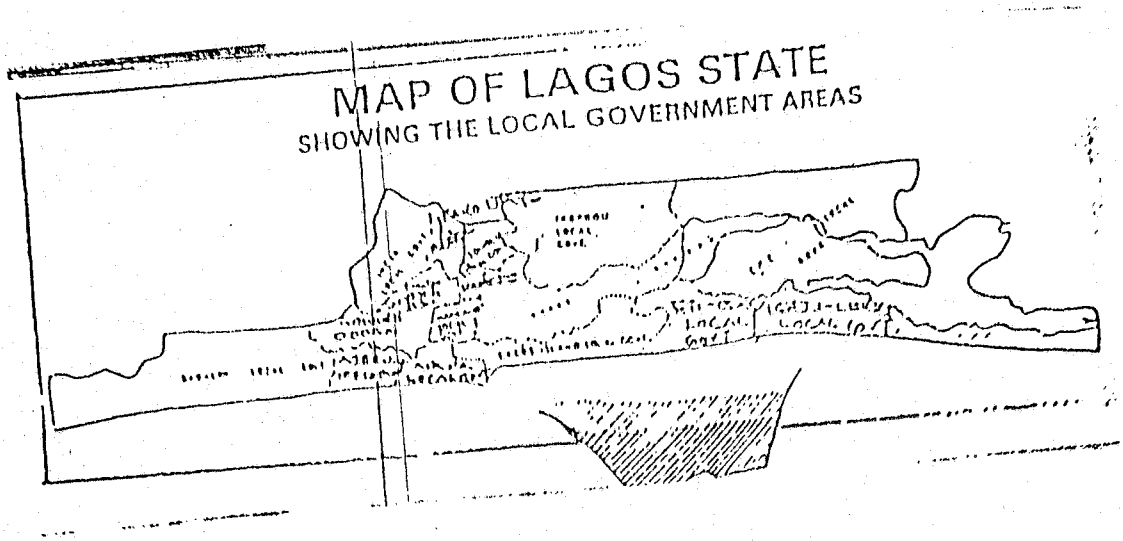
Lagos (over 10 million inhabitants) otherwise called Eko, and Nigeria's erstwhile capital is the most populous and foremost urban centre in Nigeria. Founded in the15h century, the city has witnessed considerable changes aided by its peculiar geographic situation and initial political and economic advantage. Early immigrants settled at Ebute – Metta, moved next to Iddo and Later to Lagos Island where the Oba's palace is at Idunganran. The development of modern day Lagos can be traced back to the Afro – European Atlantic coastal trade which commenced in the 15th century. Lagos merchants and rulers prospered substantially from the slave trade economy. Their belligerence against its abolition attracted the wrath of the British Naval force and the imposition of colonial rule in 1851 (Babatola, 2000).

Constitutionally, Lagos state was created on May 27, 1967 by virtue of the state (Creation and Transitional Provisions) Decree 14 of 1967 which restructured Nigeria into a Federation of 12 states. However, Lagos as a trading port has a recorded history dating back to the Portuguese explorers of the 16th century.

The state is composed of the old Federal Territory of Lagos which remains the financial hub, and was the Federal Capital of Nigeria (up to December 12, 1991) and the old colony province of the defunct Western Region of Nigeria comprising Badagry, Ikeja, Ikorodu and Epe divisions.

Situated in the South – Western corner of the country, this elongated state spans the Guinea Coast of the Atlantic Ocean for over 180 kilometers, from the Republic of Benin on

the West to its boundary with Ogun state in the east. It extends approximately from Latitude 6^0 20' to 6^0 40' North and Longitude 2^0 45' East to 4^0 20' East. Its total area is 3, 577 square kilometers, out of which about 787 square kilometers or 22% is covered by water. See map showing regions of the state below,



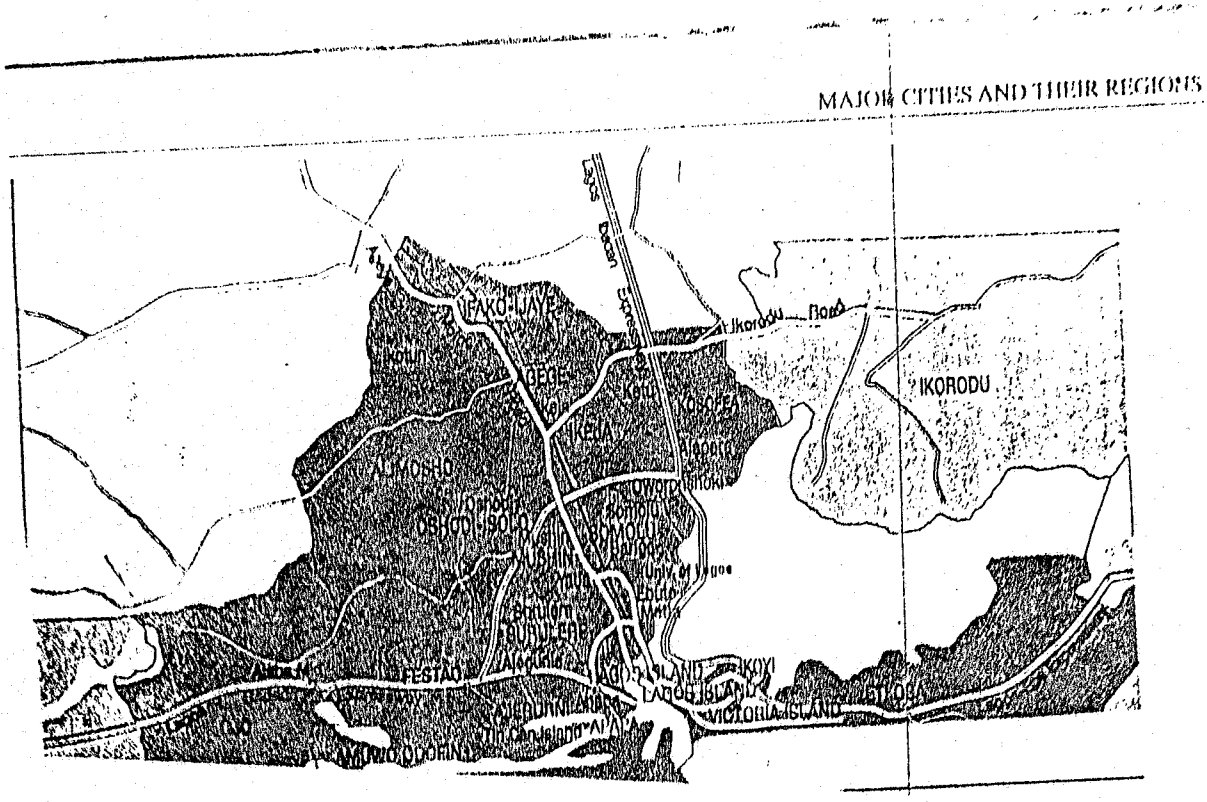


Fig. 5.1a: Map showing Regions of Lagos State.

Fig 5.1b: Landuse map showing more details on Lagos.

5.2. GEOPHYSICAL SETTING.

Lagos occupies a low – lying site generally below 17m, except at the northernmost end of greater Lagos, where local altitudinal rise commences, (Babatola, 2000). The Southern portion bordering the Atlantic Ocean comprises islands, lagoons, creeks, and extensive swamps. Prominent among the islands are Ikoyi, Victoria Island and Lagos Islands. Sand bar formation across the natural harbours led to the construction of the East and West moles (Babatola, 2000). Ironically, these features have been linked with the periodical occurrence of ocean surge flooding many parts of the islands, particularly Victoria Island.

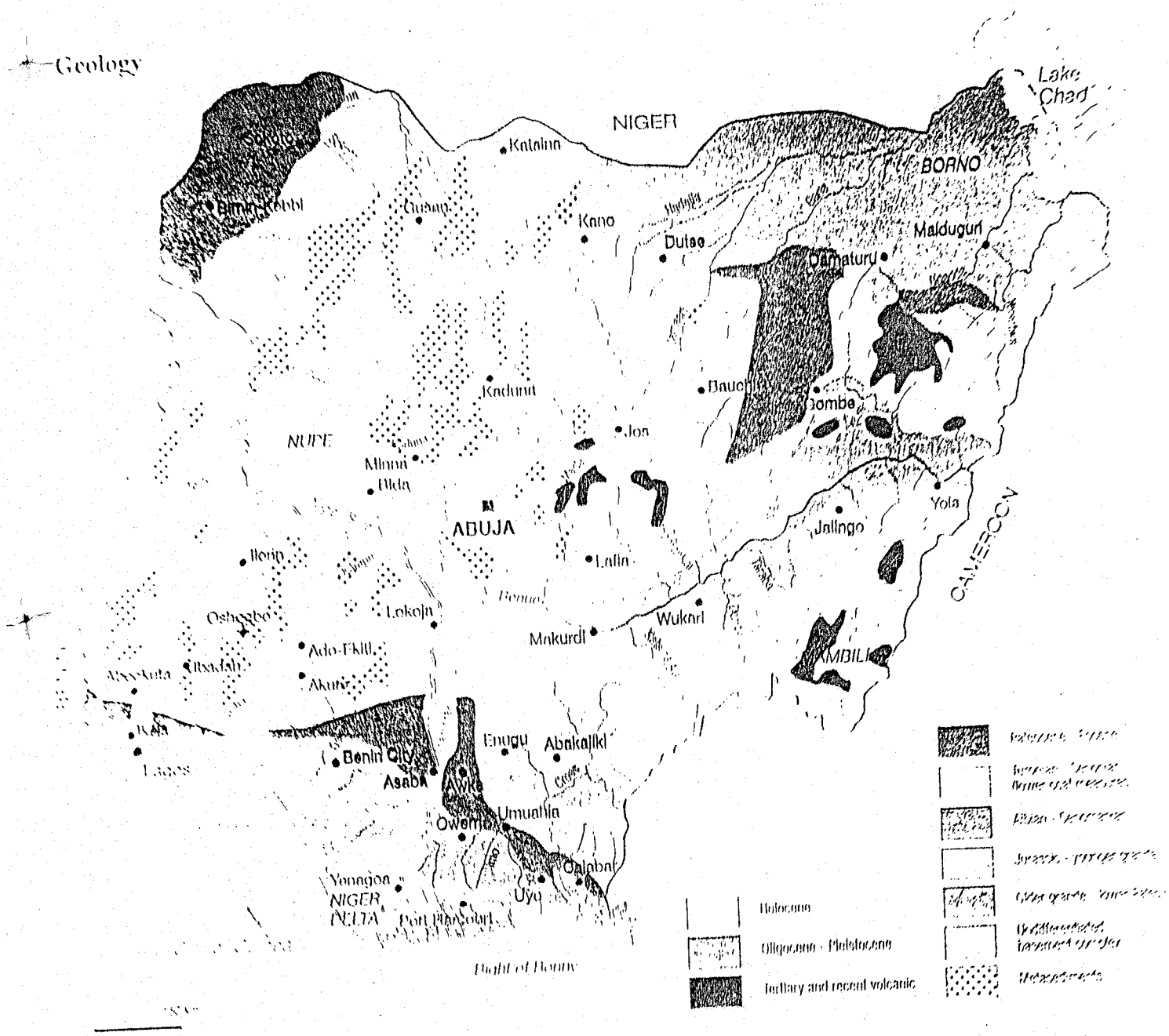


Fig. 5.2a: Geological Map of Nigeria with Lagos in-set.

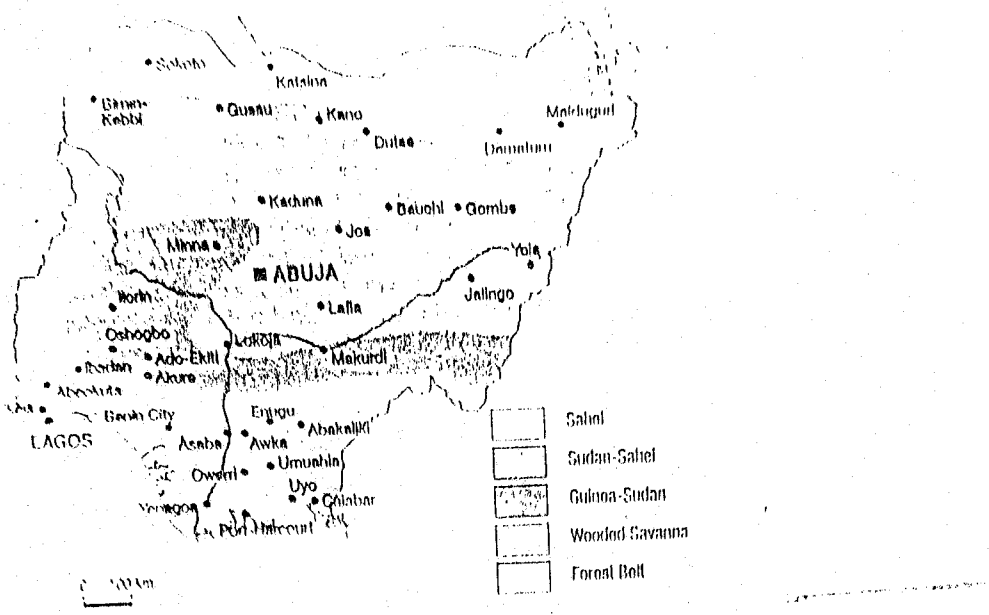
5.3. CLIMATIC CONDITIONS.

The tropical climate of Lagos State is characterized by year-round precipitation relatively high temperature and humidity.

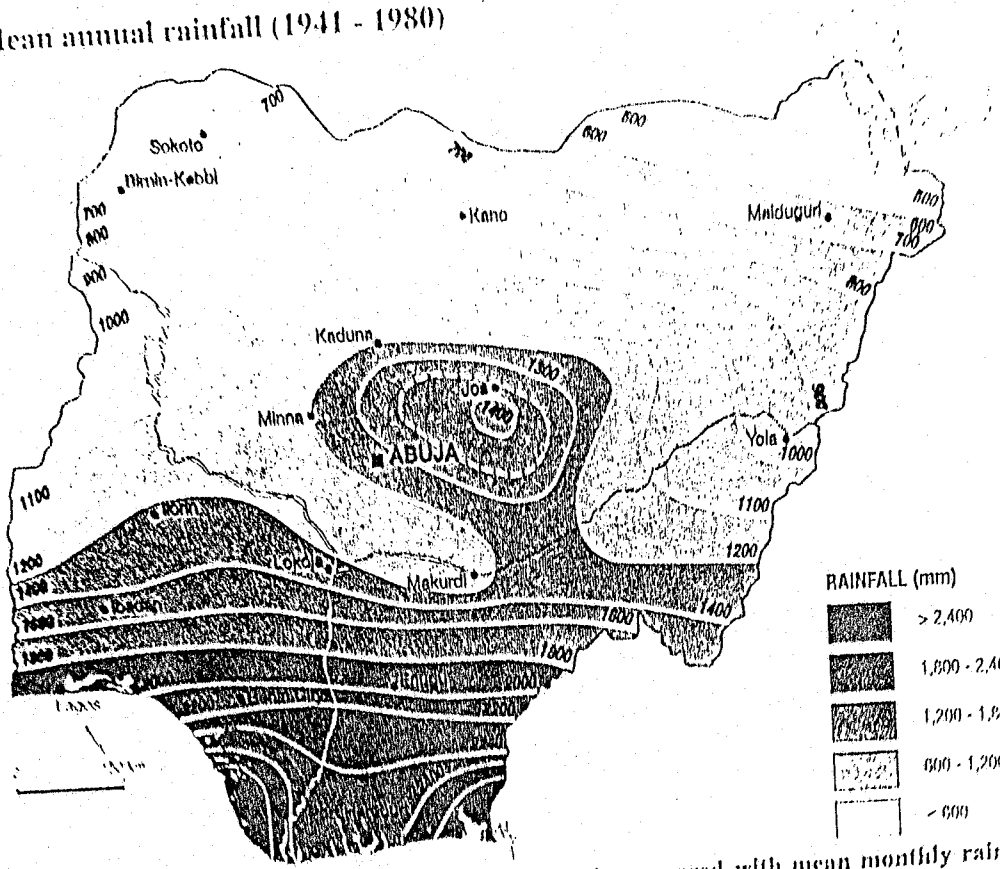
As in other parts of Nigeria, precipitation in Lagos State occurs in the form of rain Annual rainfall ranges from 1524- 2031 in the Western half of the state to 2032 – 2540mm i the eastern half, (Olukoya, 1999).

However, very small portions in the extreme West have annual precipitation values o 1270mm to 1524mm only. On the whole, the state lies in the southern half of the countr with over 75% multiple a relatively drought-free zone in the Federation.

Climatic Zones



Mean annual rainfall (1941 - 1980)



Frequency of Forcados Current (FOCU) in Percentages/Month compared with mean monthly rainfall in Lagos Nigeria (from Longhurst, 1962)

Months	Jan	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
Percentage	22	17	17	18	40	30	13	5	9	27	30	13
Mean rainfall (mm)	40	57	100	115	215	336	150	59	214	222	77	41
Max. (mm)	155	180	286	325	549	763	786	580	424	450	183	150
Min. (mm)	0	0	5	34	90	138	2	2	10	75	4	0
[illegible]	28.1	27.0	28.8	29.1	29.2	27.9	25.7	24.4	25.0	27.1	28.1	28.3

Fig 5.3a: Climatic Map of Nigeria with Lagos in-set.

5.4. TEMPERATURE.

Temperatures are generally high in Lagos State, the mean annual maximum being about 30^0 c (86^0 F) and the mean annual minimum being 23.8^0 c (75^0 F). The lowest temperatures occur at the peak of the rainy season in July (Lagos state Meteorological station 1991).

Effective temperature (°C) in march at 15 GMT

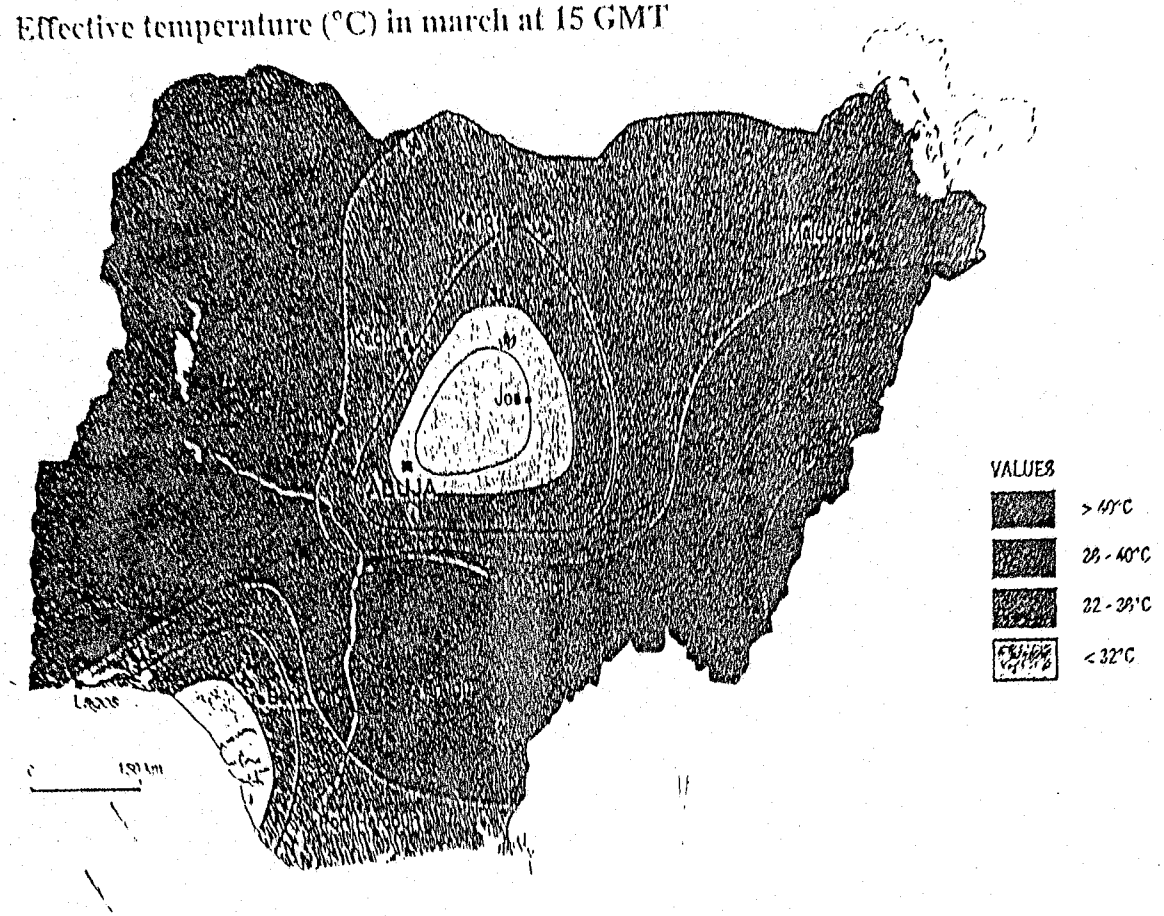


Fig. 5.4a: Mean temperature values shown on map.

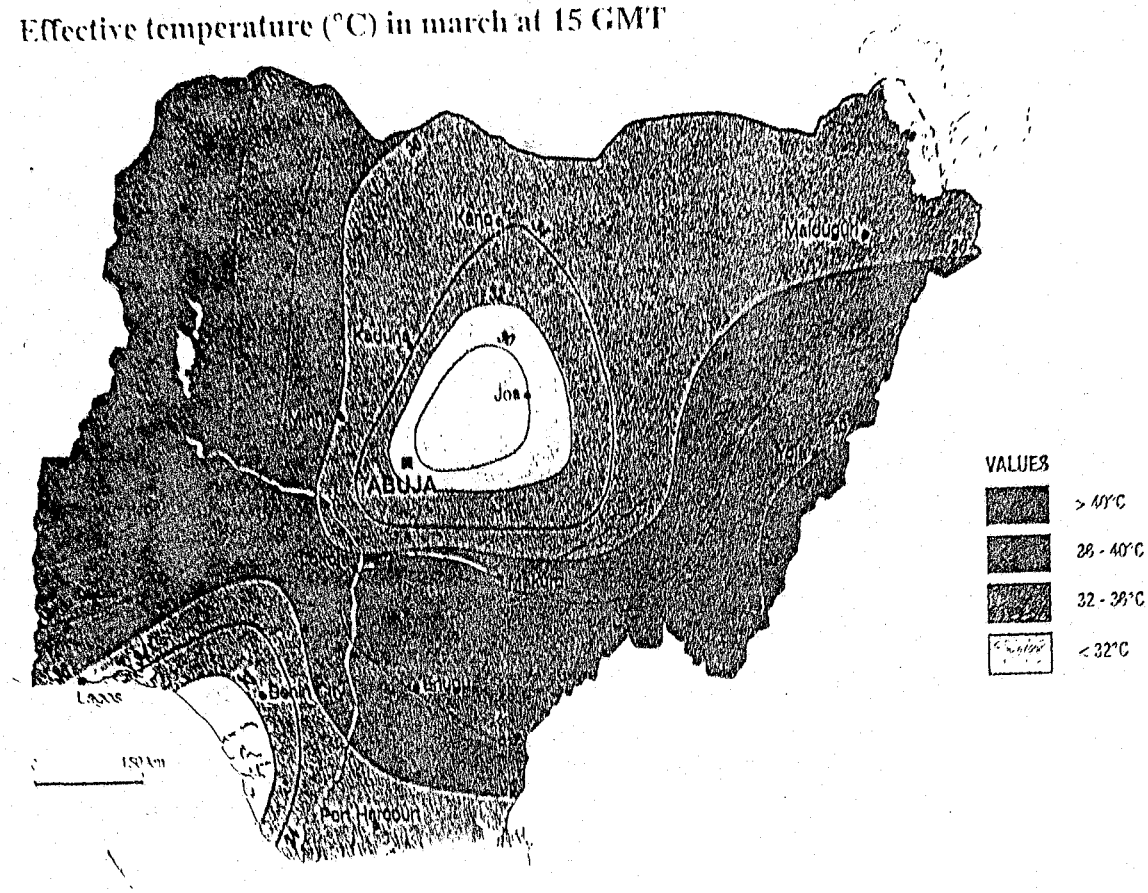


Fig. 5.4b: Temperature map of Nigeria with Lagos inset.

5.5 HUMIDITY.

Relative humidity is also high in the state, the annual mean being about 88%. However, the relative humidity is higher in the early hours of the morning (7 – 10am) and lower in the afternoon hours (1 – 4pm), (Olukoya, 1999).

5.6. WIND.

Wind directions are intimately related to the seasonal positions of the inter – tropical convergence zone (I.T.C.Z) over the country (Olukoya, 1999). During the wet season months, the southwest, SW trade winds prevail as the front moves to the North. But as from October when the front moves south wards, the North East N.E. trade winds sweep in the dry season.

5.7. SUNSHINE

During the dry months (November – March) the annual monthly variation of sunshine follows a general trend which is 24 hours in the state. He approach of rainy season increases the trend in cloudiness. The sunshine hours experience a major decline as the rainy season reaches its highest value in the month of August.

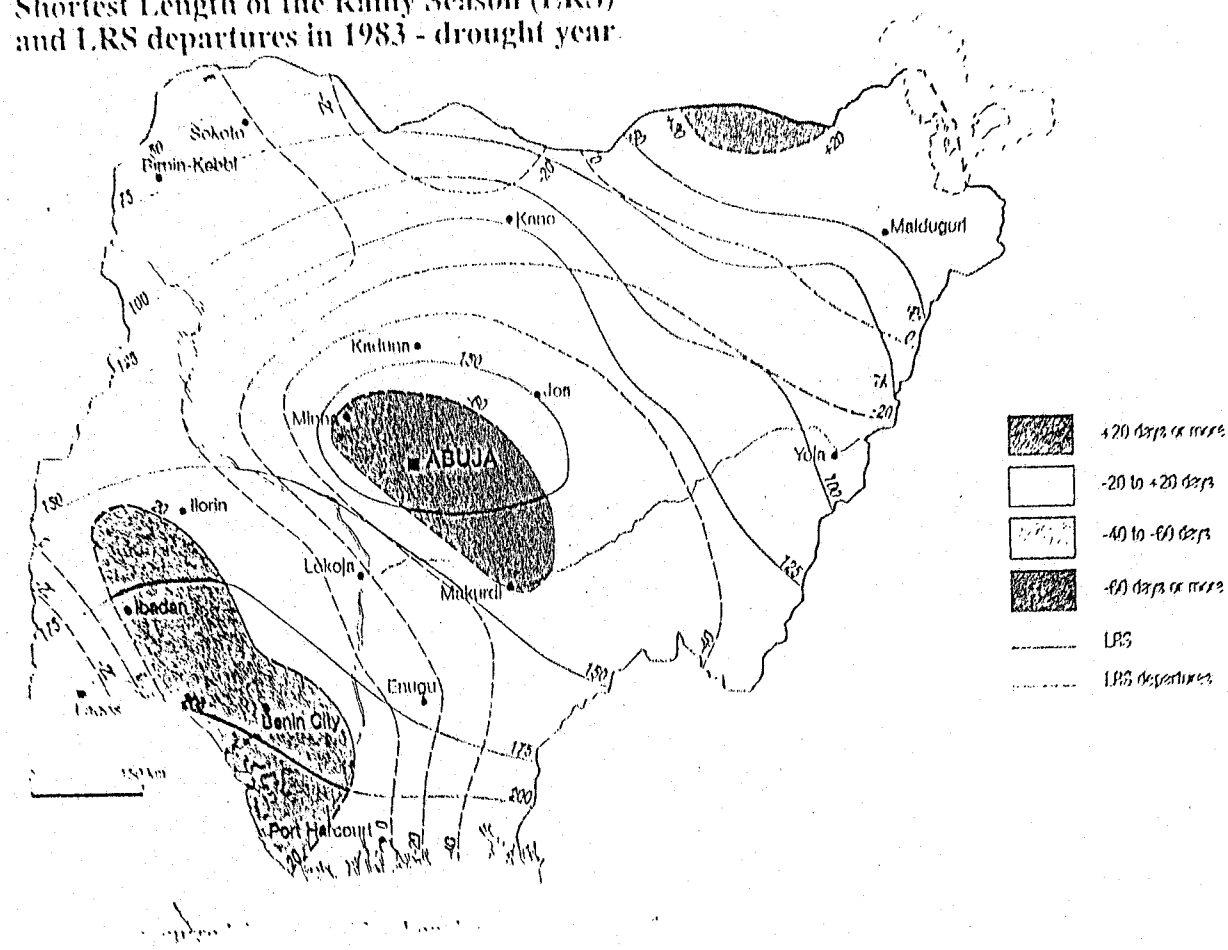


Fig. 5.7a: Sunshine Map of Nigeria with Lagos in-set.

5.8 TOPOGRAPHY.

Topographically, Lagos state lies entirely within the coastal plain which is characterized by sand banks, Lagos and creeks (Olukoya, 1999). The land does not rise more than 650 meters above sea level anywhere in the in the state. Rather most areas lie below 320 meters above sea level. In addition, steady coastal retreat is occurring in some area among which is Lekki, as a result of large scale beach erosion.

With regard to the proposed site, the slope is relatively flat and slope gently inland from the oceanfront. This makes it important to build proper drainage's to counter the adverse effect of erosion inland.

5.9 DEMOGRAPHY

Estimates by the United Nations and the Lagos State Master Regional plan put the state's population at about 10.6 Million inhabitants. However, the 1991 census of Nigeria puts the population of Lagos state at 5,685,781 or 6.42% of the National total.

The figure still makes lagos state the most populous state in the Federation. With its area of 3,577 square kilometers, the smallest in the country, the state's population density of 1,590 persons/km is excessively high. The density value for built – up metropolitan Lagos, estimated at 20,000 persons / km^2 is even higher still.

Thus, the Metropolitan area barely 2.4 km^2 in 1818 increased to about 1056. 42km^2 in the nineties, with population density of about 5850 persons / km^2 in 1992 encompassing 11 of the 15 Local Government Areas of Lagos state, (Babatola, 2000). Taking away the wetlands, inundated and scantily built-up areas in Ojo and Eti-Osa Local Government Areas, the effective population density approximates to 8,100 persons /km^2. Population densities

varies. Highest in Mushin (44,849 p/km^2) and Surulere (21, 810 P/km^2) and lowest in Eti-Osa (921 P/km^2).

A 1988 estimate indicates that the population of Lagos State has been growing of an annual rate of 8% in the urban areas and 3% in rural areas. However, in view of the recent movement of the Federal seat of Government to Abuja, the growth rates have begun to decline, or increase at a decreasing rate. The distribution of the state's population is as shown in the table below.

Population distribution by States, 1991 Census and 1996 estimate

State	Area		Population		
	Square Kilometre	National Ranking	1991 Census	National Ranking	1996 estimate
Abia	6,320	28	2,297,978	21	2,688,649
Adamawa	36,917	9	2,124,049	24	2,416,812
Akwa-Ibom	7,081	27	2,259,736	17	2,770,425
Anambra	4,844	30	2,767,903	14	3,215,216
Bauchi	84,605	4	4,294,413	4	5,002,521
Benue	34,059	12	2,780,398	13	3,165,319
Borno	70,898	2	2,596,589	15	2,915,741
Cross River	20,156	19	1,865,604	27	2,197,492
Delta	17,698	22	2,570,191	16	2,978,388
Edo	17,802	21	2,159,848	23	2,497,238
Enugu	12,831	24	3,161,295	12	3,626,713
Imo	5,530	29	2,485,499	18	2,857,831
Jigawa	23,154	16	2,829,929	10	3,306,103
Kaduna	46,053	7	3,969,252	6	4,524,933
Kano	20,131	20	5,632,040	2	6,680,523
Katsina	24,192	15	3,878,344	8	4,315,123
Kebbi	36,800	11	2,062,226	26	2,378,223
Kogi	29,833	13	2,099,046	25	2,469,358
Kwara	36,825	10	1,566,469	28	1,780,269
Lagos	3,345	31	5,685,781	1	6,582,388
Niger	76,363	1	2,482,367	19	2,784,186
Ogun	16,762	23	2,338,570	20	2,683,175
Ondo	20,969	18	3,884,485	7	4,352,150
Osun	9,251	25	2,203,016	22	2,481,301
Oyo	28,454	14	3,488,789	9	3,969,726
Plateau	58,030	5	3,283,704	11	3,808,409
Rivers	21,850	17	3,983,857	5	4,954,865
Sokoto	65,735	3	4,392,391	3	5,139,535
Taraba	54,473	6	1,480,590	29	1,738,592
Yobe	45,502	8	1,411,481	30	1,609,274
FCT Abuja	7,315	26	378,671	31	427,328
All Nigeria	**923,768**		**88,514,501**		

Source : FOS Annual Abstract of Statistics.

Tab. 5.9a: Demography of Nigeria, 1991 census.

ensity by state (estimation for 1996 based on 1991 Census)

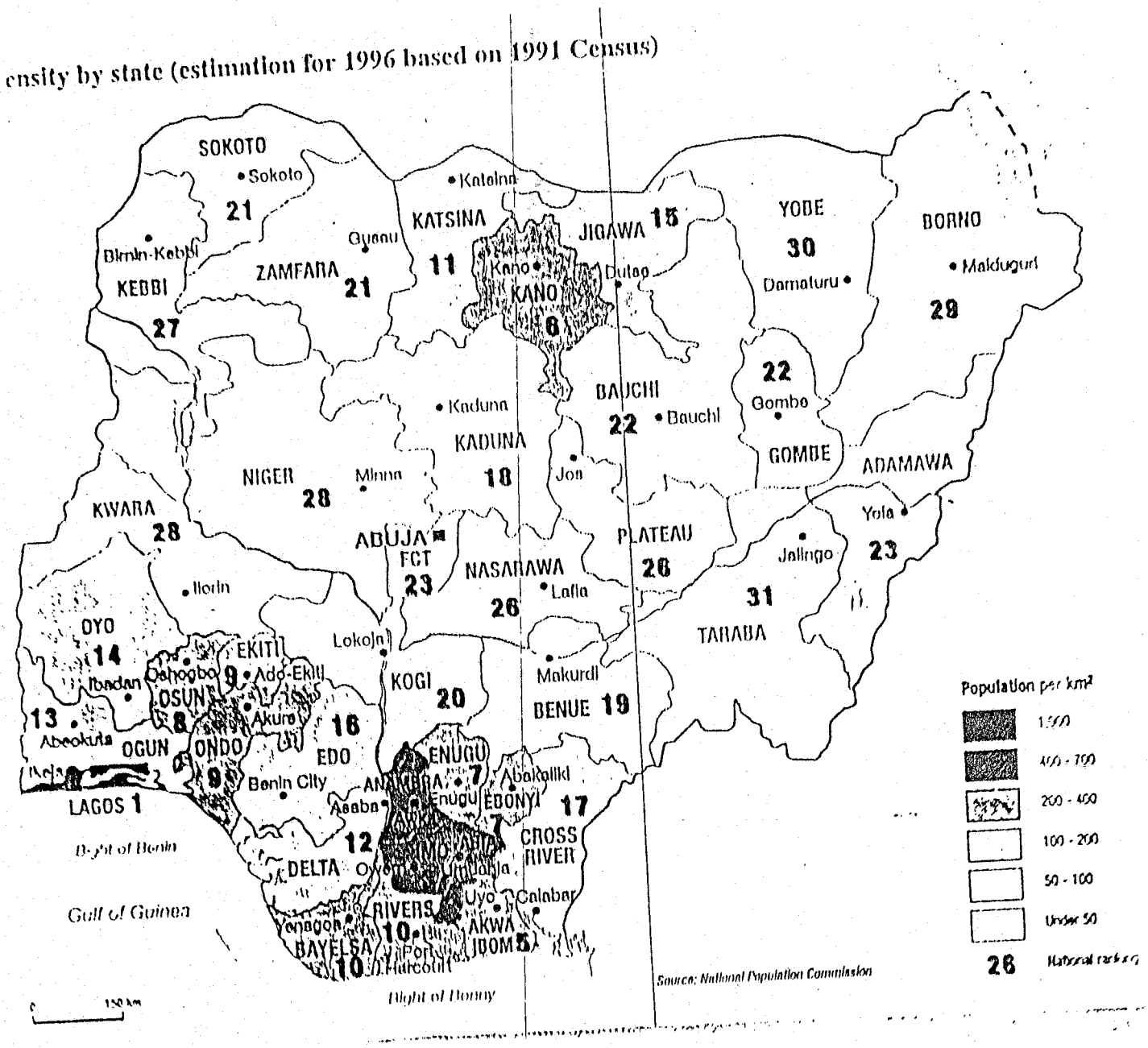


Fig. 5.9a: Demographic map of Nigeria showing Lagos.

PROJECTED POPULATION OF LAGOS STATE, 1987 - 2000.

End of Year	Metropolitan Lagos (000)	Non-Metropolitan Lagos (000)	Total of the state (000)	Metropolitan Lagos as % of Lagos State
1987	7,178	779	7,957	90.21
1988	7,580	812	8,392	90.32
1989	7,989	847	8,836	90.41
1990	8,404	884	9,290	90.49
1991	8,787	914	9,704	90.55
1992	9,173	952	10,125	90.60
1993	9,565	988	10,553	90.64
1994	9,975	1,026	11,001	90.67
1995	10,406	1,065	11,471	90.72
1996	10,861	1,105	11,966	90.77
1997	11,342	1,147	12,489	90.82
1998	11,848	1,191	13,039	90.87
1999	12,384	1,236	13,620	90.93
2000	12,949	1,283	14,232	90.99

* TABLE 5.1 SOURCE: LAGOS STATE REGIONAL PLAN, 1980 - 2000.

Tab. 5.96! Population Data of Lagos state.

5.10. ECONOMY AND COMMERCE

The economy of Lagos state, especially Metropolitan Lagos, forms hub of Nigeria's national economy (Olukoya, 1999). The Lagos metropolis has the single largest concentrations of Nigeria's commerce and industrials activities (Babatola, 2000). It had over 1,100 manufacturing establishments distributed among its 18 industrial estates in 1990 accounting for at lest half of Nigeria's value added by manufactures. Ikeja (24.1%) tops the list, followed by Mushin (20.2%) and Lagos mainland (10.0%).

Lagos Island is the traditional core of commerce, where a great number of the financial institutions have their headquarters in Broad / Marina streets. See map below for the commercial / industrial layout zones in Lagos.

Currently, Metropolitan Lagos continues to provide serve as or support the following:

* The most elaborate port facilities in Nigeria;
* The older and busier of the two railway termini on the country's Atlantic coast.
* The countries busiest international/domestic airports;
* The headquarters of most Merchant, commercial and Development Banks, as well as insurance companies.
* A wide range of educational institutions.
* A wide range of top rate hotels and recreational outfits.

These and other functions make Lagos a place to be, and provide the state with a bright and magnetic economic climate. The hegemony and growth of the Lagos area appear assured well into the future. What policy makers may worry about is how to manage, sustain and further the processes of new developments.

5.11. TRANSPORTATION DATA.

The development of transportation facilities have been an integral part of the growth of the state and the country's over time.

(A) ROAD TRANSPORT FACILITIES.

Transport facilities in Lagos state feature all the transportation modes; Road Water, Railway and Air. All the major classes of Road in the country (Truck 'A' 'B' and 'C') are well represented. Some of the more prominent routeways incude 10-lane Ikorodu road, Western Avenue and Eko Bridge, Marina and third Mainland bridge complex, the Apapa-Oworonshoki expressway, the Lagos-Badagry expressway, the Victoria – Island – Epe Road, and a variety of other important streets and major inter – state roads.

By the mid – 1980s, there were in Lagos state, 1,414 surfaced roads spanning about 847km, and 3,799 earth roads spanning 1,807 km (Olukoya, 1999).

In spite of visible effort to expand the road networks, such problems as inadequate maintenance, traffic congestion and inadequate transport facilities still remain remarkable features.

(B). WATERWAY TRANSPORT FACILITIES.

As this concerns the project at hand, it is imminent to state the position of water transport in Lagos State. The waterways and Lagoons which abounds in the State are being increasingly used. For the riverine area water transport by canoes and motorized boats have been natural options for a long time. Ferry services between Apapa and Lagos was pioneered by the Federal Inland waterways and in 1983, the State Government established its own ferry service.

(C) RAILWAY TRANSPORT FACILITIES

The Nigerian Railway Corporation runs its normal cargo and passenger services from the Iddo terminus to the Northern parts of the country. It has also traditionally provided skeletal intra-state commuter services between Iddo and Agege. The State Government in conjunction with the Nigerian Railway Corporation launched the jubilee Rail service in November 1992 to expand the Rail commuter services in the State.

(D) AIR TRANSPORT FACILITIES

The biggest and one of the most modern Airport in Nigeria is the Murtala Mohammed International Airport which accounts for over 40% of total Air passenger traffic in Nigeria. The Airport complex at Ikeja has three wings respectively for International, Domestic and private Airlines. Practically, all the major airlines of the world operates air services to Lagos. There are provisions in the State's Regional Master plan to construct another Airport at Lekki Peninsula for Domestic Travelers in order to relieve pressure on the Ikeja Airport Facilities (Olukoya, 1999).

Major roads and rail network

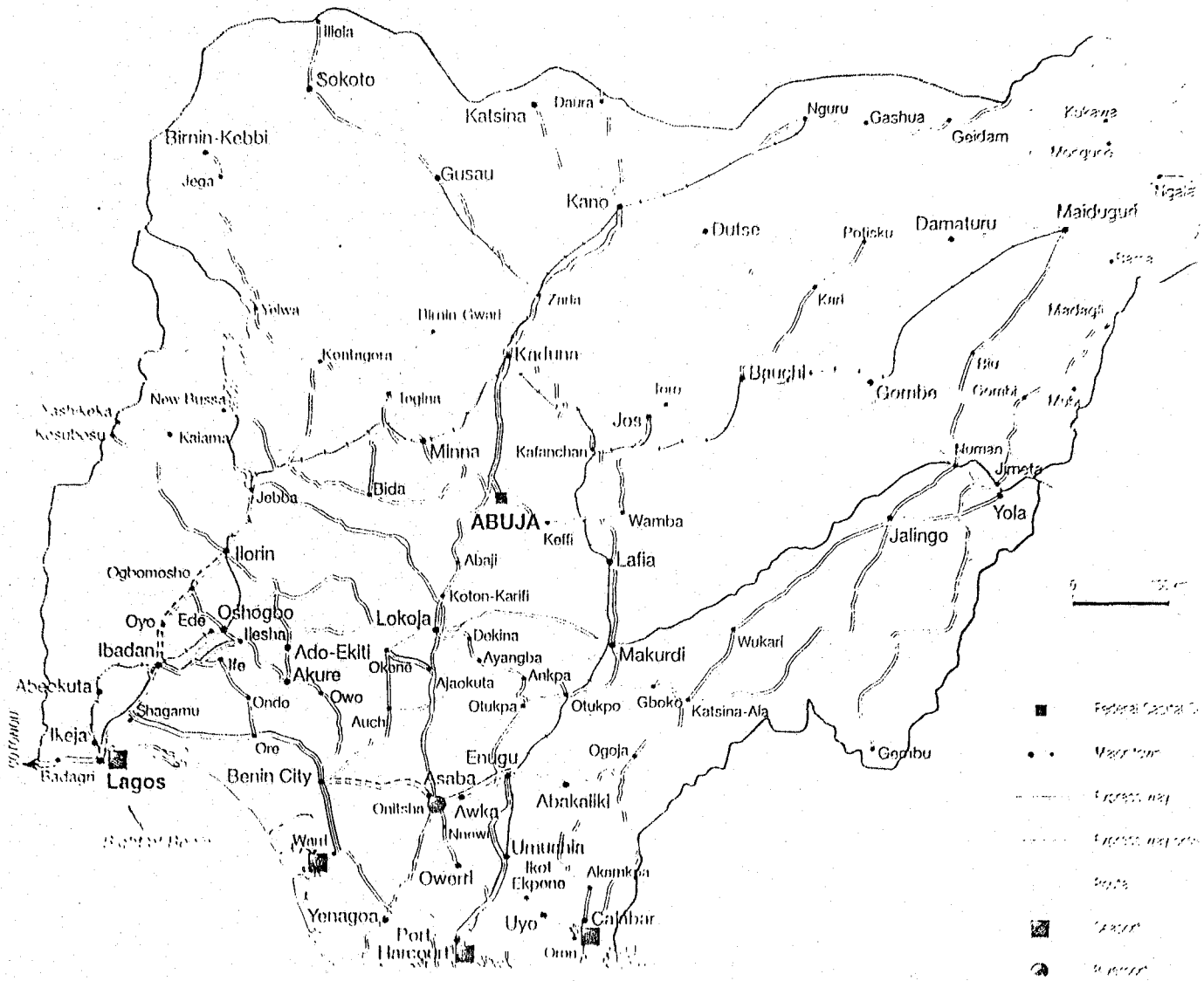


Fig.5.11a: Road Map of Nigeria (Express roads).

Transports

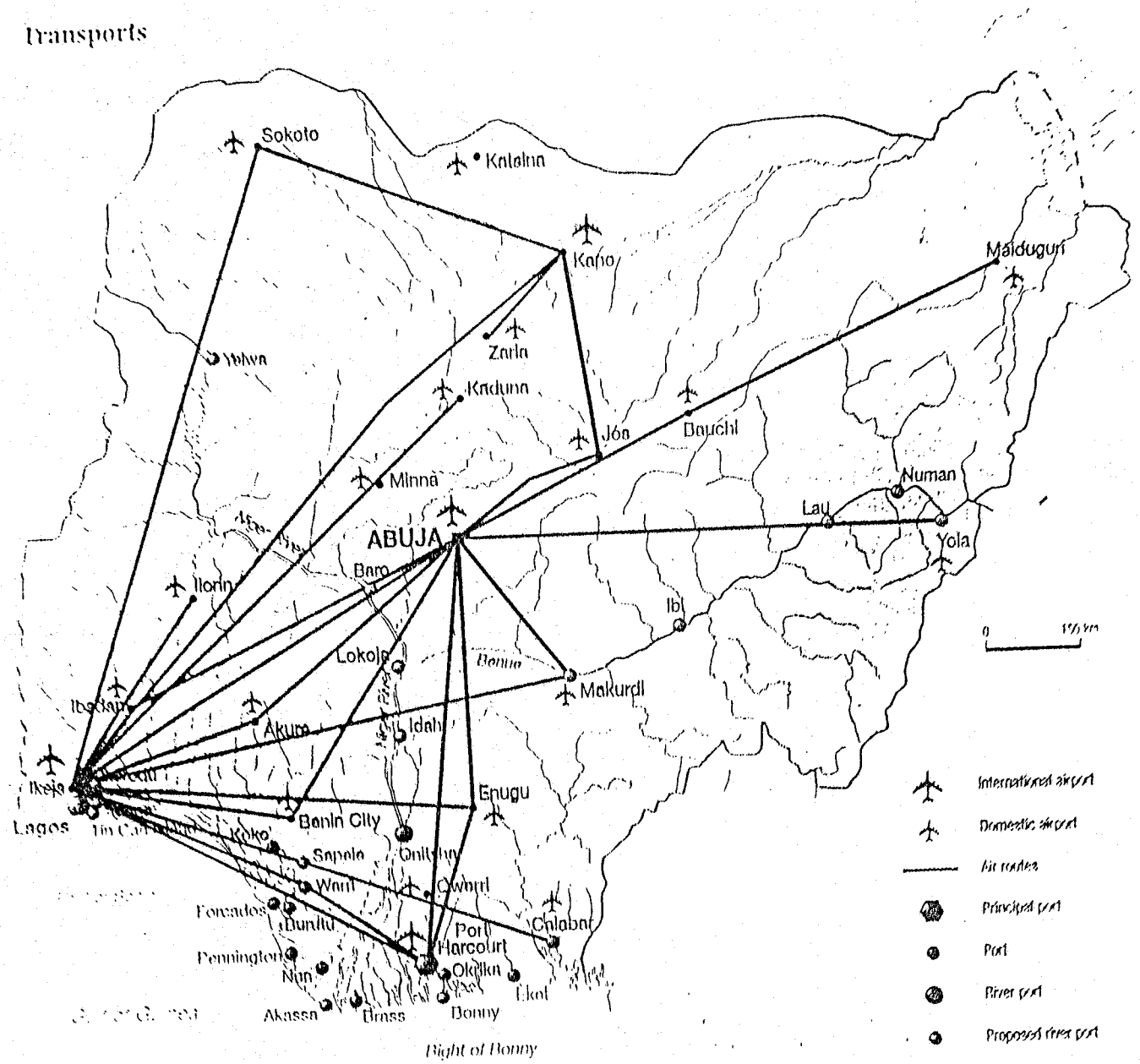


Fig. 5-11b: Air Routes in Nigeria.

5.12 SOCIO – CULTURAL EXISTENCE

The indigenous people of Lagos State are the Yoruba subgroups of the Aworis in Ikeja, the Eguns in Badagry, the Ijebus in Ikorodu and Epe; While Lagos Island Consists of an Admixture of Benin and Eko Aworis as well as repatriated Yorubas and other immigrants. However, the State in its present form is a socio-cultural melting point which has attracted a cross section of Nigerians from all over the Federation; as well as Non-Nigerians.

Nevertheless, Lagos State has its own distinctive cultural charades, which have been nurtured all along by its indigenous people. The arts and crafts of the State include pottery, sculpture, mat weaving basket weaving, hair plaiting, and raffia works. The cultures of the people are also reflected in certain types of masquerades which have particular times of the year for their festivals and some of which originated from ancient religious practices. The major festival include those of the Adamu Orisha (Eyo Masquerades) of Lagos Island, Egungun, Kori and Osun Iya Alaro festivals at Ikeja, Eluku Festival at Ikorodu, Ebi festival and Okoso festival (Boat regatta) of Epe, the Sangbeto Masquerates of Badagry and a host of others.

5.13 EXISTING LAND USE AND FUTURE TRENDS.

The settlement system in Lagos State is obviously dominated by Metropolitan Lagos, which incorporates fourteen of the eighteen Local Government Areas. In each of the remaining Local Government Areas That is, Epe, Ibeju-Lekki, Ikorodu and Badagry, there is typically a focal town surrounded by numerous other low-order settlements and village communities. These four Local Government areas contains virtually the totality of the Rural in Lagos State (Olukoya, 1999)

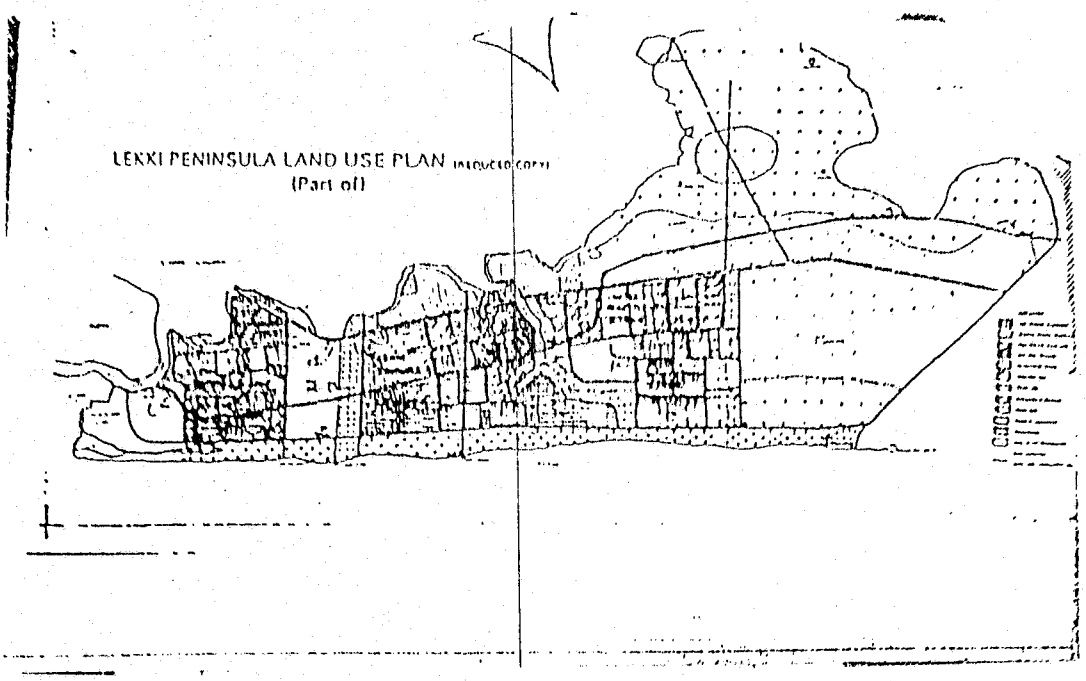


Fig. 5.13a: Summerized land use map of Lekki Area.

6.0 CHAPTER SIX : SITE ANALYSIS

6.1 Site Analysis

6.2 Site Location

6.3 Site Inventory

6.4 Criteria For Site Selection.

6.5 Self-Discovery/Economy.

6.6 Accessibility.

6.7 Utilities

6.8 Future Expansion

6.9 Topography.

6.10 Scenery / Man – Made Features

6.11 Population / Social Status

6.12 Environmental Problems

6.4 CRITERIA FOR SITE SELECTION.

Several factors were considered before arriving at the decision to locate this project at Lekki beach. Prime among which is the attractiveness (natural) and solitudeness of the site. Such an environment is envisage to be adequate for sports and recreational activities. At Lekki beach, you see nature at work - from the tidal effect of ocean currents surging into the beautiful beach sand, to the mangrove estuary (palm trees and others) at the background or hinterland; the site is indeed another world wonder.

Other factors borne in mind in selecting Lekki beach are as enumerated below:

6.5 SELF-DISCOVERY/ECONOMY.

Nigeria is a vast country, and so are its potentials. Nigeria is naturally endowed; a cursory look at an aspect of her tourism avenue, in this case – Beaches only shows that the above statement is not a fallacy.

(Filani, 2001) in a paper on tourism documented in Africa Atlases – Nigeria maintained that there are various beautiful beaches and bars along the coast of Nigeria. Accordingly, he cited Bar Beach, Mayegun beach, and Lekki beach specifically as having a beautiful array of coconut palms, sunshine, lovely gardens and a sandy beach.

The above characters which are mostly natural to the proposed site are what captivates tourist elsewhere, be it America, Asia, Europe and even Africa. The only difference between Nigeria and these places is that Nigeria is yet to fully discover the uses to which her resources could be put.

For those who watched or witnessed Sydney 2000 Olympics, you can not agree more that the venue used for Beach Games was simply one to behold in terms of scenic beauty and architectural input. Nigeria can do better if only she discovers herself. The stresses picked up during the week can be let off weekends and holiday periods by only visiting such places. Not until the new National stadium in Abuja was built, many Nigerians stood in disbelief

Nigeria can also produce world champions in some types of Beach Gaming activities. It is only when we have such architectural facilities as Beach Games Arena, Located in a most national site that this possibility can be jump – started.

In Europe and other continents, people are getting bored with the usual sporting activities in stadia and indoor halls, they now have a predilection for attending sporting meets at very natural and relaxed environment.

If Nigeria discovers herself fully, the chances of which are existent, she can conveniently tow the trend in other Land.

In terms of Economy, Nigeria stands to gain much from tourists. This is so with counties with coastal environments characterized by Beaches, for swimming and leisure, Mangrove estuaries for fishing and Boating, and / or clear water and coral reefs for skin diving. Countries endowed with the above are increasing their share of the world market as these attractions are developed for use as recreational ventures for Local and foreign tourists.

Whereas, Nigeria with several thousands of kilometer stretch of Beaches across several coastal states of the Federation, is yet join the League of Nations that earns huge foreign exchange from coastal recreation (Ayo, 2000).

Lekki was therefore chosen to preserve the national Land scope

And habitat that will create National and International attraction to the Area, as well as to boast foreign earnings for Lagos state and Nigeria.

6.6. ACCESSIBILITY.

Accessibility, though not a macro factor still play an important role in site selection.

Th proposed site is located in the southernmost part of Metropolitan Lagos, and is well serviced by a properly integrated system of street roads and of course a major expressroad from Victoria Island, thereby absorbing impact egress traffic loads.

Hence access shall mainly be through the Victoria Island / Lagos Epe expressway.

6.7. UTILITIES.

The public services provided within the neighborhood of the proposed site are: telecommunication gadgets, well integrated road network, and Electricity lines. All these can be extended to the proposed site. Note however that pipe-borne water does not exist there, however because the water table is not too deep, boreholes have proved to be a viable alternative.

6.8. FUTURE EXPANSION.

As a result of the vast size of Lekki – beach, there is ample chance of expanding the site if need be. This vast size is both in terms of he beachfront and its background hinter area.

6.9. TOPOGRAPHY.

The proposed site does not pose topography problems as it is relatively flat and slopes very gently inland. This gentle inland gradient is a major problem to be tackled in terms of drainage.

6.10. SCENERY / MAN – MADE FEATURES.

Several attractive scenes abound on location. Few tents made of raffia palm for picnickers can be seen around, the Atlantic Ocean with its tidal currents, large chunks of loose soil with animal shells buried in it, array of coconut and palm trees forms part of the important scenes on location.

This is quite an important selection factor, as some aspects of the proposed Beach Games Arena would be designed to blend with the existing environment.

6.11. POPULATION / SOCIAL STATUS.

Lagosians are by far the most fun – seeking people in Nigeria the Level of socialization is high perhaps because different folks have found a home in the state (Local and foreign inhabitants). These people are also in their numbers (high population).

Even though, it is envisaged that the proposed project is a Federal one, by virtue of its placement in Lagos State, the first benefactors are Lagosians, as such for the dynamic nature of the state and her residents, the proposed Beach Games Arena – Lagos – Nigeria will not lie fallow. It important to put this facility to use at all time, this is one of the reasons why Lagos State was chosen.

6.12. ENVIRONMENTAL PROBLEMS.

Despite the scenic attributes of the proposed site, it still poses a number of environmental problems. Among these are: -

- Possibility of erosion due tidal currents.

- Alluvial (loose soil) nature of soil along the beach.
- Salinity of the surrounding waters / atmosphere and the likely effect of high wind pressures.

Perhaps the most destructive of all is the effects of salinity.

This is why it was specifically treated in Chapter Three of this thesis. Salinity of the surrounding water / atmosphere especially when erosion occurs, poses a serious threat to building materials. Therefore, to avoid this problem, preventive measures as regard the containment of the sea, as well as the exclusion of corrosive building materials must be carefully looked – at. Refer to chapter three of this thesis for more details.

Additionally, it has been noted that high wind pressure is a feature peculiar to most sea fronts. Cases are known in the past where, in some part of the world, Tornadoes or currents of fast moving wing which build – up from the sea have resulted in destruction of lives and properties.

Great care and attention must be taken to forestall the Occurrence of any of the above environmental issues, or at least reduce the environmental impact to a bearable level.

As such, design of the proposed Beach Games Arena Lagos – Nigeria would be made to respond positively to the above issues, as would be seen in the chapters to follow.

7.0 CHAPTER SEVEN: THE DESIGN

7.1 Design philosophy and concept.

7.2 Materials and construction.

7.3 Space allocation standard.

7.4 Design services.

7.1 DESIGN PHILOSOPHY

The philosophy guiding the various building components in the proposed Beach Game Arena Lagos –Nigeria is simply that of creating a serene and solitude environment in which first and foremost Beach Games facilities are provided and, then other relevant recreational facilities to support the main design. Additionally, a wide range of tourists are also borne in mind. Facilities provided are designed to be open as much as possible to the external surroundings. These facilities also offer users a chance to freedom of self-expression.

Architecturally, adequate spaces within and around the Beach facilities provided are also ensured in the proposed design. Finally, a leap from the school of taught- '3fs' (function, fund and form in that order) of which the writer is an adherent, was also borrowed and used in the design.

DESIGN CONCEPT.

This is in two folds. First is as reflected on the core facilities. Experience has shown that most resort facilities are curvilinear or radial on plan. This accounts for why 90% of the facilities provided are radial on plan. The curvilinear phenomenon can be seen in the main arena, shower Island, Beach rack, restaurant and ''pano-hut'. This curvilinear concept is also reflected in the site plan as footpaths, road network and other landscape features assumes radial shapes whether on plan or in elevation.

Secondly, the approach view through the main entrance to the main arena also represents an elevational concept in which the three floodlight poles which protrude above the roof has been designed to appear in elevation as though two players are blocking the ball

during a typical action in a game session, here, the middle pole represents the net which is normally the divisor in most beach sports, (most important for now is Beach volleyball). The other two poles, one in each half of the pitch represents two opposing players trying to block over the net. Blocking is a major skill in popular beach sports. See below.

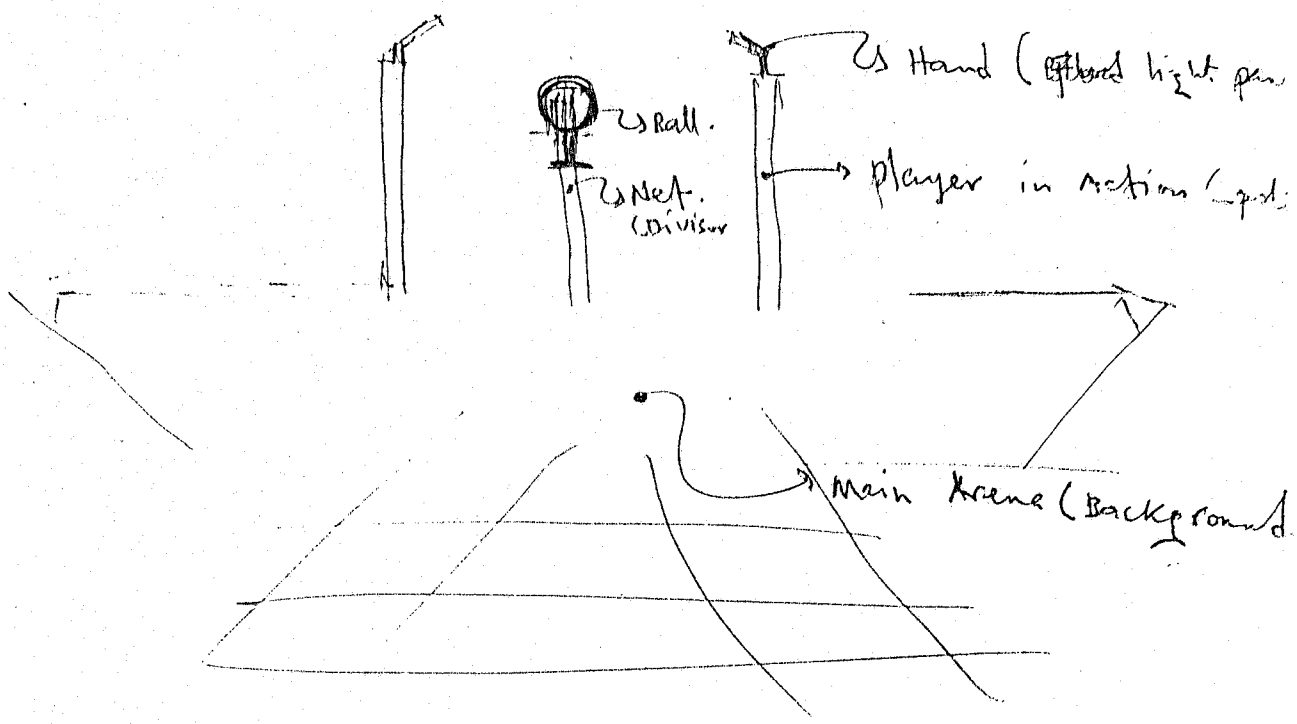


Fig. 7.19: Concept of Main Arena (Elevational Concept).

7.2 MATERIALS AND CONSTRUCTION

Materials as used here simply mean all building components used in the structures in the proposed Beach games arena, Lagos –Nigeria. Building materials used in the design can aptly be described as mixed, complex, durable and aesthetical. Mixed in the sense that in some case both modern and traditional materials were used; complex because in some cases they require technology and expertise to produce, install and maintain; durable as this forms part of the requirement of any material envisaged to reach its life span; and aesthetical because only appealing materials will further attract users and possibly place the design in a class of its own.

Selection factors will not be discussed here, however, standard should not be compromised in the choice of materials to be used in the proposed Beach comes Arena. As materials are a function of where they are to be used, and for what purpose, they shall be classified for the sake of clarify as:

i. **Material for external works.**

ii. **Materials for the buildings.**

I. Material for external works.

This cut across a wide range of materials, chief among which are materials for kerbs, drainages, pavements, roads, security lights, plants, fence, and outdoor furniture to list but just a few. Only a summarized account of the materials to be used for the above listed categories of external work elements shall be given. Details can be obtained as described and specified in the drawing for these units.

Material selection for any of the above listed external works can be made out of one or an appropriate combination from any of the following: cement, granite chippings, Beach sand, Shard sand, timber/wood, reinforcement bars /iron, bituminous asphalts, paints/coatings. For plants, the materials required include the plants, loam soil, manure/ fertilizer and water.

II. Material for the buildings.

For simplicity, the building shall be further classified as

a. Type I: made up of; restaurant, ticketing, "Panohut" and main arena
b. Type II: made up of; shower Island and Beach rack unit.
c. Type III: made up of; administration and maintenance/Storage unit.

The above classification is based on the semblance of the materials used on the listed buildings/units under each class

a. MATERIAL SPECIFICATION FOR TYPE I

i. **SUB-STRUCTURE**: Raft foundations except for the main arena where both Raft and Piles are used. Principal materials are: hard-core stones, reinforcement bars, cement, sharp sand and water.

ii. **ROOF/FRAME**: steel roof trusses, acrylic sheathing and thatch finishing in the case of the restaurant, ticketing and "pano hut"

iii. **LOAD/NON LOAD BEARING WALLS**: Hollow Sandcrete blocks, concrete panels, stabilized bricks and other partition as detailed in the drawings.

iv. **WINDOW/DOORS**: where applicable, use was made of Aluminium doors and windows.

v. **FINISHES:**

a. Plastered/painted soffits.

b. Plastered/painted walls.

c. Ceramics tiles for toilet walls and floors.

d. Concrete for main Arena tiers.

vi. PLUMBING:

a. Medium duality vitreous china sanitary fittings

b. P.V.C. pipe work generally

c. Galvanized iron pipe work for water supply.

vii. ELECTRICAL:

a. Standard cables

b. P.V.C. conduits

c. Standard lighting points/sockets

d. Water heater in changing area.

b. MATERIAL SPECIFICATION FOR TYPE II.

i. **SUB-STRUCTURE**: Raft/pad foundation: appropriate materials to be used.

ii. **ROOF/FRAME**: Steel roof trusses/Acrylic sheathing.

iii. **LOAD BEARING WALL**: octagonal concrete column (with shaft) for shower Island and concrete stanchion for Beach Rack appropriate concrete constituents to be used.

iv. **FINISHES:**

a. Plastered/painted appropriate materials for this as specified in the drawings to be used.

b. Plated iron railings.

c. Clay tiles/ceramic tiles for floor of shower Island.

v. **PLUMBING**: ditto for I

vi. **ELECTRICAL**: ditto for I

c. MATERIAL SPECIFICATION FOR TYPE III.

i. **SUB-STRUCTURE:** the same as type II

ii. **ROOF/FRAME**: space frame for storage/maintenance unit and steel trusses for Admin building. Use should be made of long span aluminum roofing sheets.

iii. **LOAD/NON LOAD BEARING WALLS:** Hollow sandcrete Blocks (150mm and 230mm) see drawing for further details.

iv. **WINDOWS/DOORS**: ditto for type I

v. **FINISHES**:

a. Plastered/painted soffits

b. Plastered/painted walls

c. Terrazzo floor finishes

d. Concrete floor for mechanically operated service bay.

e. Cellotex ceilings.

f.

vi. **PLUMBING**: the same as for type I

vii. **ELECTRICAL:** the same as for type I

Note that the above submission on materials for the proposed design is not in itself exhaustive for the construction of the various units on site. As such, reference must be made to the drawings for the project and specification schedule for further understanding.

B. CONSTRUCTION.

Any form of building project usually starts with site preparation at the construction stage. This entails site clearance, mobilization of workers and materials to site, and the setting-up of plants and machineries where necessary.

As may be expected, the construction of the proposed Beach Arena Lagos –Nigeria, shall be a staged affair. Firstly, the site shall be fenced –off, before other works can proceed for security and other alloyed reasons.

As with the classification under materials specifications, same shall apply in the case of construction details, thus, only an overview of construction techniques with respect to the listed classes shall be presented.

i. **Construction of external works.**

ii. **Construction of the building**

I. Construction of external works.

Roads, parking lots, walkways and other pared areas shall be built with unreinforced concrete laid on hardcore filing resting on well consolidated earth. Wherever applicable, kerbs are to precede the above process. Solid concrete strip foundation shall be provided for all kerbs.

For asphalted surfaces, constructions shall begin with kerbs, then well compacted earth to hardcore setting; upon which a lean concrete can be spread before asphalting. This shall be constructed to slope very gently towards the kerbs, which has the drainage for easy draining of run-off water . Drainage gutters shall be constructed of reinforced concrete.

Garden light poles shall be bolted to heavy concrete masses buried beneath the ground. For the fence, at intervals of 3m apart, pad foundation are to be built with strip of concrete underneath and linking the pads.

II. Construction of the buildings.

For ease of work, the various units to be constructed shall follow the same pattern as discussed below;

a. FOUNDATION: for type I, use shall be made of Raft foundation except for the main Arena where both raft and pile foundations will be used.

For type II, Raft and pad would be used.

For type III, pad and strip will be appropriate.

b. WALLS: Design intricacies of the individual units shall suggest the type of walling to be constructed. For details see the drawings and specification for the unit concerned. However,

Generally in some cases, formwork for concrete walls are erected in some, precast elements are brought in, and in other it is normal blocklaying. For blockwork, English bond should be used. Where columns and beams are involved, they are first set-up and built before other operations. While this is going on, due care must be accorded plumbing and electrical piping. Conduits must be well built.

c. ROOF: Generally, roofing system would largely be dictated by the methods used in the design. Mostly steel roof trusses and space frame has been adopted. Their construction have been detailed enough in the drawings, as such reference should be made to the drawing where necessary.

7.3. SPACE ALLOCATION STANDARD.

Architectural spaces must be judiciously utilized to meet the user's desire. Hence, it can be aptly said that Architectural space is money. This is why any available space must be optimally designed. It is for this reason, that this section becomes expedient. In this context, the space requirement for each function is taken care of right from the pre design stage.

Space allocation is principally a function of furniture fittings, circulation space and utilization space. Thus, the below is a checklist of space allocation to major functions within the various units on site. Their sizes have been reduced to square metres (m^2)

SUMMARIES **(m^2)**

- ENTIRE SITE 60,000.00
- AREA FOR FUTURE USE 4,800.00
- ADMIN. BUILDING 415.25

- MAINTENANCE/STORAGE UNIT 815.24
- MOTHER ARENA 13,974.57
- 2 NO OF BABY ARENA 5,655.60
- 2 NO OF RESTAURANTS..... 895.66
- 4 NOS OF PANO UNIT 944.40
- SHOWER ISLAND 153.96
- BEACH RACK 254.50
- TICKETING/LOCKER UNIT..... 380.70
- GATE HOUSE 12.00
- GENERATION HOUSE 13.60
- ROADS, PARKING, WALK AND OTHER PAVEMENT . 16,800.00
- GREEN ARENA/BEACH AREA ..... 13,200.

NB;

% For accesses and roads = 28% = 16,800m2

% For building coverage = 42% = 25,200m2

% For green area/beach area = 22% = 13,200m2

% For future use = 8% = 4,800m2

% For entire site = 100% = 60,00m2 (approx).

The space allocation within the individual units area given below;

A. ADMIN BUILDING (m^2)

- PRO'S OFFICE 21.60
- GEN OFFICE 19.80
- RECORDS OFFICE 15.00
- TYPING POOL/SEC 14.40
- RESIDENT MANAGER'S OFFICE 17.50
- WCs/SHOWER 44.80
- TEA ROOM/STORE.....14.30
- BOARD ROOM 61.75
- COURT YARD/ PASSAGES 127.50
- LOBBIES 09.50
- MALE/FEMALE WARD 23.68
- AMBULANCE BAY/CONSULTROOM 32.92
- WAITING/ENTRANCES 12.50

TOTAL 415.25m^2

B. MAINTENANCE/STORAGE UNIT (M^2)

- Mech. Ope. servs. Bay/Gen workshop 106.08
- Tools room 14.26
- Lobby/passage 101.20
- Wcs/shower 41.12

- Waiting room 16.80
- Maintenance asst/store asst..... 33.60
- Maintenance officers/store manager..... 33.60
- Store I, II, and III 222.80
- Receptionist/storeman 34.50
- Main entrance/utility lobby. 88.75
- Executive lots 156.10

TOTAL **815.24m^2**

C. MOTHER ARENA **(m^2)**

i. BASEMENT FLOOR

Combined space 1344.00

ii. FLOOR UNDER FIRST TIER

- Combined space 1375.00
- Parking lots 1400.0

iii. FIRST FLOOR

- Total area: others/seating areas. 2827.80

TOTAL **18093.57m^2**

D. BABY ARENA

Total area: other/seating area. 2827.80

TOTAL **2827.80m^2**

(m2)

E. RESTAURANT.

i. GROUND FLOOR

- Dining hall 314.20
- Main entrance 25.00
- Kitchen/cloak. 45.00

ii. FIRST FLOOR.

- Dining floor 63.63

F. PANOUNIT.

- Seats 226.08
- Snack/Drink 10.02

TOTAL 236.10m^2

G. SHOWER ISLAND

- Duct/shower areas 153.96

TOTAL 153.96m^2

H. BEACH RACK/DRINKING FOUNTAIN

- Combined total 254.50

TOTAL 254.50m^2

I. TICKETING/LOCKER UNIT.

- Supervision I & II 34.78
- Ticket hall 121.90
- Entrances 16.92
- Male changing/locker/Wcs 88.35

- Female changing/ locker/Wcs 88.35
- Vault I&II 22.00
- Lobbies 8.40

TOTAL 380.70m^2

J. GATE HOUSE:

- Combined total 12.00

TOTAL 12.00m^2

K. GENERATOR HOUSE

- Combined total .....13.60m^2

NOTE: for additional details on space allocations, refer to the drawings submitted with this thesis.

7.4. DESIGN SERVICE

A building is not complete unless it is well served by a host of services broadly classified as mechanical and electrical building services. Any building without any form of services is best described as a "car-case", which is not only redundant to itself, but to its intended users.

Building services constitutes electricity and lighting, cooling heating and ventilation, water supply, drainage and sewage disposal, refuse disposal, acoustic control, fire safety, security, telephone services and maintenance services.

ELECTRICITY AND LIGHTING.

One of the major sources of electricity supply to the site shall be through the National Electric Power Authority, NEPA. NEPA has its service lines in already inhabited areas of Lekki peninsula. Thus, what is required will only be extension to the new site. For efficient NEPA performance, it is hoped that services would be extended to the proposed site from the closest NEPA sub station. It is equally hoped that the main arena be connected separately to the step down transformer to be provided strictly for the beach games arena. In case NEPA does not improve its services in the nearest future, automatic generators should be the alternative. For this reason a generator house has been provided. The above summations give only an architectural insight. Detail of connections and installations of electrical gadgets would be provided by the persons concerned.

Lighting on the other hand shall be a function of two means natural and artificial means. As much as possible, the designs of the various units have been done to rely heavily on natural lighting. This has been made possible by the provision of adequate and functional openings at strategic points to admit direct daylight. Such opening includes windows, skylight (storage unit) screen walls, arched openings and other opening types permitted as a result of the nature of the design. At night and where natural lighting is not effective, it is to be supplemented by variously located lighting points. Artificial lighting to be provided depends on whether it is to be placed outside or in the interior of buildings. For external lighting, security lamps e.g. Sodium lamps shall be used. For the main arena, high quality-low heat radiating lamps

(Fluorescent incandescent) are to be used for the flood lighting. In other interiors, fluorescent tubes placed in standard luminaries are to be used, to enhance task

performances. Special effect lighting is also planned in and around all public areas on site, such as those around the shower Island, Beach rack and ticketing areas.

HEATING, COOLING AND VENTILATION.

In terms of heating artificial means would suffice, especially in the changing areas in the main arena (dressing rooms). For heating in other parts of the site, reliance shall be placed on the energy of the sun (direct), since it is located in tropical environment thus saving resources, which would have otherwise been used for providing artificial source of heating.

For cooling and ventilation, a combination of both natural and artificial means is expected to be used to a great advantage. Natural means can be enhanced by appropriately orienting the openings towards the windward direction. Artificial means employed includes extractors/ventilators (Basement floor in main arena) and central air-conditioners at other office spaces. Details of installation shall be provided by experts concerned.

WATER SUPPLY.

Water been a necessity for the continued existence of any facility shall be tapped from the mains of the Lagos state water board already available in close by neighborhood of Lekki peninsula. However because it is envisaged that at peak periods in the Beach games arena when water would be seriously needed, water board supplies might be epileptic, it is therefore important to provide an alternative independent source perhaps a mini dam in an adjacent location. This is to allow for improved sanitation habits in the conveniences provided. Even where water supply is regular (for example the New Abuja National stadium)

sanitation habits are still a subject to be tackled let alone where water supply would be erratic. Additionally, overhead storage tanks can also be put in place. Water and sanitary engineers will provide all necessary details with regard to the above.

DRAINAGE AND SEWAGE DISPOSAL.

Any poorly drained site has costly implications; likewise, sewage disposal must be accorded top priority. Polyvinyl chloride drain pipes, cast iron pipes and lead pipes shall be variously combined in their numerous sizes and used as would be suggested in the mechanical drawings. However, the separate drainage system shall be used. A network of drain gutters shall be carefully worked and constructed to take care of run-off/stormwater from roof and road surfaces. The choice of where such waters shall be emptied would be provided by a sanitary engineer.

A more complex form of waste water known as sewage or foul water shall be separately collected, pre-treated by the use of such facilities as cesspools, septic tank pit, before sending other effluents into the public sewer.

REFUSE DISPOSAL.

Experience has shown that great attention must be paid to refuse collection and disposal at busy beach-sides otherwise in a short time the beach environment can become another headache for sanitary personnel. Sound management is what is required to adequately handle refuse envisaged at the proposed beach game arena –Lagos. This could be monitored through the maintenance unit/officer. Essentially, wastebaskets, bins (movable/fixed) shall be placed at appropriate locations on site; incineration should not be

used at all for its adverse environmental effects. To complete the process of disposing refuse in and around the beach games arena, lager sanitation trucks shall constantly visit the site to empty collected refuse. It is hoped that the managers of the arena would be able to buy and maintain his or her own refuse collection truck.

ACOUSTICS.

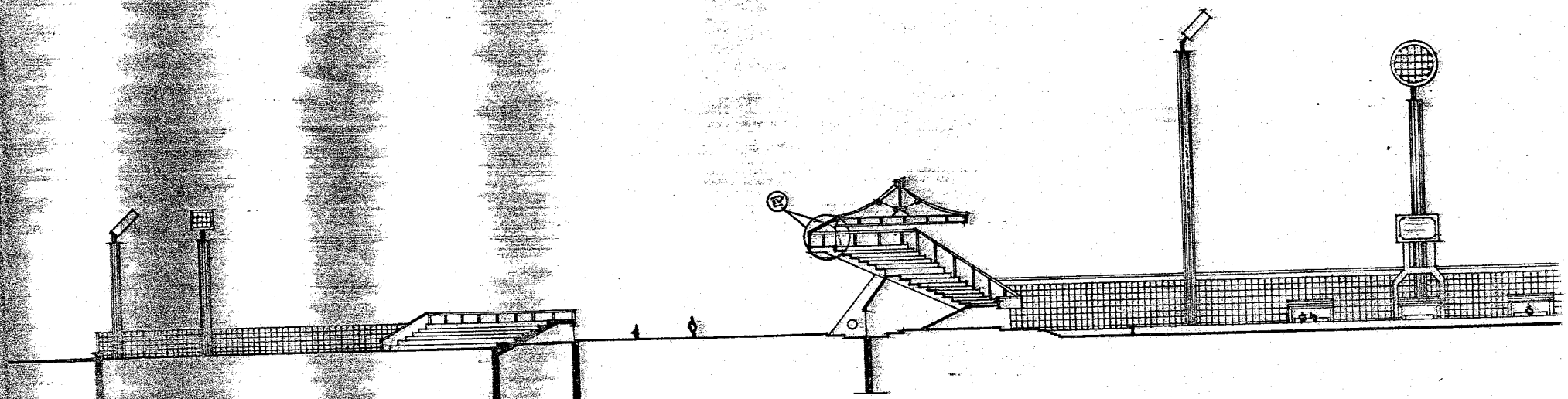
In the entire scheme, the only area requiring acoustic treatment is the boardroom in the Admin. building. To reduce noise and reverberant sound, special acoustic tiles shall be applied to wall and floor surfaces. Acoustic ceilings are also suggested. For the windows, they should be double-glazed, and doors acoustically treated.

Externally, the generator house will be located and screened off by plants away from activity areas. In the main arena, reliance would be placed on high quality modern public address systems and hifi –speakers for improved sound quality.

FIRE SAFETY.

Principally, sprinkler and hose reel system shall be fitted at appropriate locations, around all building units on site. Fire extinguishers shall also be used, where necessary. It is also planned that a stationed fire fighting truck be put in place. Fire safety protection or prevention shall be commenced right from the design stage. For this reason, highly fire-resisting finishes would be used. Plastic seats in the main arena shall be of high fire resistance.

Areas having greater combustibility shall be handled with caution for this reason, the maintenance/storage unit has been grouped together. High ceiling is also used in the storage



SECTION B-B.

Design Proposal For

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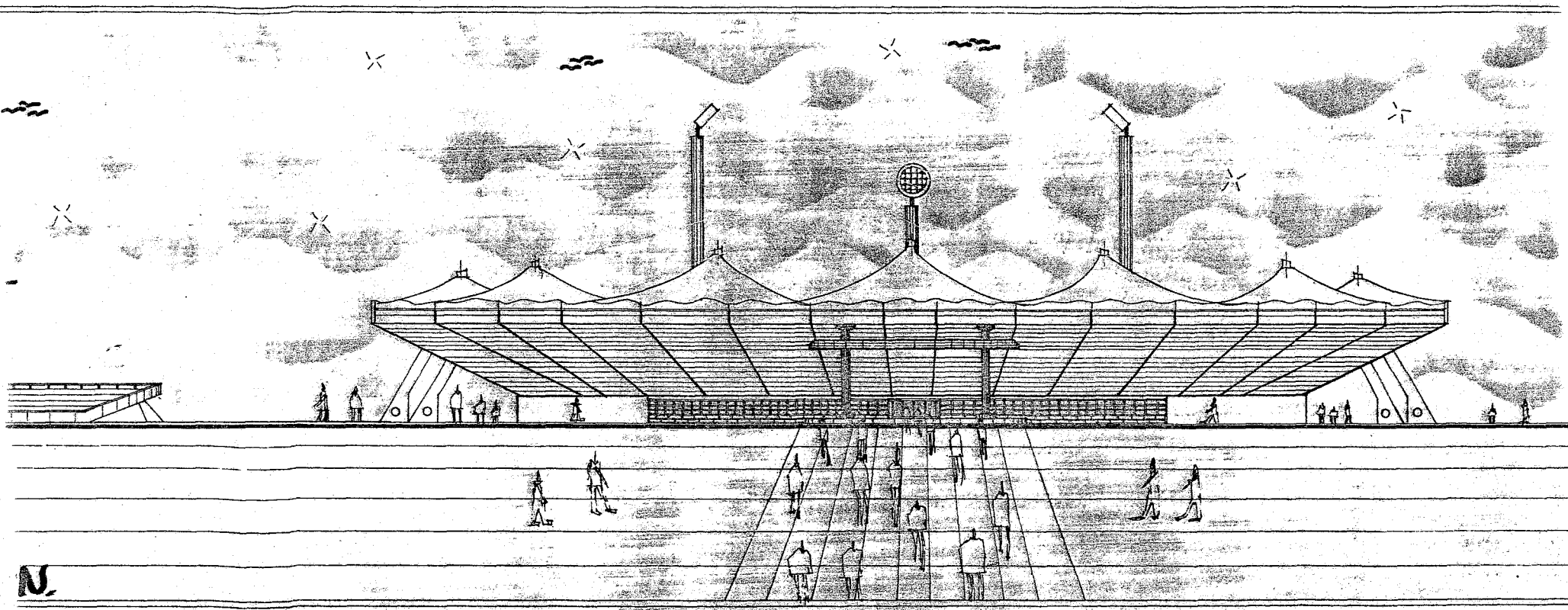
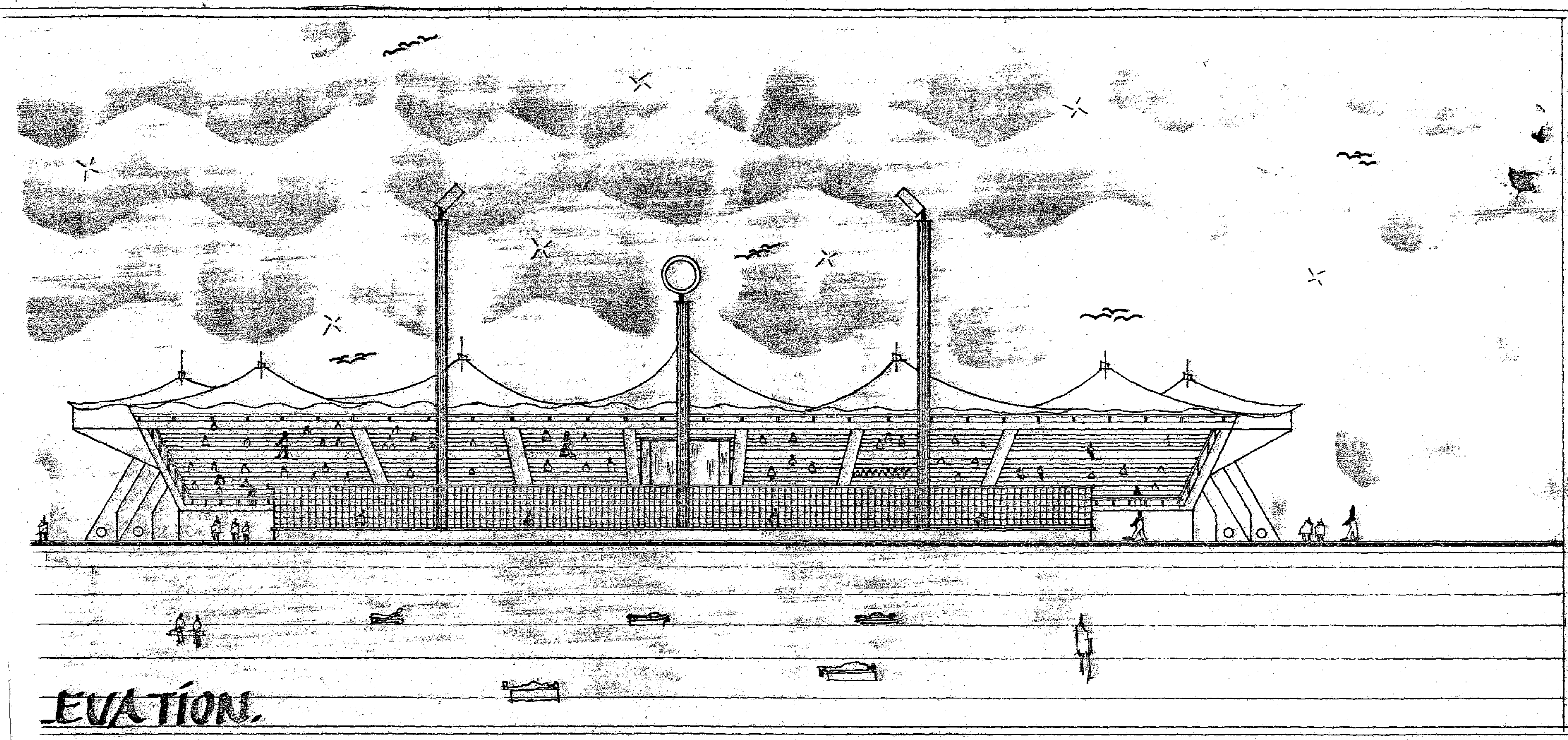


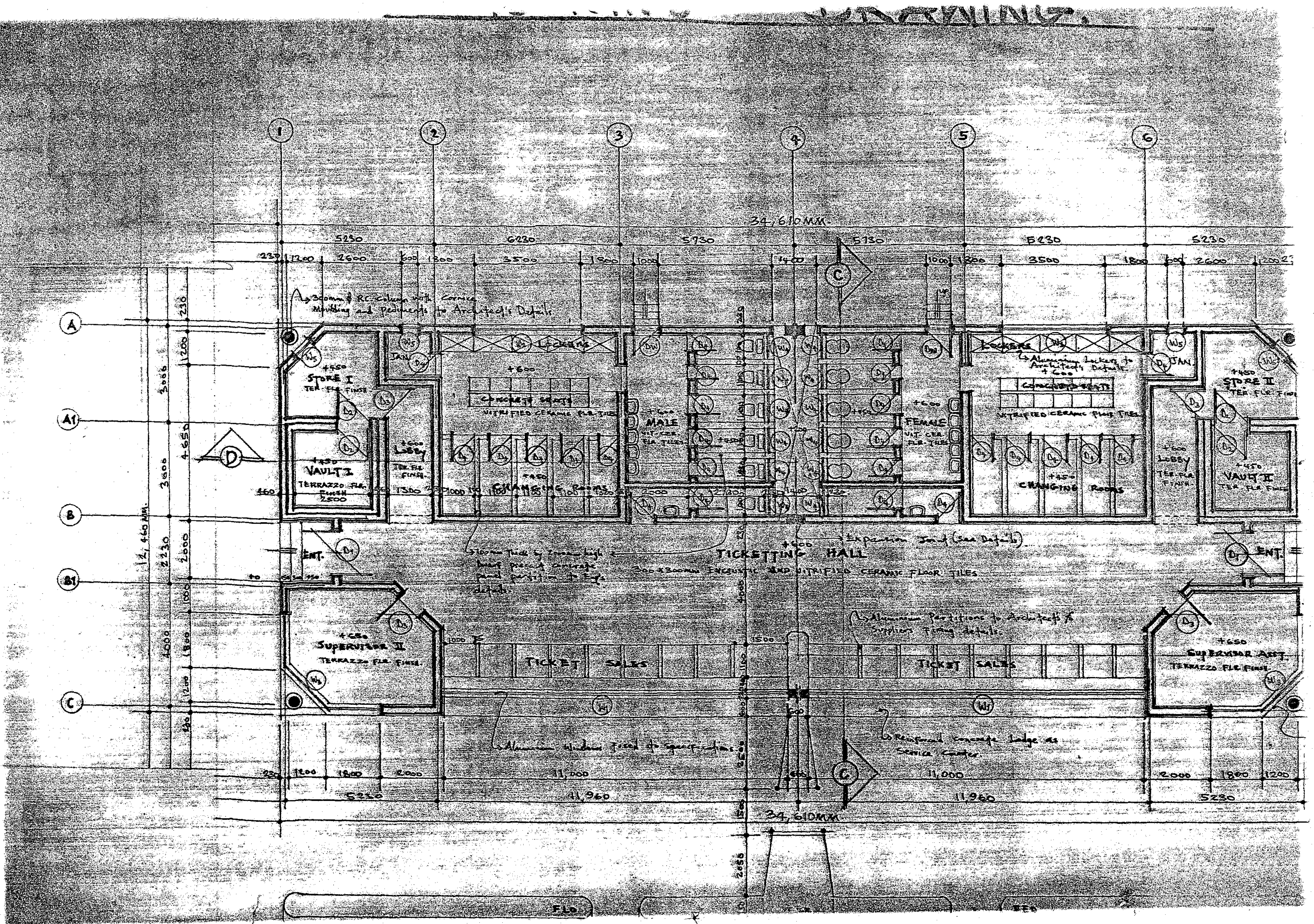
N.

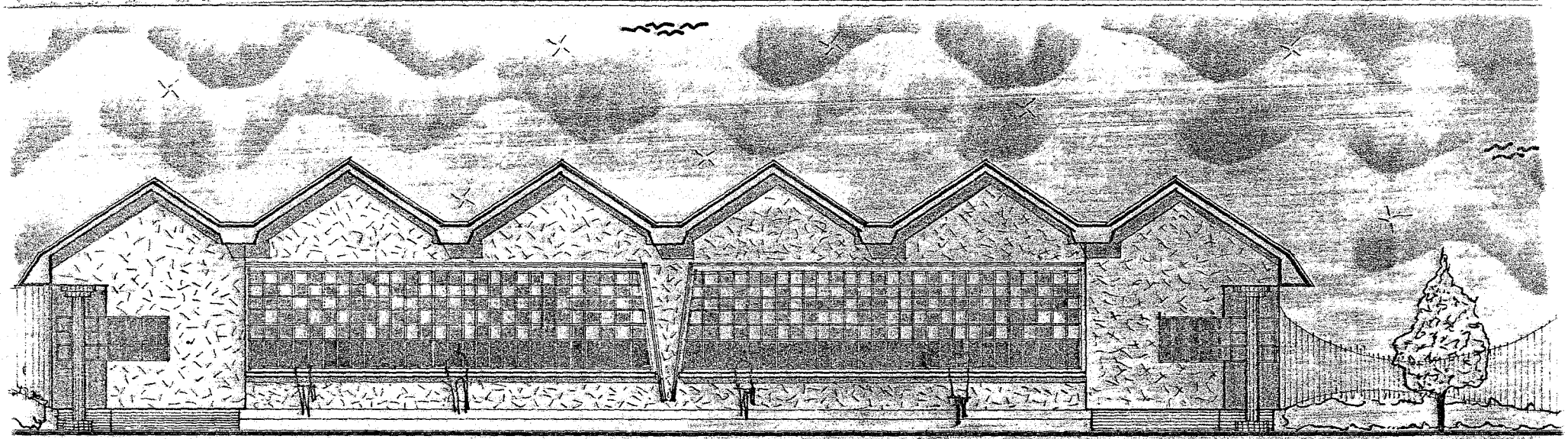
design Proposal for

FCH GAMES ARENA, LAGOS - NIJ

With Focus On Adverse Effects Of Salty Environment On Building Materi


EVATION.

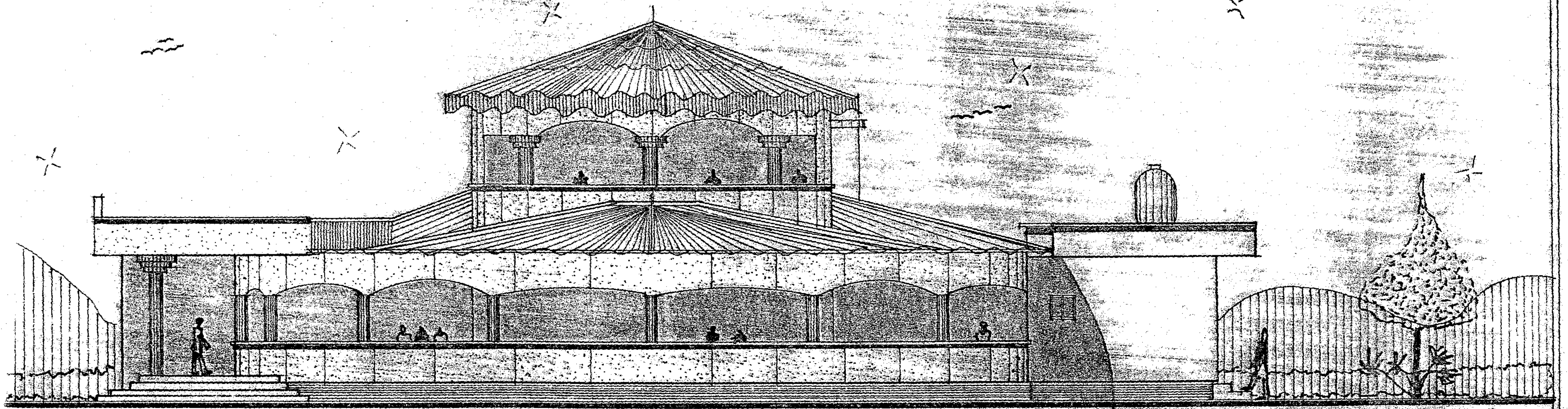

34,610MM.
12,460MM.
TICKETTING HALL
TICKET SALES
TICKET SALES
MALE
FEMALE
CHANGING ROOMS
CHANGING ROOMS
LOCKERS
LOCKERS
CONCRETE SEATS
STORE I
STORE II
VAULT I
VAULT II
LOBBY
LOBBY
JAN
JAN
SUPERVISOR II
SUPERVISOR ASST.
ENT.
ENT.
TERRAZZO FLR. FINISH
VITRIFIED CERAMIC FLR. TILES
+600
+450
+650
5230
6230
5730
5730
5230
5230
11,000
11,000
11,960
11,960



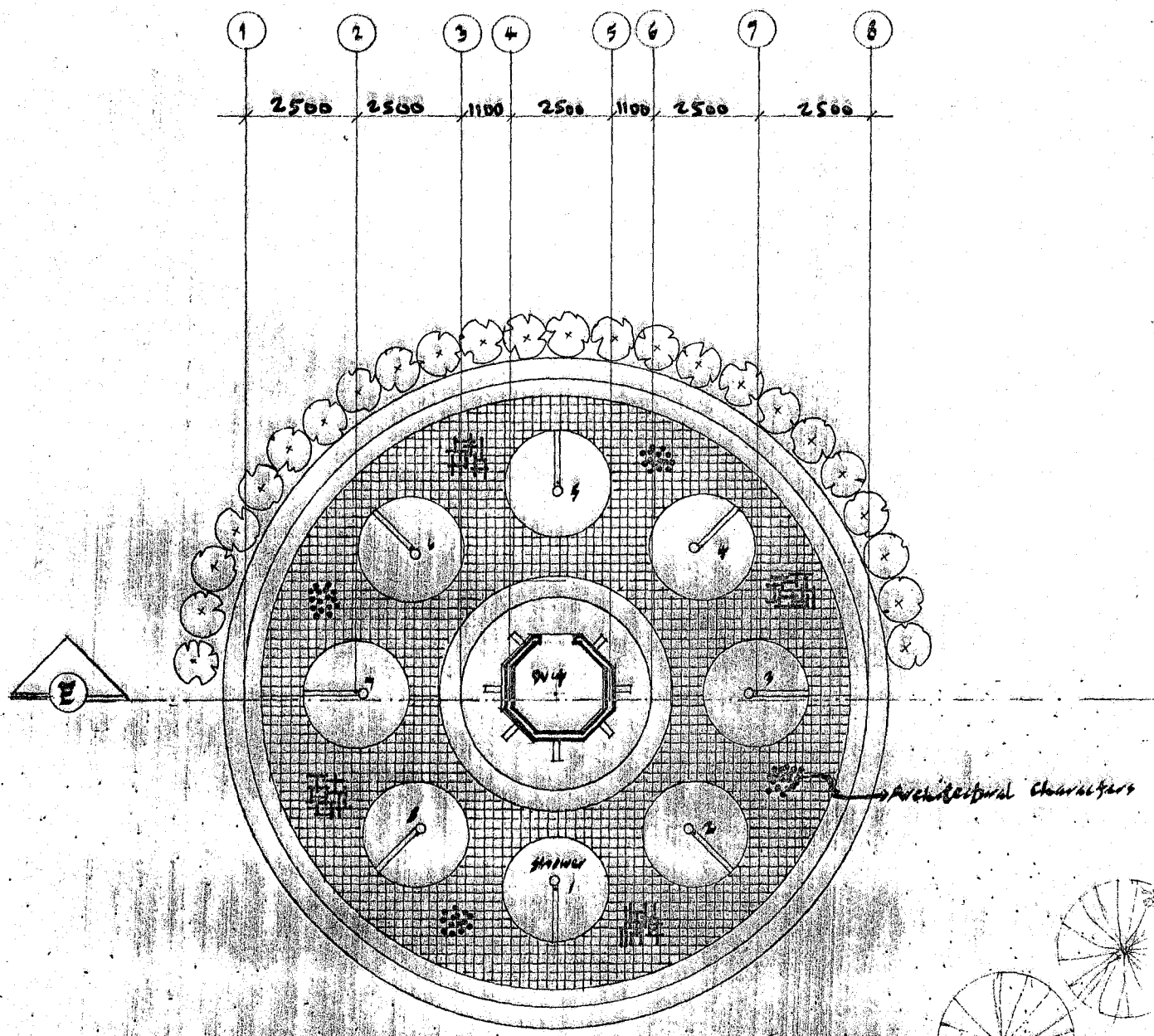
Design Proposal For

GAMES ARENA, ANGOLA - NIGER

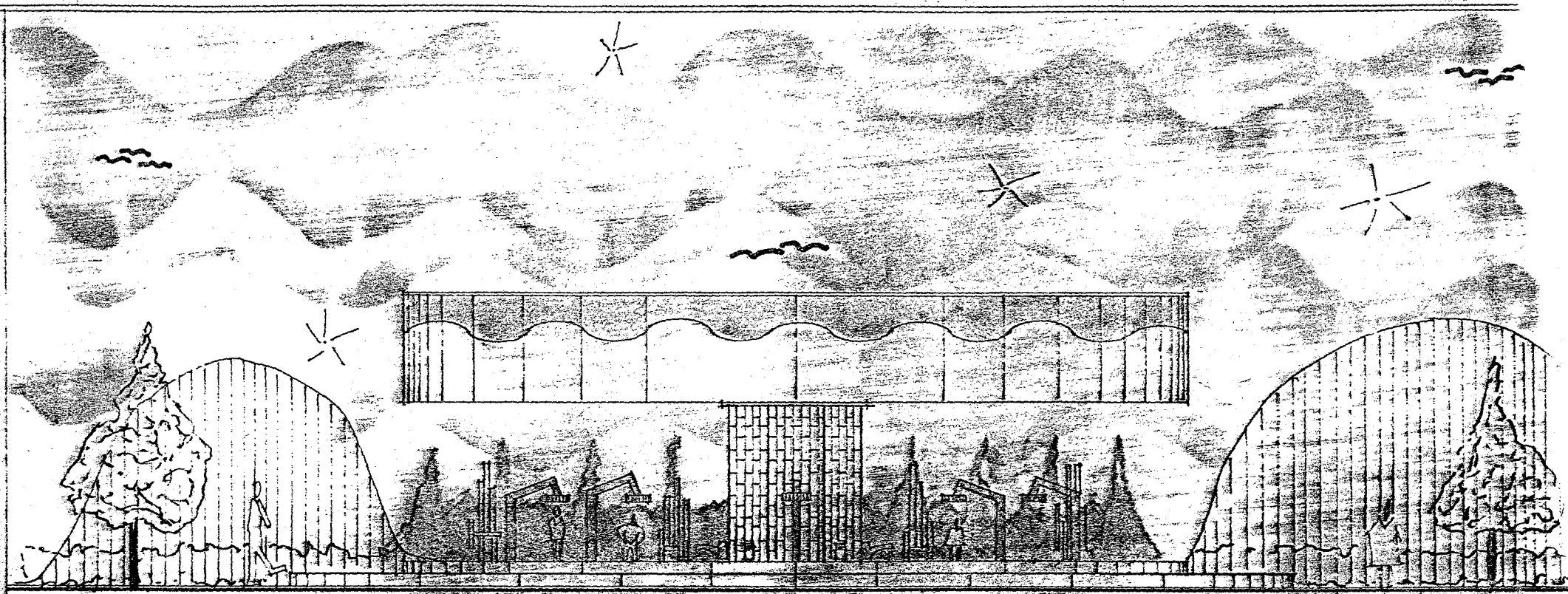
iews On Adverse Effects Of Salty Environment On Building Materials.



EVATION.

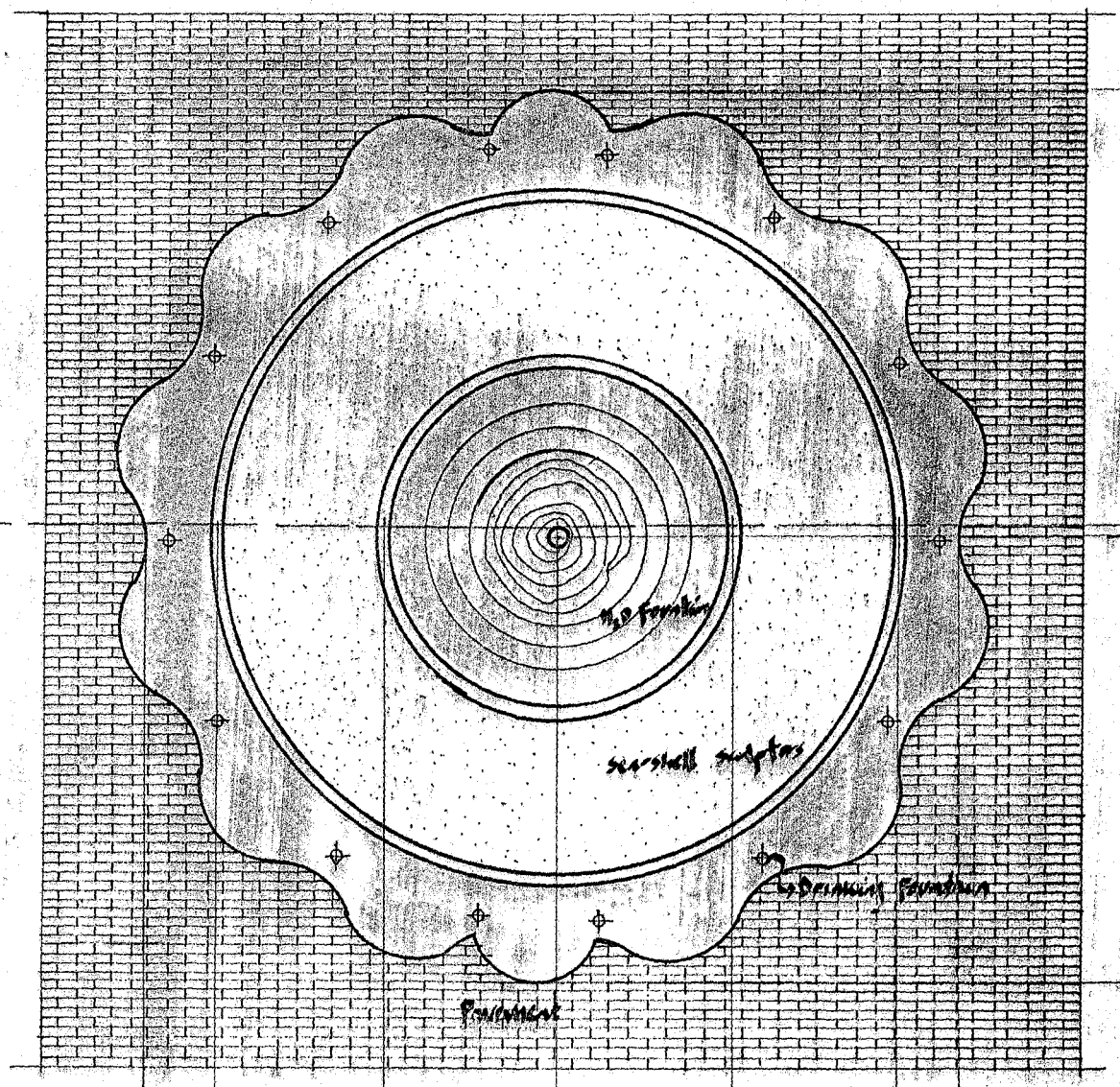


GROUND FLOOR PL

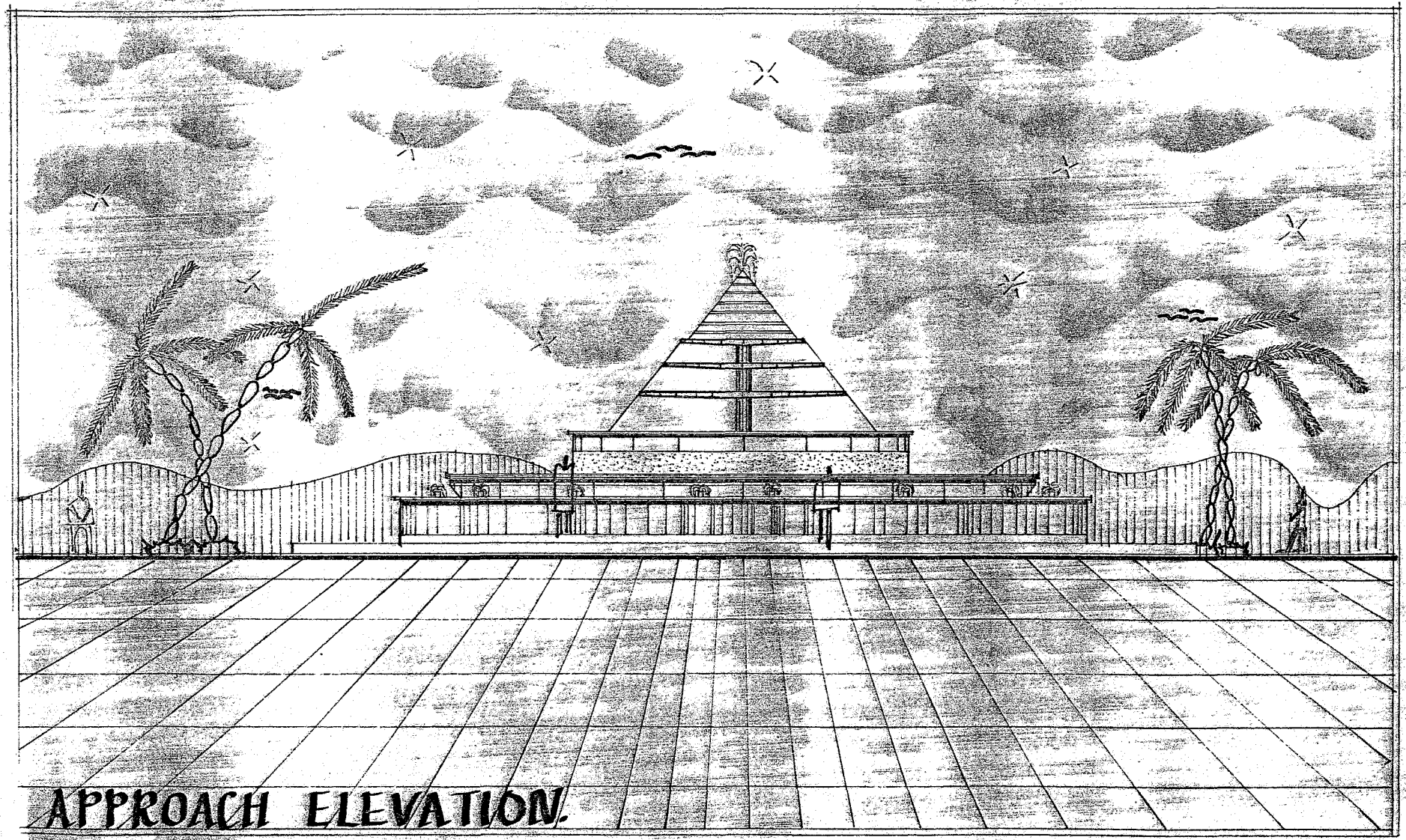


SOUTH-EAST ELEVATION.

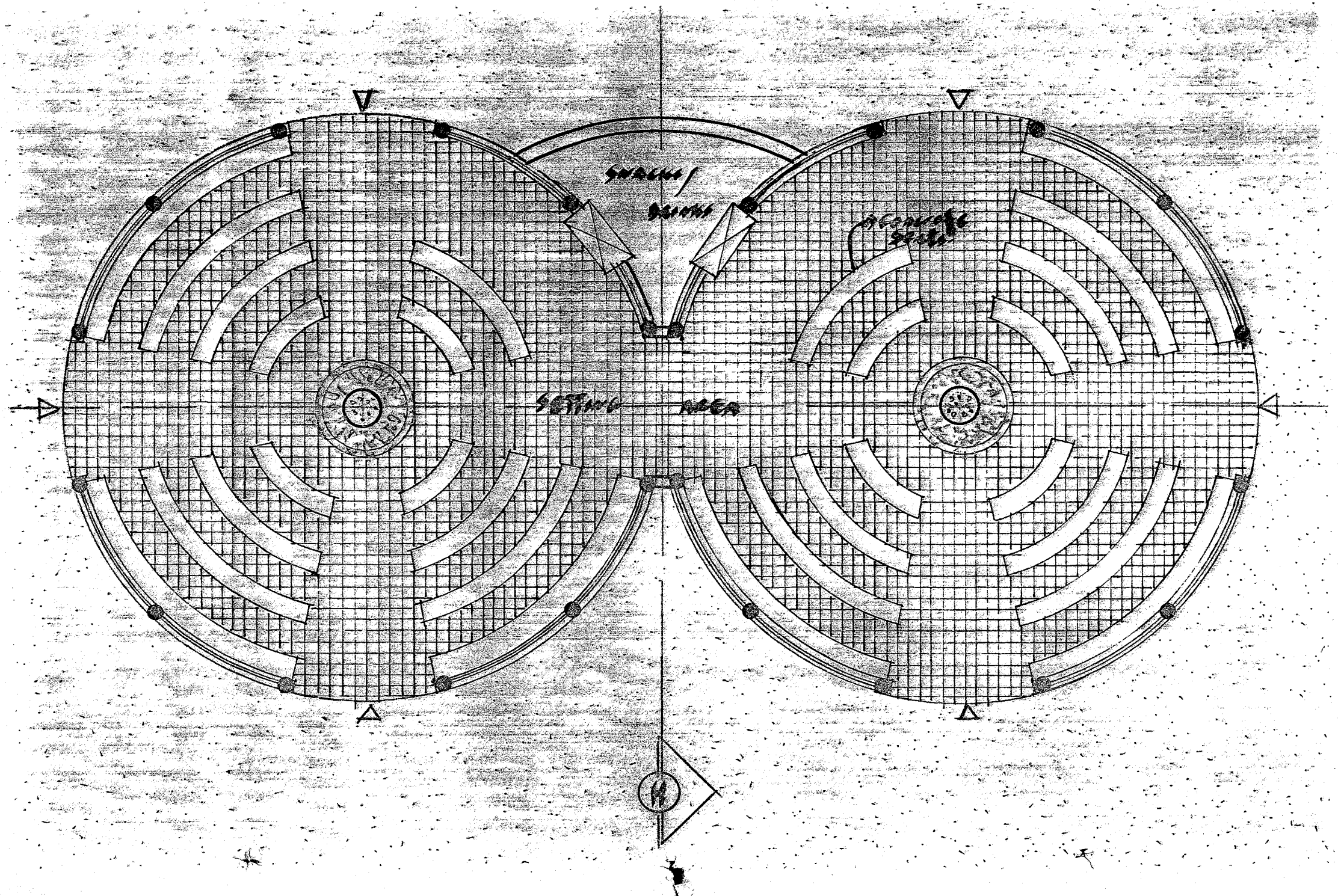
BEACH RACK.

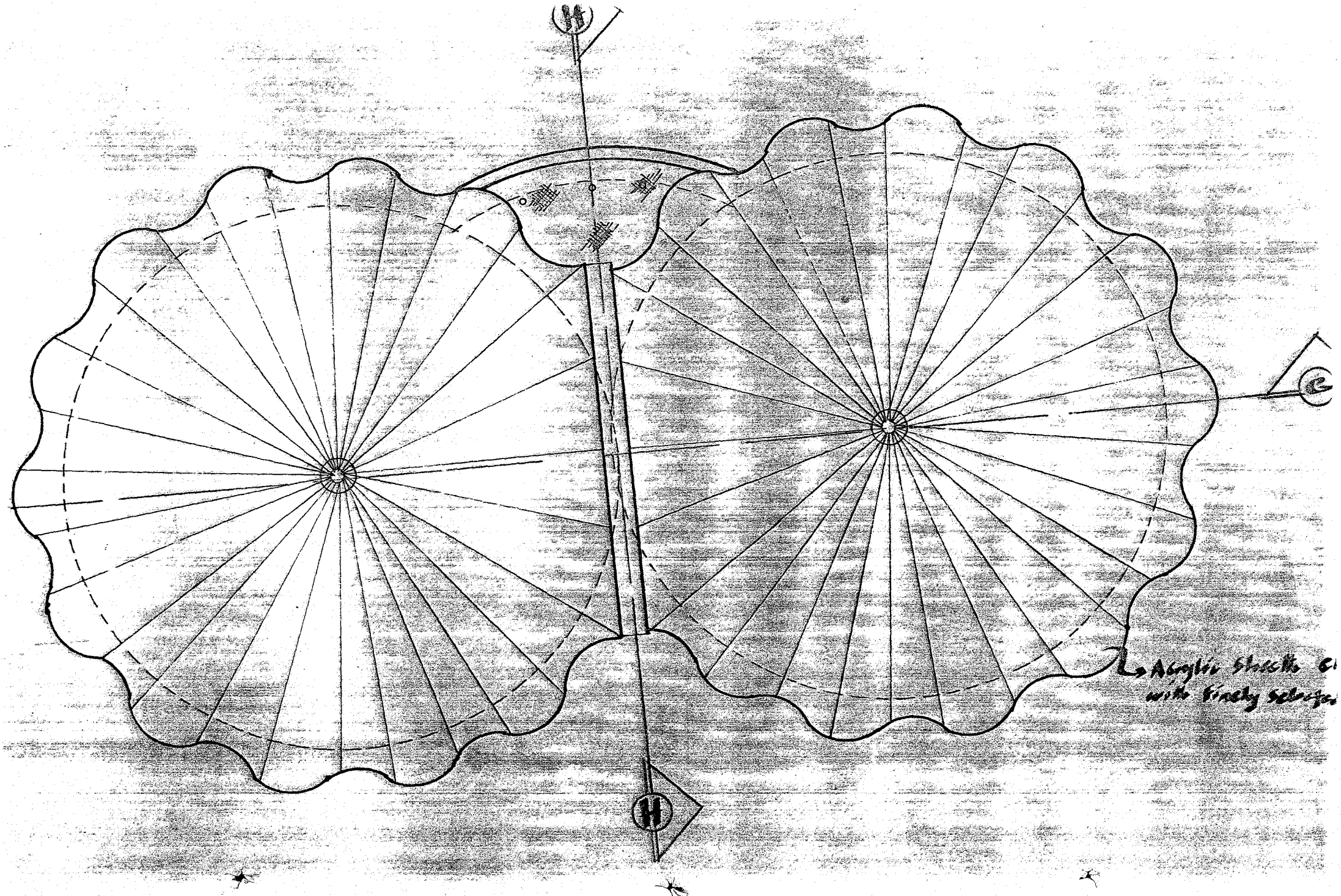


PLAN



APPROACH ELEVATION.

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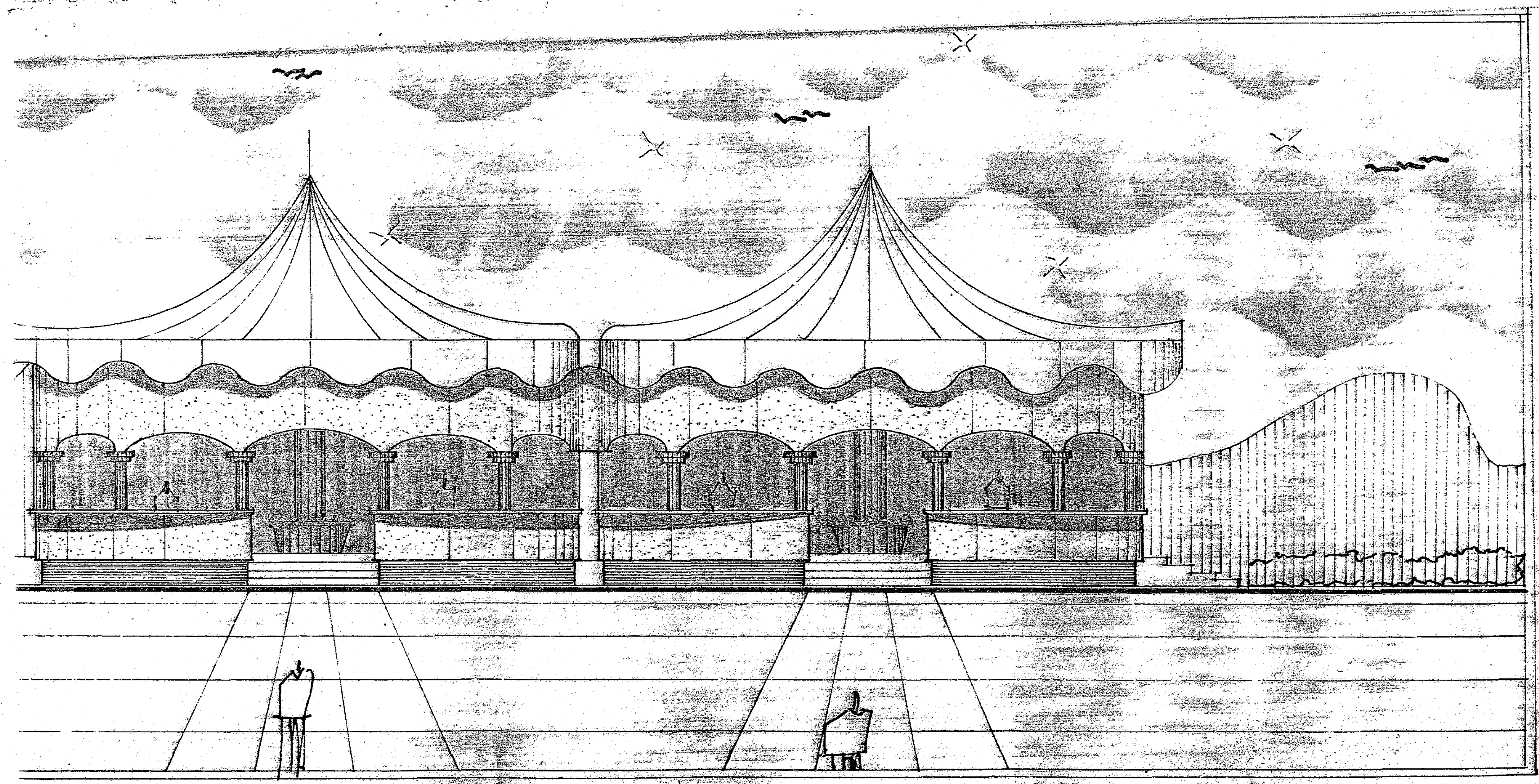
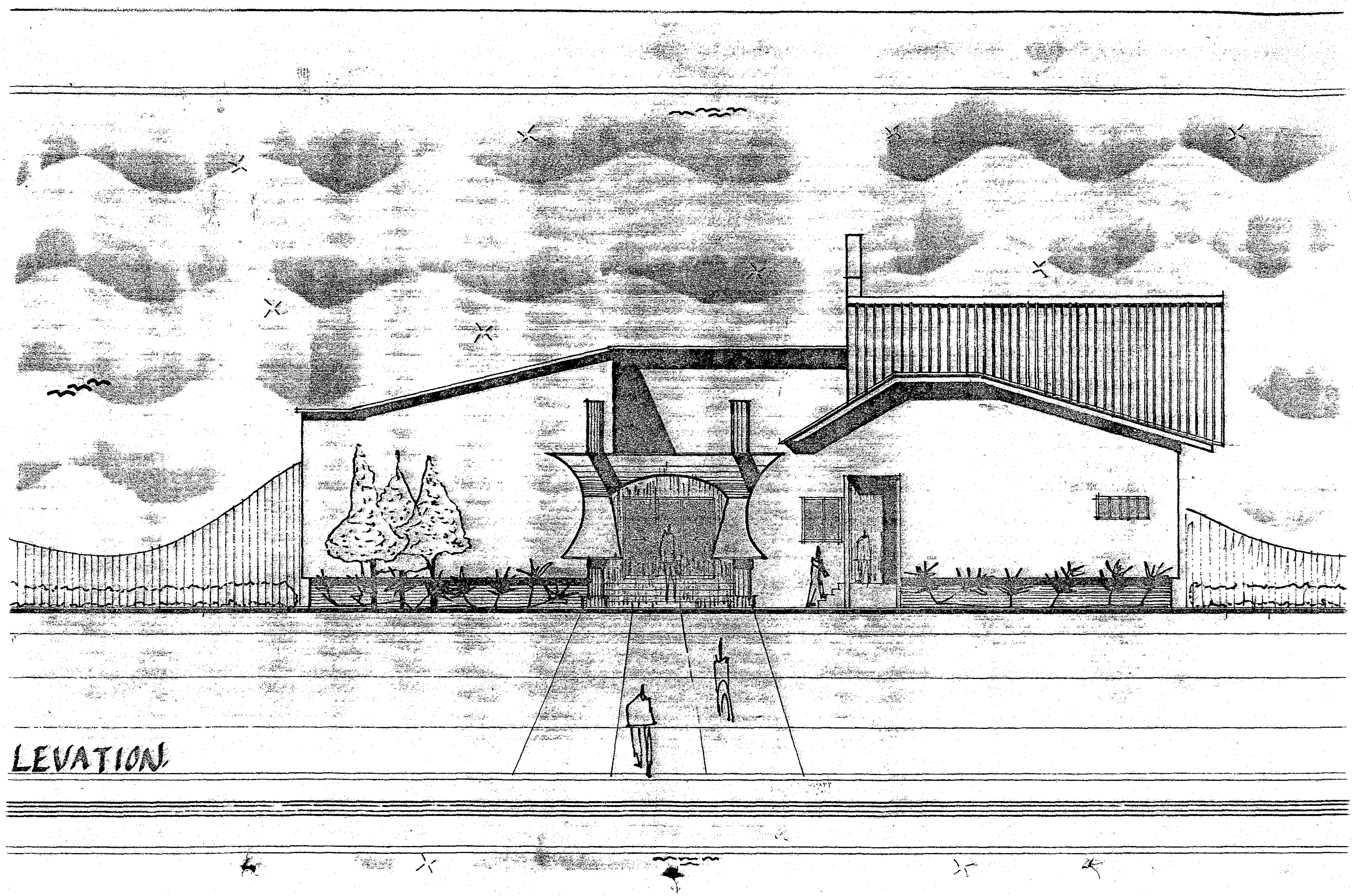
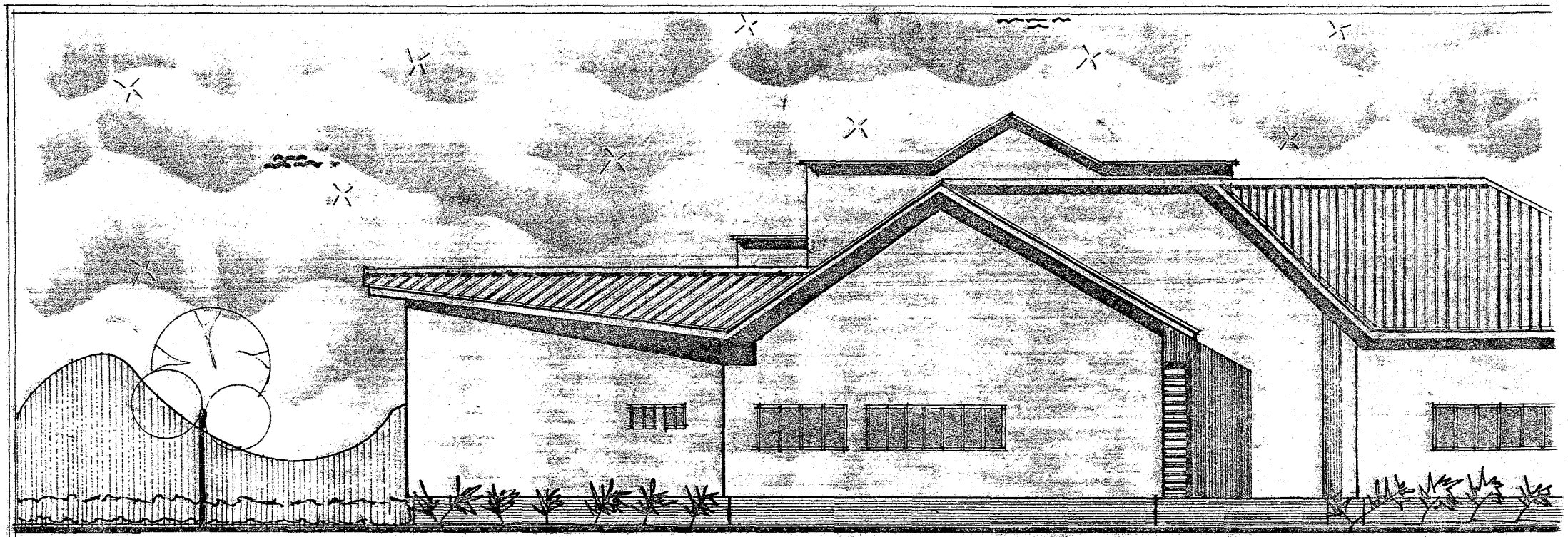


Design Proposal For



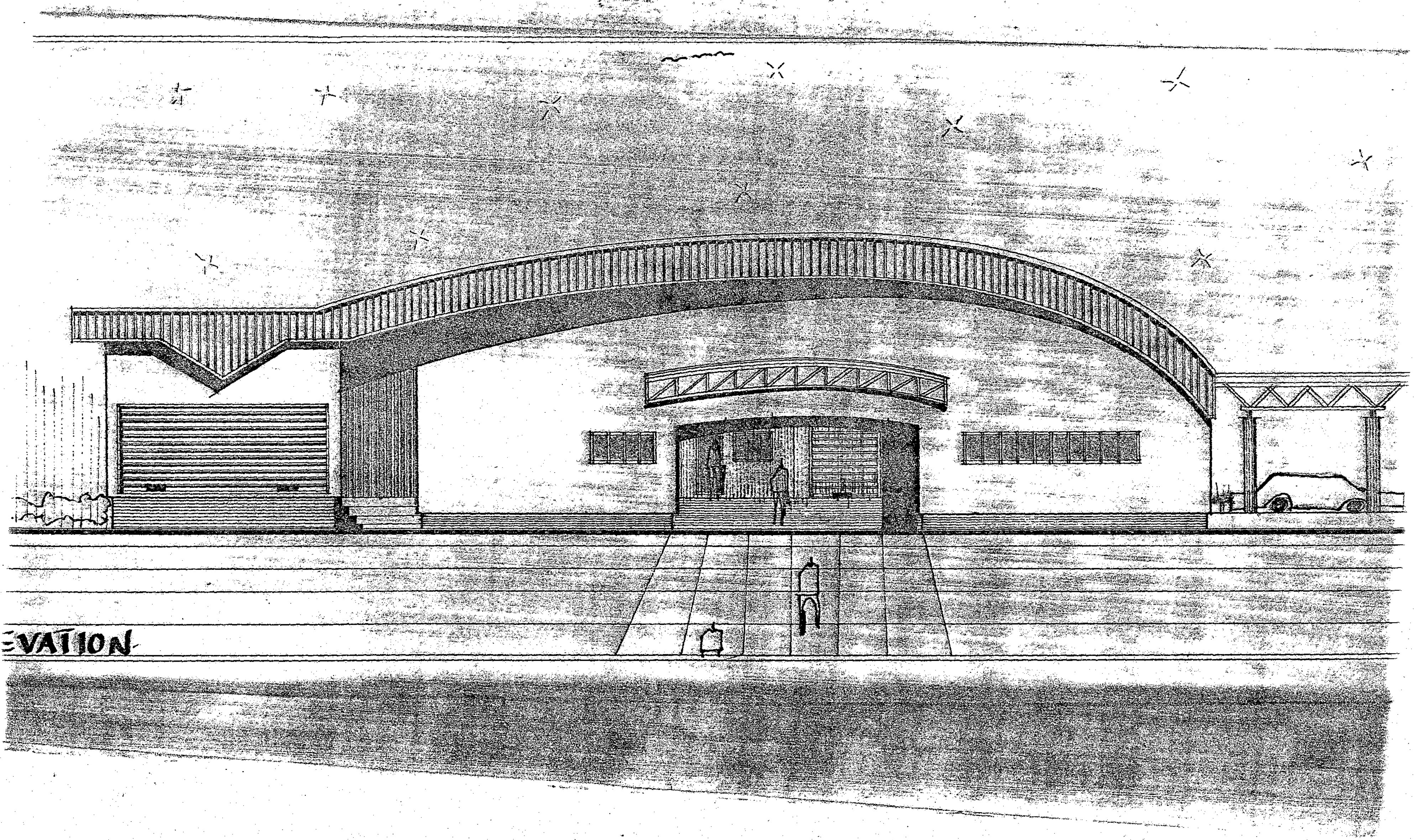
LEVATION.

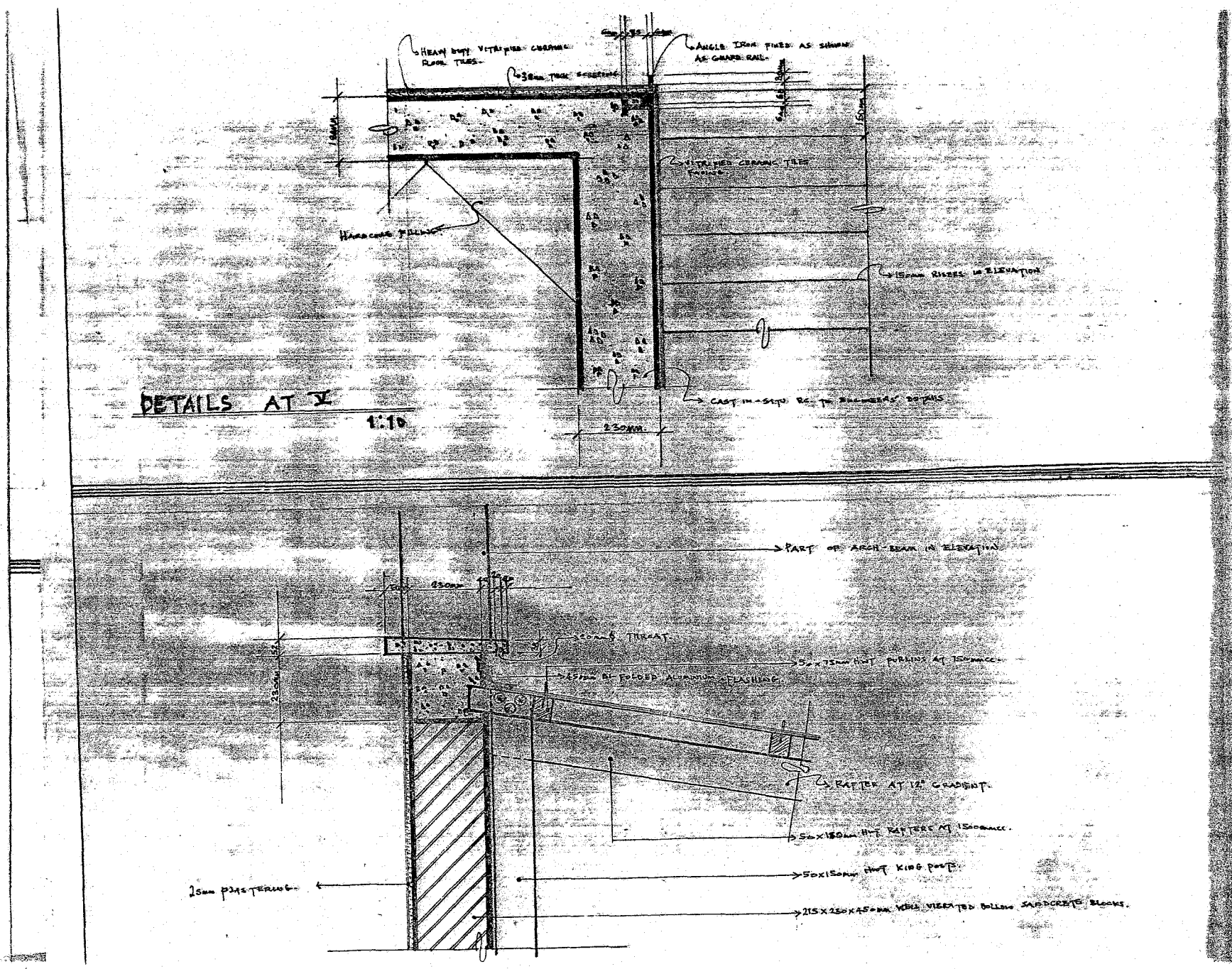


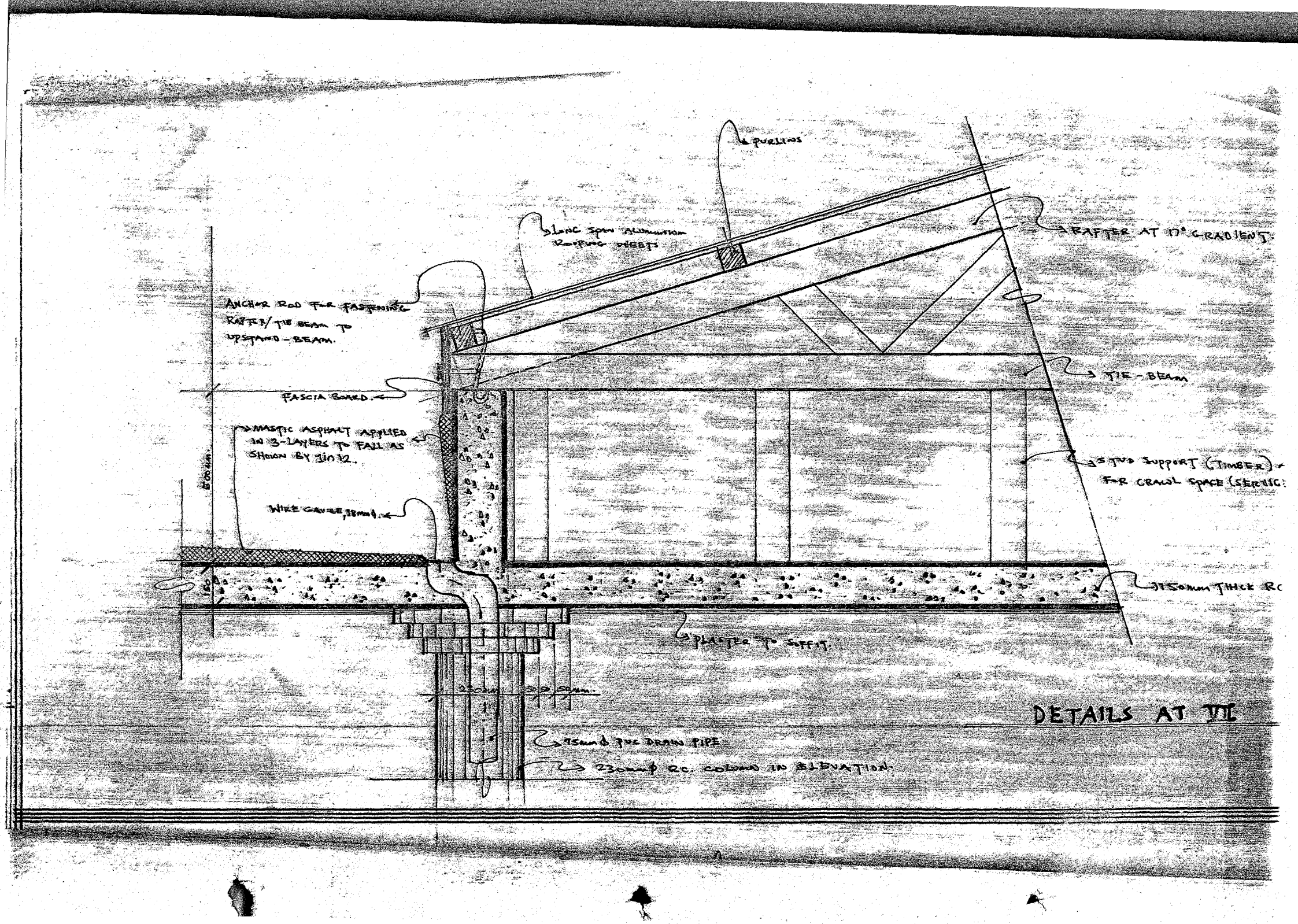
RIGHT SIDE ELEVATION.

Design Proposal For

BEACH GAMES ARENA


EVATION


HEAVY DUTY VITRIFIED CERAMIC ROOF TILES
38mm TIMBER BATTENS
ANGLE IRON FIXED AS SHOWN AS GUARD RAIL
VITRIFIED CERAMIC TILES
HARDCORE FILLING
150mm RISERS IN ELEVATION
CAST IN-SITU RC TO ENGINEER'S DETAILS
250mm
DETAILS AT X
1:10
PART OF ARCH BEAM IN ELEVATION
450mm
150mm THROAT
2135mm
150mm BI-FOLDED ALUMINIUM FLASHING
50x75mm H&T PURLINS AT 1500mm c/c
RAFTER AT 12° GRADIENT
50x150mm H&T RAFTERS AT 1500mm c/c
50x150mm H&T KING POSTS
25mm PLASTERING
215x250x450mm WELL VIBRATED ROLLED SANDCRETE BLOCKS


PURLINS
BLANC SPAN ALUMINIUM ROOFING SHEET
RAFTER AT 17° GRADIENT
ANCHOR ROD FOR FASTENING RAFTER/TIE BEAM TO UPSTAND-BEAM.
TIE-BEAM
FASCIA BOARD
MASTIC ASPHALT APPLIED IN 3-LAYERS TO FALL AS SHOWN BY 1in 12.
STUD SUPPORT (TIMBER)
FOR CRAWL SPACE (SERVIC
WIRE GAUZE, 38mm
150mm THICK RC
PLASTER TO SOFFIT
DETAILS AT