



Norms and Standards for Sport and Recreation Infrastructure Provision and Management

Volume 2 - Technical Specifications

An Active and Winning Nation



sport & recreation

Department:
Sport and Recreation South Africa
REPUBLIC OF SOUTH AFRICA



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Volume 2 - Specifications

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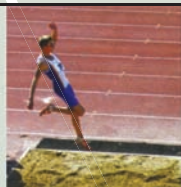
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*"Sport has the power to change the world.
It has the power to inspire.
It has the power to unite people in a way that
little else can.
Sport can awaken hope where there was
previously only despair."*

(Nelson Mandela, Laureus Sports Awards Ceremony 2000)





Mr Fikile April Mbalula

Foreword by the Minister of Sport and Recreation

South Africa as a developing country with rapidly growing socio-economic demands and as a respectable player in global affairs including sport and recreation is facing numerous challenges, which include amongst other things the creation of sustainable sport and recreation infrastructure.

Remarkable disparities between the previously advantaged areas and disadvantaged areas of our population in the provision of sport and recreation facilities exist. Although the extent of the disparity is not well documented, information from the municipalities has revealed that a significant number of communities do not have any access to even a basic sport and recreation facility. In some areas where facilities exist, they are not properly located for easy access, not properly constructed, not well operated and maintained and some not effectively utilized.

Notwithstanding the expressed need to focus more on disadvantaged areas, there is also an increasing crisis particularly in rapidly growing urban areas. Urban areas are fast becoming concrete settlements without any sport and recreation amenities as no provision is made by the local authorities or developers.

It is in the light of the above that Sport and Recreation South Africa has developed the norms and standards to set minimum standards for the provision and management sport and recreation infrastructure. This is in keeping with section 13A of the National Sport and Recreation Act 18 of 2007, as amended.

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EXECUTIVE SUMMARY

This project deals with the development of standards for sport and recreation facility planning, provision and management in South Africa. It was commissioned by the Facilities Directorate of SRSA. The purpose was to develop norms and standards that addressed four elements. These were provision and management of facilities; technical specifications; operations and maintenance; and finally safety and security. In order to develop a good understanding of the context of sport and recreation facilities, status quo and related issues throughout the country, a consultative approach was followed where researchers travelled to selected municipalities in all nine provinces to gather data. In addition, municipal managers and/or planners of facilities were interviewed for their inputs. Desk top and library research was done to develop an in depth understanding of the relevant issues, trends and techniques being utilised globally to address the problem. Several case studies from an international and national perspective were studied to extract best practices and relevant guiding principles.

The findings revealed that planning, provision and management of facilities occurs in a fragmented manner in municipalities. There is hardly any alignment of local approaches of facility planning and provision to provincial and national priorities and goals. Facilities are inequitably distributed in most areas. Most facilities are under-utilised, poorly maintained and managed. Personnel at facilities do not have the requisite competencies to carry out their daily work. On the national government level, it was found that there is no common definition of what constitutes a sport or recreation facility, no classification system for sport and recreation facilities, and no modern integrated strategy for facilities planning, provision and management. Several facility construction projects have been observed to be incomplete, of poor quality, not appropriately maintained, and under-utilised.

The major problems in the planning and provision of facilities arise from the lack of a strategic framework for facilities in South Africa. Also, ad hoc and fragmented approaches to facility development are based on short term planning which does not take into account future growth in population and demand for quality opportunities. There is a clear lack of policies on sport and recreation facilities at national level and in several municipalities.

The norms provide a definition of sport and recreation facilities, a classification system to categorise them, and local examples of such facilities. It goes on to provide the legislative framework that regulates the planning, provision, management, maintenance and protection of the future use of facilities. It provides an integrated, holistic approach to the problem of facilities planning and provision. It encourages a clustered approach to the planning of new developments, rather than the traditional stand alone development of sport facilities that have no adjacent economic activities or hubs to make

them sustainable. It warns against a narrow approach of relying solely on normative standards for planning purposes. Rather, it advocates for the joint working of several stakeholder departments in local government to arrive at solutions that are in the best interests of sport and recreation. The end result should always be an improved quality of life of local residents and neighbourhoods. Lessons learnt from the development of standards in different cities and localities have assisted in recommendations with regard to general guidelines and specific standards for a variety of sport, recreation and open space provision.

Further, the main principles that impact on the planning, provision and management of sport and recreation facilities are explained. Issues such as needs assessments, feasibility studies, design principles, funding options, public-private partnerships, and sources of revenue are addressed. The area of management covers management options, management plans, the principle of viability and sustainability, operational aspects, maintenance processes and procedures, safety and security, and accessibility. Principles and strategies relating to making the facilities economically viable are also presented in this document.

The penultimate section deals with a summary of the main standards that can be implemented in the planning, provision and management of South African sport and recreation facilities. The document concludes with key recommendations and conclusions.



1. TECHNICAL SPECIFICATIONS

1.1 GENERAL

This section is intended to address the design, construction and technical aspects of the facility. The key questions are:

- Is the proposed design suitable for the types and level of usage projected?
- Does the design comply with statutory building regulations and meet industry guidelines for these types of facility?
- Are the projected capital costs reasonable for this type of facility?
- Are the lifecycle maintenance amounts sufficient to sustain the building in good condition for 25+ years?
- Does the facility demonstrate accessibility to all sections of the community?
- Have environmental sustainability considerations been accounted for?

NATIONAL BUILDING REGULATIONS

When designing and constructing the various sports facilities it is important that all facilities conform to the SOUTH AFRICAN STANDARD Code of Practice for the application of the National Building Regulations (SABS 0400 – 1990) and applicable revisions as published by THE COUNCIL OF THE SOUTH AFRICAN BUREAU OF STANDARDS (Gr22).

MUNICIPAL BY-LAWS

In addition to the above all sporting facilities have to comply with Municipal By-Laws.

Zoning: In terms of the Municipal By-Laws and Town Planning ordinances the land use is generally termed “Sports and Recreation” and in some instances where the sports facilities form part of a larger complex they may be termed “Special or in terms with the Site Development Plan”.

ISO RATINGS

In cases where the equipment, particularly imported equipment, does not have a SABS rating, the applicable ISO 9000 ratings will apply.

1.2 ENVIROMENTAL IMPACT ASSESSMENTS AND PROVISION OF BULK SERVICES

In the planning of all new sport and recreational facilities a detailed environmental impact assessment needs to be carried out by an Environmental Consultant in conjunction with the Professional Team.

The environmental impact assessments place particular emphasis on the provision of the following:

- Impact of proposed development on the environment
- Availability of Water
- Availability of Electricity
- Availability and treatment of Waste
- Local Community Consultation
- Governmental and Municipal Regulations
- National Building Regulations

Detailed demand calculations have to be made to determine the use of water, electricity and the availability of sufficient waste water treatment facilities in the area in which the facilities have been planned. Developers of the sport facilities have to verify the availability of the bulk services from the local service providers who normally are the local Municipalities or their Utilities.

1.3 SPECIFICATIONS

The specifications indicate the dimensions of the facilities required for the various sporting codes together with the construction details and related anticipated construction costs.

With reference to the construction costs it should be borne in mind that due to varying terrain conditions, geographical locations, economies of scale and other local factors these costs will vary from location to location and should be seen as a guide only.

The specifications of the various sporting codes are compiled alphabetically.

1.4 SPORTING CODES

1.4.1 Archery

Field specifications

The dimensions of the shooting field are dependent on the number of competitors and vary between men and women.

Men shoot at distances of 90 metre, 70 metre, 50 metre and 30 metre. Women shoot at distances of 70 metre, 60 metre, 50 metre and 30 metre.

Two target buttresses are placed in each shooting lane. The lane in which the pair of targets is placed has to be at least 5 metre wide.

In addition to the above suitable spectator barriers have to be erected 10 metres wide on either side of the shooting lanes and at least 25 metres behind the 90 metre distance.

A further 5 metre wide lane separates the men's and women's shooting lanes. A waiting line is set up 5 metres behind the shooting line. Target buttresses are moved forward to the shooting line. Spectator seating is situated behind the shooting line.

Since teams of archers consist of four archers and since there are never less than two or more than six archers shoot at each target, the minimum length of the field (without spectator facilities) is thus 120 metres and the minimum width of the field ranges from 35 metres. The maximum width of the field may however vary dependant on the number of shooting lanes that are set up.

The lanes must be demarcated on the ground with either tape or whitewash.

Field surfaces

Fields are grassed and are generally set level with a slight sideways gradient to allow for storm water run-off.

In general lower earth platforms are compacted to 93 % Modified AASHTO followed by a 50 mm thick layer of coarse river sand and a 75 mm thick layer of top soil (not compacted) which is then grassed.

On larger fields it may be necessary to insert a herring bone sub-soil storm water drainage system.

Target buttresses

The buttress can be either square or round and must be not less than 1240 mm in any direction to ensure that any arrow just missing the target remains in the buttress. The buttresses are set at an angle of between 12 and 18 degrees and the centre of the target must be 1300 mm above ground level.

The target

There are two standard target face sizes; 1220 mm diameter to be used for distances between 90 and 60 metre and 800 mm diameter to be used for distances of 50 and 30 metre.

The target faces are divided into 5 concentric circles. The zones created by 2 mm thick concentric lines are 61 mm wide on the 1220 mm diameter targets and 40 mm wide on the 800 mm diameter targets. The concentric zones are arranged from the centre outward in the following colours: Centre: Gold (Yellow), Red, Light Blue, Black, White

1.4.2 Athletics

TRACK & FIELD EVENTS

Outdoor track and field specifications

Any firm, uniform and level surface capable of accepting running shoes or spikes may be used for athletics.

Where meetings are held under the auspices of the International Amateur Athletics Federation (IAAF), only surfaces sanctioned and constructed to the standards prescribed by the IAAF may be used.

The field that houses the 400 metre oval athletics track has minimum dimensions of 176.91 metre long x 92.52 metre wide. The lanes are a1220 mm wide. Demarcation lines are 50 mm wide and distances are measured from the edge of the starting line to the edge of the finishing line. (See drawing below)

Where races are not run in lanes the starting line must be curved to ensure that all runners start at the same distance from the finishing line.

Tracks normally consist of 6 – 10 lanes (up to 12 lanes on the 'front' straight) and many include a steeple chase lane with a water pit on one of the turns. The steeple chase pit can be placed on either the inside or the outside of the track.

The inner field is usually known as the infield and has a surface of either grass or artificial turf. Field events that can be held on the infield are as follows.

Throwing Events:

- Discus throw
- Hammer throw
- Javelin throw
- Shot put

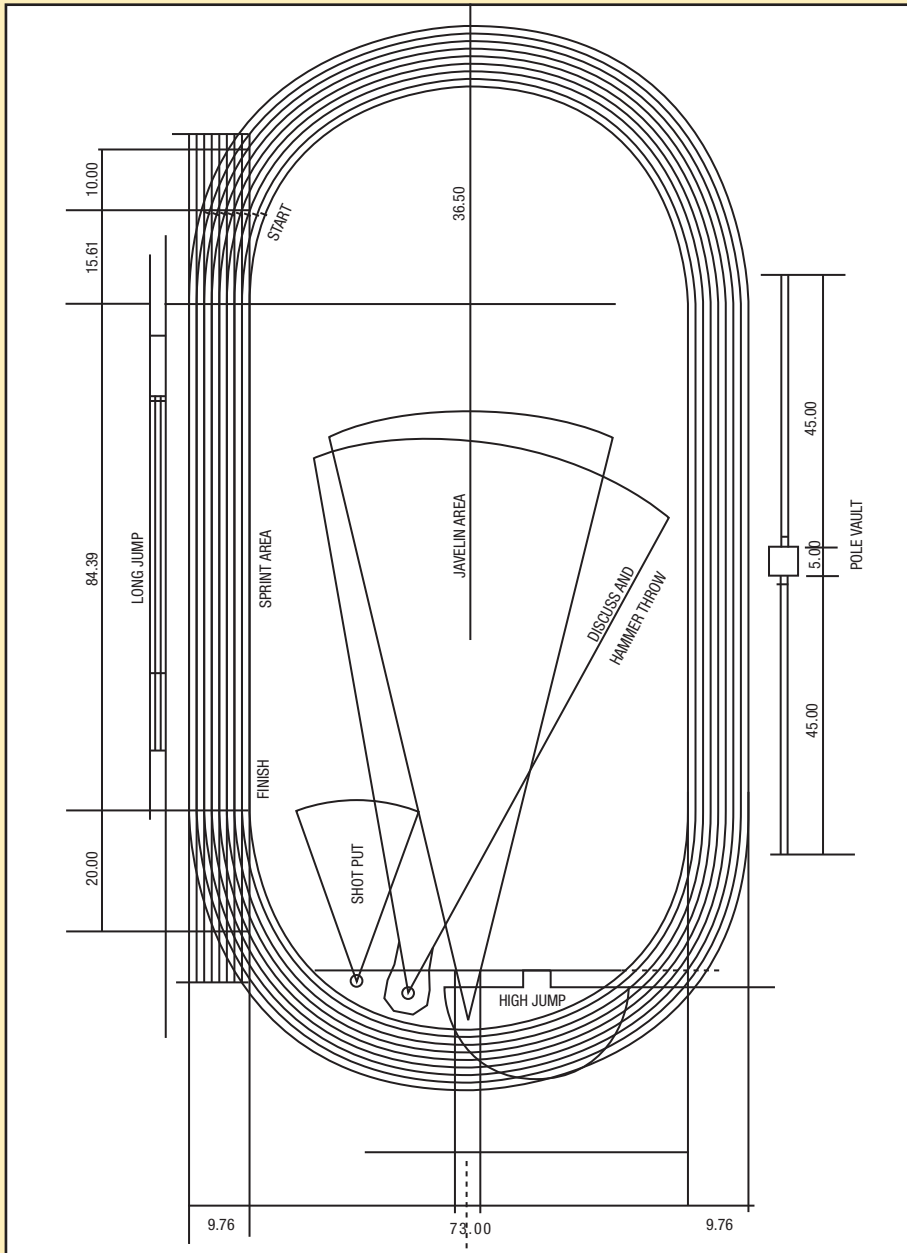
Jumping Events:

- High Jump
- Long Jump
- Pole Vault
- Triple Jump

Synthetic surfaces

Synthetic surfaces may be either for outdoor or indoor applications and various trade products are available on the commercial markets.

Athletics Track



Outdoor synthetic surfaces

Outdoor synthetic surfaces consist of cast in-situ polyurethane materials that are commercially available in various grades:

Embedded surfaces have a granular surface that allows for greater traction and are available in a number of different coarseness.

Encapsulated (Abrasion Resistant) surfaces are smoother and offer a greater resistance to abrasion. Again they are available in a number of different coarseness.

All of the above are available in a number of different colours.

CONCRETE SUBSTRATES

The sub-surface earth needs to be levelled and compacted to 93 % Modified ASSHTO with a maximum cross slope of 1%.

Sub-Surface drainage system to be installed below all track surfaces (in terms with Civil Engineering design).

The sub-surface drainage system is to be connected to a storm water system to ensure proper drainage.

A 250 micron damp proof layer is to be installed below a 125 mm thick (20 Mega Pascal design strength) concrete surface bed finished smooth to ensure proper adhesion.

Sealers and curing agents should not be used since these may affect the adhesion of the polyurethane track surface.

All concrete surfaces need to be dry and dust free prior to the placement of the track surface.

Since the track surface is poured in-situ, formwork or a suitable kerb needs to be set into the track edges.

ASPHALT SUBSTRATES

The sub-surface earth needs to be levelled and compacted to 93 % Modified ASSHTO with a maximum cross slope of 1%.

Sub-Surface drainage system to be installed below all track surfaces (in terms with Civil Engineering design).

The sub-surface drainage system is to be connected to a storm water system to ensure proper drainage.

A 250 micron damp proof layer is to be installed below a 25 mm thick asphalt carpet finished smooth to ensure proper adhesion.

All asphalt surfaces need to be dry and dust free prior to the placement of the track surface.

Since the track surface is poured in-situ, formwork or a suitable kerb needs to be set into the track edges.

EXISTING SUBSTRATE SURFACES

It is possible to pour the synthetic surfaces over existing surfaces, they do however, need to be thoroughly cleaned; paint, grease, oils, hydraulic type fluids and all loose particles have to be removed to ensure proper adhesion.

MAINTENANCE

Needle/pin or pyramid spikes in excess of 5 mm are not recommended for use. Some types of running shoes will mark the running surface, these can however be removed.

The tracks can be cleaned by use of a stiff broom and/or water hose. Detergents recommended by the manufacturers may be used to remove stains from the track surface. High pressure washing or street sweeping equipment is not recommended.

Care should be taken to ensure that any products applied to the track surface comply with the manufacturer's instructions. It may be possible to repair damage to the track surface.

Indoor track and field

Most indoor tracks are 200 metres and consist of 1 – 6 lanes. Track lengths may vary however, from 120 metres to lengths of up to 300 metres. The 300 metre lengths are not considered valid for setting indoor records. Often an indoor track will have banked turns to compensate for the tight turns.

In an indoor track meeting athletes contest the same track events as at the outdoor meetings, with the exception of the 100 metre sprints and 100/110 metre hurdles events that are replaced by the 55 – 60 metre sprints and 55 – 60 metre hurdles. In field events, indoor meetings only feature high jump, long jump, pole vault, triple jump and shot put. Due to space limitations, discus, hammer throw and javelin throw events are not included in indoor events.

Indoor synthetic surfaces

As with outdoor synthetic surfaces, indoor surfaces are available in various grades and colours:

Micro-Encapsulated surfaces have a granular surface that allows for greater traction and are available in a number of different coarseness.

Encapsulated (Abrasion Resistant) surfaces are smoother and offer a greater resistance to abrasion. Again they are available in a number of different coarseness.

Sharkskin surfaces are smooth and are used for multi-purpose facilities.

CONCRETE SUBSTRATES

The sub-surface earth needs to be levelled and compacted to 93 % Modified ASSHTO with a maximum cross slope of 1%.

A 250 micron damp proof layer is to be installed below a minimum thickness of 100 mm thick (20 Mega Pascal design strength) concrete surface bed finished smooth to ensure proper adhesion.

Sealers and curing agents should not be used since these may affect the adhesion of the polyurethane track surface.

All concrete surfaces need to be dry and dust free prior to the placement of the track surface.

Since the track surface is poured in-situ, formwork or a suitable kerb needs to be set into the track edges.

FIELD EVENTS

Discus throw

The discus is an athletic field event where athletes throw a heavy disk which has the following properties:

Men's Event: Disk with a diameter of 220 mm and a weight of 2 kilogram

Women's Event: Disk with a diameter of 181 mm and a weight of 1 kilogram.

The disk in both of the above cases has sides made of rubber, plastic, metal or wood with a metal rim and a metal core.

A rubber disk for practice purposes is also available.

The disk is thrown from a Discus Circle which has an internal diameter of 2500 mm. All throws are made from an enclosure to ensure the safety of fellow athletes and spectators.

Each throw, measured immediately after the throw, is measured from the nearest mark made by the discus to the inside of the circumference of the discus circle, along a line from the mark made by the discus to the centre of the circle. Distances are rounded down to the nearest 0,02 metre below the distance measured. The current world record has been set by a throw of 74.08 metres.

Hammer throw

The hammer throw is a field event where the "hammer" is a heavy metal ball attached to a wire and a handle, which is then thrown by athletes by spinning the hammer above their head in a circular motion. By spinning the hammer a number of times above their head, athletes build up momentum and then release the hammer from the front of a throwing circle which is similar to the discus circle except that

the diameter reduces from 2500 mm to 2135 mm.

The men's hammer weighs 7.257 kilograms and measures 1220 mm in length and women's hammer weighs 4 kilograms and has a length of 1190 mm.

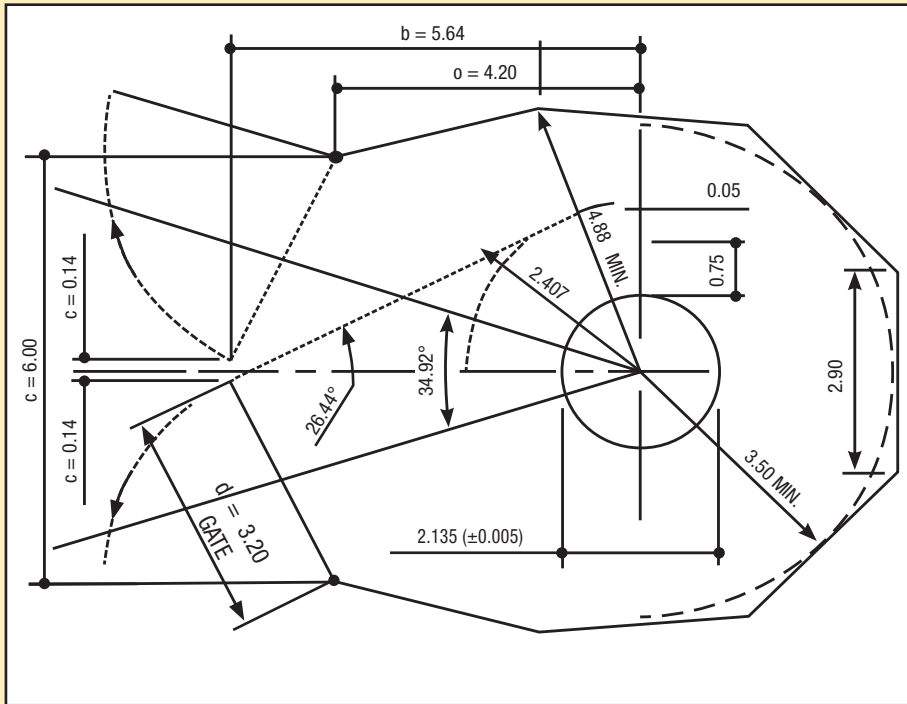
All throws are made from an enclosure to ensure the safety of fellow athletes and spectators. Each throw, measured immediately after the throw, is measured from the nearest mark made by the head of the hammer to the inside of the circumference of the discus circle, along a line from the mark made by the hammer to the centre of the circle. Distances are rounded to 0,02 metre and the winner is decided by tying the competitors second best throws. The current world record has been set by a throw of 86.74 metres.

Hammer and Discus Throwing Cages

To ensure the safety of fellow competitors, officials and spectators, both discus and hammer throwing events require a throwing cage that has to adhere to the following standards:

- For international events the construction of the cage must have an IAAF Product Certificate which is subject to submission of drawings and an in-situ inspection once the cage has been constructed.
- The cage must meet the dimensions requirements as set out in the IAAF rules (See drawings below).
- The netting must be strong enough so that it does not break under the impact of the hammer, abrade where it attached or deteriorate under the effects of ultra violet sun rays.
- The net must be able to be raised and lowered quickly.
- The net must be firmly attached to the ground and must maintain a correct relationship to the throwing circle.
- The gate pivots and frame should not be exposed so that an implement causing damage to both can hit it.
- The netting should be loosely hung clear of the supporting posts so that a thrown implement does not strike the posts.
- The gates should maintain their integrity under long term usage.
- The supporting frame should be strong enough to support the netting and resist wind forces.

Hammer Throwing Cage with Gate



Javelin throw

The javelin throw is an athletic field event where the object thrown is the javelin which is manufactured from either metal, fibreglass or carbon fibre.

The men's javelin weighs 800 gram whilst the women's javelin weighs 600 gram. The overall length varies from 2600 mm – 2700 mm for men and 2200 – 2300 mm for women.

The javelin runway must be at least 30 metre long and must be marked by two parallel lines 50 mm wide and 4 metre apart.

Each throw is measured immediately after the throw from where the tip of the metal head first struck the ground to the inside edge of the arc along a line from the point of landing to the centre of the circle of which the arc is a part. (See athletic track drawing). Distances are rounded down to the nearest 0.02 metre.

The current world record distance for men is 98.48 metre for men and 71.20 metre for women.

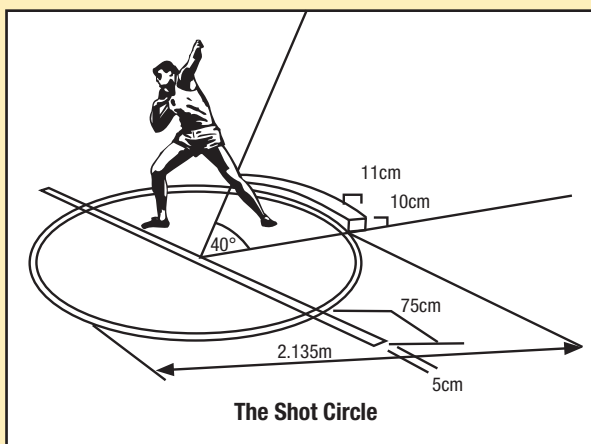
Shot put

The shot put is a field event where a heavy metal ball is thrown in a pushing motion as far as possible. The shot is made of solid iron, brass or any metal not softer than brass, or of a shell of such metal filled with lead or other material.

In men's competition the shot weighs a minimum of 7.26 kilogram and the women's shot weighs 4 kilogram.

The shot circle from which the shot is thrown is bounded by an iron or steel ring or other suitable material. The interior of the circle may be constructed of concrete, asphalt or some other firm non-slip synthetic material. A raised board is placed midway between the sector lines (See Drawing below).

Each shot is measured immediately after the put, from the mark made by the fall of the shot to the inside circle, along a line from the mark made by the shot to the centre of the circle. Distances are rounded down to the nearest 0.01 metre below the distance measured. The current record distance thrown is 23.12 metre.



High jump

The high jump is a field event in which athletes jump over a horizontal bar suspended between rigid uprights at measured heights without the aid of any devices.

The high jump bar which is between 3980 mm and 4020 mm long is manufactured from either glass reinforced plastic or aluminium and has either a circular, triangular or square cross section and must not exceed 2 kilogram in weight. The cross bar supports must be flat and rectangular 40 x 60 mm in size. Each support must face the opposite upright. The ends of the cross bar rest on the supports in such a manner that if the cross bar is touched by the jumper, it must easily fall to the ground, either forwards or backwards.

The runway may not be shorter than 15 metre or longer than 25 metre. The landing area, manufactured from soft foam covered with a p.v.c covering must be at least 5000 x 3000 mm. Measurements are made from the ground to the lowest part of the upper side of the bar.

Pole vault

Pole vaulting is a field event where athletes use a long, flexible pole to vault a cross bar suspended between two uprights.

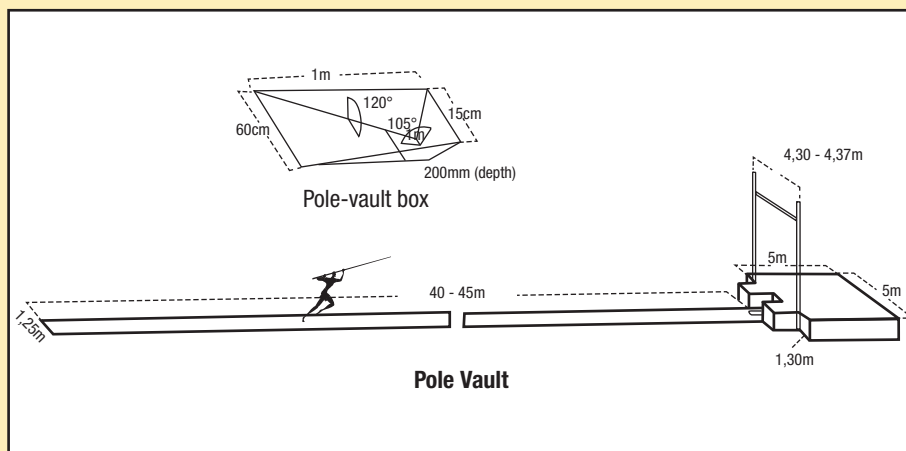
Uprights or posts of any type may be used, provided they are rigid. They should extend at least 100 mm above the maximum height to which the cross bar can be raised. The current world record height is 6.14 metres. In addition to the above, the supports may be moved by individual athletes by no more than 400 mm in the direction of the runway and 800 mm in the direction of the landing area, measured from the prolongation of the inside edge of the top of the box.

The cross bar supports must be smooth with a uniform diameter of not more than 13 mm. The cross bar must be circular in cross section between 4480 mm and 4520 mm long and weigh 2.25 kilogram.

The box (See Drawing below) must be constructed of a suitable rigid material and be sunk level with the ground. The 1250 mm wide runway is unlimited but usually between 40 and 45 metres long. Athletes may use their own vaulting poles that may be of any length or diameter provided that they are smooth. Bindings, except at the foot of the pole, may not exceed two layers of adhesive tape of uniform thickness. Today's pole vaulters benefit from poles produced by wrapping sheets of fibreglass around a pole mandrel. Different fibreglass types, including carbon-fibre, are used to give poles specific characteristics to promote higher jumps.

The landing area consists of solid foam mats covered with p.v.c usually between 1000 and 1500 mm thick.

Measurements are made from the ground to the lowest part of the upper side of the bar. Heights are rounded down to the nearest 0.01 metre below the distance measured.



Long jump

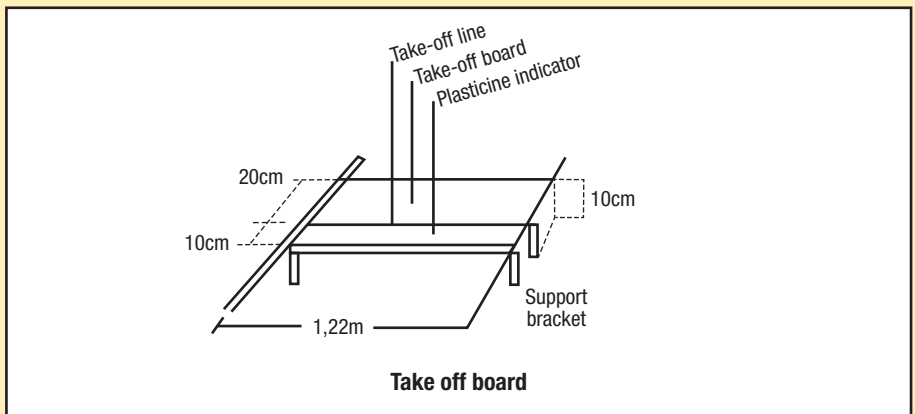
The long jump is a field event in which athletes combine speed, strength and agility in an attempt to land as far as possible from the take off point.

Runway

Athletes sprint down a runway, which is between 1220 – 1250 mm wide, between a minimum of 40 metres and 45 metres long and is usually covered with the same surfaces as the running tracks, and jump as far as possible off a wooden board into a pit filled with finely ground gravel or sand.

Take off board

The take off board is made of wood or any other suitable rigid material and sunk level with the runway. The board, 200 mm wide and 1220 mm long, is placed across the runway at a distance of between one and three metres from the landing area. Beyond the take off board is a tray of plasticine or some similar soft substance to record foot faults. The plasticine tray is 100 mm wide. A take off line separates the board from the plasticine indicator.



Landing area (pit)

The landing area usually filled with fine damp sand, which is raked level with the take off board after every jump, is between 1750 mm and 2000 mm wide and the distance from the take off line and the end of the pit should not be less than 10 metre long. The sides of the pit may have boards placed on either side to contain the sand.

A jump is measured from the nearest break in the landing area made by any part of the athlete to the take off line and at right angles to it. The distance measured is rounded down to the nearest 0,01 metre if the distance measured includes a fraction of a centimetre. To-date jumps over 8.95 metres have been officially recorded although wind assisted jumps of 8.99 metre have been made.

Triple jump

The triple jump is a field event where the jump comprises a hop, a step and a jump. The hop is made so that the athlete lands first on the same foot as that from which he/she has taken off, in the step he/she must land on the other foot, from which, subsequently, the jump is performed.

Runway

Athletes sprint down a runway, which is between 1220 – 1250 mm wide, between a minimum of 40 metres and 45 metres long and is usually covered with the same surfaces as the running tracks, and jump as far as possible off a wooden board into a pit filled with finely ground gravel or sand.

Take off board

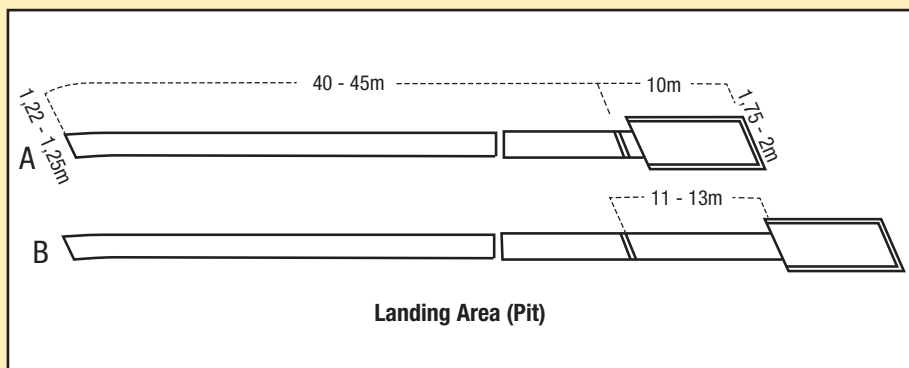
The take off board is made of wood or any other suitable rigid material and sunk level with the runway. The board, 200 mm wide and 1220 mm long, is placed across the runway at a distance of between one and three metres from the landing area.

Beyond the take off board is a tray of plasticine or some similar soft substance to record foot faults. The plasticine tray is 100 mm wide. A take off line separates the board from the plasticine indicator.

Landing area (pit)

The landing area usually filled with fine damp sand, which is raked level with the take off board after every jump, is between 1750 mm and 2000 mm wide and the distance from the take off line and the NEAREST end of the pit should not be less than 11 metre long for women and 13 metre for men. The sides of the pit may have boards placed on either side to contain the sand.

A jump is measured from the nearest break in the landing area made by any part of the athlete to the take off line and at right angles to it. The distance measured is rounded down to the nearest 0,01 metre if the distance measured includes a fraction of a centimetre. To-date jumps of 18.29 metres have been officially recorded.



1.4.3 Baseball

Baseball is a bat-and-ball sport played between two teams of nine players each. The goal of baseball is to score runs by hitting a thrown ball with a bat and touching a series of four markers called bases arranged at the corners of a 27.4 metre square diamond.

(See Drawing Below)

Players on one team take turns hitting while the defence tries to stop them from scoring runs by getting hitters out in several ways. The teams switch between offence and defence whenever the team gets three players out. The pitcher's mound is located in the centre infield. It is a 5.5 metre diameter mound of earth no higher than 254 mm above the general playing field.

Near the centre of the mound is the pitching rubber, a rubber slab positioned 18.4 metre from home plate. The pitcher must have one foot on the rubber at the start of every pitch to a batter, but the pitcher may leave the mound area once the ball is released. The pitching rubber is 610 mm long and 150 mm wide.

Baseball equipment

The regulations governing the specifications of the various baseball equipment pieces vary from league to league so players are cautioned to verify the rules prior to purchasing an individual piece of equipment.

Bats

Although a variety of aluminium alloys and graphite composite bats are available in professional leagues only Ash and Maple wooden bats may be used.

The length and weight of the bats vary and are generally chosen by players according to individual likes. The rules governing the performance characteristics of the bats vary from league to league and should be verified prior to purchase.

Baseball gloves

Choosing a baseball glove depends on a number of factors, these include the following:

- Fielding position
- Hand size
- Level of play
- Personal preference
- Pocket depth
- Size of Webbing

Protective head gear

As in the equipment indicated above the protective head gear is subject to personal preference and should be verified with individual league prior to purchase.

Construction of playing field

The general specification of the sub-surface may vary dependant on site conditions and should be in terms with a Civil Engineers specifications. The general specification may, however, be described as follows:

- Remove all topsoil. Remove all topsoil and level earth platform to correct site development levels with particular emphasis on natural sub-soil drainage.
- Rip and compact in-situ earth to 93 % modified AASHTO.
- Install sub-surface drainage comprising 110 mm diameter agricultural drains placed in 450 x 600 mm deep herring bone drainage system at 6 metre intervals and to entire perimeter of the field.

Sub-surface drains to be lined with a “Bidum” Hessian layer and filled in with 19 mm crusher run stone. Sub-Surface drains to connect at the lowest point to a storm water catch pit which should be connected to a storm water main.

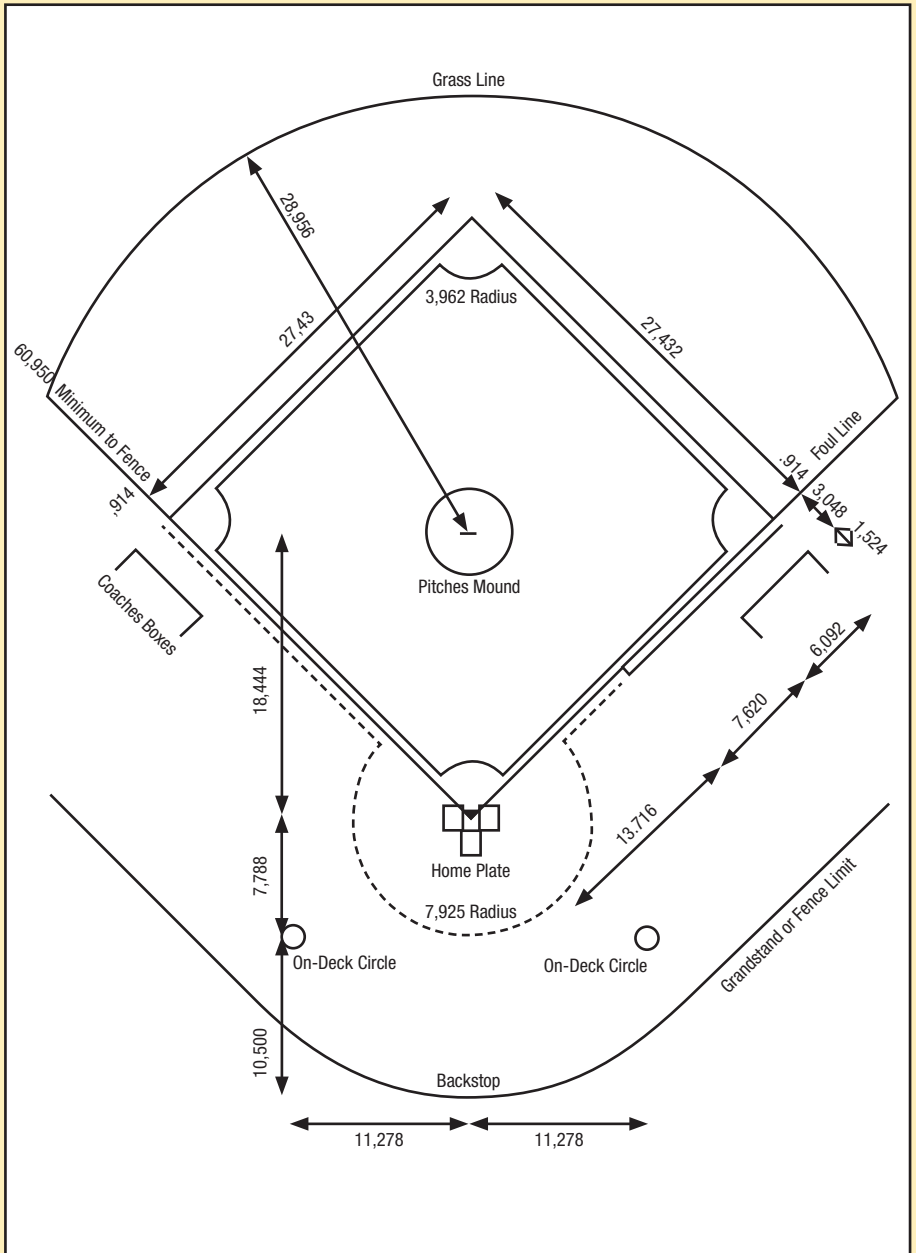
- The sub-surface drains are then covered with a 100 mm thick layer of crusher run to assist in the sub-surface drainage (Optional layer dependant on the drainage characteristics of the in-situ soil). The crusher run layer is levelled, lightly compacted and covered with a 25 mm thick layer of course river sand.
- Import, spread and level 100 mm thick layer of weed free top soil and compact lightly.
- Fertilise soil as per chemical soil analysis and grass with either Kikuyu grass or alternatively with “Golfing Green” grass.
- Once the grass is established, top dress.
- Cover grass with thin layer of sieved top soil to a depth of not more than 15 mm over the grass and smooth.
- Water daily or as may be required.
- Regular soil tests should be taken to ensure that the correct fertilisation program is carried out.
- Grass matting should be avoided and always controlled by vertical cutting. Length of grass should never be longer than 15 mm when played on.

THE MOUND

The mound is constructed out of compacted earth with the following dimensions:

- 5.5 Metre diameter mound of earth no higher than 254 mm above the general playing field.

BASEBALL FIELD



1.4.4 Badminton

Badminton is a racquet sport played by either two opposing players or two opposing pairs, who take up positions on opposite halves of a rectangular court that is divided by a net. Players score points by striking a shuttlecock with their racquet so that it passes over the net and lands in the opponent's half of the court. A rally ends when the shuttlecock strikes the ground, and the shuttlecock may only be struck once by either side before it passes over the net.

The court

The court is rectangular 6.10 metres wide and 13.40 metres long. The court is divided into halves by a net (See drawing below). Markings should be in white, yellow or any other easily distinguishable colour.

The service courts are marked by a centre line dividing the width of the court, by a short service line at a distance of 1980 mm from the net and by the outer side and back boundaries. In doubles, the service court is also marked by a long service line which is 780 mm from the back boundary. The lines should be 40 mm wide and are included in the overall dimensions of the court.

The courts are constructed as indoor facilities and although there is no mention in the Laws of Badminton of a minimum ceiling height, a badminton court will not be suitable if the ceiling is likely to be hit by a high serve.

The court surface is wood and bituminous material. Concrete and carpet should be avoided as these surfaces may lead to injury.

The posts

The posts are 1550 mm high and should be sufficiently rigid to support the net under tension. They are placed on the side of the boundary lines of the court. The posts or its supports shall not extend into the court.

The net

The net made from a fine cord of dark colour and even thickness with a mesh of not less than 15 mm and not more than 20 mm, should be 760 mm deep and at least 6.10 metres wide.

The top of the net should be edged with a 75 mm white tape doubled over a cord or cable running through the tape. The tape should rest upon the cord or cable.

The cord or cable should be stretched firmly, flush with the top of the posts. The top of the net from the surface of the court should be 1524 mm at the centre of the court and 1550 mm over the side lines for doubles.

There should be no gaps between the ends of the net and the posts and the full depth of the net should preferably be tied to the posts.

Shuttle

The shuttle should be made of natural or synthetic material with the flight characteristics similar to those produced by a natural feathered shuttle with a cork base covered by a thin layer of leather.

The shuttle should have the following characteristics:

- The shuttle should have 16 feathers fixed in the base.
- The feathers should have a uniform length between 62 mm and 70 mm from the tip to the top of the base.

- The tips of the feathers should lie in a circle with a diameter from 58 mm to 68 mm.
- The feather should be fastened firmly with a thread or a suitable material.
- The base should be 25 mm to 28 mm in diameter and rounded at the bottom.
- The shuttle should weigh between 4.74 and 5.50 grams.

To test a shuttle, a player shall use a full underhand stroke which makes contact with the shuttle over the back boundary line. The shuttle shall be hit at an upward angle and in a direction parallel to the side lines. A shuttle of correct speed should land not less than 530 mm and not more than 990 mm short of the back boundary line. These positions should be clearly marked on the court surface with a 40 mm wide by 40 mm long line on the “singles” side line.

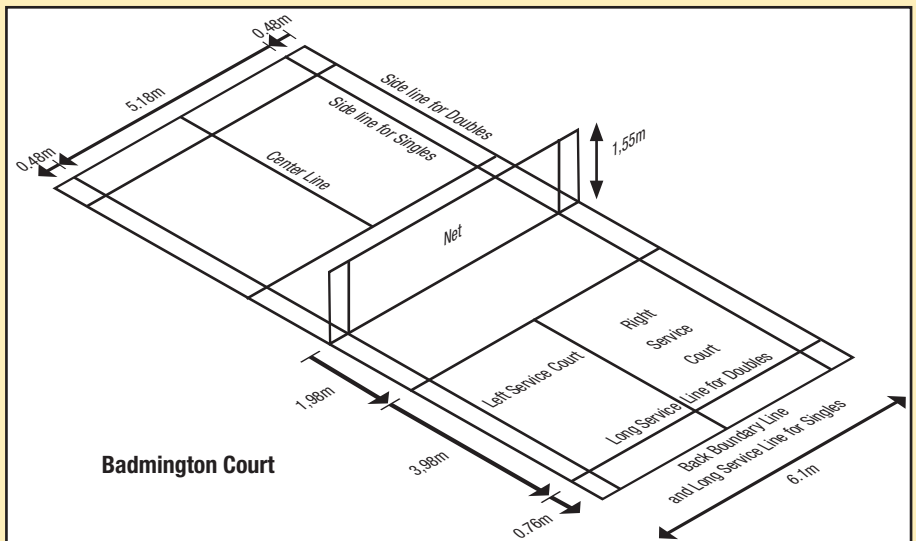
Racket

The racket is usually made of wood, steel or carbon fibre composites. The frame of the racket, including the handle, may not exceed 680 mm in overall length and 220 mm in overall width. The head of the racket should not exceed 280 mm in overall length and 220 mm in overall width. The strings may, however, extend into an area which otherwise would be the throat, provided that the width of the extended area does not exceed 35 mm and the overall length of the stringed area in such cases does not exceed 330 mm.

The racket should also be free of any attached objects and protrusions, other than those used solely and specifically to limit or prevent wear and tear, or vibration, or to distribute weight, or to secure the handle by cord to the player's hand, and which are reasonable in size and placement for such purposes.

The racket shall be free of any device that makes it possible to materially change the shape of the racket.

Badminton strings are thin, high performance strings and range in thickness between 0.65 mm and 0.73 mm and may be strung to any tension desired by any individual player. The thickness of the grip of the racket may be to individual player's discretion.



1.4.5 Basketball

Basketball is a team sport in which two teams of five players try to score points against one another by throwing a ball through a raised steel hoop fixed to a backboard.

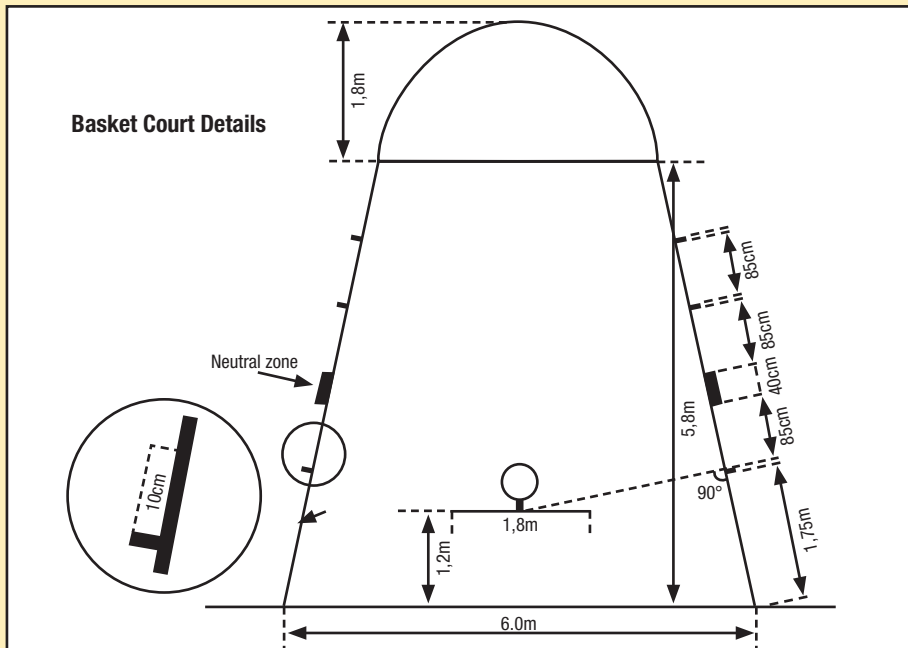
The court

The court must have a hard surface (not grass) and be 29.0 metres long and 15 metres wide. (See Drawing Below). Although the length may vary by two metres and its width by one metre, the proportions must be retained (See Drawing Below). If situated indoors, the ceiling should be at least 7.0 metres high.

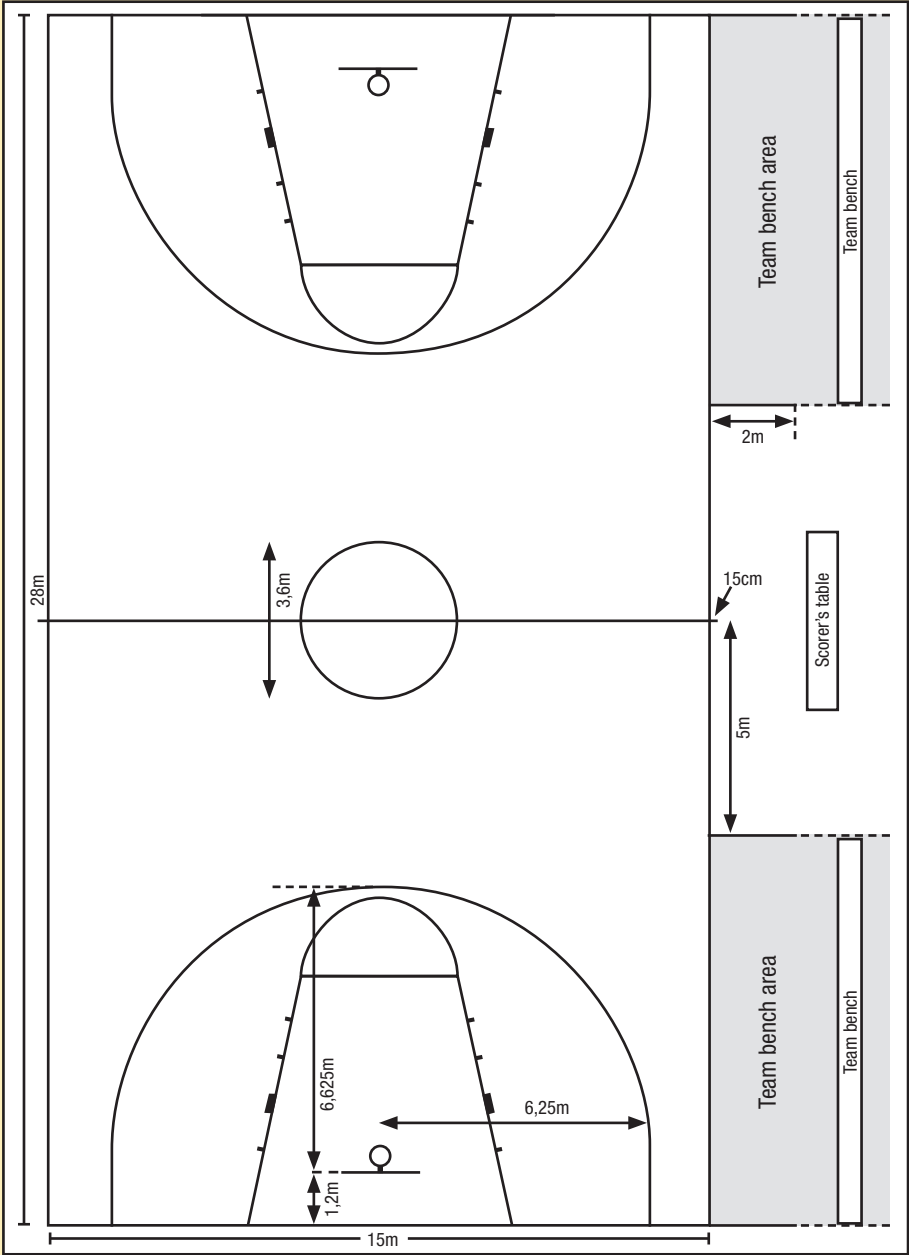
The court is divided into two equal halves with centre dividing line. The centre circle has a radius of 1.80 metre and a free throw line is drawn 5.90 metre from the end line. The measurements for the restricted areas and free-throw lanes are set out in the diagram below.

The backboard

There must be a 1800 mm wide and 1200 mm high backboard at each end of the court. It must be made of wood or a suitable transparent material. The front of the board is flat and unless it is transparent it is finished in a white colour. The backboard is attached to a rigid steel support bracket as indicated in the diagram below.



Basketball Court



The rings, through which goals are scored, are 450 mm in inner diameter and should be attached horizontally to the backboards at a height of 3.05 metre above the floor. The inside edge of the ring must be 150 mm away from the face of the backboard. The net attached to the ring must be 400 mm long.

The ball

The balls are orange to brown in colour with an outer cover of leather or nylon and a pebbled (indented) surface for grip and control. In men's play a regulation ball is 749 to 762 mm in circumference and 567 to 624 gram in weight. Women's version can be slightly smaller and lighter in weight. When inflated the ball should bounce between 1.20 metre and 1.40 metre when dropped from a height of approximately 1.80 metre.

1.4.6 Bowls

Bowls is a precision sport in which the goal is to roll slightly asymmetrical balls (bowls) closest to a smaller white ball referred to as the "jack". Outdoors the game is played either on grass or artificial playing surfaces referred to as the "green". Indoors it is played on artificial surfaces.

The green

The green should form a square of not less than 36.58 metres and not more than 40.23 metres a side. It must be surrounded by a ditch and a bank. The ditch is 203 mm – 381 mm wide and 51 mm – 203 mm deep below the level of the green, while the bank may not be less than 229 mm high above the level of the green.

The green is divided into spaces 5.48 metre to 5.79 metre wide called rinks. They are numbered consequently and the centre line of each rink is marked on the bank at each end by means of a wooden peg or number.

The four corners of the rink must also be marked. These corner pegs are connected by a green thread drawn tightly along the surface of the green thus defining the boundary of the rink. White pegs fixed on the side of the banks indicate a clear distance of 23.16 metre from the ditch on the line of play. (See Drawing Below)

The mat

The mat must be 610 mm long and 356 mm wide.

The jack

The jack is round and white, 63 mm – 64 mm in diameter and weighs 227 – 283 grams.

Bowls

Bowls are made of wood, rubber or a composite and must be either black or brown in colour and each bowl must bear a distinguishing mark on each side. The minimum diameter for wooden bowls is 117

mm and the maximum diameter is 133.35 mm. The bowls may not weigh more than 1.59 kilogram.

A bowl's bias may not be less than that of the Master Bowl. A Master Bowl is a bowl that has been approved by the International Bowling Board, has the minimum bias required and complies with the laws of the game in all other respects. It is engraved with the words "Master Bowl".

Construction of green

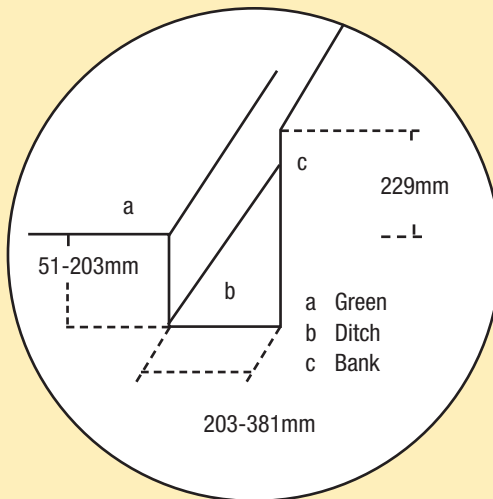
In order to provide a proper playing surface the following preparations need to be done:

- Remove all topsoil and level earth platform to correct site development levels with particular emphasis on natural sub-soil drainage.
- Rip and compact in-situ earth to 93 % modified AASHTO.
- Install sub-surface drainage comprising 110 mm diameter agricultural drains placed in 450 x 600 mm deep herring bone drainage system at 6 metre intervals and to entire perimeter of the bowling green. Sub-surface drains to be lined with a "Bidum" Hessian layer and filled in with 19 mm crusher run stone. Sub-Surface drains to connect at the lowest point to a storm water catch pit which should be connected to a storm water main.
- The sub-surface drains are then covered with a 150 mm thick layer of crusher run to assist in the sub-surface drainage.
- The crusher run layer is levelled, lightly compacted and covered with a 25 mm thick layer of course river sand.
- Return or import top soil to an even thickness of 200 mm spread and levelled in 50 mm thick layers to a true level with a gradient of not more than 3 mm in 3000 mm. All stones to be removed.
- Grade by a ridge grader, or other approved implement to remove dips, hollows, ridges, moulds etc. four times in two directions to produce a smooth and even surface.
- Lightly harrow and flat roll alternatively two times in two directions crosswise, to produce a level, fine and smooth formed seed bed.
- Remove any surface stones exceeding 10 mm.
- Apply %:1:5, 10:1:10, 4:3:4 or equal approved fertiliser at 50 grams per square metre, or 5 -10 grams sulphate of ammonia, 30 grams of superphosphate or lime and 15 grams of potash per square metre. (Note: It is advisable to have the top soil chemically and physically analysed to ensure that the correct fertilisers and application rates are applied).
- Sow the specified grass seed at the prescribed rate using an effective seed broadcaster. The seed quantity must be halved and applied in two equal sowings in transverse directions. (Typical grass types may be mixture of 80% Chewings Fescue and 20% Browntop Bent. Alternatively Carter's Hurlingham mix)

- Lightly harrow the seed twice in two directions crosswise into the immediate surface.
- Remove any surface stones that may be loosed by this operation and finally twice roll with a light flat roller.
- Water the green as necessary. All seeded areas normally require at least six satisfactory mowings of the grass before being finally cut to a length of 4 mm in the active growing season.
- Cutting to be done with a 9 – 11 blade per cylinder cylindrical mower.
- Winter Treatment:

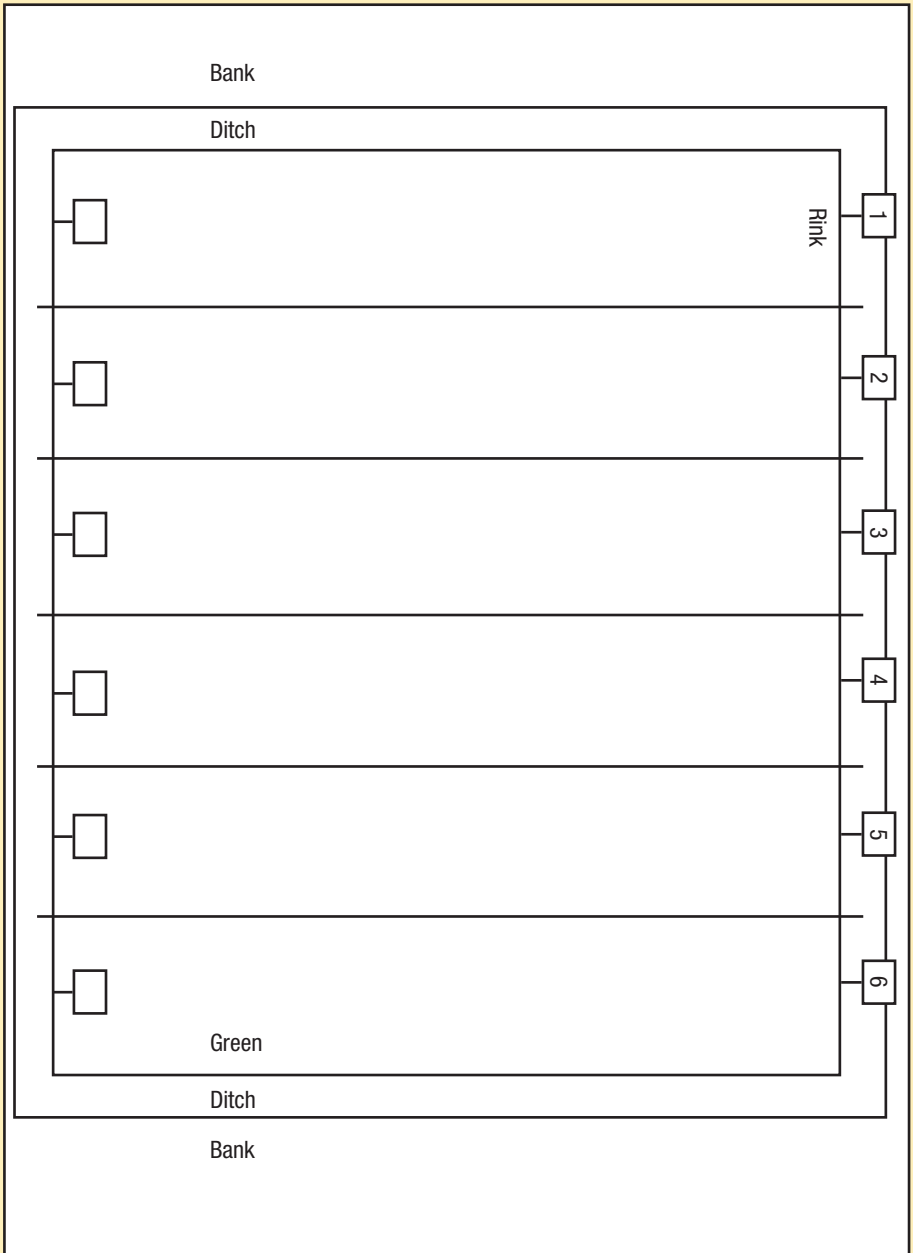
Hollow tinning and scarifying, followed by top dressing with “Lignitic Fine” (Sand and Organic Mixture). Winter treatment to be completed before the middle of August each year.

- Remove dry thatch regularly.
- Pest control, weeds, algae, fungi and damageable insects are to be controlled on an ongoing basis.
- Cut all surrounds regularly, irrigate as needed and fertilise with nitrogen and potassium once every 30 days.



Bowls - construction of green

Bowls - construction of green



1.4.7 Boxing

Boxing is a combat sport in which two participants of similar weight fight each other with their fists. Fights take place in boxing rings and boxers wear protective gloves, genital protectors, mouth protectors and in amateur fights wear protective head gear.

The ring

In terms with World Boxing Association rules the rings used in World Championship bouts are to measure no less 5.486 metre on all four sides and no more than 7.315 metre on all four sides between the ropes. The ring floor shall not extend further than 457.2 mm beyond the ropes.

The ring padding must consist of a 25 mm thick layer of “Ensolite Boxing Ring Pad” or similar material applied over a 25 mm thick base of Celotex Building Board or similar material. The padding must be covered with canvas, drill or similar material tied tightly under the platform.

All boxing rings must be equipped with four parallel ring ropes each of no less than 25 mm diameter thick. The ropes are to be constructed out of either manila, synthetic or plastic or any similar material and may not have any metal particles in them. The first rope must be positioned 457 mm above the ring floor level, the second rope to be positioned at 762 mm above the ring floor, the third rope is to be positioned 1067 mm above the ring floor and the fourth rope is to be positioned 1372 mm above the ring floor.

The ropes are secured to the ring floor with rigid steel uprights that are covered with protective material and must be secured on the outside of the extended ring floor with the ring ropes secured with diagonal ropes at each rope level. The floor of the ring may be raised and in each case the supporting structure must be verified by a Registered Structural Engineer.

The gloves

The weight of the gloves to be used in world championship bouts must be as follows:

- From Super Welterweight up to and including Heavyweight, ten (10) ounces.
- From Minimum up to and including Welterweight, eight (8) ounces.
- When in the contract of boxers the gloves trademark is not established, the Local Commissioner shall decide the glove trademark to be used.

Bandage

In all categories including Middleweight the bandage shall be of no more than ten (10) yards of soft gauze of no more than 25 mm wide and no more than 1.83m of surgeon's tape on each hand.

In categories between Middleweight and up and including heavyweights the bandage shall be of no more than twelve (12) yards of soft gauze of no more than 25 mm wide and no more than 2.43m of surgeon's tape on each hand. The binding of the surgeon's tape must not be applied in less than 25mm from the knuckles of the contender's hands.

The style of the bandage shall be free, being understood that the boxer may use his or her bandage as he or she likes, provided that the knuckles of his or her hands are not covered by the surgeon's tape.

Boxer weight categories

Mini Flyweight	47.63 Kilograms
Light Fly	48.99 Kilograms.
Flyweight	50.80 Kilograms
Super Flyweight	52.16 Kilograms
Bantamweight	53.52 Kilograms
Super Bantamweight	55.34 Kilograms
Featherweight	57.15 Kilograms
Super Feather	58.97 Kilograms
Lightweight	61.23 Kilograms
Super Lightweight	63.50 Kilograms
Welter Weight	66.68 Kilograms
Super Welterweight	69.85 Kilograms
Middleweight	72.57 Kilograms
Super Middleweight	76.20 Kilograms
Light Heavyweight	79.38 Kilograms
Cruiserweight	86.18 Kilograms
Heavyweight	86.18 Kilograms (+)

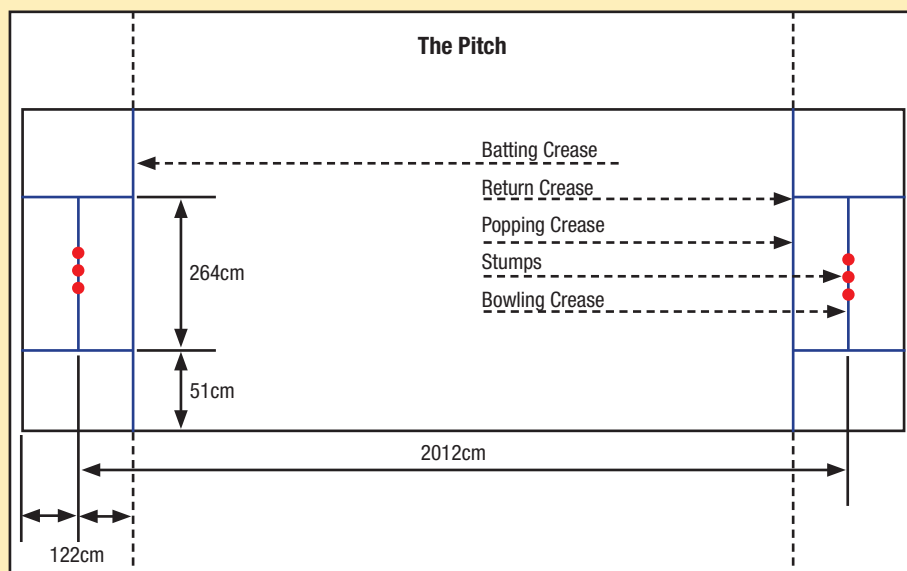
1.4.8 Cricket

Cricket is a bat-and-ball game played by two teams consisting of eleven players per team each with a twelfth man who is a fielding reserve. A cricket match is played on a grass field in the centre of which is a cricket pitch which has wickets placed at either end.

Bowlers use a hard ball to bowl at batsmen (or women) who use a bat to hit the ball in an attempt to score runs by exchanging ends with a team mate. Each completed exchange of ends scores one run. Runs are also scored if the batsman hits the ball to the boundary either reaching the boundary for a four or by hitting the ball over the boundary without bouncing, scoring a six. The team that scores the most runs wins the game.

The pitch

The pitch is located in the centre of the playing field and its width is 1.52 metre to either side of the centre line joining the wicket's centre stump. The length between the two sets of wickets at either end of the pitch is 20.12 metre (22 yards) with an additional 1220 mm recommended on either side as part of the Bowler's run up. The ball is bowled from a line situated 1220 mm from the wickets (within the 20.12 metre area) referred to as the popping crease and must be at least 1.83 metre on either side of the line of the wicket. (See Drawing Below). There may be more than one pitch placed next to each other and is referred to as "The Square". Pitches may also be constructed out of concrete and covered with either a coir mat or artificial turf.



These surfaces are normally reserved for junior players only.

The wickets

Two sets of wickets, each with 228.6 mm wide and consisting of three stumps with two wooden bails placed on the top, are pitched opposite and parallel to each other.

The stumps must be equal in size and big enough to prevent the ball from passing between them. The top of the wickets must be 710 mm above the ground and with the exception of the bail grooves must be dome-shaped.

The bails must each be 111 mm long and when placed on top of the stumps must not project more than 13 mm above the stumps.

The outfield

The boundaries of the field are a minimum of 130.00 metres square of the pitch. The pitch should be a minimum of 55.00 metres from one of the boundaries square of the pitch. When this minimum distance is used the pitch has to be a minimum of 73 metre from the opposite square boundary. The straight boundary at both ends of the pitch shall be a minimum of 55.00 metre from the centre of the pitch.

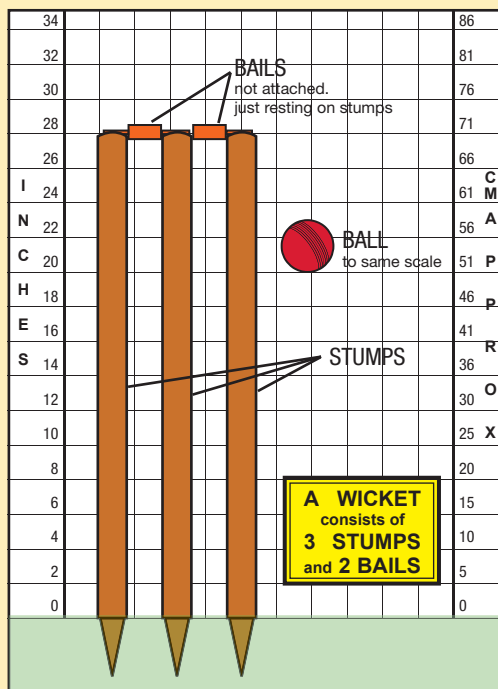
The boundary should be marked by a white line, a rope laid on the ground or a boundary fence. If only flags or posts are used an imaginary line joining the flags or posts is regarded as the boundary.

The ball

The ball is round, is covered with leather and has a stitched seam. The leather may be in either two or four parts. For senior games the ball has a circumference of between 224 mm and 229 mm and weighs 155.9 and 163 gram (termed a 156 gram ball). Junior players play with either a 115 gram or a 135 gram ball.

The bat

The bat is made out of wood (either English or Pakistan Willow) and may not be longer than 965 mm and may not be wider than 108 mm at its widest. Various sizes and weights are available for all ages of players.



Sight screens

Sight screens are placed on opposite sides of the field behind the bowlers bowling arm to assist the batsmen in seeing the ball. The sight screens may be fixed or moveable and should be high enough so that the ball is visible below the top of the screen, from the batsman's point of view, at point of the delivery of the ball by the bowler.

The sights screens should thus be at least 4.0 metres high and if fixed, must project at least one pitch width beyond either side of the "Square". The sight screens may be constructed out of various materials but should be painted white for day games and covered with a black material for games played under lights during the evening (When a white ball is used for play).

Player's equipment

The batsmen (or women) wear batting gloves, padded leg pads, abdominal protectors, thigh guards, arm guards and protective head gear.

The wicket keeper wears wicket-keepers gloves and padded leg pads. Players normally wear white shirts and flannel trousers for multiple innings games and coloured clothing for "limited over" games.

Construction of the pitch

THE OUTFIELDS

The construction of the cricket outfields needs to be carried out prior to the construction of the cricket pitches.

The general specification of the sub-surface may vary dependant on site conditions and should be in terms with a Civil Engineers specifications. The general specification may, however, be described as follows:

- Remove all topsoil. Remove all topsoil and level earth platform to correct site development levels with particular emphasis on natural sub-soil drainage.
- Rip and compact in-situ earth to 90 % modified AASHTO.
- Install sub-surface drainage comprising 110 mm diameter agricultural drains placed in 450 x 600 mm deep herring bone drainage system at 6 metre intervals and to entire perimeter of the cricket field.

Sub-surface drains to be lined with a "Bidum" Hessian layer and filled in with 19 mm crusher run stone.

Sub-Surface drains to connect at the lowest point to a storm water catch pit which should be connected to a storm water main.

- The sub-surface drains are then covered with a 100 mm thick layer of crusher run to assist in the sub-surface drainage. (Optional – Dependant on the drainage characteristics of the in-situ soil)
- The crusher run layer is levelled, lightly compacted and covered with a layer of Bidum U14.
- Import, spread and level 100 mm thick layer of weed free top soil and compact lightly.

GRASS

- Fertilise soil as per chemical soil analysis and grass with either Kikuyu grass or alternatively with “Golfing Green” grass.
- Once the grass is established, top dress.
- Cover grass with thin layer of sieved top soil to a depth of not more than 15 mm over the grass and smooth.
- Water daily or as may be required.
- Regular soil tests should be taken to ensure that the correct fertilisation program is carried out.
- Grass matting should be avoided and always controlled by vertical cutting. Length of grass should never be longer than 15 mm when played on.

CONSTRUCTION OF THE PITCH

The construction of the cricket pitch should be done by a specialist contractor and with great care and all materials used should be chemically and physically analysed to ensure that the final product produces a cricket pitch that will prevent the pitch from disintegrating when used.

- Remove all top soil from the area of the square.
- Excavate out natural earth to a depth of at least 450 mm to Civil Engineering specification. (Depth may vary dependant on the carrying capacity of the soil)
- Rip and compact in-situ earth to 93% modified AASHTO.
- Install sub-surface drainage comprising 110 mm diameter agricultural drains placed in 450 x 600 mm deep herring bone drainage system at 6 metre intervals and to entire perimeter of the cricket pitch or square.

Sub-surface drains to be lined with a “Bidum” Hessian layer and filled in with 19 mm crusher run stone. Sub-Surface drains to connect at the lowest point to a storm water catch pit which should be connected to a storm water main.

- The sub-surface drains are then covered with a 150 mm thick layer of crusher run to assist in the sub-surface drainage compacted to 95 % modified AASHTO.
- Lay strip of 250 micron plastic down the edges of the excavation to prevent encroachment of invader grass species.

The crusher run layer is covered with a 50 mm thick layer of coarse river sand.

- Add 100 mm thick layer of loam soil and mix in fertiliser as required by soil analysis.
- A grid of levelling pegs is to be set out by the specialist contractor at two metre intervals with a longitudinal fall of 1:180 and a cross fall of 1:180. It is important to ensure that the pegs do not pierce the geo-textile layer.
- Roll in 150 mm thick clay in layers. A 100mm coarse bully soil is to be spread, lightly compacted and finished to an appropriate level. A 50 mm layer of fine bully soil is to be spread and screeded to the final level of the grid pegs, ensuring that the desired surface finish and fall is attached.
- Wash grass sods to remove all soil and tease sprig apart.
- Prior to the commencement of grassing a true surface finish must be obtained, as detailed above. Grass stolons (sprigs) of the species *Cynodon dactylon* (or latest approved grass species) are to be planted over the entire wicket (all wickets of “the square”) at a square spacing of 30mm apart. The planters must stand on wooden boards, or the like, whilst planting the stolons to ensure minimum disruption to the surface finish occurs. The stolons must be inserted to the layer of topsoil/compost mixture to ensure adequate root development. Add a thin layer of sieved bully to a depth of not more than 15 mm (sieve aperture of maximum 10 mm) over the grass and smooth.
- Apply fertiliser and water twice daily with a fine nozzle spray until grass shown signs of sprouting.
- The contractor shall maintain in good order, the whole of the works, for a period of six months after the certified completion of grass planting.
- Continue to water until the grass has covered the pitch.
- Once the grass has established, cut to 15 mm and rub in sieved (1.25 mm gauge screen) bully, to a smooth even surface, making sure that the grass tips protrude above the bully.
- Water daily, as required, until the grass shoots push through.
- Repeat the rubbing in process until a smooth even finish to the pitch has been achieved. The final level of the pitch should be slightly above the surrounding field area.
- Commence with normal pitch preparation once all grass has grown through. The height

of the grass must gradually be worked down to 6mm and the height of the grass is not to exceed 10mm between cuts.

- Cutting to be done with a 9 – 11 blade per cylinder cylindrical mower.
- Hand weeding must be undertaken at least once a week for the first three months of maintenance. Care must be taken to ensure that the surface levels are not disrupted excessively.

Compact with heavy roller to produce a hard even surface so that it is not possible to create indentations with your fingers

MAINTENANCE

• Winter Treatment:

Dormant surface growth, to stimulate new spring growth, to be removed. Hollow tining by removing cores approximately 50 mm apart in the surface and fill holes with bulli. Winter treatment to be completed before the middle of August each year.

- Remove dry thatch regularly.
- Pest control, weeds, algae, fungi and damageable insects are to be controlled on an ongoing basis.
- Cut all surrounds regularly, irrigate by flooding at least 5 mm on the complete area during a period of two days or as needed and fertilise in terms with the chemical soil analysis.

THE OUTFIELDS

The construction of the cricket outfields needs to be carried out prior to the construction of the cricket pitches.

The general specification of the sub-surface may vary dependant on site conditions and should be in terms with a Civil Engineers specifications. The general specification may, however, be described as follows:

- Remove all topsoil. Remove all topsoil and level earth platform to correct site development levels with particular emphasis on natural sub-soil drainage.
- Rip and compact in-situ earth to 93 % modified AASHTO.
- Install sub-surface drainage comprising 110 mm diameter agricultural drains placed in 450 x 600 mm deep herring bone drainage system at 6 metre intervals and to entire perimeter of the cricket field.

Sub-surface drains to be lined with a “Bidum” Hessian layer and filled in with 19 mm crusher run stone.

Sub-Surface drains to connect at the lowest point to a storm water catch pit which should be connected to a storm water main.

- The sub-surface drains are then covered with a 100 mm thick layer of crusher run to assist in the sub-surface drainage.
- The crusher run layer is levelled, lightly compacted and covered with a 25 mm thick layer of course river sand.
- Import, spread and level 100 mm thick layer of weed free top soil and compact lightly.
- Fertilise soil as per chemical soil analysis and grass with either Kikuyu grass or alternatively with “Golfing Green” grass.
- Once the grass is established, top dress.
- Cover grass with thin layer of sieved top soil to a depth of not more than 15 mm over the grass and smooth.
- Water daily or as may be required.
- Regular soil tests should be taken to ensure that the correct fertilisation program is carried out.
- Grass matting should be avoided and always controlled by vertical cutting. Length of grass should never be longer than 15 mm when played on.

Practice net facilities

The practice net ground preparations and sizes, whether concrete or turf pitches, are same as those described above.

The net enclosures are to be constructed out of 50 mm diameter mild steel framework (either painted or galvanised) covered with a 40 mm nylon netting to the sides and a 3.00 metre long section above the batting crease.

The overall side netting length should be at least 9.10 metres long to ensure the safety of spectators and fellow athletes. The overall height of the net facilities should be at least 3.00 metres high.

Note:

For indoor net facilities specifications refer to multi-purpose hall specifications in this document.

1.4.9 Football (Soccer)

Football is a ball game where two teams of eleven players each, kick of a ball in an attempt to score a goal. The game may be played either indoors (See Multi-Purpose Halls) or outdoors on a rectangular playing field that may not be longer than 120 metres and not shorter than 90 metres and it may not be more than 90 metres or less than 45 metres wide.

The field must be clearly marked with lines that are wider than 120 mm. A halfway line is marked across the centre of the field. A suitable mark indicating the centre of the field is surrounded by a circle with a radius of 1500 mm. Penalty areas, in front of the goal posts, are also marked at each end of the field (See Drawing Below).

Flags are placed at each corner on a post not less than 1500 mm high. Similar flags are placed opposite the halfway line on each side of the field of play and not less than 1.00 metre outside the touch line.

Goal area

Two lines are drawn at right angles to the goal line, 5.50 metre from each goal post. These lines extend into the field for 5.50 metre and are joined by a line drawn parallel with the goal line. The space enclosed by these lines is referred to as the goal area.

Penalty area

Two lines are drawn at right angles to the goal line, 16.50 metre from each goal post and are joined by a line drawn parallel with the goal line. The penalty spot is drawn 11 metre from the centre of the goal line. Using the penalty as a centre, an arc of a circle with a radius of 9.15 metre is drawn outside the penalty area.

Corner area

A quadrant with a radius of 900 mm is drawn from each corner post.

Goal posts

The goal posts are 7.32 metre apart (internal dimensions) and are joined by a horizontal cross bar situated 2.64 metre (internal dimension) above the playing field level. The posts and the crossbar must be the same width as the goal line. Nets giving the goalkeeper ample room may be fixed to the rear and the sides of the goal posts. The nets are generally manufactured out of 40 mm rectangular nylon netting.

The ball

The ball is round and has a circumference of 680 – 710 mm and weighs 396 – 453 grams. The outer casing may be made out of leather or other suitable synthetic material provided that the material does not prove to be dangerous to the players.

Player's equipment

A player's compulsory equipment consists of a jersey or shirt, shorts, socks, shin guards, and football boots. One piece suits may not be worn nor any apparel that may endanger another player. The goalkeeper must wear colours that distinguish him or her from the other players and the referee.

Construction of a football field

The construction of the outdoor grass football field may be briefly described as follows:

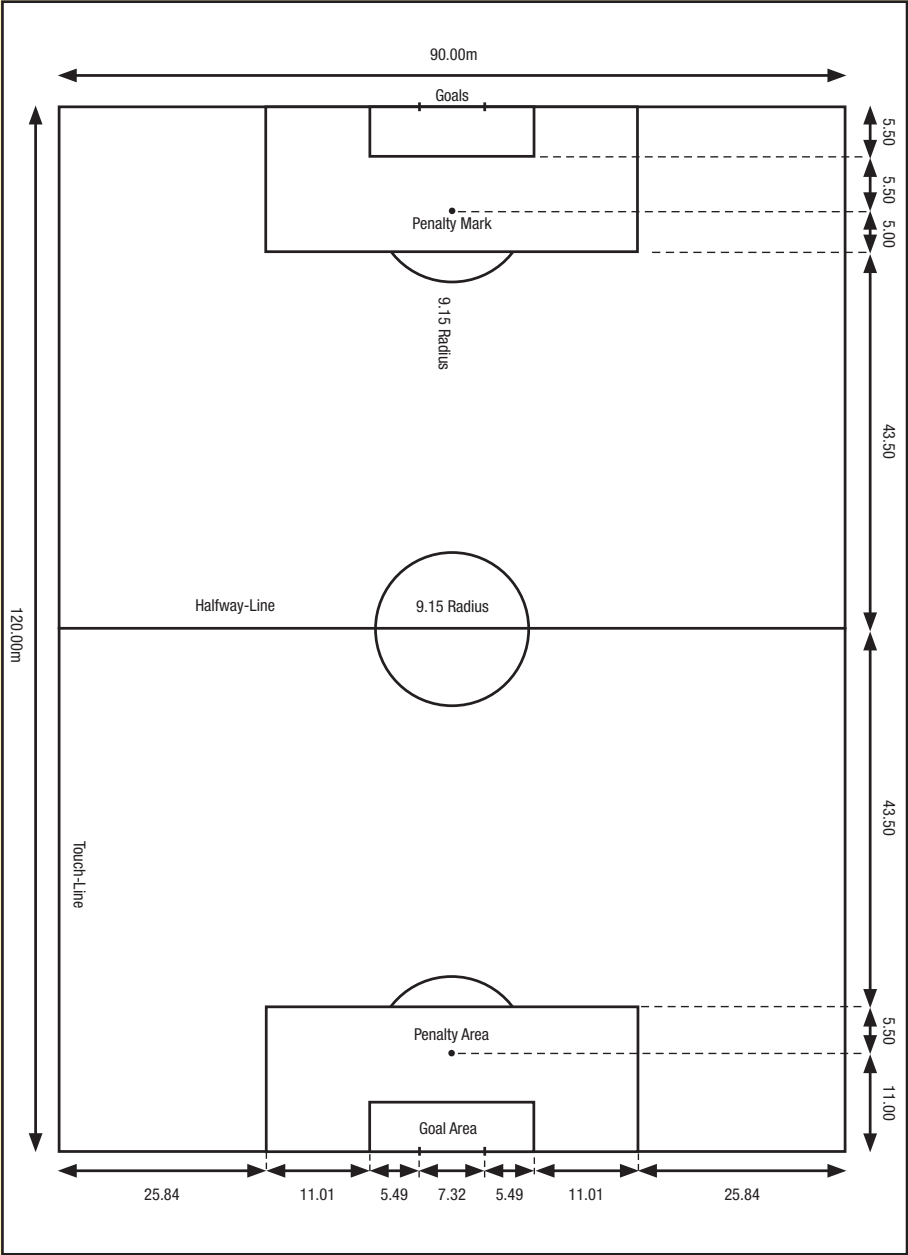
The general specification of the sub-surface may vary dependant on site conditions and should be in terms with a Civil Engineers specifications. The general specification may, however, be described as follows:

- Remove all topsoil. Remove all topsoil and level earth platform to correct site development levels with particular emphasis on natural sub-soil drainage.
- Rip and compact in-situ earth to 93 % modified AASHTO.
- Install sub-surface drainage comprising 110 mm diameter agricultural drains placed in 450 x 600 mm deep herring bone drainage system at 6 metre intervals and to entire perimeter of the cricket field.
- Sub-surface drains to be lined with a "Bidum" Hessian layer and filled in with 19 mm crusher run stone.
- Sub-Surface drains to connect at the lowest point to a storm water catch pit which should be connected to a storm water main.
- The sub-surface drains are to be covered with a 100 mm thick layer of crusher run to assist in the sub-surface drainage (Optional dependent on the drainage characteristics of the in-situ soil).
- The crusher run layer is levelled, lightly compacted and covered with a 25 mm thick layer of course river sand.
- Import, spread and level 100 mm thick layer of weed free top soil and compact lightly.
- Fertilise soil as per chemical soil analysis and grass with either Kikuyu grass or alternatively with "Golfing Green" grass. Once the grass is established, top dress.
- Cover grass with thin layer of sieved top soil to a depth of not more than 15 mm over the grass and smooth.
- Water daily or as may be required.
- Regular soil tests should be taken to ensure that the correct fertilisation program is carried out.
- Grass matting should be avoided and always controlled by vertical cutting. Length of grass should never be longer than 15 mm when played on.

INDOOR FOOTBALL FACILITIES

For details of indoor football facilities see Multi-Purpose Hall specifications elsewhere in this document.

Football (Soccer) Field



1.4.10 Golf

Golf is a sport in which a player, using several types of clubs, hits a ball into each hole on a golf course in the lowest number of strokes. The game is played on golf courses, each with a unique design and typically consists of either 9 or 18 separate holes.

A course consists of a series of holes, each containing a teeing area, fairway, rough and other hazards, a green with a pin and a cup.

The typical length of an eighteen hole is between 5000 and 6000 metres long. The holes usually comprise four par 5 holes, four par 3 holes and ten par 4 holes. Whilst the length of the courses may vary the boundaries need to be clearly defined.

FEATURES OF A HOLE

Teeing ground

A smooth level area on which the play begins.

Fairway

A closely mown strip along which the players aim to hit the ball.

Rough

The rough refers to the unprepared area that flanks the fairway.

Hazards

Hazards may be either natural or bunkers, water features and the like that have been constructed to increase the difficulty factor of play.

Putting green

The putting green is a finely grassed area that contains the hole and cup into which the ball is played.

GOLF EQUIPMENT

Clubs

A player may have a maximum of 14 clubs. Damaged clubs may be replaced during a round or extra clubs may be added if a player started with fewer than 14 clubs provided that he or she does not exceed the total number of clubs.

There are three different types of clubs:

- A wood is a club that is usually made from wood, plastic or a light metal and used for long

shots from the tee or fairway as well as from the rough. A new type of wood known as a Hybrid is often used for long shots from difficult rough.

- Irons have a head that is relatively narrow, made of steel and is normally used for hitting the ball over shorter distances. The irons are numbered from 1 to 9. In addition there is a pitching wedge and a sand wedge.

The difference between the various irons is the angle of the head in relation to the shaft which allows the ball to be hit to various distances. A low number is normally associated with longer distances.

- A putter is a light metal club for hitting a ball on the putting green.

The normal distances associated with the various club numbers are as follows:

- **Woods**

No. 1	200 – 300 m
No. 2	180 – 250 m
No. 3	110 – 220 m
No. 4	100 – 200 m

- **Irons**

No. 2	150 – 190 m
No. 3	140 – 180 m
No. 4	130 – 170 m
No. 5	120 – 160 m
No. 6	110 – 150 m
No. 7	15 – 140 m depending on the type of shot
No. 8	15 – 100 m depending on the type of shot
No. 9	15 – 100 m depending on the type of shot
Pitching Wedge	15 – 100 m depending on the type of shot
Sand Wedge	Normally used for shots from the sand bunkers

- **Putter**

Putter	Normally used on and around the putting greens.
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Golf shafts

Golf shafts are used between the grip and the club head. The profile of the shaft is circular in shape and is usually thicker at the grip end of the shaft. Any strong and light material may be used to manufacture the shafts. Common materials are tempered steel or graphite. The shaft of all clubs other than the putter must be straight.

The ball

The minimum allowed diameter of a golf ball is 42.67 mm and its mass may not exceed 45.93 gram. Modern golf balls have two, three or four layer designs and are constructed from various synthetic materials. The outer surface layer is dimpled with between 300 and 450 dimples designed to improve the flight characteristics of the ball.

The method of construction and materials used greatly affect the balls playing characteristics such as amount of spin, distance travelled, trajectory and feel. Some golf balls are fitted with RFID technology which is a homing device which allows a golfer to locate balls. These devices may also be used to calculate distance and accuracy of shots.

Golf bags

Golf bags are used to hold the golf clubs and sundry equipment and are commonly made from synthetic material, nylon or leather. They may be attached to a two wheeled golf pull cart or attached to a motorised golf cart during play.

Golf carts

Golf carts are electrically motorised carts that normally carry two golfers, their caddies and their golf bags.

Gloves

Players often use gloves on the one hand to improve the grip on the golf club and to prevent blistering.

Pitchfork

A pitchfork is a pitch mark repair tool that golfers use to repair the indentations caused by golf balls striking the putting green surface. To repair a pitch mark the tool is inserted into the ground next to the mark and pushed gently inwards from all sides, loosening the compacted turf to allow the re-growth of grass and the mark is then flattened smooth with the bottom of the putter.

Tees

A tee is an object made from either wood or plastic that is pushed into the ground and the ball is placed in an elevated position on top of it to allow for the first stroke at each hole. (The use is optional when irons are used to take the first stroke).

Scoring

In every form of golf the goal is to play as few shots as possible. Scores for each hole can be described as follows:

TERM ON A SCORE BOARD	SPECIFIC TERM	DEFINITION
-4	Condor (Triple Eagle)	Four strokes under par
-3	Albatross (Double Eagle)	Three strokes under par
-2	Eagle	Two strokes under par
-1	Birdie	One stroke under par
0	Par	Stroke equal to par
+1	Bogey	One stroke over par
+2	Double Bogey	Two strokes over par
+3	Triple Bogey	Three strokes over par

A hole-in-One is scored when a single shot results in the ball falling into the cup. On most golf courses a par round amounts to a total number of 72 shots played.

Construction of a golfing green

The construction of the golfing green should be done with great care and all materials used should be chemically and physically analysed to ensure that the final product produces a cricket pitch that will prevent the pitch from disintegrating when used.

- Remove all top soil from the area of the square.
- Excavate out natural earth to a depth of at least 450 mm to Civil Engineering specification. (Depth may vary dependant on the carrying capacity of the soil)
- Rip and compact in-situ earth to 95% modified AASHTO.
- Install sub-surface drainage comprising 110 mm diameter agricultural drains placed in 450 x 600 mm deep herring bone drainage system at 6 metre intervals and to entire perimeter of the cricket pitch or square.
- Sub-surface drains to be lined with a "Bidum" Hessian layer and filled in with 19 mm crusher run stone.
- Sub-Surface drains to connect at the lowest point to a storm water catch pit which should be connected to a storm water main.

- The sub-surface drains are then covered with a 150 mm thick layer of crusher run to assist in the sub-surface drainage compacted to 95 % modified AASHTO.
- Lay strip of 250 micron plastic down the edges and bottom of the excavation to prevent encroachment of invader grass species.
- The crusher run layer is covered with a 50 mm thick layer of course river sand.
- Add 100 mm thick layer of loam soil and mix in fertiliser as required by soil analysis.
- Roll in 150 mm thick clay in layers (Dependant on the results of the chemical analysis, fertiliser to promote root growth should be mixed into the clay) and compacted.
- Wash grass sods to remove all soil and tease sprigs apart. Lay sprigs on bulli (clay) surface and add a thin layer of sieved bulli to a depth of not more than 15 mm (sieve aperture of maximum 10 mm) over the grass and smooth.
- Apply fertiliser and water twice daily with a fine nozzle spray until grass shows signs of sprouting.
- Continue to water until the grass has covered the pitch.
- Once the grass has established, cut to 15 mm and rub in sieved (1.25 mm gauge screen) bulli, to a smooth even surface, making sure that the grass tips protrude above the bulli.
- Water daily, as required, until the grass shoots push through.
- Repeat the rubbing in process until a smooth even finish to the pitch has been achieved. The final level of the pitch should be slightly above the surrounding field area.
- Commence with normal pitch preparation once all grass has grown through.
- Cutting to be done with a 9 – 11 blade per cylinder cylindrical mower.
- Compact with heavy roller to produce a hard even surface so that it is not possible to create indentations with your fingers..

Maintenance

• Winter Treatment:

Dormant surface growth, to stimulate new spring growth, to be removed. Hollow tinning by removing cores approximately 50 mm apart in the surface and fill holes with bulli. Winter treatment to be completed before the middle of August each year.

- Remove dry thatch regularly.
- Pest control, weeds, algae, fungi and damageable insects are to be controlled on an ongoing basis.
- Cut all surrounds regularly, irrigate by flooding at least 5 mm on the complete area during a period of two days or as needed and fertilise in terms with the chemical soil analysis.

1.4.11. Gymnastics

Gymnastics is a sport involving the performance of exercises requiring physical strength, agility and coordination.

The various forms of exercises (each requiring specific apparatus and space) may be briefly described as the following:

- Uneven Bars
- Balance Beam
- Floor Exercise
- Vault
- High and Parallel Bars
- Still Rings
- Pommel Horse
- Artistic Gymnastics
- Rhythmic Gymnastics
- Trampoline and Tumbling
- Aerobic Gymnastics
- Team Gymnastics
- Display Gymnastics

The above events are generally performed indoors and require the following special characteristics:

General floor area

The overall respective floor areas for the various apparatus are dealt with in detail in the multi-purpose halls section. In general a suspended timber or vinyl sheeted floor suffices for most of the apparatus. Some apparatus will, however, require canvas (or other synthetic material) clad dense foam mats for the Gymnasts personal protection.

Floor events

The floor event takes place on a 12 metre square sprung floor which comprises the following:

- Carpet laid over a hard foam which in turn is placed over a layer of plywood which is supported by springs or dense foam blocks.

1.4.12 Hockey

Hockey is a sport where two teams, of eleven players each, compete by manoeuvring a ball into the opponent's goal using a hockey stick

Hockey is played on fields that may be grassed, sand-based artificial surfaces or water-based artificial surfaces. The field is rectangular 91.40 metres long and 55 metres wide. The longer lines are called sidelines and the shorter lines are called back lines. The goal-line is part of the back line.

Flagposts

Flag posts 1200 – 1500 mm high are placed at each corner of the field and at the centre line 910 mm outside the sidelines.

Shooting circles

A line 3.66 metre long is drawn in front of each goal, parallel to and 14.63 metre from the back line. This line is continued in both directions to meet the back line by quadrants which have the nearest inside corner of the goal-post as their centre.

On both sides of the goal, marks for penalty corners are drawn on the back line inside the field, at distances of 4.55 metre and 9.14 metre from the nearest goal-post. A spot with a diameter of 150 mm is marked in front of the centre of each goal at a distance of 6.40 metre from the goal-line.

Goals

A set of goals consists of two vertical posts 3.66 metre apart, joined by a horizontal crossbar 2.14 metre above the playing field level. The goals have a 460 mm high backboard fixed to two 460 mm high sideboards. Nets are attached to the posts, crossbar and the back and sideboards.

EQUIPMENT

The ball

The ball must be cylindrical in shape and hard and may not weigh less than 156 gram and not more than 163 gram. The ball may be solid or hollow with an outer surface of any natural or synthetic surface.

Stick

The stick may have a flat face on its left hand side only.

The head of the stick must be curved and must be made of wood. It must have rounded edges and there may be no metal fittings, sharp edges or splinters.

The stick may not weigh less than 340 gram or more than 794 gram and it must be able to pass through a ring with an inner diameter of 510 mm.

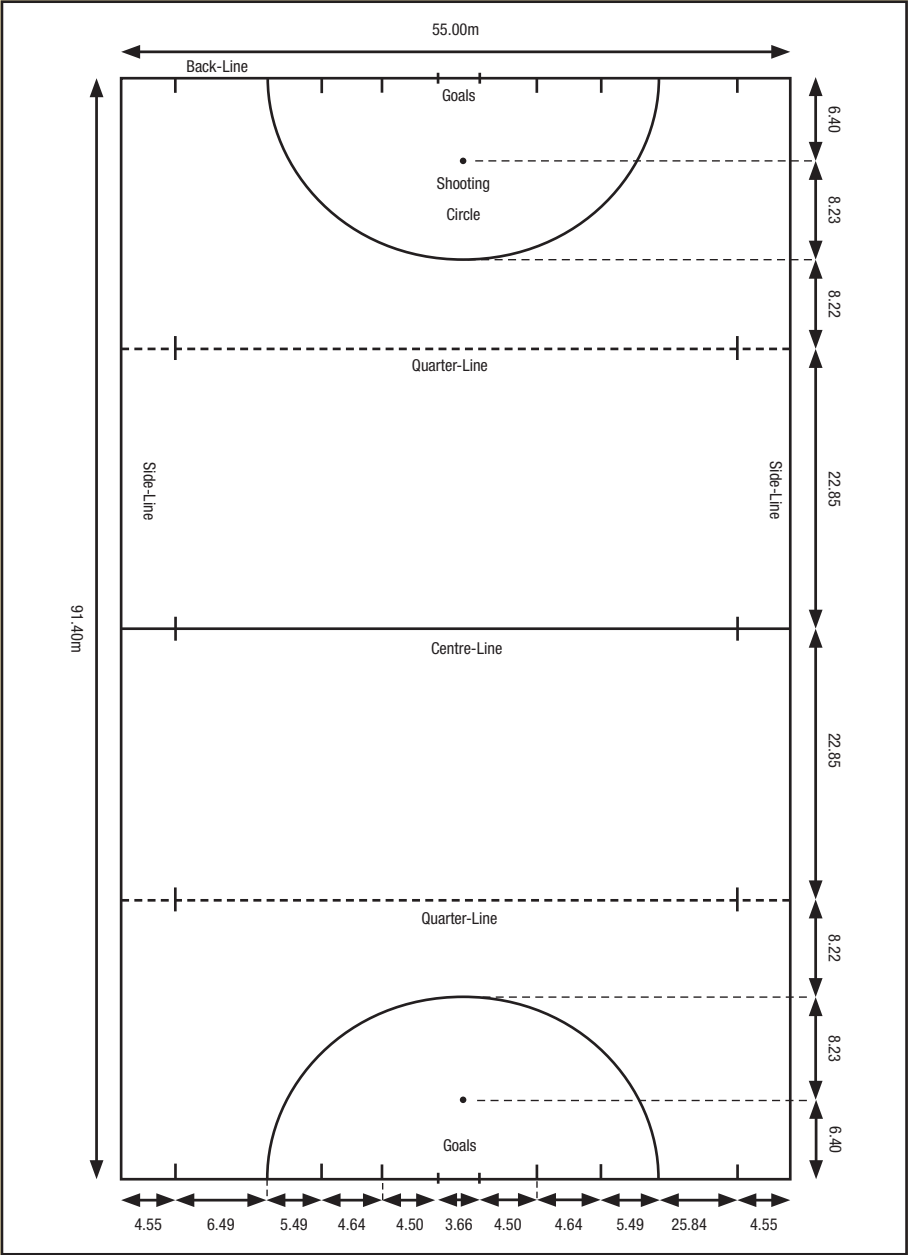
Construction of a grassed hockey field

The construction of the outdoor grass hockey field may be briefly described as follows:

The general specification of the sub-surface may vary dependant on site conditions and should be in terms with a Civil Engineers specifications. The general specification may, however, be described as follows:

- Remove all topsoil. Remove all topsoil and level earth platform to correct site development levels with particular emphasis on natural sub-soil drainage.
- Rip and compact in-situ earth to 93 % modified AASHTO.
- Install sub-surface drainage comprising 110 mm diameter agricultural drains placed in 450 x 600 mm deep herring bone drainage system at 6 metre intervals and to entire perimeter of the cricket field.
- Sub-surface drains to be lined with a “Bidum” Hessian layer and filled in with 19 mm crusher run stone.
- Sub-Surface drains to connect at the lowest point to a storm water catch pit which should be connected to a storm water main.
- The sub-surface drains are then covered with a 100 mm thick layer of crusher run to assist in the sub-surface drainage (Optional dependant on the drainage characteristics of the in-situ soil).
- The crusher run layer is levelled, lightly compacted and covered with a 25 mm thick layer of course river sand.
- Import (if necessary) spread and level 100 mm thick layer of weed free top soil and compact lightly.
- Fertilise soil as per chemical soil analysis and grass with either Kikuyu grass or alternatively with “Golfing Green” grass.
- Once the grass is established, top dress.
- Cover grass with thin layer of sieved of top soil to a depth of not more than 15 mm over the grass and smooth.
- Water daily or as may be required.
- Regular soil tests should be taken to ensure that the correct fertilisation program is carried out.
- Grass matting should be avoided and always controlled by vertical cutting. Length of grass should never be longer than 15 mm when played on.

Hockey Field



ARTIFICIAL SURFACES

Artificial turf is a man-made surface manufactured from synthetic materials, made to look like natural grass.

There are three different types of artificial grass surfaces used in hockey:

- **Unfilled:** Often called water-based where the pile is not filled with sand and the field requires wetting prior to play dependant on climatic conditions. These surfaces are favoured by players as they minimise the abrasive effect created by the sand filling that the other systems require.
- **Sand Dressed:** The pile of the carpet is filled to within 5 – 8 mm of the top of the fibre with fine sand.
- **Sand Filled:** The pile of the carpet is filled to the top with sand. The sand makes the field rougher and harder. In comparison to the other two systems, the ball speed is much slower.

In order to ensure that the play is not interrupted it may be necessary to install a sprinkler system to the perimeter of the field, when the wet system is used.

In all cases the artificial grass is glued to a smooth and even concrete surface with an approved adhesive in terms with specific manufacturer's instructions.

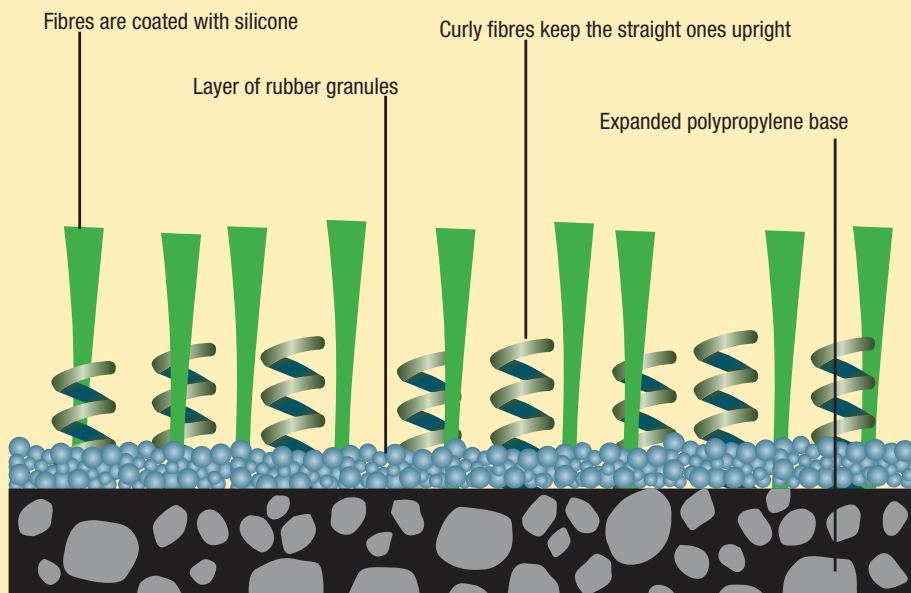
Concrete substrates

The surface preparation for artificial playing surfaces may be briefly described as follows:

- The sub-surface earth needs to be levelled and compacted to 95 % Modified ASSHTO with a maximum cross slope of 1%
- Sub-Surface drainage system to be installed below all field surfaces (in terms with Civil Engineering design).
- Install sub-surface drainage comprising 110 mm diameter agricultural drains placed in 450 x 600 mm deep herring bone drainage system at 6 metre intervals and to entire perimeter of the cricket field.
- Sub-surface drains to be lined with a "Bidum" Hessian layer and filled in with 19 mm crusher run stone.
- Sub-Surface drains to connect at the lowest point to a storm water catch pit which should be connected to a storm water main.
- The sub-surface drains are then covered with a 100 mm thick layer of crusher run to assist in the sub-surface drainage.

- The sub-surface drainage system is to be connected to a storm water system to ensure proper drainage.
- A 250 micron damp proof layer is to be installed below a 125 mm thick (20 Mega Pascal design strength) concrete surface bed finished smooth to ensure proper adhesion.
- Sealers and curing agents should not be used since these may affect the adhesion of the artificial grass surface.
- All concrete surfaces need to be dry and dust free prior to the placement of the track surface.
- A 25 mm thick cement levelling screed needs to be placed to true and smooth levels.
- Any level defects are to be filled in to ensure a smooth and even finish. Any projections will damage the artificial grass carpet when subjected to use.

Typical Section through Artificial grass



Modern artificial grass

Advantages of artificial grass

- May be a better solution where the environment is hostile to natural grass.
- Long lasting and if maintained correctly last up to ten years.
- Suitable for indoor applications
- Some types may have fibre-optics embedded in them to allow for advertisements.

Disadvantages of artificial grass

- The abrasions, caused by artificial grass, have been linked to a higher incidence of MRSA infections.
- Some artificial grass types contain heavy metals which can leach into the underground water systems.
- Turf toe is a medical condition often associated with artificial grass surfaces.
- Friction between the skin and the artificial surface causes greater “grass burns” than natural grass.
- Artificial grass tends to be hotter than natural grass.

1.4.13 Korfball

Korfball is a team game similar to netball and is mostly played in the Netherlands and Belgium. It differs from netball in that it is a mixed gender game with 4 males and 4 females playing in each team. The game is normally played on a hard court, similar to those that netball is played on, but lawn fields are also allowed and it may be played outdoors or in indoor centres.

The field

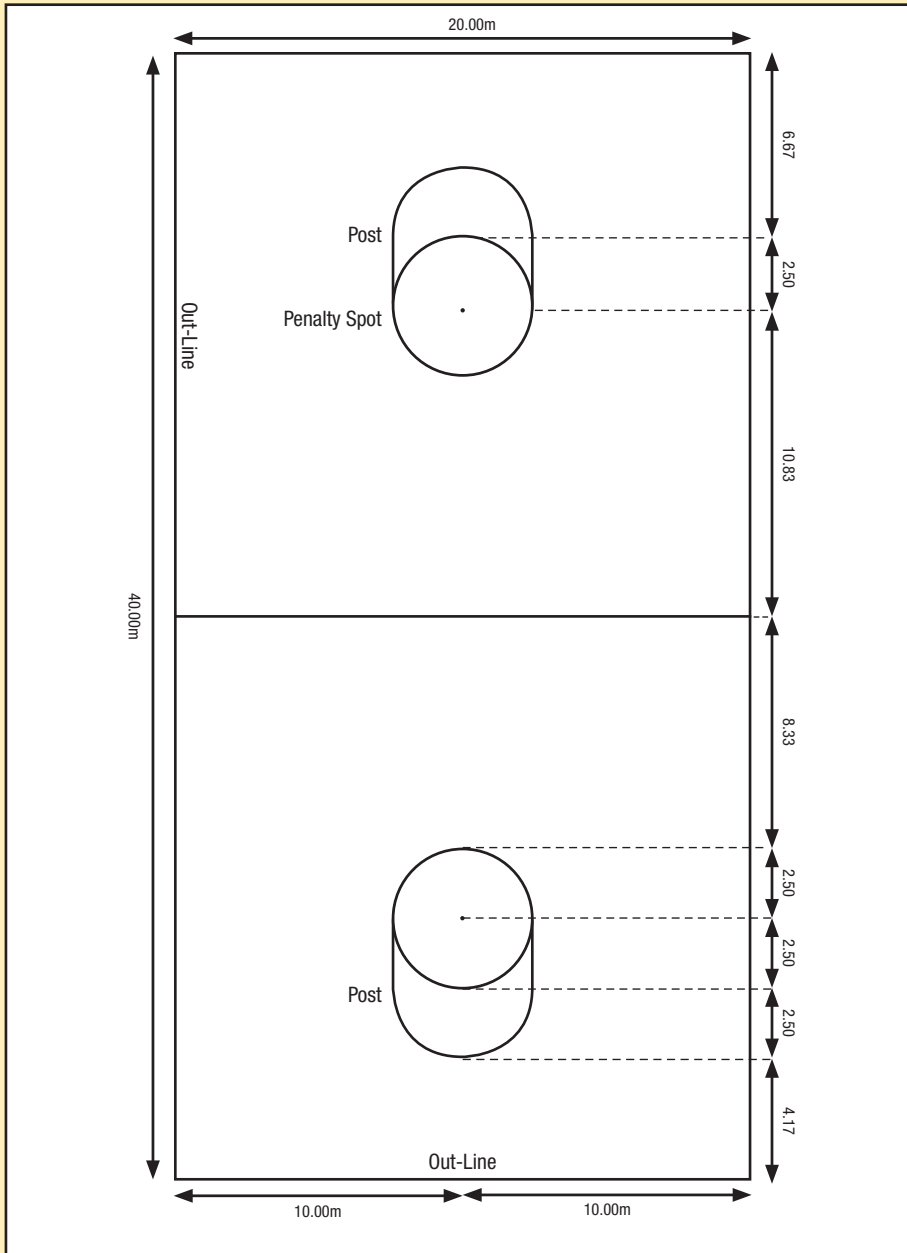
The field is rectangular and is 40 metres long and 20 metres wide. The court is divided into two equal parts. In the centre of each side of the court there are two interlocking 5000 mm diameter circles. (See Drawing Below)

Two 90 mm diameter x 3.00 metre high goal posts, each with a 450 mm diameter steel ring attached flush to the top of the post, are situated in the middle of each side of the field. A net is fixed to each steel ring. All lines must be white and between 25 and 50 mm wide.

The ball

Under – 9's, under – 10's and under - 11's play with a No. 4 ball. All other teams play with a No. 5 ball which has a mass of 450 gram and its circumference is between 690 and 710 mm.

Korfball Field



Construction of a lawn korfball field

The construction of the korfball field should be done with great care and all materials used should be chemically and physically analysed to ensure that the final product produces a korfball field that will prevent the field from disintegrating when used.

- Remove all top soil from the area of the square.
- Excavate out natural earth to a depth of at least 450 mm to Civil Engineering specification. (Depth may vary dependant on the carrying capacity of the soil)
- Rip and compact in-situ earth to 95% modified AASHTO.
- Install sub-surface drainage comprising 110 mm diameter agricultural drains placed in 450 x 600 mm deep herring bone drainage system at 6 metre intervals and to entire perimeter of the cricket pitch or square.
- Sub-surface drains to be lined with a “Bidum” Hessian layer and filled in with 19 mm crusher run stone.
- Sub-Surface drains to connect at the lowest point to a storm water catch pit which should be connected to a storm water main.
- The sub-surface drains are then covered with a 150 mm thick layer of crusher run to assist in the sub-surface drainage compacted to 95 % modified AASHTO.
- Lay strip of 250 micron plastic down the edges of the excavation to prevent encroachment of invader grass species.
- The crusher run layer is covered with a 50 mm thick layer of course river sand.
- Add 100 mm thick layer of loam soil and mix in fertiliser as required by soil analysis.
- Roll in 150 mm thick clay in layers (Dependant on the results of the chemical analysis, fertiliser to promote root growth should be mixed into the clay) and compact.
- Wash grass sods to remove all soil and tease sprigs apart. Lay sprigs on bulli (clay) surface and add a thin layer of sieved bulli to a depth of not more than 15 mm(sieve aperture of maximum 10 mm) over the grass and smooth.
- Apply fertiliser and water twice daily with a fine nozzle spray until grass shown signs of sprouting.
- Continue to water until the grass has covered the pitch.
- Once the grass has established, cut to 15 mm and rub in sieved (1.25 mm gauge screen) bulli, to a smooth even surface, making sure that the grass tips protrude above the bulli.
- Water daily, as required, until the grass shoots push through.

- Repeat the rubbing in process until a smooth even finish to the pitch has been achieved. The final level of the pitch should be slightly above the surrounding field area.
- Commence with normal pitch preparation once all grass has grown through.
- Cutting to be done with a 9 – 11 blade per cylinder cylindrical mower.
- Compact with heavy roller to produce a hard even surface so that it is not possible to create indentations with your fingers.

Maintenance

- **Winter Treatment:**

Remove dormant surface growth, to stimulate new spring growth. Hollow tining by removing cores approximately 50 mm apart in the surface and fill holes with bulli. Winter treatment to be completed before the middle of August each year.

- Remove dry thatch regularly.
- Pest control, weeds, algae, fungi and damageable insects are to be controlled on an ongoing basis.
- Cut all surrounds regularly, irrigate by flooding at least 5 mm on the complete area during a period of two days or as needed and fertilise in terms with the chemical soil analysis.

ARTIFICIAL SYNTHETIC SURFACES ON CONCRETE SUBSTRATES

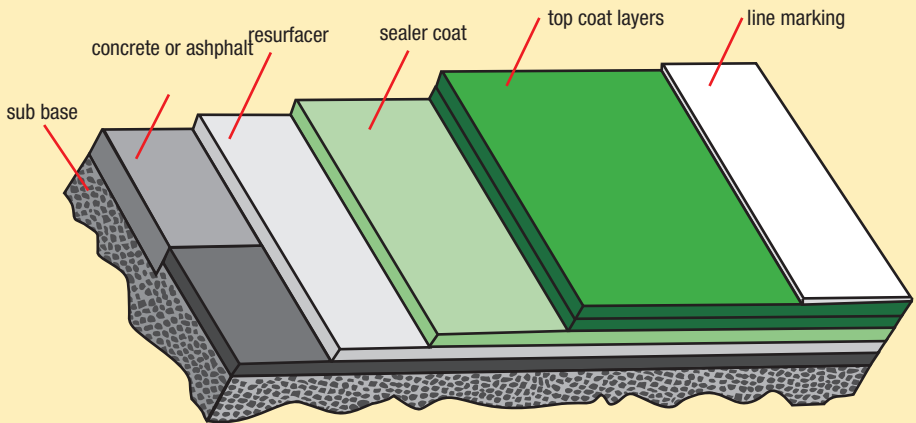
The surface preparation for artificial playing surfaces may be briefly described as follows:

- The sub-surface earth needs to be levelled and compacted to 95 % Modified ASSHTO with a maximum cross slope of 1%
- Sub-Surface drainage system to be installed below all field surfaces (in terms with Civil Engineering design).

Install sub-surface drainage comprising 110 mm diameter agricultural drains placed in 450 x 600 mm deep herring bone drainage system at 6 metre intervals and to entire perimeter of the cricket field.

- Sub-surface drains to be lined with a “Bidum” Hessian layer and filled in with 19 mm crusher run stone.
- Sub-Surface drains to connect at the lowest point to a storm water catch pit which should be connected to a storm water main.
- The sub-surface drains are then covered with a 100 mm thick layer of crusher run to assist in the sub-surface drainage.

- The sub-surface drainage system is to be connected to a storm water system to ensure proper drainage.
- A 250 micron damp proof layer is to be installed below a 125 mm thick (20 Mega Pascal design strength) concrete surface bed finished smooth to ensure proper adhesion.
- Sealers and curing agents should not be used since these may affect the adhesion of the artificial grass surface.
- All concrete surfaces need to be dry and dust free prior to the placement of the field surface.
- A 25 mm thick cement levelling screed needs to be placed to true and smooth levels.
- Any level defects are to be filled in to ensure a smooth and even finish. Any projections will damage the artificial field surface when subjected to use.
- A number of manufacturers' artificial synthetic surfaces are available. The surfaces have to be applied strictly in accordance with the manufacturers' instructions. (See Drawing Below)



1.4.14 Netball

Netball is a team game based on running, jumping, throwing and catching. Teams may include up to 12 players but only 7 may take to the court at any one time.

The aim of the game is to score as many goals as possible by throwing a ball through a hoop situated on top of a post. The game is played on a hard court.

The court

The court is 30.5 metres long and 15.25 metres wide and is divided into thirds. There is a centre circle with a diameter of 900 mm and two goal circles which are semi-circles measuring 4.9 metres in radius. All lines are part of the court and measure 50 mm in width.

The goal posts are placed mid-point on each goal line and measure 3.05 metre in height. The goal rings have an internal diameter of 380 mm. The goal rings project horizontally from the post on a single attachment measuring 150 mm.

The ball

The ball is made of leather, rubber or similar material, weighing 400 – 450 grams and has a circumference of 690 – 710 mm.

Construction of court

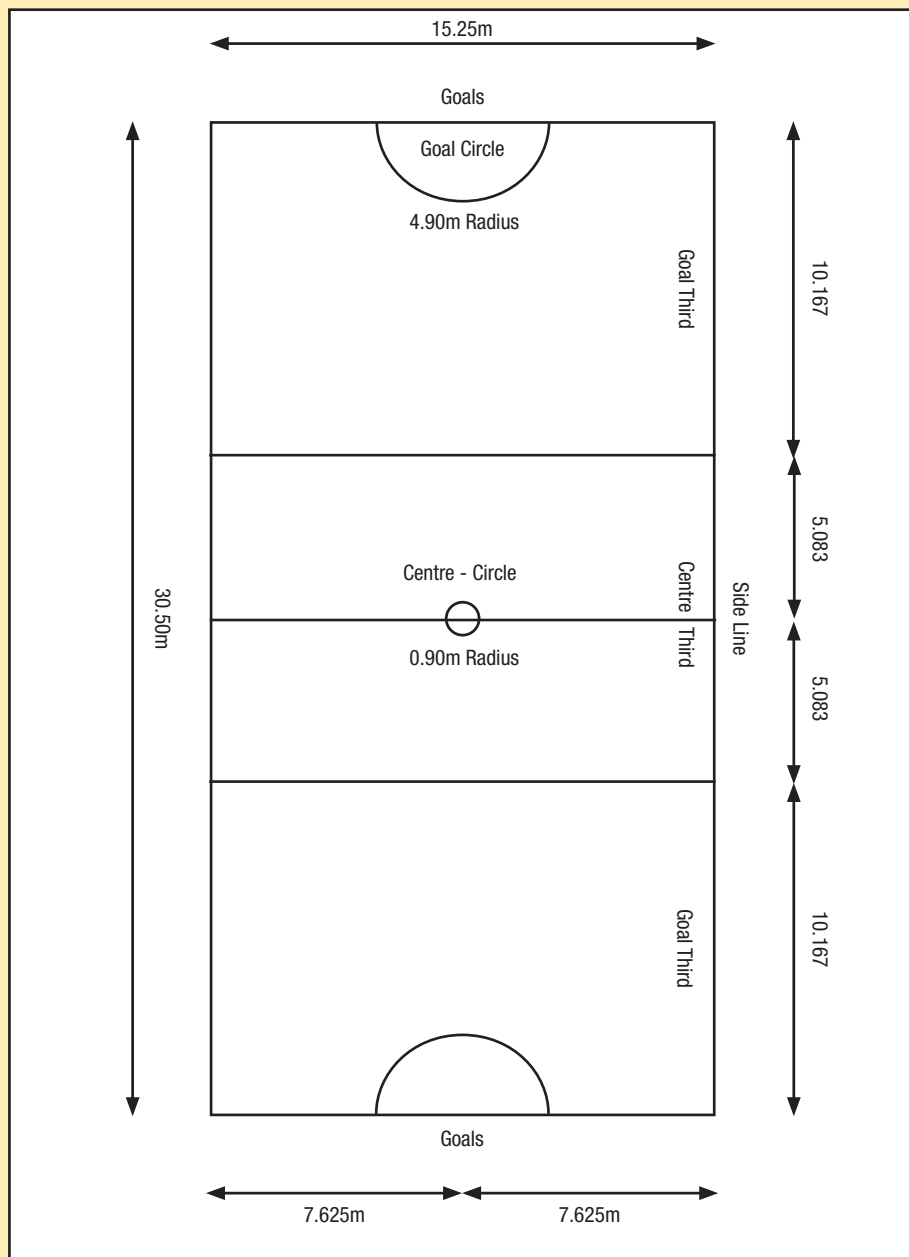
The courts have a hard surface and may have an asphalt or an artificial synthetic surface. The substrate preparation is the same for both types of surfaces.

Artificial synthetic surfaces on concrete substrates

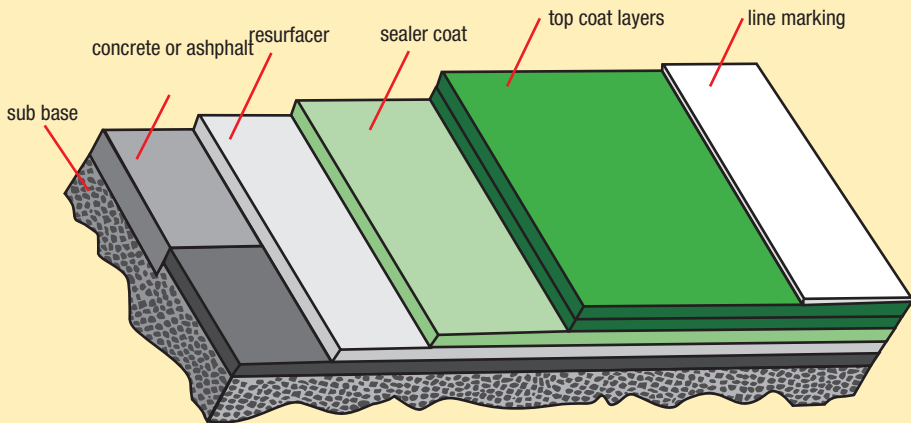
The surface preparation for artificial playing surfaces may be briefly described as follows:

- The sub-surface earth needs to be levelled and compacted to 95 % Modified ASSHTO with a maximum cross slope of 1%.
- Sub-Surface drainage system to be installed below all field surfaces (in terms with Civil Engineering design). Install sub-surface drainage comprising 110 mm diameter agricultural drains placed in 450 x 600 mm deep herring bone drainage system at 6 metre intervals and to entire perimeter of the cricket field.
- Sub-surface drains to be lined with a “Bidum” Hessian layer and filled in with 19 mm crusher run stone.
- Sub-Surface drains to connect at the lowest point to a storm water catch pit which should be connected to a storm water main.
- The sub-surface drains are then covered with a 100 mm thick layer of crusher run to assist in the sub-surface drainage.

Netball Field



- The sub-surface drainage system is to be connected to a storm water system to ensure proper drainage.
- A 250 micron damp proof layer is to be installed below a 125 mm thick (20 Mega Pascal design strength) concrete surface bed finished smooth to ensure proper adhesion.
- Sealers and curing agents should not be used since these may affect the adhesion of the artificial grass surface.
- All concrete surfaces need to be dry and dust free prior to the placement of the field surface.
- A 25 mm thick cement levelling screed needs to be placed to true and smooth levels.
- Any level defects are to be filled in to ensure a smooth and even finish. Any projections will damage the artificial field surface when subjected to use.
- A number of manufacturer's artificial synthetic surfaces are available. The surfaces have to be applied strictly in accordance with the manufacturer's instructions. (See Drawing Below)



1.4.15 Rugby Union

Rugby Union is an outdoor sport played by two teams of 15 players with a spheroid-shaped ball. The aim of the game is to score as many points as possible. The team that scores the greatest number of points is the winner. Points are scored by scoring a try or kicking a goal or conversion.

The game is played on a natural grass field that is 100 metre in length (excluding the in-goal area) and the width may vary but may not be more than 70 metres wide. The in-goal area may not be less than 10 metres and not more than 22 metres deep.

The “H-Shaped” goal posts, which are 5.60 metre apart and have a crossbar situated 3.0 metre above the playing field, are situated on the centre of the goal line.

The field is marked as follows: (See Drawing on next page)

- To the perimeter of the field
- A goal line on each side of the field
- A 22 metre “drop out” line across the width of the field on both sides of the field.
- A halfway line across the width field.
- A 10 metre dotted line across the field on either side of the halfway line.
- A 5 metre dotted line across the field situated 5 metres away from the goal line within the 22 metre “drop out” zone, to both sides of the field.
- A 5 metre dotted line, situated on the inside of the side line on both sides of the field.
- A 15 metre dotted line, situated on the inside of the side lines on both sides of the field.

Flags are positioned at each corner, at the ends of the goal line, at the ends of the 22 metre line and at the ends of the halfway line.

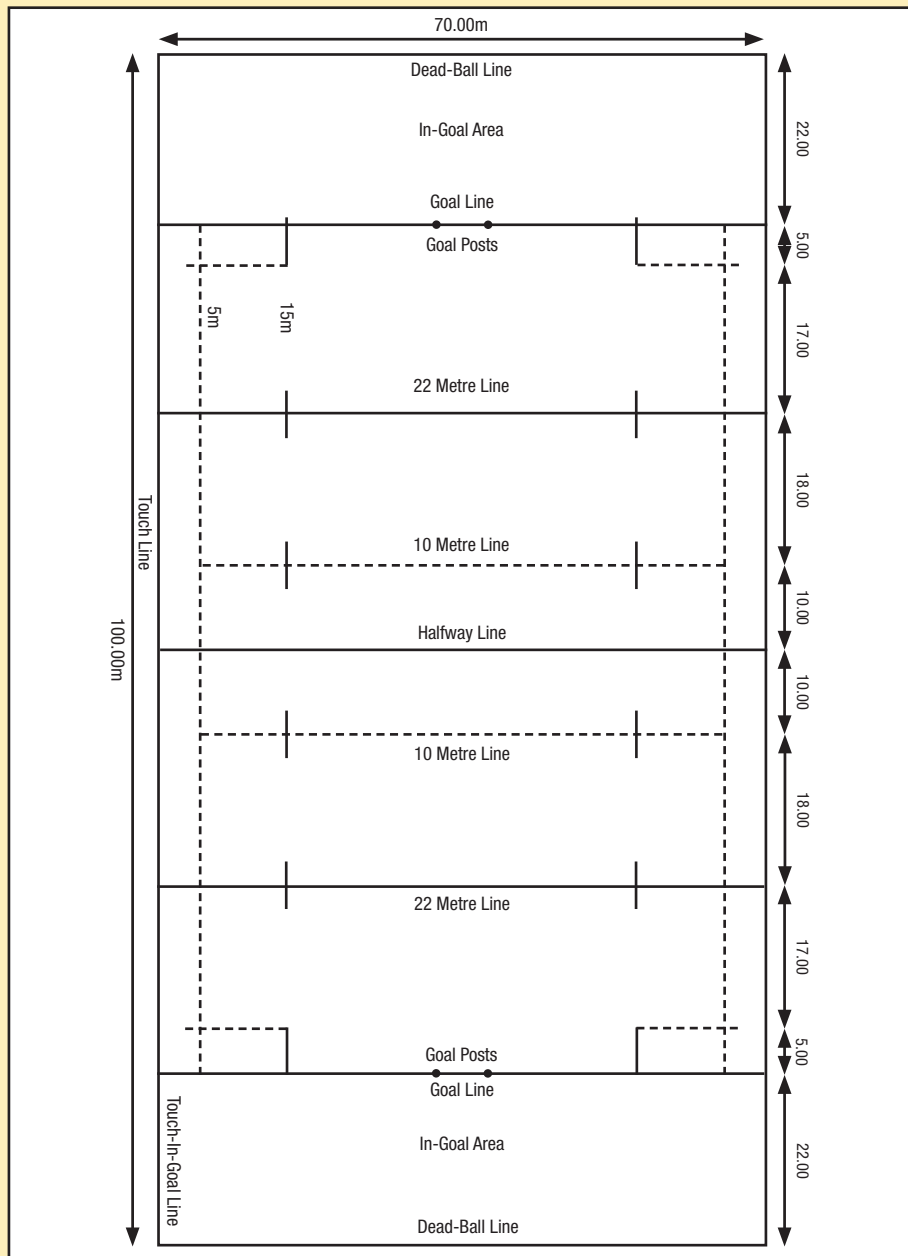
The ball

The ball is oval in shape and is made from leather or synthetic materials and should resist water.

The ball has the following dimensions:

- Length in line 80 – 300 mm
- Circumference (end on) 760 – 790 mm
- Circumference (width) 580 – 620 mm
- Mass 400 – 440 grams
- Pressure at sea level 0.67 – 0.70 kg per cm²

Rugby Field



Construction of a natural grass rugby field

The construction of the outdoor grass rugby field may be briefly described as follows:

The general specification of the sub-surface may vary dependant on site conditions and should be in terms with a Civil Engineers specifications. The general specification may, however, be described as follows:

- Remove all topsoil. Remove all topsoil and level earth platform to correct site development levels with particular emphasis on natural sub-soil drainage.
- Rip and compact in-situ earth to 93 % modified AASHTO.
- Install sub-surface drainage comprising 110 mm diameter agricultural drains placed in 450 x 600 mm deep herring bone drainage system at 6 metre intervals and to entire perimeter of the cricket field.
- Sub-surface drains to be lined with a “Bidum” Hessian layer and filled in with 19 mm crusher run stone.
- Sub-Surface drains to connect at the lowest point to a storm water catch pit which should be connected to a storm water main.
- The sub-surface drains are then covered with a 100 mm thick layer of crusher run to assist in the sub-surface drainage (Optional dependant on the drainage characteristics of the in-situ soil).
- The crusher run layer is levelled, lightly compacted and covered with a 25 mm thick layer of course river sand.
- Import, spread and level 100 mm thick layer of weed free top soil and compact lightly.
- Fertilise soil as per chemical soil analysis and grass with either Kikuyu grass.
- Once the grass is established, top dress.
- Cover grass with thin layer of sieved of top soil to a depth of not more than 15 mm over the grass and smooth.
- Water daily or as may be required.
- Regular soil tests should be taken to ensure that the correct fertilisation program is carried out.
- Grass matting should be avoided and always controlled by vertical cutting. Length of grass should never be longer than 25 mm when played on.

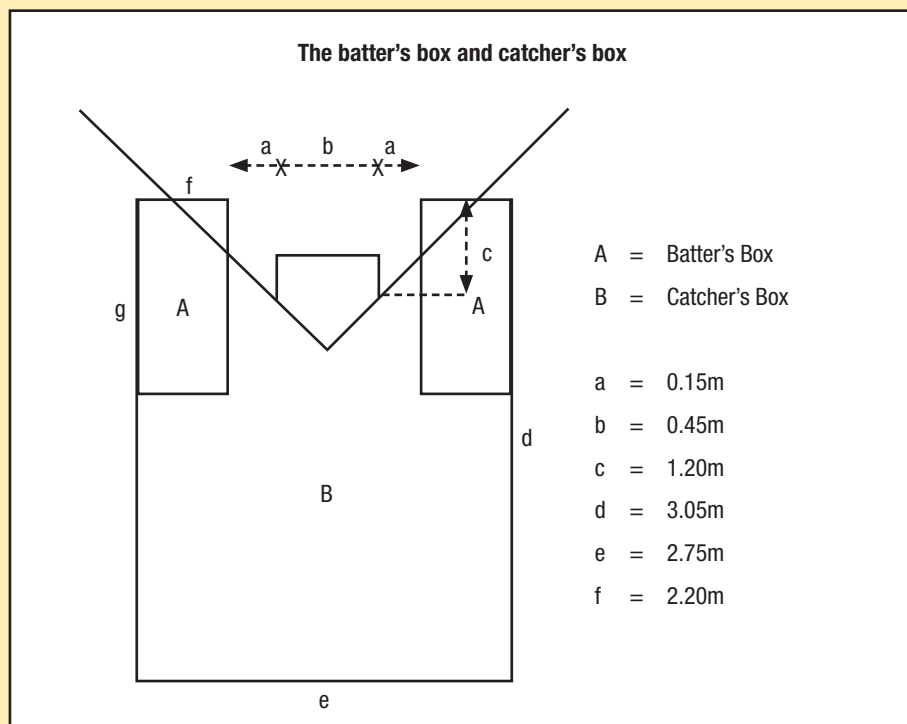
1.4.16 Softball

Softball is a team sport similar in nature to baseball. It is played between two teams on a large field called a diamond, comprising an earth infield and a grassed outfield. As in baseball, the bases are arranged in a square which has baselines of 18.3 metre for all players. Pitching distances for women and girls are 12.20 metres and 14 metres for men.

Starting at a point halfway between home plate and first base the 1-metre line is drawn parallel to and 1 metre from the baseline. The batter's on-deck circle is a 1500 mm diameter circle next to the end of the player's bench or dugout area closest to the home plate.

The batter's box (one on each side of the home plate) measures 1 metre by 2.20 metre. The inside lines of the batter's box are 1200 mm from a line drawn through the centre of the home plate. The catcher's box is 2.75 metre wide and 3.0 metre long measured from the rear outside corners of the batter's box.

The coach's box is behind a 5 metre line drawn outside the diamond. This line is parallel to and 3.60 metre from the first and third baselines, extended from the bases towards the home plate. (See Drawing) Behind home plate is a backstop that must be between 7.62 and 9.14 metres away.



EQUIPMENT

The bat

The official bat is made of wood, bamboo, plastic, graphite, metal, magnesium or any other composite material. It must either be round or three sided. If the bat is round it may not be more than 60 mm in diameter and it may not be longer than 860 mm or 1.08 kilogram in weight. In addition, in fast pitch, a “drop” of no more than 12 is allowed. A drop is calculated by taking the length of the bat in inches and subtracting the weight in ounces.

The ball

The size of the ball varies according to the classification of play. In International play the circumference is 300 mm and the weight is between 6 ¼ and 7 ounces and where the circumference is 280 mm the weight is between 5 7/8 and 6 1/8 ounces.

Gloves

All defensive players wear fielding gloves that have webbing between the thumb and forefinger. The first baseman and the catcher may wear mitts. Mitts have additional padding and do not have fingers.

Construction of the soft ball field

The substrate construction of both the infield and the outfield are the same. The difference in the two is that the infield does not get grassed and the earth surface is compacted and levelled with the grassed outfield.

The construction of the grassed outfield is as follows:

Grassed outfield

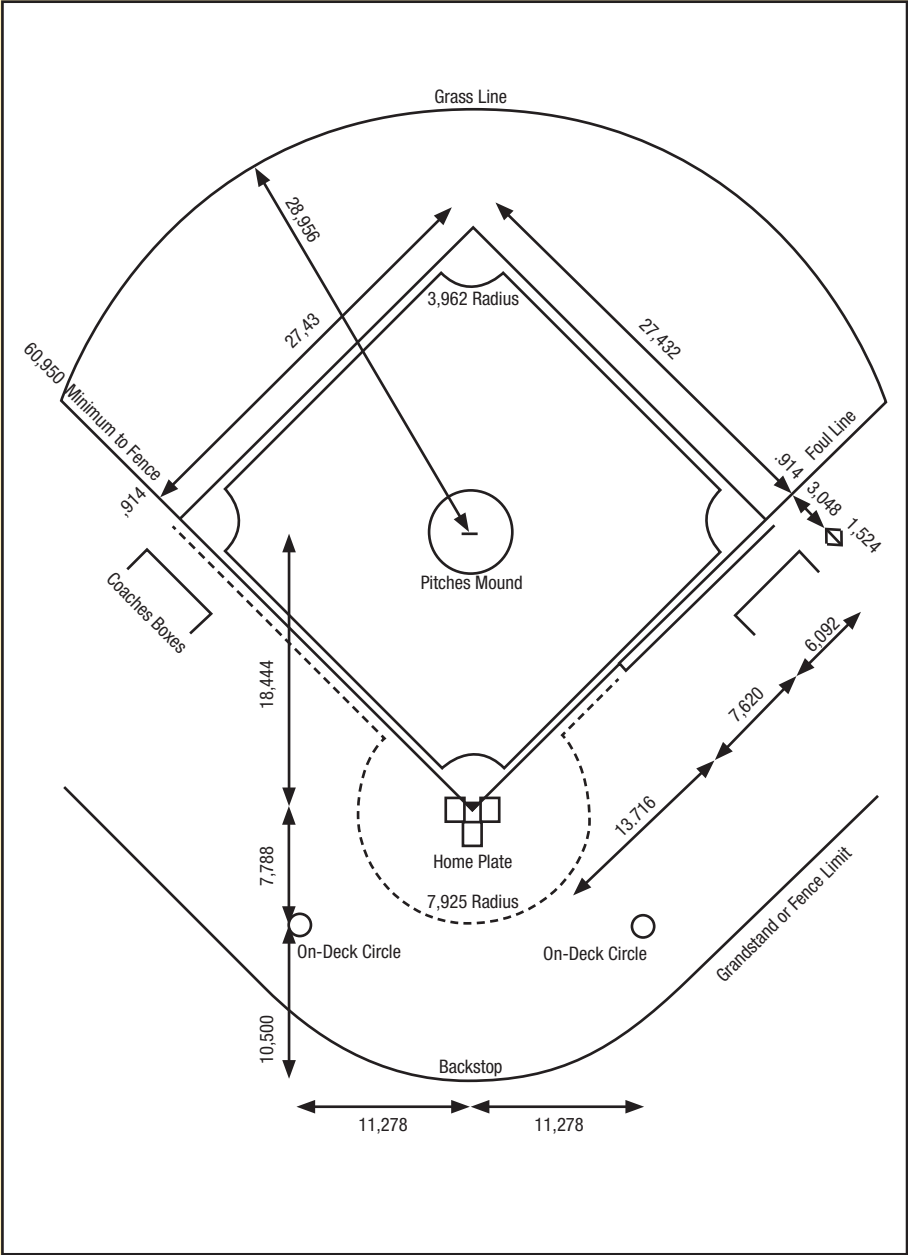
The general specification of the sub-surface may vary dependant on site conditions and should be in terms with a Civil Engineers specifications. The general specification may, however, be described as follows:

- Remove all topsoil. Remove all topsoil and level earth platform to correct site development levels with particular emphasis on natural sub-soil drainage.
- Rip and compact in-situ earth to 93 % modified AASHTO.
- Install sub-surface drainage comprising 110 mm diameter agricultural drains placed in 450 x 600 mm deep herring bone drainage system at 6 metre intervals and to entire perimeter of the cricket field.
- Sub-surface drains to be lined with a “Bidum” Hessian layer and filled in with 19 mm crusher run stone.
- Sub-Surface drains to connect at the lowest point to a storm water catch pit which should

be connected to a storm water main.

- The sub-surface drains are then covered with a 100 mm thick layer of crusher run to assist in the sub-surface drainage (Optional dependant on the drainage characteristics of the in-situ soil).
- The crusher run layer is levelled, lightly compacted and covered with a 25 mm thick layer of coarse river sand.
- Import, spread and level 100 mm thick layer of weed free top soil and compact lightly.
- Fertilise soil as per chemical soil analysis and grass with either Kikuyu grass or alternatively with “Golfing Green” grass.
- Once the grass is established, top dress.
- Cover grass with thin layer of sieved of top soil to a depth of not more than 15 mm over the grass and smooth.
- Water daily or as may be required.
- Regular soil tests should be taken to ensure that the correct fertilisation program is carried out.
- Grass matting should be avoided and always controlled by vertical cutting. Length of grass should never be longer than 15 mm when played on.

Softball Field



1.4.17 Squash

Squash is an indoor racquet sport that is played by two players (or four players for doubles) with standard racquets in a four walled court with a small, hollow rubber ball. Courts may be either for singles or doubles play. The dimensions for the two types of court are as follows:

Singles court

The plan dimensions of the singles court, measured 1 metre above finished floor level, shall be:

- Length: 9,750 mm plus or minus 10 mm
- Width: 6,400 mm plus or minus 10 mm
- Diagonals: 11,665 mm plus or minus 25 mm
- Height above floor to lower edge of Front Wall Line 4570 mm
- Height above floor to lower edge of Back Wall Line 2130 mm
- Height above floor to lower edge of Service Line on

the Front Wall 1780 mm

- Height above floor to upper edge of Board 480 mm
- Distance to nearest edge of Short Line from Back Wall 4260 mm
- Internal dimensions of Service Box 1600 mm
- Width of all line and the Board 50 mm

Doubles court

The plan dimensions of the doubles court, measured 1 metre above finished floor level, shall be:

- Length: 9,750 mm plus or minus 10 mm
- Width: 7,620 mm plus or minus 10 mm
- Diagonals: 12,375 mm plus or minus 25 mm
- Height above floor to lower edge of Front Wall Line 4570 mm
- Height above floor to lower edge of Back Wall Line 2130 mm
- Height above floor to lower edge of Service Line on the Front Wall 1780 mm
- Height above floor to upper edge of Board 480 mm
- Distance to nearest edge of Short Line from Back Wall 4260 mm
- Internal dimensions of Service Box 1600 mm
- Width of all line and the Board 50 mm

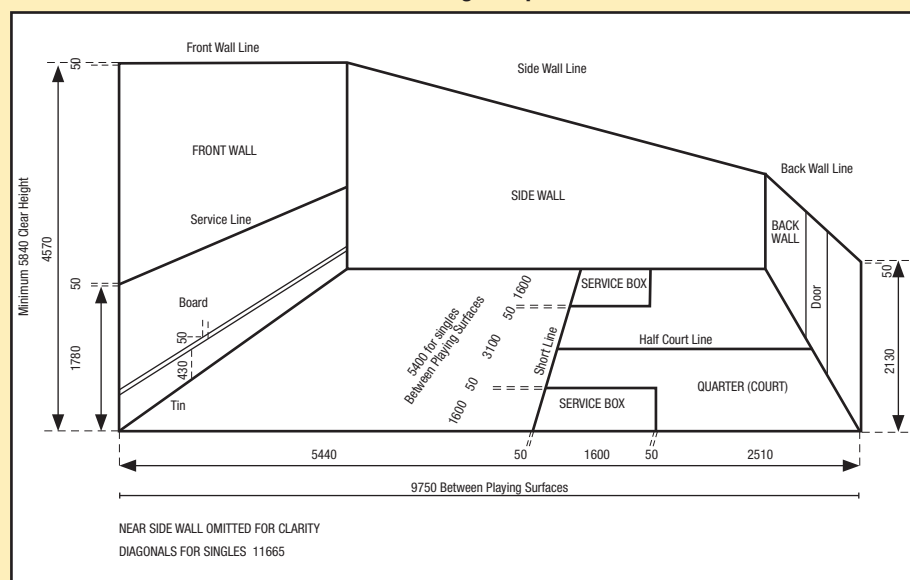
In both of the above instances, space shall be provided for a marker and a referee, who shall be able to see the whole of the court and shall be able to hear play and the players and be heard by them. The space for the marker and the referee shall be behind the plane of the back wall.

Clear height

The clear height above finished floor level (i.e. the height to the underside of the lowest obstruction) over the whole of the court shall be no less than 5.64 metre, measured to the underside of the lowest obstruction including lights.

Spectator areas may be located behind the plane of any wall of the court.

Dimensions of Singles Squash Court



Camera facilities

Play may be televised, filmed, photographed or recorded in any way from above the court or through any of the walls, provided that:

- No camera or any other equipment may project into any part of the court or below the minimum clear height above the court specified above.
- Players inside the court are not aware of any camera or other equipment, or any person operating the cameras or other equipment, behind either the front or the side walls during play.

Camera panels may be incorporated in any part of the court playing walls provided that any such panel shall:

- Be flush with the adjacent wall surfaces on the court side.
- Match as closely as possible the colour of the adjacent surfaces on the court side of the wall.
- Have similar rebound characteristics to the surrounding surfaces of the court.
- Be fixed in such a way as to withstand indefinitely the impact of the ball, rackets and players in normal play.
- Be constructed of material (for example safety glass) which will not be liable to cause serious injury to players or spectators if it breaks.

CONSTRUCTION OF COURTS

Court walls

General

Each wall of the court shall be of the same construction over the whole of the playing area except as allowed under the “Camera Facilities” section. Adjacent walls need not be of the same construction.

Strength

The walls of the court and all components of them shall be capable of withstanding all the stresses which may be placed upon them in normal play and shall not suffer any temporary or permanent damage as a result of:

- The impact of balls or rackets.
- The impact of players defined as equivalent to that of a human body with a mass of 100 kilogram and a coefficient of absorption of 47 % (i.e. 47 % of the impact is absorbed by the body and 53 % transmitted to the wall), travelling at the moment of impact at a speed of 4.5 metre per second and striking the wall at right angles to it over an area of not more than 0.25 square metre at a height to the centre of the impact of 1.47 metre (plus or minus 50 mm) over the whole of its length.

Where courts have transparent walls they shall be constructed of safety materials tested in accordance with the appropriate national standard to a test energy equivalent to the above and shall meet the stated requirements for safety.

In the absence of any National Standards the requirements of British Standards BS 6206 – 1981, German DIN 18038, North American ANSI Z97, BOCA 1984 and UBC 1991 are among the standards that are considered to be adequate.

Deflection of court walls

The walls of the court shall not deflect under the impact of the ball in normal play to such an extent or in such a manner that the rebound of the ball is affected.

The walls may deflect under impact of the players if it is necessary for their structural integrity that they should do so, however, they should not deflect to such an extent or in such a manner so as to affect the safety of the players, officials or spectators.

Any wall which deflects as above shall return to its original static position within one second of the initial impact and shall not suffer any breakage nor any permanent or temporary damage as a result of the deflection.

Finishes

All playing walls of the court shall have a hard smooth finish. Any front or side walls, or any transparent panel in the playing surface of the front or side walls, shall be treated and/or lit in such a manner as to make it non-reflecting when viewed from inside the court.

Reflectance

The average reflectance of the front and side walls shall not be less 50 % at any point when in clean condition.

Ball rebound

The ball shall rebound truly on all striking surfaces of the playing walls. The ball rebound shall be consistent over the whole area of each wall.

All wall surfaces including transparent materials shall have a surface friction such that the pace and wall angle characteristics are equivalent in a plaster court.

Joints in playing surface

Any open joints in the finish of a wall of panel construction shall:

- Not deflect the rebound of the ball in any way.
- Not be wider than 2 mm in the plane of the wall surface.
- Be constructed in such a manner as to ensure that adjacent areas of the finish cannot move relative to one another at right angles to the plane of the wall following the impact of the ball, a racket or a player, except in the case of doors in transparent walls as allowed in the "Finger Traps with Transparent Doors" section of this document.

Wall to wall junctions

There shall be no protrusions of any kind into the court at the junction of any wall of the court with the floor. An expansion joint may be provided of any wall of the court with the floor, but this may not

exceed 6 mm in any dimension or at any point where the adjoining surfaces are fixed or 122 mm when a moveable wall is used.

Moveable walls

While courts are provided with moveable walls these walls shall comply in all aspects with the above specifications as if they are of a permanent construction.

Out of court wall areas

The walls of the court may be extended upwards as required but shall not project into the space above the court. Any wall so extended upwards shall have a plain white or light coloured matt finish against which the players shall be able to sight the ball without difficulty and must have a minimum reflectance value of 50 % as below.

The floor

The floor shall be level to within plus or minus 10 mm in length, width and on the diagonals of the court.

Any joint in the floor finish shall be plane to within 0.25 mm. Any open joint shall not be more than 2 mm wide, except that an expansion gap not more than 6 mm wide shall be allowed at the junction of the floor with any wall.

The floor shall be hard, smooth, have limited spring and provide a firm footing in normal play.

The floor shall either be:

- Able to absorb small amounts of moisture without becoming slippery.
- If provided with an impervious surface be tested in accordance with the appropriate National Standards to demonstrate adequate slip resistance in wet conditions.
- In the absence of any National Standards, the requirements of the German DIN 18032 Part 2 when tested in wet conditions is considered adequate.
- The floor shall be kept clean of all rubber, dust particles and other deposits which may reduce the floor's slip resistance.

CONSTRUCTION OF COURT FLOOR

The construction of the floor to the indoor squash court facility may be briefly described as follows:

- A 250 micron damp proof layer is to be installed below a 125 mm thick (20 Mega Pascal design strength) concrete surface bed or reinforced concrete slab (in terms with structural engineering design) finished smooth to ensure proper adhesion.

- Sealers and curing agents should not be used since these may affect the adhesion of some of the Manufacturer's flooring systems.
- All concrete surfaces need to be dry and dust free prior to the placement of the sports floor.
- A 25 mm thick cement levelling screed may need to be placed to true and smooth levels.
- Any level defects are to be filled in to ensure a smooth and even finish. Any projections may affect the final level of the floor.
- Note: If it unclear whether or not a damp proof membrane exists below the concrete floor it may be necessary to place a 250 micron damp proof layer on top of the above finished surface prior to the insertion of the sports floor.
- The floor sub-structure may be either a patent Manufacture's rails, etc. or a timber battened rail system fixed onto rubber bushes fixed to the floor to create an air void beneath the flooring boards.
- A 12 mm thick layer of plywood is fixed at right angles to the patent flooring or timber battened rails.
- The 22 mm thick x 57 mm wide Beech or other approved tongue and grooved continuous strip flooring is secret nailed onto the plywood boards.
- All sub-structure timber to be sealed with an approved sealant.
- The strip flooring is to be sanded sooth to a 100 grit finish and sealed with a matt polyurethane sealant.

The ceiling and out of court areas

The ceiling shall have a simple shape against which the players may be able to sight the ball without any difficulty.

The ceiling shall have a plain white or light colour matt finish against which the players shall be able to sight the ball without difficulty. The minimum reflectance value shall be 80 % as below and for the purposes of this paragraph the ceiling shall include all area in view from the court against which the players may have to sight the ball.

The door

Position of the door

It is recommended that the door to the court be positioned at the centre of the back wall, but in any event shall be in the middle third and shall open into the court.

Inside surface of the door

The inside surface of the door shall be plane and shall be flush with the adjacent wall surfaces when the door is closed. It shall be fitted with a flush pull handle and a restraining device which shall stop the door opening through 180 degrees and hitting the court wall.

The door shall match the colour, texture and ball rebound characteristics of the adjacent wall surfaces as closely as possible and shall be fitted with a latch or other mechanism which will prevent the door opening following an impact of the player with it on the court side.

Door size

The door size is 900 mm wide and 2130 mm high. Note should be taken that local conditions may require disabled access greater than the 900 mm, which should be referred to manufacturers when transparent materials are being used.

Finger traps with transparent doors

The amount by which the edge of any transparent door, or adjacent transparent panel, deflects relative to any part of the frame or edge of any adjacent panel following an impact equivalent to that of a simulated human body with a mass of 100 kilogram and a coefficient absorption of 47 % (ie. 47 % of the impact energy is absorbed by the body and 53 % transmitted to the wall) striking the door or transparent panel at right angles to it shall not exceed:

- The thickness of the transparent panel plus 2 mm at an impact velocity of 3 metres per second.
- The thickness of the transparent panel plus 12 mm at an impact velocity of 4.5 metres per second.

Roof lights

There may be no windows or other areas of glazing over any part of the court. If windows are provided in any walls above or adjoining the court they shall be provided with blinds or louvers.

Court markings

FRONT WALL

There shall be three horizontal markings on the front wall:

- The front wall line
- The service line
- The board, with the tin beneath it for the full width of the court.

The lower edge of the front wall shall be 5470 mm above finished floor level. The line shall not project into the space above the court and shall ideally be so shaped to deflect any ball striking it.

The lower edge of the service line shall be 1780 mm above finished floor level. The line shall be marked on the surface of the wall and shall not deflect in any way any ball striking it.

The upper edge of the board shall be 480mm above the finished floor level. The board shall project into the court by not more than 15 mm at the top and 45 mm at the bottom and shall be shaped so as to deflect any ball striking it. All edges of the board shall be rounded. Between the board and the floor, for the full width of the court, the tin shall be constructed in such a manner as to make a distinctive noise when struck by the ball.

If the court has a transparent front wall it is recommended that the wall extends to a minimum height of 5250 mm above the floor.

As an alternative to the board electronic devices may be used provided they:

- Emit an audible sound when the ball passes within the 50 mm line zone that they replace.
- Be unaffected by external conditions such as vibrations, atmospheric or luminance variations.

BACK WALL

There shall be one horizontal court marking on the back wall, the back wall line, the lower edge of which shall be 2130 mm above finished floor level except that if the court has a transparent wall 2130 mm (plus or minus 5 mm) high above finished floor level. No transparent wall with a height of between 2130 mm and 2180 mm (both dimensions plus or minus 5 mm) above finished floor level shall be allowed.

If the court has a solid back wall, the back wall line shall ideally be so shaped as to deflect any ball striking it or shall be marked on the bottom edge of a sounding board not less than 200 mm deep across the full width of the court. Any such sounding board may project up to 5 mm into the court.

SIDE WALLS

There shall be one court marking on each side wall, the side wall line. The line shall join the ends of the front wall line and the back wall line. If the back wall line is omitted as allowed above, the side wall line shall join the ends of the front wall line and an imaginary back wall line/ The side wall lines shall not project into the court but should ideally be so shaped as to deflect any balls striking them.

If a court has a transparent side wall it is recommended that the wall extends to a minimum height 5250 mm above the floor for at least the first 2000 mm back from the front wall.

FLOOR

There shall be four markings on the floor:

- The Short Line
- The Half Court Line
- The Service Boxes (2)

Court markings on the floor shall be flush with the finish and be slip resistant. The Short Line shall be parallel to the front and back walls of the court. The distance to the nearest edge of the Short Line from the back wall shall be 4260 mm. The short Line shall be marked for the full width of the court.

The Half Court Line shall be parallel to and equidistant from the side walls. It shall run from the back wall to the Short Line. The internal dimensions of the service boxes shall be 1600 mm x 1600 mm. The services boxes shall be placed on the back wall side of the Short Line at the junction of the Short Line with the side wall.

Colour and designs

There shall be no more than three different colours on the wall playing surfaces within the court. Each of the side walls shall be of one colour and each side wall shall be the same colour. The front wall may be two colours, one below and one above the service line. The front wall colours need not be the same as the side wall colours. The floor shall have no more than two colours and each colour shall be bonded on at least two sides by the floor markings. The use of colour shall be symmetrical about the Half Court Line. Natural wood materials shall be considered to be of one colour.

All colours shall have a minimum reflectance value of 50 % and all colours shall be of the same reflectance value plus or minus 10 %. Colours will be permitted on all new and existing courts providing that the average illumination does not fall below the recommended standard of 500 lux or the minimum standard 300 lux.

Out of court wall surfaces shall have a reflectance value the same or higher than any of the colours used on the play wall surfaces. The ceiling shall have a minimum reflectance value of 80 %. Stripes or patterns of any type wall not be permitted on the wall playing surfaces except on the front wall at a minimum height of 3600 mm above the floor where a logo, club or sponsors name may be used providing it is not more than 750 mm square and is located central on the front wall.

A logo, club or sponsors name on the floor will not normally be permitted, however individual designs may be specifically approved by the World Squash Federation upon request. The minimum reflectance value of any of the colours used in the logo or name shall be 30 %. The tin may be any colour and contain advertising, logos, club or sponsors names providing that no part has a reflectance value of less than 30 %.

Electrical

The recommended light level for squash courts is 500 lux with a minimum of 300 lux.

1.4.18 Swimming

For purposes of public swimming pools the pools may be classified into the following categories:

Competition pools

Competition pools may be indoor or outdoor 8 lane pools, heated all year round with regulations regarding water temperature, anti-turbulent lane lines, starter blocks and backstroke flags.

Olympic standard length is 50 metre and with a width of at least 25 metre. The lanes are numbered 1 – 8, with individual lane widths of 2.50 metres wide and a space of at least 2.0 metre is to be provided on the outside of lanes 1 and 8. The minimum water temperature for competition is 26 degrees.

Starting platforms must be used for all races in all styles other than backstroke. The starting platforms are covered with a non-slip material and bear the lane number on all four sides. They must have a surface platform of at least 500 x 500 mm and 500 – 700mm above the water level. The overall depth of an Olympic standard pool is 2.00 metre.

Regional swimming pools

These swimming pools are designed to dimensions, which will be in multiples of the Olympic standard length for competitive swimming of 50 metre, for example for the pool length to be one of the following and consist of 8 lanes:

16.66 metre, 25.00 metre, 33.33 metre, or 50 metre.

The overall depth of the regional swimming pool is 2.00 metre.

These pools will be in a position to accommodate swimming clubs who may then be able to make use of the facilities for water polo, diving, lifesaving events, competitions, etc.

Neighbourhood swimming pools

These swimming pools are mainly recreational and are not designed/ used by clubs for championships or competitions but may at times be used for a gala (School or other), if gala equipped. They therefore do not have to conform to any standard of dimensions and do not have to follow the hours of operation set for Competition and Regional swimming pools.

The maximum depth of the recreational swimming pool is generally more than 1.50 metre.

District swimming pools

District swimming pools are admission free, these pools are of various shapes and sizes as they intended for recreational purposes only and therefore are not governed by any standards or set dimensions.

However, the most widely used design for the district swimming pool has been the rectangular shape and the design of the modern district swimming pool is rectangular to half Olympic standard length of 25 metre with a maximum depth of 1.50 metre.

They are provided with change rooms, ablution facilities, shower facilities, but without any clothing storage accommodation. Each bather is thus responsible for the security of their own belongings.

Seasonal closing of public swimming pools

Seasonal closing, or closing of swimming pools for maintenance purposes must be accompanied by the following:

- A sign is posted that the pool is closed.
- The gates must be locked shut.
- The Department is notified, in writing, of such closures.

Drinking water

Drinking water from an approved source and dispensed through one or more water fountains need to be located on the deck of each public swimming pool.

GENERAL DESIGN STANDARDS AND SPECIFICATIONS

All plans and specifications for a new swimming pool or for alterations for an existing public swimming pool must be submitted for Municipal approval.

Alterations for a swimming pool include the following items:

- Change in shape
- Change in depth
- Change in water circulation system
- Changes to the enclosure
- Adding a water feature
- Installation of diving equipment
- Changes to the disinfectant system.

All work to conform to approved plans, specifications and be carried out by licensed contractors.

Materials

The materials and construction of a public swimming pool shall be sound, durable and waterproof. The pool shall be constructed of materials that rigid, non-toxic, smooth, free from cracks, easily cleanable and finished in white or pastel colours. The colour, pattern or finish to the interior of the pool should not obscure objects, surfaces within the pool, debris, sediments or algae.

Corners shall be rounded. Pool linings, specifically plastic and similar linings and finishes not totally bonded to the poolside and bottom are prohibited.

Shape

The shape of a public swimming pool has to conform to the following:

- The pool may be any shape except that the shape may not be hazardous to users and it must provide adequate water circulation.
- There shall be no protrusions, extensions, and means of entanglement or other obstructions that may cause injury to users. This does not prohibit the installation of water features, slides, water play equipment, and water volleyball or basketball nets.
- Where a racing lane terminates in a swimming pool the wall shall be plum to a depth of 1.50 metre below the waterline, below which the wall shall have a radius where it joins the floor.
- The minimum average width of a public swimming pool shall be 4.30 metre, which shall be calculated by dividing the surface area by the total length of the pool.
- Copings or cantilevered decks may project from the wall of a swimming pool to provide a handhold for users. The coping or deck should be rounded, have a slip resistant surface and shall not exceed 90 mm in thickness. The overhang may not be less than 25 mm and not more than 50 mm. All corners created by the coping or deck shall be rounded in both vertical and horizontal planes to avoid sharp corners.
- Pool decks adjacent to the pool have to be at least 3.0 metres wide and have to be continuous and unobstructed except where diving boards and platforms are installed where the walkway shall extend at least 2.50 metres to each side and behind the board or platform but not less than 3.0 metres from the pool wall.
- Pool decks have to slope away from the pool with a gradient of 1:3 to properly located deck drains or other points of disposal.
- Pool decks have to be constructed of concrete or other inorganic material with a slip resistant finish which is free from sharp objects or surfaces and is easily cleanable.
- Decks to have expansion joints that are filled with an approved polysulphide sealant to prevent water ingress and cracking of the finished surface.
- All construction joints at the junction of the pool and the pool decks to be similarly sealed.

Floors

The slope of a public swimming pool floor, from the shallow end towards the deep end up to the point of the first change in slope shall not exceed a gradient of 1:10.

The gradient from the point of first change in slope towards the deep end shall not exceed 1:3. The depth at the first point of change in slope shall be a minimum depth of 1500 mm. All parts of the floor must drain towards a main drain.

The transitional radius where the floor of a public swimming pool meets the walls shall comply with the following:

- The centre of the radius shall be no less than 915 mm below the waterline in the deep end and no less than 610 mm below the waterline in the shallow end.
- The radius shall be tangent at the point where the radius meets the wall or floor.
- The radius shall be equal to or greater than the depth of the swimming pool minus the vertical wall depth measured from the waterline minus 100 mm.

Water recirculation and filtering system

The water circulation system that consists of the necessary piping, pumps, filters, water conditioning equipment and disinfecting equipment shall conform to the following:

- Each pool shall have a separate system
- The circulation system shall be adequate to filter and disinfect the entire pool within eight (8) hours. Bypassing chemical feeders or similar devices may be exempted from this requirement with the approval of the Department.
- The circulation system of a wading pool shall be adequate to filter and disinfect the entire pool within one (1) hour.
- Whilst in use, the water circulation system shall operate continuously.
- Water circulation components shall comply with SABS requirements and Institute International Standard Number 50 (INSF) "Circulation System Components and Related Materials for Swimming Pools, Spas and Hot Tubs".
- The swimming pool may only be filled with water from an approved source.
- Water withdrawn from a public swimming pool shall not be returned unless it has been filtered and adequately disinfected except in instances where water is circulated for water features and water slides.

PIPING

The piping system shall conform to the following:

- Designed to carry the required quantity of water at a velocity of not more than 3.0 metre per second when located on the discharge side of a pump, except for PVC discharge piping where the velocity shall not exceed 2.4 metre per second and no less than 1.8 metres per second when located on the suction side of the pump.

- All components shall be made of non-toxic materials and must be reasonably resistant to corrosion under operating conditions.
- Components must be strong enough to be able to withstand pressures 150 % of normal operating conditions.
- Piping must be installed in such a manner that they do not pose a hazard to the users.
- Pipes must comply with the following sizes and flow rates show in the following table, unless accompanied by a hydraulic design:

PIPE SIZE	32mm	38mm	50mm	63mm	76mm	100mm	150mm
GPM PRESSURE SIDE	25	60	90	140	220	350	800
GPM PRESSURE SIDE - COPPER	20	48	72	96	176	280	640
GPM SUCTION SIDE	15	35	50	80	140	220	450

TOTAL DYNAMIC HEAD

The total dynamic head of the reticulation system shall be calculated. In the absence of any calculations the following table may be used:

DISTANCE FROM THE MAIN DRAIN TO THE PUMP	TOTAL DYNAMIC HEAD (TDID)
300 – 7620 mm	55
7620 – 15240 mm	60
15240 – 22860 mm	65
22860 – 30480 mm	70
30480 – 38100 mm	75
38100 - 45720	80
Beyond 45720 mm	Calculations are Required

PUMPS AND MOTORS

Pumps and motors are to be installed on each water circulation system and shall conform to the following:

- Pumps must be sized to meet but exceed the flow rates required for filtering against the total head developed by the complete water circulation system.
- Pumps must be sized to comply with the required turnover rates.
- All equipment must be readily and easily accessible for inspection, maintenance and repair. When pumps are installed below the waterline, valves must be installed on permanently connected suction and return lines. The valves must be removable when required.

- Each motor shall have an open drip proof enclosure. In addition each pump shall be constructed electrically and mechanically to perform satisfactorily and safely under conditions of load in the environment normally encountered in swimming pool installations.
- Each motor shall be capable of operating the pump under full load with a voltage variation of plus minus ten (10) percent from the nameplate rating. Each motor shall have thermal overload protection to provide locked rotor and running protection. Thermal or current overload protection may be either built into the motor or in the line starter.
- The emergency shut-off switch must be clearly visible and labelled.

HAIR STRAINER

The water circulation system shall have a removal hair strainer located upstream from the pump to prevent solids, debris, hair, lint, etc. from reaching the pump and filters. Strainers shall be corrosion resistant with openings having a total area equal to four times the area of the circulation pump suction pipe.

POOL WATER CLEANING SYSTEM

A pool vacuum cleaning system shall be provided for public swimming pools which shall conform to the following:

- The cleaning system provided shall not create a hazard or interfere with the operation or use of the pool. In integral systems, connections shall be provided in sufficient numbers and located in the pool walls at least 250 mm below the waterline.
- Vacuum outlets shall be provided with covers, which automatically close and latch and which can only be opened with the use of a tool.
- Automatic or self-cleaning systems may be installed as approved by the Department.

INLETS

Inlets shall be properly designed, have sufficient numbers and sizes and installed in such a manner to ensure a uniform circulation throughout the pool in terms with the following:

- There shall be a minimum of six (6) inlets, spaced not more than 4.50 metres apart along the periphery of the pool. At least one inlet must be placed within 1.50 metre from each corner of the pool and in each alcove. Inlets shall be on closed loop piping system. Where the pool exceeds 9.0 metres in width, bottom returns will also be required.
- Bottom returns shall be flush with the pool bottom or of such a design to prevent injury to users. Bottom returns are considered to have an area of influence described by a radius of 4.50 metres. Pools with three (3) or more bottom returns are to be on a closed loop piping system.

DRAINS

Pools shall be equipped with at least two main drains, located in the deepest portion, at least 900 mm apart. The drains have to be constructed in such a way to prevent suction entrapment under all operating conditions. An anti-vortex or an approved grate that has a minimum diagonal measurement of 600 mm, has safe openings of at least four times the area of the drain pipe and is securely fixed into position to ensure that they are not readily removable by bathers, must cover each drain.

Drains have to be spaced at interval of not exceeding 6.0 metres and may not be less more than 1.50 metres from each side wall.

In addition to the above, no check valve may be installed between a suction outlet and a pump.

FLOW METER

All public swimming pools must be equipped with flow metres that measure the rate of backwash through the filter. The flow meter shall be installed between the pump and the filter on a straight section of pipe in accordance with the manufacturer's instructions, in a location where it may easily read. The meter shall measure the flow in litres per second and shall be accurate to within 5 % under all flow conditions. The flow meter shall further have an indicator that is capable of readings of at least 150 % of the normal flow rate.

SIGHT GLASS

Pressure filters systems shall have a sight glass fitted on the waste discharge pipe.

AIR RELIEF VALVES

Pressure type filters shall be equipped with a means to release internal pressure. Each pressure filter shall be equipped with an air relief piping system connected at an accessible point near the crown. Automatic air relief systems may be used instead of manual systems.

The design of a filter with an automatic air relief system as its principal means of air release shall include lids that provide a slow and safe release of pressure.

The design of a separation tank used in conjunction with a filter tank shall include a manual means of air release or a lid that provides a slow and safe release of pressure as it is opened.

ACCESS TO EQUIPMENT

All of the above equipment (including all filtration equipment) has to readily accessible for inspection, maintenance and replacement purposes.

FILTRATION

The maximum filtration rate shall not exceed the design flow rates prescribed by the ANSI/NSF Standard 50 for Commercial filters.

FILTRATION RATE – SAND

The filtration rate in high-rate sand filters shall not exceed 7.033 litre per minute per square metre of effective surface area.

FILTRATION RATE – DIATOMACEOUS EARTH

The filtration rate in high-rate sand filters shall not exceed 0.703 litre per minute per square metre of effective surface area.

FILTRATION RATE – CARTRIDGE TYPE

The filtration rate in high-rate sand filters shall not exceed 0.132 litre per minute per square metre of effective surface area.

GAUGES

Pressure gauges shall be installed on the inlet side of the pump and the inlet and outlet manifolds of the filters.

CROSS CONNECTION CONTROL

Cross-connections between potable water piping and the circulation system or water reservoir of any pool are prohibited. Potable water for makeup water may only be introduced into the reservoir as follows:

- Across an air gap of at least twice the diameter of the pipe , not less than 150 mm above the overflow level. If an over-the-rim spout is used, it shall be so located so that it not presents a hazard to users of the pool.
- 76 mm above the overflow rim of a float controlled make up water feed tank.
- By a submerged inlet which is properly protected against siphonage by a backflow prevention device.

All sewage from sanitary fittings, showers and drinking fountains shall be disposed of in a sanitary manner. Filter backwash and wasted water from swimming pools shall be discharged into a sanitary sewer through an approved air gap, an approved sub-surface disposal system or by means as approved by the Department. There shall be no direct physical connection between the sewer system and the water circulation system.

ROOF DRAIN WATER

Rainwater drainage from any structure must be diverted away the swimming pool and deck to a suitable point of disposal.

Water depth and depth markers

Water depth shall be conspicuously and permanently marked on the walls of the swimming pool and on top of the coping or the edge of the deck next to the swimming pool as follows:

- Depth makers on a vertical wall shall be positioned to be read from the waterside.
- Depth markers that are located on the deck shall be made from slip resistant materials.
- Depth markers at a public swimming pool shall be installed at points of maximum and minimum water depth and at all points of slope change.
- Markings are required at half metre depth intervals to a depth of 1.70 metre thereafter at 1.0 metre intervals.
- Depth markers shall not be spaced further than 8.70 metres apart.
- Depth markers have to be positioned at both ends and to both sides of the swimming pool.
- Depth markers shall be in international numerals with a minimum height of 100 mm in a contrasting colour to the background.
- In pools utilised for competitive swimming and training, approach warning markings must be installed under the water level on opposite walls at the end of each swimming lane in the pool. The warning markers must be of uniform size and colour on a background of uniform contrasting colour. In addition they must be clearly visible in or out of the water at all times from a distance of not less than 1.50 metres.
- The shallow area of a swimming pool shall be visually set apart from the deep area of the pool by a rope or floating line. Except for zero depth entries, the depth of the shallow portion of a pool shall not be less than 750 mm or deeper than 1.00 metre.
- For purposes of these regulations, that portion of a public swimming pool 1.50 metre deep or less in depth shall be designated as the “non-swimmer” area. That part which deeper than the 1.50 metre depth shall be designated the “swimmer” area. In designing pools and computing the maximum load of a public swimming pool, areas are to be apportioned as follows:
 - o 1.5 Square metres of pool surface area per bather shall be provided in the “non-swimmer” area.
 - o 8.30 Square metres of pool surface area shall be provided for each swimmer in the “swimming” area of the pool.
 - o 90 Square metres of pool surface area shall be reserved around each diving board or diving platform. This area shall not be included in determining the “swimming” area.
 - o The maximum bathing load for a public swimming pool shall be determined by the number of toilets and showers that are provided in the ablution and dressing room facilities provided in the pool enclosure.

- o The maximum bathing load calculated in terms with the tables set out below shall not be exceeded.
- o The maximum bathing load shall be clearly indicated in the pool enclosure.

Overflow collection system

An overflow collection system shall be installed in all public pools. The overflow system shall be designed so that the level of the pool is maintained at the mid-point of the operating range of the skimmers.

Skimming devices, where used, shall be recessed into the pool wall and shall be installed to achieve effective skimming action throughout the pool. They shall further conform to the following:

- Skimmers to be provided on the basis of at least one per 37 square metre of pool surface area.
- The overflow slot shall be at least 200 mm in width at the narrowest section.
- The rate of flow through the skimmers shall be a minimum of 75 % of the circulation system capacity.
- They have to be designed to carry at least 137 litres per minute per linear metre of weir throat.
- A minimum of two skimmers shall be installed in public swimming pools.
- Where three or more skimmers are installed they must be on closed loop piping system.
- At least one skimmer is to be installed on the side or near the corner of the pool that is downwind of the areas prevailing wind.
- Main drain piping shall be designed to carry at least 50 % of the design flow.

Rim type overflow systems where used shall be installed on at least two opposite sides and have a total length of at least 50 % of the design capacity of the perimeter of the pool. The system shall be capable of carrying at least 50 % of the circulation system.

The surge tank shall be equipped with float controls regulating the main drain, fill line and overflow. It shall have a capacity in litres equal to the surface area of the pool measured in square metres. The surge tank may be incorporated into the gutter.

Overflow gutters, where used, shall be installed continuously around pools with the lip of the gutter level throughout its perimeter and shall conform to the following:

- They shall have sufficient opening at the top and width at the bottom to permit easy cleaning.
- The gutter bottom shall have a gradient of 1:1.5 to drainage outlets located at intervals as approved by the Department.

- Outlet piping shall be sized to circulate at least 50 % of the capacity of the circulation system and shall have a properly installed and approved cover.
- Stainless steel and other special gutter systems may be used provided they are hydraulically equivalent to overflow gutters.

Mixed inlet types, such as skimmers and gutters are prohibited on the same body of water.

Ladders, steps and recessed steps

At least one set of steps shall be provided in the shallow end of each swimming pool. Where the deep section is greater than 6.0 metres in width, two ladders, located on opposite sides of the deep section are required.

A minimum of two means of egress are required in all pools and there shall be at least one ladder for every 23 metres of perimeter. Preformed step holes with suitable handrails may be substituted for ladders.

Steps must be permanently marked so as to be clearly visible from above or below the pool surface and shall not project into the pool in such manner which will create a hazard and shall conform to the following:

- Steps may be constructed in the shallow end of a public swimming pool.
- All tread surfaces of steps must be slip resistant.
- The location of steps, ladders and recessed treads shall not interfere with racing lanes.
- Handrails shall be provided at either the side or in the middle of all stairways.
- Handrails must be installed in such a way that they can only be removed with the aid of tools.
- A swimming pool ladder shall be equipped with at least two handrails. All treads on ladders to have a slip resistant finish.
- Ladder treads to have a minimum tread width of 25 mm. The minimum height of the risers is 70 mm with a maximum riser height of 300 mm.
- Below the waterline there shall be a clearance of not more than 160 mm and not less than 80 mm between any ladder tread and the wall as measured from the side of the tread closest to the wall.
- Recessed treads shall be designed in such a way as to drain into the pool to prevent the accumulation of dirt.
- Recessed treads to have a tread width between 120 mm and a maximum of 300 mm deep.

- Recessed treads to have a riser height of between 180 mm and a maximum of 300 mm high.

A beach entry may be substituted for steps in the shallow end of a public swimming pool.

Hose taps

Hose taps shall be provided to the perimeter of all pool decks so that the decks may be washed down. The taps have to be installed in such a manner that they do not pose a hazard to bathers.

Diving facilities

Diving boards and platforms have to conform to the following:

- Diving equipment is to be permanently anchored to the pool deck.
- Equipment shall be rigidly constructed with sufficient bracing to insure stability. All platforms have to be constructed in terms with a Structural Engineering design and specifications.
- All diving stands higher than 540 mm, measured from the deck to the top of the diving board, must be fitted with a ladder or steps.
- All diving boards or platforms higher than 1.0 metre above the waterline are to be fitted with handrails. Handrails shall be at least 800 mm high and shall extend to the edge of the swimming pool wall.
- Diving equipment must be constructed out of durable and corrosion free materials. All tread surfaces are to be slip resistant.
- All diving boards shall be fitted with a label indicating the following:
 - o Manufacturers name and address
 - o Board length
 - o Fulcrum setting instructions.
- The maximum diving board height above the water is 3.0 metres.
- The maximum diving platform height above the water is 10.0 metres.
- There shall be a completely unobstructed clear vertical distance of 4.0 metres above any diving board or platform (measured from the centre of the front edge of the board or platform). The clear unobstructed space shall extend horizontally 2.4 metres behind and to each side of the board or platform and 4.80 metres ahead of the front end of the board or platform.

Starter blocks shall be located in the deep end of a public swimming pool where the depth is at least 1.50 metre.

Lifeguard chairs

Each public swimming pool shall have at least one elevated lifeguard chair for every 186 square metres of pool surface area or 150 bathers. The chairs must be located close to the deep end of the pool and provide a clear unobstructed view of the bottom of the pool. If a pool is equipped with more than one chair, the chairs have to be situated on opposite sides of the pool.

Lifesaving and safety equipment

Each public swimming pool must be provided with at least two Coast Guard type ring buoys, each with a 15 metre long, 20 mm diameter or other approved rope attached to it.

In addition a shepherds crook mounted on a 5.0 metre pole shall be provided. All safety equipment must be conspicuously located and must be readily accessible for immediate use. All safety equipment must be maintained on a regular basis.

Ablution and dressing room facilities

The general layout of ablution facilities have to be such that bathers leaving the dressing room pass the toilets and showers in sequence before entering the pool area. All entrances and exits have to be effectively screened to interrupt the line sight of persons outside the dressing rooms. Separate facilities have to be provided for each sex.

The design and construction of the ablution and dressing room facilities have to conform to the national building regulations and should be well light and ventilated.

Toilet facilities for each sex shall be provided as set out in the table below:

MEN	WOMEN
One toilet and one urinal per 100 bathers or a fraction thereof	One toilet per 50 bathers or a fraction thereof but in no case less than two toilets
One shower per 50 bathers with a minimum of two showers	One shower per 50 bathers with a minimum of two showers
One wash hand basin per 100 bathers or fraction thereof	One wash hand basin per 100 bathers or fraction thereof

Toilet roll holders, soap dispensers, etc. are to be provided to all facilities. In addition seating is to be placed in all dressing rooms. Finishes to floors are to be easily cleanable and slip resistant.

Fencing

All public swimming pools to be enclosed with a fence or wall at least 2.0 metre high to ensure that small children, dogs, livestock are not allowed access to the enclosure other than through the entrance doors or gates.

Doors and gates are to be fitted with automatic closers and latches. Doors and gates to open outwards and panic bars are to be fitted to the inside of doors and gates. In addition the mechanical filtration equipment, disinfection equipment and circulation equipment are to be enclosed to restrict access to the general public.

Water quality standards

Swimming pool water shall be treated and maintained so that whenever the facilities are in use, the bacterial, chemical and physical quality meets the standard as set out below.

Bacterial standards

Not more than 15 % of the water samples collected from a public swimming pool shall contain the following:

- Not more than 200 bacteria per millilitre as determined by the standard (35 degree) agar plate count.
- Show a confirmed positive test for coli form organisms in any five (5) – ten (10) millilitre portions of sample or more than one coli form organism per 50 millilitre when the membrane filter test is used.
- All samples shall be collected, de-chlorinated or similarly neutralised when another disinfectant is used and examined in accordance with the procedures outlined in the latest edition of “Standard Methods for the Examination of Water and Wastewater” as published by the American Public Health Association.
- The Department may collect or request that the owners of the pool submit samples for bacteriological examination on a routine basis when the facilities are in use.

Chemical standards

Public swimming pools shall be continuously disinfected by an approved means that will maintain an adequate and readily measurable residual of disinfectant in the water as follows:

- Whenever chlorine, or a chlorine compound, is employed in pools as a disinfectant the amount of free chlorine residual in the water shall not be less than 1.0 parts per million or more than 5.0 parts per million (ppm).
- Bromine disinfectant equipment for a pool shall be designed to maintain a bromine residual of 2.0 ppm to 4.0 ppm
- Total alkalinity shall be maintained between 60 ppm and 180 ppm.
- Whenever chlorine isocyanurates or isocyanuric acid is applied to the water for stabilization a level of 100 ppm or less shall be maintained.
- The procedure for determining the free chlorine residual shall be the DPD method or any of the other methods outlined in the “Standard Method for Examination of Water and Wastewater”.

Physical standards

The surface of the water shall be kept free of scum and floating debris. The bottom and the sides are to remain free of sediment, dirt, slime and algae. Water shall not be turbid and shall be sufficiently clear so that the main drain is clearly visible from the pool deck.

The temperature of the water shall not exceed 40 degrees Celsius.

Chemical disinfectant equipment

No dry or liquid chemical disinfectants are to be added directly into public swimming pools other than for shock treatments.

Dry and liquid disinfectants are to be added to the water by means of adjustable automatic feeders. All chemical equipment and feeders are to comply with SABS requirements.

When gaseous chlorine disinfectants are used the following enclosure norms shall apply:

- Mechanical exhaust equipment shall be installed to extract air at a maximum height of 150 mm above finished floor level. Fresh air intakes shall be at least 900 mm above the air extraction points.
- Ventilation equipment is to be designed to provide at least one complete air change per minute.
- Chlorine cylinders are to be kept upright and must be securely anchored. If they are stores externally then they must be kept out of direct sunlight and should preferably not be stored near ventilation shafts or public walkways.
- Warning signs have to be prominently displayed indicating the danger of chlorine gas within the enclosure. Doors to the enclosure should also be fitted with an inspection window.
- Chlorinators are to be solution-feed type capable of feeding the solution into the water circulation system without discharging the gas into the atmosphere.
- Whilst a common gas disinfectant system may be utilised in separate swimming pools, separate metering and feeding devices need to be installed for each pool.

Chemical feeders are to be installed downstream from the filters and they should only operate when the filter pump is running.

The use of chloramines as a primary disinfectant in public swimming pools is prohibited.

1.4.19 Table tennis

Table tennis is a sport where two (singles) or four (doubles) players hit a lightweight, hollow ball back and forth across a table with bats.

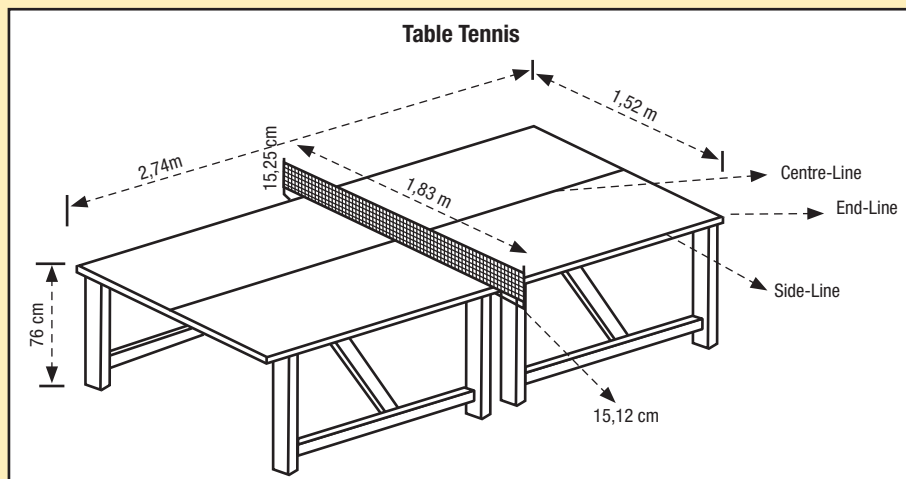
The table, known as the playing surface must be rectangular, 2,74 metre long, 1,525 metre wide and must lie horizontally 760 mm above the finished floor level. See drawing below.

The playing surface may be constructed from any material provided that it yields a bounce of about 230 mm when a standard table tennis ball is dropped onto it from a height of 300 mm.

The surface should preferably be finished in a dark colour with 20 mm wide white lines that mark the edges of the playing surfaces. A 3 mm wide “centre line” is drawn down the full length of the playing surface demarcating the court for doubles play.

The area required for competitive play, as required by the International Table Tennis Federation, is 14.0 metre long, 7.0 metre wide and 5.0 metre high.

A net which is 1.83 m long and 152.5 mm high along its entire length, divides the playing surface into two equal courts. The net is suspended from a cord attached at each end to a rigid upright post that is positioned 152.5 mm outside the sideline. The ends of the net should be as close as possible to the posts and the bottom of the net should be as close as possible to the playing surface.



The ball

The ball must be round, hollow, have a diameter of 38 mm and weigh 2.5 gram. It is made of celluloid or similar material and may be either white or yellow and must have a matt finish. A three star rating indicates that the ball is true to the above specification.

The bat

The bat may be any size, shape or weight. The blade must be constructed out of wood, be continuous, of even thickness, flat and rigid. The sides of the blade must be matt and a uniform colour although the two sides need not have the same colour.

The sides of the blade may be covered with the following:

- A rubber layer with pimples pointing inwards or outwards, as well as a thin layer of sponge between the plywood centre and the rubber layer. The total thickness of this layer may not be more than 4 mm thick.
- A plain rubber layer with pimples pointing inwards or outwards which may not be thicker than 2 mm.
- Pimples must be evenly spaced on the rubber surface and there must be between 10 and 50 pimples per cm²
- The edge of the bat must be in a dark colour.

1.4.20 Tennis

Tennis is played on a rectangular flat surface, usually on grass, clay, concrete (hard court) or a synthetic suspended court. The court is 23.77m long and its width is 8.23m for singles matches and 10.97m for doubles matches.

Additional clear space around the court is needed in order for players to reach overrun balls for a total of 18.288 m wide and 36.576 m long. A net is stretched across the full width of the court, parallel with the baselines, dividing it into two equal ends. The net is 1.07 metre high at the posts and 914mm high in the center. The court on the right side of each player is called the deuce court, while the left side is called the ad court (short for 'advantage court')

Types of tennis courts

There are four main types of courts depending on the materials used for the court surface: clay courts, hard courts, grass courts and indoor courts (carpet, rubber or wood). Each playing surface has its own characteristics which affects the playing style of the game.

Of the Grand Slam tournaments, the U.S Open and Australian Open use hardcourts (though both used grass courts in the past, and the U.S Open also used clay courts), the French Open is played on clay (though it too was played on grass before 1928) and Wimbledon is played on grass.

Hard Courts

Hard courts, usually made of cement or asphalt, are considered “medium” to

“fast” surfaces, where fast hard-hitting players have a slight advantage. Hard courts can vary in speed, but they are faster than clay and slower than grass courts, which allow the ball to slide. These courts are considered the most equal for all playing styles.

The US Open is played on Deco Turf, an acrylic hard court, while the Australian Open is played on the synthetic hardcourt Plexicushion, having previously used Rebound Ace.

The main difference between a synthetic hardcourt and true hardcourt surface is the level of hardness. Synthetic hardcourts are normally softer (more spongy). Consequently, when the ball bounces on this surface a large part of the ball's momentum is absorbed by the surface and reduces its speed.

On a hard surface the loss of momentum is negligible because the surface provides less cushion to the bouncing ball. The amount of sand used in the top paint and the size of the sand also determines the speed – more sand means less speed and the larger the sand particles will slow the speed of play. The amount of friction can also be altered and more friction will produce a clay court effect, where topspin is magnified. The extra grip/friction will resist the sliding effect of the ball and the resistance will force the ball to change its rotation. The extra grip provided by the surface can resist the movement of the player and can cause injury.

Grass Courts

Grass courts are the fastest type of tennis courts in common use (Astro Turf is faster but is primarily only used for personal courts). They consist of grass grown on very hard-packed soil, similar to golf greens, which adds an additional variable: bounces depends on how healthy the grass is, how recently it has been mowed, and the wear and tear of recent play. Points are usually very quick where fast, low bounces keep rallies short, and the serve plays a more important role. Grass courts tends to favour serve-and-volley tennis players. The most famous grass tennis court is Centre Court at Wimbledon. The surface is less firm and more slippery than hard courts, causing the ball to slide and bounce lower, and so the players the ball faster.

Serve and volley players take advantage of the surface by serving the ball (usually a slice serve because of its effectiveness on grass) and then running to the net to cut off the return of serve, leaving their opponents with little time to reach the low-bouncing, fast moving ball. Players often hit flatter shots to increase power and allow the ball to travel faster after and before the ball hits the ground. Due to high maintenance costs however, grass courts are now rare as they must be watered and mowed often, and takes a longer time to dry after rain than hard courts.

Indoor Courts

Special surfaces can only be used indoors. Most commonly carpet surfaces, carpet courts vary in playing characteristics due to differences in thickness, texture, and materials used in the base and yarn. Suspended surfaces may be used indoors.

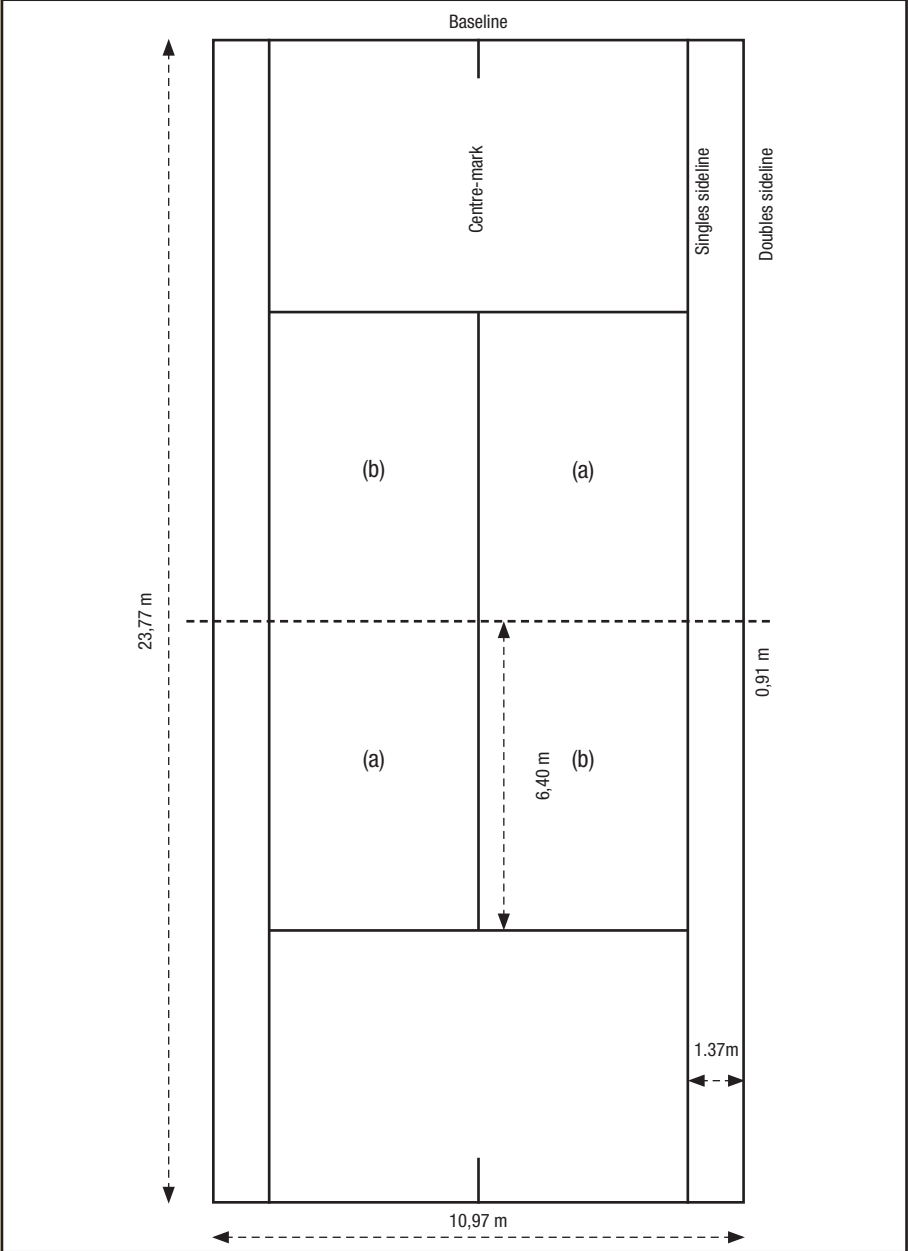
The ATP tennis tour also considers rubber surfaces as carpet, such as that of the Paris Masters. While being the most common surface for real tennis, wood is the rarest surface for tennis. It is also the fastest surface, which bounces faster and lower than grass. There are many other types of indoor surfaces including fake grass.

Clay Court

A clay court is one of the four different types of tennis court. Clay courts are made of crushed shale, stone or brick. The red clay is slower than the green, or Har-Tru “American” clay. The French Open uses clay courts, making it unique among the Grand Slam titles.

Although more traditional and cheaper to construct than other types of tennis courts, maintenance costs are higher than those of hard courts. Clay courts need to be rolled to preserve flatness. The clay's water content must be balanced; green courts generally require the courts to be sloped to allow water run-off.

Tennis court dimensions



The net

The net is suspended from a cord or metal cable held over two posts. The posts must be 1.07 metre high and positioned 914 mm outside the centre of the doubles sidelines. The net must be 914 mm high at the centre, where it must be kept taut by a white strap that may not be wider than 50 mm. A white band at the top of the net covers the cord or cable and must extend between 50 and 63 mm down on each side of the net.

Playing lines

The outside dimensions of the playing lines should be as follows:

- Doubles: 23.77 metre x 10.97 metre
- Singles: 23.77 metre x 8.23 metre
- All lines should be not less than 25.4 mm wide except for the base line which may be up to 100 mm wide.
- The lines should be laid out and applied as close to the exact measurements as possible within the limitations of the playing surface. At no time should the line dimensions vary by more than 6 mm from the exact measurement unless the court surface won't allow.

Back space

Tournament play requires a minimum 6.401 metre from the base line to fixed obstruction (for example fence or back stop wall). In non-tournament this distance may be reduced to 5.486 metres.

Side space

A side space of not less than 3.658 metre is required from the side line to a fixed obstruction. Where courts are in battery and where netting is used between courts, the netting is considered to be a moveable obstruction in which case 2.743 metre is considered a minimum between the side line and the netting.

Clearance between courts

Where courts are constructed within the confines of an enclosure, the distance between side lines should not be less than 3.658 metre. It is however preferable to allow as much space as possible to enhance play.

Overhead clearance

The space directly above the playing area within the playing lines should be free from any overhead obstructions and should be not less than 6.400 metres over the base line and 10.668 metre over the net line.

Stadium – tournament court area

For tournament play, where judges are required, a minimum clear area of 21.330 metre x 39.620 metre should be provided. This allows for both judges and player run off areas.

Fencing

The purpose of fencing around a tennis court is to keep most of the tennis balls within the court during play. Chain link fencing is the most commonly used, but any fence, wall, hedge or netting may be used.

The overall dimensions of the fencing should be as follows:

Back stop: 3.00 metre (2.438 metre minimum)

Side stops: For a distance of 6.10 metres from the backstop the fence should be 3.00 metre, thereafter it may be reduced to a minimum of 1.00 metre.

Construction of tennis courts

A tennis court should be laid out to minimise players looking into the sun either when serving or when following the flight of a ball. In addition to the above it should be laid out to avoid distracting shadow lines and patterns.

Generally a tennis court should be set out with the longitudinal axis of the court perpendicular to the azimuth of the sun (the angular measurement of the horizontal location of the sun in relation to true north). Since the azimuth of the sun constantly shift according to the time of day, the season of the year and the latitude in which it is observed, the exact alignment of the court may be determine by the following influencing factors:

- Season of the year during which the court is intended for play.
- Time of day during which the court is intended for play.

In addition to the above the following factors may also influence the orientation of the court:

- Other structures and site features.
- Neighbouring property.
- Vehicle and pedestrian traffic.
- Prevailing winds.
- Property lines.
- Zoning Requirements.
- The topography and efficiency in site utilisation.

Hard court construction

Hard courts may have either an asphalt or a concrete base onto which a synthetic surface is applied.

ASPHALT BASE

The general specification of the sub-surface may vary dependant on site conditions and should be in terms with a Civil Engineers specifications. The general specification may, however, be described as follows:

- Remove all topsoil. Remove all topsoil and level earth platform to correct site development levels with a maximum gradient of 1:10 and particular emphasis on natural sub-soil drainage.
- Rip and compact in-situ earth to 95 % modified AASHTO.
- Install sub-surface drainage comprising 110 mm diameter agricultural drains placed in 450 x 600 mm deep drainage system to the perimeter of each tennis court.
- Sub-surface drains to be lined with a “Bidum” Hessian layer and filled in with 19 mm crusher run stone. Sub-Surface drains to connect at the lowest point to a storm water catch pit which should be connected to a storm water main.
- The compacted earth layer must be covered with a 125 mm thick layer of crusher run to assist in the sub-surface drainage.
- Lay either a cast in-situ or pre-cast concrete edge beam to external edge of court to contain asphalt surface.
- A 30 mm thick asphalt Carpet compacted to a true, smooth and even finish to ensure proper adhesion of the final court surface.
- All asphalt surfaces need to be dry and dust free prior to the placement of the court surface.
- The final synthetic court surface is laid in two or three layers dependant on the specific Manufacturers instructions.
- The court lines are applied when the surfaces have dried.

CONCRETE SUB-STRIATES

The general specification of the sub-surface may vary dependant on site conditions and should be in terms with a Civil Engineers specifications. The general specification may, however, be described as follows:

- Remove all topsoil. Remove all topsoil and level earth platform to correct site development levels with a maximum gradient of 1:10 and particular emphasis on natural sub-soil drainage.
- Rip and compact in-situ earth to 95 % modified AASHTO.
- Install sub-surface drainage comprising 110 mm diameter agricultural drains placed in 450 x 600 mm deep drainage system to the perimeter of each tennis court.

- Sub-surface drains to be lined with a “Bidum” Hessian layer and filled in with 19 mm crusher run stone. Sub-Surface drains to connect at the lowest point to a storm water catch pit which should be connected to a storm water main.
- The compacted earth layer must be covered with a 125 mm thick layer of crusher run to assist in the sub-surface drainage.
- Insert layer of 250 micron damp proof course.
- Place 150 mm thick layer of 20 (Mpa) concrete surface bed finished smooth with a final brushed surface.
- If the final concrete surface is not smooth and level, a levelling screed has to be applied with a minimum thickness of 15 mm.
- The concrete and screed finish needs to dry out for a period of twenty eight days before the final synthetic finish can be applied.
- The final synthetic court surface is laid in two or three layers dependant on the specific Manufacturers instructions.
- The court lines are applied when the surfaces have dried.

Grass court construction

The general specification of the sub-surface may vary dependant on site conditions and should be in terms with a Civil Engineers specifications. The general specification may, however, be described as follows:

- Remove all topsoil. Remove all topsoil and level earth platform to correct site development levels with particular emphasis on natural sub-soil drainage.
- Rip and compact in-situ earth to 95 % modified AASHTO.
- Install sub-surface drainage comprising 110 mm diameter agricultural drains placed in 450 x 600 mm deep drainage system to the perimeter of each tennis court.
- Sub-surface drains to be lined with a “Bidum” Hessian layer and filled in with 19 mm crusher run stone. Sub-Surface drains to connect at the lowest point to a storm water catch pit which should be connected to a storm water main.
- Dependant on the nature of the site, the sub-surface drains may be covered with a 100 mm thick layer of crusher run to assist in the sub-surface drainage. The crusher run layer is levelled, compacted and covered with a 25 mm thick layer of coarse river sand.
- Import, spread and level 100 mm thick layer of weed free top soil and compact lightly. (Importation of top soil only necessary when the local top soil is not suitable)
- Fertilise soil as per chemical soil analysis and grass with either a fine bladed grass or alternatively with “Golfing Green” grass. Seeding should be done transversely in two applications to ensure an even spread of seed.

- Once the grass is established, top dress. Cover grass with thin layer of sieved of top soil to a depth of not more than 8 mm over the grass and smooth.
- Water daily or as may be required.
- Regular soil tests should be taken to ensure that the correct fertilisation program is carried out.
- Grass matting should be avoided and always controlled by vertical cutting. Length of grass should never be longer than 8 mm when played on.
- The grass should be rolled regularly during the playing season since it the hardness of the top soil that will ensure uniformity and consistency of the bounce of the ball.

Since grass courts require a high volume of water, it may be prudent to install a sprinkler system to the perimeter of the court.

Clay court construction

The general specification of the sub-surface may vary dependant on site conditions and should be in terms with a Civil Engineers specifications. The general specification may, however, be described as follows:

- Remove all topsoil. Remove all topsoil and level earth platform to correct site development levels with a maximum gradient of 1:10 and particular emphasis on natural sub-soil drainage.
- Rip and compact in-situ earth to 95 % modified AASHTO.
- Install sub-surface drainage comprising 110 mm diameter agricultural drains placed in 450 x 600 mm deep drainage system to the perimeter of each tennis court.
- Sub-surface drains to be lined with a “Bidum” Hessian layer and filled in with 19 mm crusher run stone. Sub-Surface drains to connect at the lowest point to a storm water catch pit which should be connected to a storm water main.
- Insert sub-surface irrigation system to specific manufacturer’s instructions.
- The compacted earth layer must be covered with a 125 mm thick layer of crusher run to assist in the sub-surface drainage.
- Apply 2.8 kilogram of fast dry material, level, water and compact to a smooth even surface. Brush off any loose material and store for later re-use.
- Apply court makings as before.

1.4.21 Volley Ball

Volley ball is a game in which two teams of six active players, separated by a high net, each try to score points against one another by grounding the ball on the other team's court.

The court is rectangular, 18,0 metres long and 9.0 metres wide and a free zone at least 3.0 metres wide all round the court. The clearance height above the court must be at least 7.0 metres.

The playing surface must be flat, horizontal, uniform and slip resistant. (Only wood or synthetic surfaces are accepted for international competition)

All lines in the court are 50 mm wide. Two side lines and two end lines represent the boundaries of the court. The centre line is the front of each court, the front zone lies between the centre line and the attack line, which is drawn 3.0 metres behind the centre line. (See Drawing below) The attack zone extends indefinitely beyond the side lines.

The service zone is the whole width of the court situated immediately behind the end line. It is limited on both sides by two 150 mm short lines which are drawn 200 mm long, in line with the side lines, beyond the end lines.

The net

The net is stretched across the centre of the court at a height of 2.24 metres for women and 2.43 metres high for men. The net is 9.5 metres long and 1.0 metre deep with 50 mm wide white bands across the top and both sides which line up with the sides of the court. The net is manufactured out of 100 mm² netting and has multicoloured antennae which project 800 mm above the top of the net above each side marker.

The posts

The posts that support the net must be 2.55 metres high and fixed firmly into the ground at a distance of 500 – 1000 mm beyond the side lines.

The ball

The ball is round, uniform in colour, has a circumference of 650 – 670 mm and weighs between 260 and 280 gram. It is made of a leather casing with an inner tube made from rubber or similar material.

2. MULTI-PURPOSE SPORTS HALLS

2.1 GENERAL

This section recommends the minimum dimensions and specifications for the design of multi-purpose sports halls.

The space required for most games depends on the standard of play; generally the higher the standard of play the greater the special requirement. Whilst the playing area is usually the same, increased safety margins and additional clear height may be required.

In addition to the above an extra zone is required for team benches and officials' tables. Finally a further security zone may be required between teams and spectators.

Since badminton has the most demanding requirements for a number of functional elements including lighting and associated roof structure, background colours and air velocities, the overall dimensions of the halls described below are calculated from the optimum arrangement of badminton courts compatible with the minimum requirements of other indoor sports.

In specialist halls individual requirements, particularly for sports that require a larger playing surface such as hand ball, hockey, etc. may overrule the above modular method in calculating the sports hall dimensions. Other factors that may influence the overall size of the halls are as follows:

- Additional spectator seating.
- Dedicated additional space for sprint runoffs.
- Structural elements and building design.
- International competition that may require additional space.
- Non-Sports events that may require additional space.
- Regional sports arenas.

2.2 OVERALL COURT DIMENSIONS

In terms with the above the critical dimensions of the various court types have been graded in term with club standard sizes and national or international standards, as follows:

BADMINTON

BADMINTON	CLUB STANDARD	NATIONAL / INTERNATIONAL STANDARD
Minimum Height over Court	7.6 m	9.1 m
Length	13.4 m	13.4 m
Width	6.1 m	6.1 m
Min. Dist. from Wall to Sideline	1.5 m	2.2 m
Min Dist. From Wall to Baseline	2.0 m	2.3 m
Min. Dist. Between Courts	1.5 m	2.0
Minimum Overall Area		
Single Court	17.4 x 9.1	18 x 10.5
Parallel Pair	17.4 x 16.7	18 x 18.6
For each additional court	+7.6	+8.1
Baseline to Division Netting 1.5 m	Sideline to Division Netting 1.2 m	

BASKETBALL COURT

BASKETBALL	CLUB STANDARD	NATIONAL / INTERNATIONAL STANDARD
Minimum Height over Court	7.0 m	7.0 m
Length	24 – 28 m	28 m
Width	13 - 15 m	15 m
Min. Dist. from Wall to Sideline	1.05 m	2.05 m
Min Dist. From Wall to Baseline	1.05 m	2.05 m
Min. Dist. Between Courts	1.05 m	2.05 m
Minimum Overall Area		
Single Court	30.1 x 17.1	32 x 22.1
Parallel Pair	30.1 x 34.2	32 x 40.1
Extra One Side for Officials & Team Area	0.9 m	3.0 m
Baseline to Division Netting 1.5 m	Sideline to Division Netting 1.2 m	

CRICKET NETS

CRICKET NETS	CLUB STANDARD	NATIONAL / INTERNATIONAL STANDARD
Height over Nets	4.0 m	4.5 m
Length	29.12 m	33.12 m
Width	3.66 m	4.0 m
Min. Dist. from Wall to Sideline	1.0 m	1.0 m
Min Dist. From Wall to Baseline	1.0 m	1.0 m
Min. Dist. Between Courts	1.0 m	1.0 m

HANDBALL COURT

HANDBALL	CLUB STANDARD	NATIONAL / INTERNATIONAL STANDARD
Minimum Height over Court	7.6 m	9.0 m
Length	34.5 – 40 m	40 m
Width	18 - 20 m	20 m
Min. Dist. from Wall to Sideline	1.0 m	1.0 m
Min Dist. From Wall to Baseline	1.0 m	1.0 m
Min. Dist. Between Courts	1.0 m	1.0 m
Minimum Overall Area		
Single Court	36.5 - 42 x 21-23	42 x 23
Extra One Side for Officials & Team Area	1.0 m	1.0 m

HOCKEY PITCH

HOCKEY PITCH	CLUB STANDARD	NATIONAL / INTERNATIONAL STANDARD
Minimum Height over Court	Not Prescribed	Not Prescribed
Length	36 – 44 m	36 – 44 m
Width	18 - 22 m	18 – 22 m
Min. Dist. from Wall to Sideline	1.5 m	1.5 m
Min Dist. From Wall to Baseline	1.5 m	3.0 m
Min. Dist. Between Courts	1.05 m	2.05 m
Minimum Overall Area		
Single Court	30.1 x 17.1	32 x 22.1
Extra One Side for Officials & Team Area	1.2 m	1.2 m

KORFBALL PITCH

KORFBALL PITCH	CLUB STANDARD	NATIONAL / INTERNATIONAL STANDARD
Minimum Height over Court	9.0 m	9.0 m
Length	36 – 40 m	36 – 40 m
Width	18 - 20 m	18 – 20 m
Min. Dist. from Wall to Sideline	2.0 m	2.0 m
Min Dist. From Wall to Baseline	2.0 m	2.0 m
Minimum Overall Area		
Single Court	40 x 22	44 x 26
Extra One Side for Officials & Team Area	2.0 m	2.0 m

NETBALL COURT

NETBALL COURT	CLUB STANDARD	NATIONAL / INTERNATIONAL STANDARD
Minimum Height over Court	7.6 m	7.6 m
Length	30.5 m	30.5 m
Width	15.25 m	15.25 m
Min. Dist. from Wall to Sideline	1.5 m	2.0 m
Min Dist. From Wall to Baseline	2.0 m	2.0 m
Min. Dist. Between Courts	2.0 m	2.0 m
Minimum Overall Area		
Single Court	34.5 x 18.25	34.5 x 20.75
End-on Pair	68 x 18.25	68 x 20.75
Extra One Side for Officials & Team Area	1.5 m	1.5 m

VOLLEYBALL COURT

VOLLEYBALL COURT	CLUB STANDARD	NATIONAL / INTERNATIONAL STANDARD
Minimum Height over Court	8.0 m	12.5 m
Length	18.0 m	18.0 m
Width	9.0 m	9.0 m
Min. Dist. from Wall to Sideline	3.0 m	5.0 m
Min Dist. From Wall to Baseline	3.0 m	8.0 m
Min. Dist. Between Courts	3.0 m	5.0 m
Minimum Overall Area		
Single Court	24 x 17	40 x 25
Parallel Pair	24 x 37	40 x 55
Extra One Side for Officials & Team Area	2.0 m	3.0 m
Extra Three Sides for Spectators & Team Area	2.0 m	3.0 m

2.3 COURT CONFIGURATIONS

To determine the overall size of the multi-purpose sports hall the various court configurations, indicated in badminton court modules are as follows:

2.3.1 Single Courts

The minimum hall area for a single badminton court is 17.4 metre long, 9.1 metre wide and has a clear ceiling height of 7.6 metre.

Apart from badminton it would be possible to house one table tennis table and two fencing piste. Halls of this particular size are thus not recommended since they have limited multi-purpose potential.

2.3.2 Two-Court Halls

The minimum size for a two-court sports hall is 18 metre long, 17 metre wide and has a clear ceiling height of 7.6 metre.

Apart from the two badminton courts, it would be possible to house four table tennis tables, three trampolines, one judo floor, one gymnastics floor and three fencing piste.

A careful assessment of the sports types has to be made before halls of this particular configuration are recommended for construction.

2.3.3 Three-Court Halls

The minimum size for a three-court sports hall is 27 metre long, 18 metre wide and has a clear ceiling height of 8.0 metre.

Apart from the three badminton courts, it would be possible to house five table tennis tables, six trampolines, two judo floors, two gymnastics floors, three fencing pistes and one volleyball court.

Due to the fact that a four court hall requires only a marginal increase in overall dimensions, it is recommended that, unless restrictive site conditions exist, a four court hall is constructed in lieu of a three court hall.

2.3.4 Four-Court Halls

The minimum size for a four-court sports hall is 33 metre long, 18 metre wide and has a clear ceiling height of 8.0 metre. The hall covers an overall area 594 square metre.

In a four-court hall it would be possible to house the following courts:

- Four badminton courts
- One basketball court
- Four cricket nets
- Two gymnastic floors
- One indoor hockey pitch
- Two judo floors
- Six trampolines
- Four table tennis tables
- One volleyball court

A small incremental increase in dimensions to an overall length of 34.5 metre and a width of 18.25 metre would have the added advantage of including one netball court into the above list.

2.3.5 Six-Court Halls

The minimum size for a six-court sports hall is 34 metre long, 27 metre wide and has a clear ceiling height of 9.0 metre. The hall covers an overall area 888 square metre.

In a six-court hall it would be possible to house the following courts:

- Six badminton courts
- One basketball court
- Eight cricket nets
- Two gymnastic floors
- One indoor hockey pitch
- Two judo floors
- One netball court
- Eight trampolines
- Six table tennis tables
- One volleyball court

2.3.6 Eight-Court Halls

The minimum size for an eight-court sports hall is 37 metre long, 34.5 metre wide and has a clear ceiling height of 9.1 metre. The hall covers an overall area 1277 square metre. In an eight-court hall it would be possible to house the following courts:

- Eight badminton courts
- Two basketball courts
- Nine cricket nets
- Four gymnastic floors
- Two indoor hockey pitches
- Four judo floors
- Two netball courts
- Twelve trampolines
- Ten table tennis tables
- Two volleyball courts

When constructing the larger halls, in addition to the above, the following factors should be taken into account:

- The overall building structure, to cater for the larger spans, would require larger supporting members which have to be carefully aligned between courts to ensure that the above number of courts may be achieved.
- The increased size of the facility would mean that, in terms with the National Building Regulations, additional ablution facilities would have to be provided to cater for both players and spectators.
- Safety features such as escape routes, spectator circulation areas, fire services and the like would have to be carefully analysed.
- Spectator seating will have to be carefully analysed and planned.
- The non-sport uses may require additional installations such as industrial size kitchens, store rooms and the like.
- Spectator and player parking regulations would have to be taken into account.
- Access control and security of the complex become more critical.

2.3.7 Nine-Court Halls

The minimum size for a nine-court sports hall is 51 metre long, 27 metre wide and has a clear ceiling height of 9.1 metre. The hall covers an overall area 1377 square metre.

In a eight-court hall it would be possible to house the following courts:

- Nine badminton courts
- Three basketball courts
- Seven cricket nets
- Two gymnastic floors
- One indoor hockey pitch
- Two judo floors
- Two netball courts
- Twelve trampolines
- Fourteen table tennis tables
- Two volleyball courts

The nine-court hall offers fewer variations in the number of playing surfaces when compared to the eight-court hall. The circumstances under which the nine-court lay-out would be preferred to the eight-court hall would be the following:

- Site restrictions
- Spectator facilities

2.3.8 Twelve-Court Halls

The minimum size for a twelve-court sports hall is 54 metre long, 34.5 metre wide and has a clear ceiling height of 9.1 metre. The hall covers an overall area 1863 square metre. In a twelve-court hall it would be possible to house the following courts:

- Twelve badminton courts
- Three basketball courts
- Eight cricket nets
- Four gymnastic floors
- One handball court
- Two indoor hockey pitches
- Four judo floors
- One korfbal pitch
- Three netball courts
- Eighteen trampolines
- Fourteen table tennis tables
- Two volleyball courts

As in the eight and nine court configurations attention should be given to the following requirements:

- Increased safety standards due to increased spectator and player numbers
- Allied facilities to cater for the increased number of people visiting the facilities
- Increased access control and security measures
- Increased mechanical and electrical installations.

2.3.9 Sport Hall Floors

The sport performance qualities required of the playing surface, vary from sport to sport and relate to the interaction of the ball and/or player to the surface.

The levels of vertical and angular rebound and spin characteristics must be appropriate to the proposed sport types.

The playing surface needs to be flat, even and consistent so that play is not affected by any variables in the floor.

The choice of the type of sports floor is crucial to the success of a multi-purpose sporting hall. The choices that need to be made may be briefly summed up as follows:

PRIORITY SPORTS

Since the various sporting types require certain minimum floor specifications, it is important to prioritise the various sporting codes that will be played in a particular facility.

Whilst some surfaces may be suitable for most sport types, compromise may be required when selecting a multi-sport playing surface.

LOAD BEARING AND WEAR REQUIREMENTS

The various sport floor types must be able to safely withstand the loading from both the users and the equipment. Particular regard has to be given to temporary spectator stands when selecting the floor type and when designing the supporting structure.

In addition to the above, resistance to wear and impact damage that may be caused by equipment has to be taken into account.

SAFETY AND RISK OF PHYSICAL INJURY

Prolonged intensive use of the sports floors requires optimal surface characteristics to minimise the potential for injury whilst allowing maximum sports development.

The levels of friction, stiffness and shock absorption appropriate to the activities of each sporting type need to be taken into account when selecting the floor to the sports hall.

The surface friction of the floor needs to be high enough to prevent slipping but at the same time it cannot restrict movement in either a continuous direction or when in a turning motion.

It is further important that the floor will not release any toxic or carcinogenic substances which may endanger the users.

INTERNAL VISUAL ENVIRONMENT

Since the floor is a major visual element of the sports hall, the colour, reflectance and other characteristics of the surface material need to be considered in making the final selection of the sports floor.

NON-SPORTING USES

Social or commercial activities need to be taken into consideration but care should, however be taken to ensure that sporting requirements are not overly compromised when a general purpose floor finish is used. Typical non-sporting uses of the multi-purpose sports halls may be as follows:

- School assemblies
- Examinations
- Functions
- Exhibitions
- Dances
- Community activities

CONSTRUCTION COSTS

The cost of construction of the various sports floors have to be seriously considered when deciding on the type of sports floor. For national and international competitions the type of floor required would in all likelihood take precedence over the cost of the floor.

MAINTENANCE

It is important that the floor is hygienic and free from dust and vapour. In addition it must be resistant to abrasion and be easy to clean.

TYPES OF SPORTING FLOORS

The various types of sporting floors that are available are as follows:

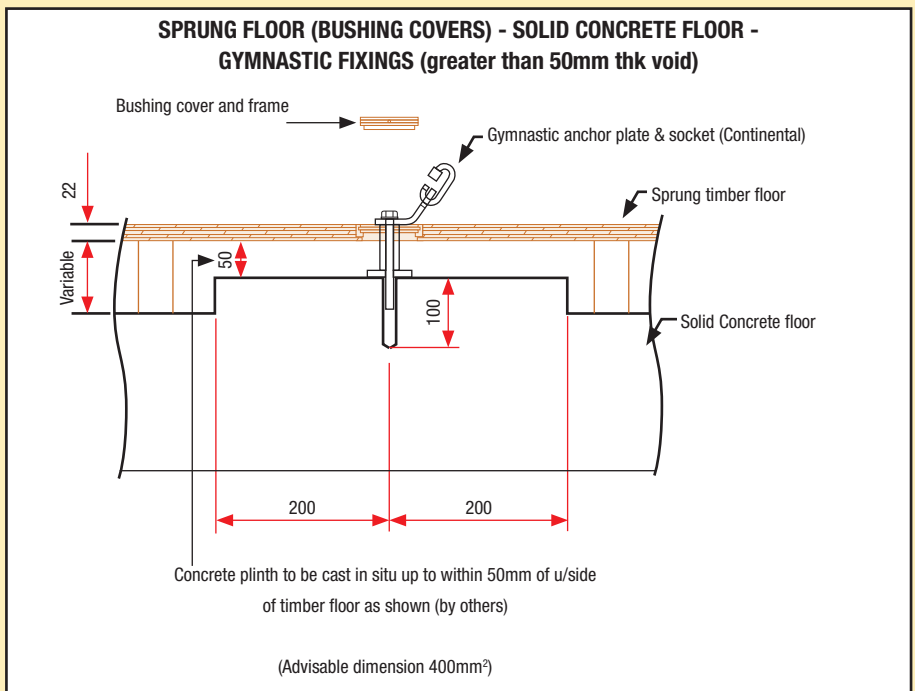
TIMBER

Timber is one of the most widely used materials for sports floors and is available in a number of different forms:

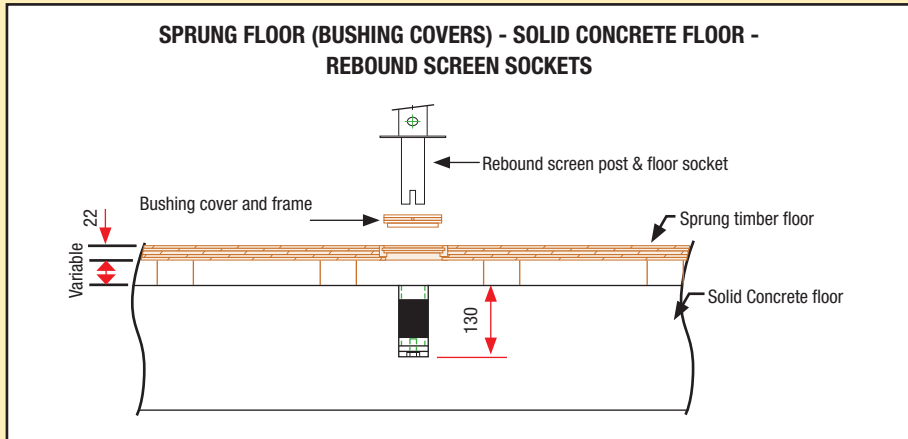
- Strip Flooring
- Blocks
- Composite boarding such as plywood, medium-density fibre and the like
- Composite tiles.

The timber floor may be fixed, in terms with specific manufacturer's instructions, directly to the concrete or screeded floors or it may be fixed to a patent sprung flooring system. When inserting a timber floor the following factors need to be taken into account:

- The type of wood required for the various sporting codes. The type of wood may also vary from inland to coastal regions due to local moisture contents, area from where the raw timber is obtained and pest control factors.
- The availability of the timber may also play a role in deciding on the type of timber floor to be used.
- Lateral movement in the timber flooring arising from humidity levels must be addressed by providing expansion gaps.
- Ventilation gaps in sprung floors have to be clean and should contain moisture barriers to prevent water penetration.
- The timber floors need to be correctly treated to prevent damage from moisture, pests and the like.
- The surfaces have to be sealed to ensure that the final surface is durable and easily cleanable.
- The insertion of access panels or plugs have to be carefully planned so that the fixing of gymnastic equipment, posts for nets and the like are correctly positioned.



Gymnastic Floor Fixing Point with Floor Plug



Net Post Floor Fixing Point with Floor Plug

SHEET FLOORS

Vinyl, linoleum, rubber and composite floor sheeting materials and fibre reinforced polyurethane are widely available for sports floor surfaces. In some instances the sheeting (or tiles) is available with shock absorption cellular plastic or rubber backing.

It is important to note that when the above floor finishes are applied directly onto a screeded surfaces that the surfaces have to be free of any dirt or projecting particles as these will considerably reduce the life of the floor.

The sheet flooring systems may also be applied onto a sprung floor for additional shock absorption.

IN SITU POLYMERIC

The polyurethane sports floors are mixed on site and form a continuous playing surface without joints. The underlay can be a cellular plastic, prefabricated sheet or in situ bonded material.

The application may be either directly onto the above underlay or it may be applied onto sprung floors. Whilst this type of surface is usually considered to be point elastic but synthetic mesh material can be integrated into the system to improve the elasticity of the material.

The finish usually ranges in thickness from 1 – 4 mm and is suitable for use with spiked shoes. The finish is smooth, self levelling and is available in a number of colours.

TEXTILE

A number of textile floor surfaces are available, including:

- Fibre bonded, tufted, woven, knitted, needle-punch or fine pile carpets
- Felt
- Velour
- Flock

The characteristics of textile surfaces vary considerably dependant on the material and construction used, particularly durability and friction qualities such as slip resistance and ball roll.

The textile finishes generally lend themselves for use in specialist facilities such as gymnastics, weight training and aerobics.

PORTABLE SPORTS SURFACES

Activities such as cricket practices and indoor bowls require surfaces that are incompatible with most other indoor sporting activities. By placing portable surfaces onto indoor sports floors the above sporting activities may be accommodated.

Whilst these systems are freely available, care should be taken to ensure that the surfaces are compatible and that they meet the performance standards as the permanent floor.

Portable floors are available for the following codes:

- Badminton
- Basketball
- Cricket
- Gymnastics
- Indoor bowls
- Volleyball

2.3.10 Colour and court markings

The colour of the sports floor must be chosen in context with the overall colour scheme and lighting requirements. The light reflectance should be between 40 – 50 % and visually contrast with the wall colour and court markings. Court markings are usually painted on most sports floors. Where temporary markings are required, it may be possible to use tape markings.

Paint should be applied strictly in accordance with individual manufacturers' instructions and all work should be carried out to a high standard. Two-part polyurethane paints offer improved durability. Courts should be set out in such a manner as to avoid line markings being too close to each other or coinciding. The sport marking colours and line widths may be briefly summarised as follows:

SPORT	LINE COLOUR	WIDTH
Hockey	Blue or Other	50 mm
Indoor Hockey	Light Blue	50 mm
Netball	Red	50 mm
Volleyball	Green or Other	50 mm
Five-a-Side Football	Other	50mm
Basketball	Black	50mm
Tennis	Yellow	50 mm
Badminton	White	40 mm

3. COMPILATION OF DOCUMENTATION TO DETERMINE CONSTRUCTION COST

In order to simplify the compilation of documentation to determine the cost of construction and to assist in the contract administration of construction projects, a set of standard documentation has been developed by the South African construction industry.

3.1 STANDARDISED CONSTRUCTION DOCUMENTATION

The following construction industry in South Africa is represented by a number of public, private and professional entities that have combined to compile standard documentation for the procurement of construction costs and the contract administration of construction projects. The principal entities are as follows:

3.1.1 Construction Industry Development Board

The Construction Industry Development Board was constituted by an Act of Parliament, The Construction Industry Development Board Act 38 of 2000, and mandated to provide the following:

- Establish a national register of contractors and of construction projects to systematically regulate, monitor and promote the performance of the industry for sustainable growth, delivery and empowerment.
- Promote improved delivery management capacity and the uniform application of procurement policy throughout all spheres of government.
- Promote improved performance and best practice of public and private sector clients, contractors and other participants in the construction delivery process.

- Promote sustainable participation of the emerging sector.
- Provide strategic direction and develop effective partnerships for growth, reform and improvement of the construction sector.

The Construction Industry Development Board may be contacted by telephone on 012 482 7200 or their call centre on 0860 103 353 or via their web site at cidb@cidb.org.za

3.1.2 Joint Building Contracts Committee

The Joint Building Contracts Committee was set up to provide good practice and an equitable distribution of contractual risk in the building industry.

The JBCC documents are compiled in the interests of standardisation with the aim to simplify the administration of construction projects. The primary documentation is supported by a set of standard documents.

The JBCC may be contacted by fax on 011 646 7812 or via. Email at info@jbcc.co.za

The standard documentation is also available at all the professional construction related bodies.

3.1.3 The Association of South African Quantity Surveyors

The Association of South African Quantity Surveyors, under the auspices of The South African Council for Quantity Surveying Profession constituted in terms of an act of parliament - Act 49 of 2000, has compiled a set of standard documentation for the procurement of construction costs:

- The various costs are identified in terms with the principals of measurement and documentation of the Standard System of Measurement of Builder's Work (Latest Edition).
- In terms with the above, Standard documentation and specifications in the form of Bills of Quantities may be compiled. (See Appendix for Example)
- In conjunction with the JBCC the above documentation forms the basis of a comprehensive set of construction related documentation.

3.1.4 The South African Association of Consulting Engineers

The South African Association of Consulting Engineers in association with the South African Bureau of Standards has compiled a set of standard specification and a method of measurement for engineering works; SABS 1200, for use in the construction industry.

3.1.5 Commercially available software programmes

Numerous commercially available software programmes are available for the planning and tracking of construction activities. (for example MS Project produced by Microsoft)

3.2 ELEMENTAL COST ANALYSIS

For purposes of this publication, an elemental cost analysis has been compiled that embraces all of the above principles. The elemental cost analysis combines the various systems of measurement and based on current and historical data, detailed anticipated costs of the various facilities may be calculated.

See appendix for examples of the various anticipated costs.

3.3 VARIATIONS IN COSTS

it should be borne in mind that whilst the enclosed anticipated elemental costs may be used as a guide to the cost of the facilities, the following factors will have a direct bearing on the costs and will vary from location to location:

- Location of the facility: The cost of the facilities may vary dependant on the cost of transporting of the various resources to a particular location. The cost of labour and accommodation of labour may have a marked effect on the final construction costs.
- Availability of Materials: Materials required for the various facilities may not be readily available and may have to be imported from either within the country or as in the case of the synthetic athletic track surfaces from international sources.
- Currency fluctuations relating to the importation of materials will have an impact of the cost of the facilities that require imported materials.
- Topographical variations will further have an effect on the final costs.
- Soil conditions may have an adverse affect on the anticipated construction costs. In this regard it is always advisable to carry out a detailed soil investigation and to carry out the necessary soil tests.
- Proximity to other structures may also have an impact on the final costs as result of inefficiencies in planning, access and potential placement of structures, etc.
- Individual architectural design, plan shape, facilities provided, service requirements and the materials will all have an impact on the final cost of the facilities.
- Seasons may also have an effect on the cost of a facility; delays in construction activity and related construction claims as a result of rainy weather will thus have to be taken into account.

In order to ensure that the anticipated costs are in keeping with the final costs of a facility it is essential that all of the above factors be taken into account.

In addition provision should also be made for contingencies for unexpected expenditure, escalations in labour and material prices, currency fluctuations where applicable, professional fees and value added tax.

4. FACILITY STANDARDS

In this section, after taking into consideration all the foregoing principles and guidelines, only the main recommendations with respect to norms and standards have been included. The appendix contains further detailed information and specifications relating to the facilities and open spaces.

4.1 SPACE BUDGETING FOR SPORT FACILITIES

Green and Argue (2007) have developed a recommendation of an allocation of 0,56 ha/1000 persons provision as a strategic level space budget for sport and recreation at the sub-district or community level. Local planners together with department of sport and recreation officials will have to develop detailed local plans for all sport facilities based on local needs and interests, and take this space budget into account. In addition, it is recommended that a further 0,3 - 0,4 ha/1000 persons standard be used as an overall allocation for the development of the larger multi-purpose or single purpose facilities at district, metropolitan and regional levels. However, it must be borne in mind that the feasibility of using this standard has not been tested as yet.

4.2 COMMUNITY HALLS

The only standard for Community Halls that the researchers came across was in Polokwane Municipality, where the intention is to provide one community hall per 15000 people within a 10 km radius. They thus utilise a combined standard of population density as well as distance of dwellings. These halls are used as recreation centres that cater for both sport and recreation activities.

4.3 SPORTS FACILITIES

Combi-playing fields: this type of playing field is put to combined use for football, rugby, cricket, softball etc. at ward level and may be grassed, depending on the availability of water. The Polokwane Municipality uses the standard of 1 playfield per 2500 residents, within a radius of 3km.

Combi-all weather court: The Polokwane Municipality uses the standard of 1 combi-all weather court per 2300 residents, within a radius of 3km as an upper threshold and 1 combi-all weather court for basketball and volleyball per 6500 residents within a radius of 3km as a lower threshold.

4.4 CLUSTERING OF FACILITIES

The authors and Green and Argue (2007) recommend that every effort should be made to cluster sport, recreation and parks in future large metropolitan, district and smaller community developments. The detailed design of each individual entity must be in terms of the CSIR Red Book (2000) and/or provincial guidelines. It is important that land allocation for development of these multi-purpose facilities should be taken from both Public Open Space and the sport and recreation land allocation based on the actual space for each facility to be provided.

The Polokwane Municipality applies this concept. They regard a stadium as a cluster of facilities that include the following: grassed playing field that caters for football, rugby, cricket, softball, athletics,

combi-all weather courts, clubhouse with seminar rooms, fenced in and provided at the rate of one cluster per 50000 residents within a radius of 10 km.

4.5 GUIDANCE FOR LOCAL AUTHORITIES TO ACHIEVE A 'QUALITY ASSURED FACILITY'

As part of the local government Comprehensive Performance Assessment indicators, as in the case of Sport England, it is proposed that there are 3 indicators focused on sport. One of these indicators is concerned with the percentage of the population within a 20-minute travel time to a range of sports facilities, where at least one facility has attained a recognised quality assurance standard.

4.5.1 The Accessibility Indicator

"% of population that are within 20 minutes travel time (Urban areas – by walk; Rural areas – by motor vehicle) of a range of 3 different sport facility types of which one has achieved a quality assured standard.

Indicative Lower Threshold = 30% of population

Indicative Higher Threshold = 50% of population."

4.5.2 Reason for the 'Accessibility Indicator'

Increasing the opportunity for people to become more active underpins one of the core aims of SRSA's 'Mass Participation Programme' in seeking to increase participation. Easy access to quality sports facilities is one of the fundamental building blocks in providing the opportunity for getting people active and improving the health of the nation. This indicator looks at access in terms of travel time to quality facilities, using a walking travel time for urban areas, and a drive travel time for rural areas.

Quality is difficult to measure but is seen as a reflection of how well managed the facilities are. Quality in this indicator is not necessarily an indicator of the standard of the facilities, but more about the approach to managing the resources efficiently and effectively to provide as positive customer experience as possible given the facility mix and condition.

Together with physical access, the range of facility types is also essential in giving people a choice of different facilities. Greater choice in the different types of facilities which people have access to, and the proximity of these facilities to where they live will increase the likelihood that people will visit and become more active. The indicator is set at a choice of at least three different facility types, of which one must meet a recognised quality assurance standard, out of a list of the following list of (X number) facility types:

Pools, halls, health & fitness, grass pitches, artificial turf pitches and golf courses etc.

4.5.3 What Quality assurance standards can be applied?

Sport England commissioned independent research that had the brief to provide an analysis and evaluation of quality assurance standards that are known to be in use within the Leisure industry. Each

of the schemes was evaluated against agreed criteria and recommendations were made as to the appropriateness of each of the schemes in terms of meeting the needs of the access indicator. These could effectively be applied in South Africa as well.

The following ten criteria were agreed for evaluating the standards and tools:

- Will ensure the sports user of the facility has a quality (positive, safe and enjoyable) experience;
- Is specifically applicable to an individual facility;
- Is appropriate to the whole of that individual facility;
- Is externally and independently assessed/accredited;
- Is applicable to one or more of the six facility types used in the indicator;
- Is applicable country wide;
- Is readily available to the market;
- Is easy for the Department of Sport and Recreation to collect data on, preferably from a single source;
- Supports continuous improvement by requiring regular renewal;
- Is not a one off or annual award won through competition with other facilities.

4.6 PUBLIC OPEN SPACES

The best examples of current standards for public open spaces were developed by Green and Argue for the City of Cape Town (2007). It is important to first clarify what is meant by open space and what are the potential uses they can be put to. For our purposes public open space is provided for the benefit and use of residents and those people from surrounding areas and for which there is no charge levied. The provision of private open space within housing developments is excluded from this definition. It is essential that such facilities are available for use throughout the year. Such spaces as cemeteries, servitudes, river corridors, mountains, road reserves and formal sport facilities are excluded from this definition.

Public open space includes three levels of open space provision, namely:

- Neighbourhood or small community parks (including pocket parks and urban squares)
- Larger community parks
- Metropolitan or sub-regional parks

Evidence from the City of Cape Town (Green & Argue, 2007) suggests that 0,38 ha/1000 people to 0,7 ha/1000 people can meet public open space needs. These standards would be able to accommodate higher densities and more compact cities. Any provision under 0,5 ha/1000 people limits the number of functional parks and the variety of types that can be provided, especially where densities are low. It is thus recommended that an indicative lower threshold of 0,5 ha/1000 people and an indicative higher threshold of 0,7 ha/1000 people would meet a variety of needs since more functional types can be provided, from very small single use community parks (including play parks) to larger multi-purpose community and smaller scale district parks (Green & Argue, 2007).

Local needs assessments will inform what is provided within the space and how it is utilised. Further guidelines for individual facilities may be found in the CSIR Red Book (2000: Chapter 5, Planning Guidelines section 5.3 and 5.4). the local context will largely determine the detailed plan of open space at any neighbourhood or district level. In terms of global land requirements for open space, several smaller parks (preferably with play equipment) should be provided at a fine grain (maximum distance of 500-700m) within communities with lower mobility levels, while in more mobile communities the same total open space allocation can be consolidated to provide parks of an appropriate size. A local park with play equipment is an almost universal need for mothers with small children (2-5 years old) and it is necessary in lower as well as upper socio economic communities (Green & Argue, 2007).

As the use of norms or standards and distance/size criteria is not an exact science, the decision to provide fewer but larger parks as opposed to smaller parks will be dependent on the socio-economic profile, mobility and density of dwelling units in the community.

4.7 PROTECTION OF SPORT AND RECREATION FACILITIES AND OPEN SPACE

To protect sports facilities, playing fields and open space from damage, loss of availability for use and to comply with SRSA policies, the following standard conditions shall apply when developing or providing new facilities:

- Identified sports facilities, playing fields or open spaces shall not be used for access, storage of vehicles, equipment or materials or in any other manner in connection with the carrying out of the permitted development
- Prior to commencement of the development, a plan to protect and ensure the continuity of the existing use of the facility shall be submitted to and approved in writing by the Local Authority after consultation with SRSA. The plan shall ensure that facilities remain at least as accessible and equivalent in terms of size, usefulness, attractiveness and quality and include a timetable for implementation. The approved plan shall be complied with in full throughout the carrying out of the development.
- To secure the provision and use of the play area prior to the occupation of the buildings, the development permitted shall not be allowed to be used until the area shown on drawings has been laid out in accordance with the drawings and that area shall not thereafter be used for any other purpose than as a play area.

4.8 COMPENSATORY PROVISION AND CONTINUITY OF USE

To ensure the satisfactory quantity, quality and accessibility of compensatory provision which secures a continuity of use, the following standard conditions shall apply when new developments that affect existing facilities are planned:

- The development permitted shall not commence until a scheme has been submitted to and approved by the Local Authority, after consultation with SRSA, for the provision of facilities that are at least as accessible and at least equivalent in terms of size, usefulness, attractiveness and quality as the existing facilities, and shall include a timetable for the provision of the new facilities. The new facilities will be provided in accordance with the approved scheme.
- The new sports facilities/open space/playing fields shall be provided in accordance with the details set out in the planning application, and made available for use prior to the implementation of the development hereby permitted.
- Prior to the commencement of development details for the phasing of development, including the provision of the sports facility, shall be submitted to and approved in writing by the Local Authority after consultation with SRSA. The development shall be carried out in accordance with the approved details.

4.9 BUILT DESIGN AND LAYOUT

To ensure the development is fit for purpose, subject to high quality design standards and sustainable and in accordance with SRSA facility standards, the following shall apply:

- The (named sports facility) hereby permitted shall be constructed in accordance with the design and layout details set out in the planning application.
- Prior to commencement of the development/use, details of the design and layout of the named sports facility, which shall comply with SRSA policy regarding access for people with disabilities, shall be submitted to and approved in writing by the Local Authority in consultation with SRSA. The facility shall be constructed in accordance with the approved design and layout details.

4.10 PLAYING FIELD PROVISION

To ensure that site surveys are undertaken for new or replacement playing fields and that any ground condition constraints can be and are mitigated to ensure provision of an adequate quality playing field and in accordance with SRSA policy, the following shall apply prior to commencement of the development/use hereby permitted:

- A detailed assessment of ground conditions of the land proposed for the sports facility shall be undertaken (including drainage and topography) to identify constraints which could affect playing field quality.
- Based on the results of this assessment to be carried out in respect of the condition above, a detailed scheme to ensure that the playing fields will be provided to an acceptable quality shall be submitted to and approved in writing by the Local Authority after consultation with SRSA.

To ensure the quality of playing fields/ pitches is satisfactory and in accordance with SRSA Policy, the following shall apply:

- The playing fields/ pitches shall be constructed and laid out in accordance with Local Authority planning department standards and methods.
- Before development commences, a scheme for the improvement of playing field drainage including an improvement and maintenance implementation programme shall be submitted to and approved in writing by the Local Authority Planning Department.
- It is highly recommended that the drainage assessment and improvement/ management scheme is undertaken by a turf grass specialist/ consultant.

4.11 MANAGEMENT MATTERS

To ensure the safe and efficient use of the development and to ensure the fence does not have an unacceptable visual impact, the following shall apply:

- Prior to commencement of development, details of protective fencing to be erected around playing fields/ the facility, including location, height, type and materials shall be submitted to and approved in writing by the Local Authority. The fencing shall be erected according to the approved details before the development is used and thereafter retained and maintained.

Where facilities require floodlighting, to minimise light pollution in the interests of the amenity and to maximise the opportunity for community use and/ or secure the viability of the development, the following shall apply:

- Prior to commencement of the development, a plan setting out the type, design, lux levels and measures to control glare and overspill light from flood lights and measures to ensure lights are switched off when not in use shall be submitted to and approved in writing by the Local Authority after consultation with SRSA. The plan shall be in accordance with SRSA/ National or International governing body technical design guidance notes. Thereafter, the floodlighting shall be operated in accordance with the approved plan and maintained in accordance with manufacturer's instructions.
- The floodlighting shall not be operated on the playing fields/ courts after 22h00 hours on weekdays and 24h00 hours on week-ends and public holidays.

To protect the playing fields/ all weather pitches from loss and/ or damage, to maintain the quality of and secure the safe use of sports fields/ pitches, and to comply with SRSA policy, the following shall apply:

- The playing fields/ all weather pitches shall be used for outdoor sport and recreational activities and for no other purpose.

To secure well managed safe community access to the sport facility, to ensure sufficient benefit to the development of sport and to comply with SRSA policy, the following shall apply:

- Prior to the commencement/ use of the development, a Community Use Plan shall be submitted to and approved in writing by the Local Authority. The plan should include details of pricing policy, hours of use, access by non-school users/ non- members, management responsibilities, and include a mechanism for review. The approved plan shall be implemented upon commencement of use of the development.

To secure sufficient benefits to the development of sport and to comply with SRSA policy, the following shall apply:

- Prior to commencement of the development/ use, a Sport Development Programme shall be submitted to and approved in writing by the Local Authority. The programme shall be carried out and implemented in full according to the approved details.

To prevent the location of trees/shrubs on/adjacent to playing fields reducing the available space for playing pitches and/ or affecting the quality of the surface, use of the pitches and ease of maintenance, the following shall apply:

- The landscaping scheme shall be prepared taking into account the need to minimise any adverse effect on the quantity or quality of the playing field by the location of proposed trees/ shrubs.

To ensure that new facilities are capable of being managed and maintained to deliver a facility which is fit for purpose, sustainable and of sufficient benefit to the development of sport in accordance with SRSA policy, the following shall apply:

- Prior to commencement of use of the facility, a Management and Maintenance Plan for a period of at least 3 years, including measures to ensure the replacement of all artificial surfaces within the next 10 years and management responsibilities, a maintenance schedule and a mechanism for review shall be submitted to and approved in writing by the Local Authority after consultation with SRSA. The measures set out in the plan shall be complied with in full, with effect from commencement of the use of the development.

To ensure that new facilities are accessible to people with disabilities, pedestrians, and cyclists, the following shall apply:

- Before the permitted development commences, a plan indicating the provision to be made

for people with disabilities to gain access to the facility in compliance with SRSA Policy, shall have been submitted to and approved in writing by the Local Authority after consultation with SRSA. The agreed plan shall be implemented in full before the permitted development is brought into use.

- The building shall not be occupied until a means of access for pedestrians and/or cyclists has been constructed in accordance with approved plans which include access points, routes to and through the site, gating, covered cycle storage (all separated from motor traffic), lockers, change-rooms, ablutions and shower facilities.

4.12 RESTORATION

To ensure that the site is restored to a condition fit for purpose and in accordance with SRSA policy, the following shall apply:

- No later than 14 days the development or permitted contractors compound and other related structures shall be removed from the site. Within 3 months of removal the playing field land shall be reinstated to a playing field of a quality at least equivalent to or better than the previous quality, or a condition fit for use as a playing field according to a plan approved by the Local Authority.
- Prior to commencement of the development/ use, a playing field restoration plan for the site shall be submitted and approved in writing by the Local Authority after consultation with SRSA. The restoration plan shall provide details of the following:
 - i. Existing and proposed ground levels
 - ii. Existing and proposed soil profiles
 - iii. Measures to strip, store and re-spread soils to avoid soil loss or damage
 - iv. Measures to dispose of/ accommodate waste materials on the site
 - v. Drainage measures including, where appropriate, under drainage
 - vi. Proposed seeding, feeding, weeding and cultivation measures
 - vii. Boundary treatment
 - viii. 5 year after-care and maintenance arrangements
 - ix. Installation of equipment (eg. Goal posts)
 - x. Restoration and maintenance programme

The site should be restored in accordance with the approved plan and shall be available for use by or on commencement of the new facility/ playing fields.

5. RECOMMENDATIONS AND CONCLUSION

Norms and standards should be used as guidelines. They would be reviewed and updated periodically. Quantifiable standards should be mainly regarded as planning guidelines and not as 'rigid' measures for the compilation of blueprints or master plans. Specific recommendations to be considered by various stakeholders:

- 1) Each Municipality should develop an up to date facilities strategy either as a stand-alone document or as part of a wider open space strategy. This would ensure that an assessment of need is carried out and that a strategy is put into place to improve accessibility and quality of facilities.
- 2) Each Municipality should ensure that its goals for sport and recreation facilities are aligned with provincial and national Government goals, programmes and ideals.
- 3) Where formal sport facilities are seen as under-utilised, they should be re-assessed for informal community based sport or recreational open space prior to being released for another land use.
- 4) Each Municipality should undertake a thorough quantifiable analysis of the provision of sport and recreation facilities and case studies to establish examples of best practice.
- 5) Each Municipality should embark on a thorough quantifiable analysis of participation patterns for each type of sport and recreation activity at specific facilities. This would assist the town planners and sport and recreation departments to strategically plan for facilities on a needs basis scientifically. It would thereafter also assist regional, provincial and national planners to compile a national profile in terms of participation patterns to determine future needs for facilities.
- 6) In areas with a shortage of facilities, community use of school facilities should be considered as an alternative to providing separately for those in school and those out of school. Appropriate management systems involving both community members and the school management should be set up to take care of the challenges that arise from shared use.

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ELEMENTAL COSTING

Bills of Quantities

NOTE: The cost estimates presented in these norms and standards are a guide and are based on the calculation as at March 2008. For calculation of escalations the formula as presented in the Industry Guide published by the Department of Cooperative Governance and Traditional Affairs (COGTA) should be used.

ARCHERY

Should it be necessary to construct a dedicated archery field measuring 120 m long x 35 m wide, the elemental cost analysis would be as follows:

NO.	ITEM	UNITS	QTY	RATE R	%	AMOUNT R	TOTALS R
A. SUB-STRUCTURE, ETC. (Provisional)							
	Removal of Trees (Size	No.	1	3,000.00	0.31	3,000.00	
	Clear site	m2	4674	6.00	2.87	28,044.00	
	Removal of Topsoil incl. Carting Away	m3	467	105.00	5.01	49,035.00	
	Bulk Earthworks	m3	935	35.00	3.35	32,725.00	
	Rip & Compact In-Situ Earth to 93 % ModAASHTO	m2	4674	6.00	2.87	28,044.00	
	Herring Bone Sub-Soil Drainage	m	1,145	90.00	10.54	103,050.00	
	Storm Water Reticulation	m	25	145.00	0.37	3,625.00	
	Storm Water Catchpits, etc.	No.	3	2,200.00	0.67	6,600.00	
	Water Supply for Sprinkler System	m	310	85.00	2.69	26,350.00	
	110 mm Diameter Sleeves	m	10	120.00	0.12	1,200.00	
	Automatic Irrigation System	m2	4,674	8.00	3.82	37,392.00	
	Crusher run Base Course	m3	467	230.00	10.98	107,410.00	
	Coarse River Sand Layer	m2	117	7.00	0.08	819.00	
	Compost	m2	234	160.00	3.82	37,392.00	
	Imported Topsoil (Weed Free)	m3	351	130.00	4.67	45,630.00	
	Levelling and Shaping	m2	4,674	3.00	1.43	14,022.00	
	Grass	m2	4,674	15.00	7.17	70,110.00	
	Fertiliser	m2	4,674	3.00	1.43	14,022.00	608,470.00
B. SPECIALIST ITEMS							
	Targets	No.	12	2,400.00	2.94	28,800.00	
	Line demarcation	m	640	4.00	0.26	2,560.00	31,360.00
	SUB-TOTALS				65.42		639,830.00
	PRELIMINARIES AND GENERAL				7.85		76,780.00
	SUB-TOTALS				73.27		716,610.00
	CONTINGENCIES	%	5		3.66		35,831.00
	PROVISION FOR ESCALATION	Months	3		1.04		10,158.00
	SUB-TOTALS				77.97		762,599.00
	PROFESSIONAL FEES	%	12.5		9.75		95,325.00
	SUB-TOTALS				87.72		857,924.00
	VALUE ADDED TAX	%	14		12.28		120,109.00
	SIX LANE ARCHERY FIELD TOTAL				100.00		978,033.00

Note: All figures have been rounded up.

ATHLETICS TRACK (8 LANES)

An eight lane athletics track with a synthetic running surface and all track and field events would cover an area of 16774 m2

NO.	ITEM	UNITS	QTY	RATE R	%	AMOUNT R	TOTALS R
A. SUB-STRUCTURE, ETC. (Provisional)							
	Removal of Trees (Size	No.	1	3,000.00	0.04	3,000.00	
	Clear site	m2	16774	6.00	1.43	100,644.00	
	Removal of Topsoil incl. Carting Away	m3	1677	105.00	2.50	176,085.00	
	Bulk Earthworks	m3	3355	35.00	1.67	117,425.00	
	Rip & Compact In-Situ Earth to 93 % ModAASHTO	m2	16774	6.00	1.43	100,644.00	
	Herring Bone Sub-Soil Drainage	m	3,000	90.00	3.83	270,000.00	
	Storm Water Reticulation	m	50	145.00	0.10	7,250.00	
	Storm Water Catchpits, etc.	No.	5	2,200.00	0.16	11,000.00	
	Water Supply for Sprinkler System	m	269	85.00	0.32	22,865.00	
	110 mm Diameter Sleeves	m	177	120.00	0.30	21,240.00	
	Automatic Irrigation System	m2	10,974	8.00	1.25	87,792.00	
	Crusher run Base Course	m3	1677	230.00	5.47	385,710.00	
	Coarse River Sand Layer	m2	10,974	7.00	1.09	76,818.00	
	Compost	m2	46	160.00	0.10	7,360.00	
	Imported Topsoil (Weed Free)	m3	1097	130.00	2.02	142,610.00	
	Levelling and Shaping	m2	16,774	3.00	0.71	50,322.00	
	Grass	m2	10,974	15.00	2.34	164,610.00	
	Fertiliser	m2	10,974	3.00	0.47	32,922.00	1,778,297.00
B. SPECIALIST ITEMS							
	13 mm Synthetic Surface to Running Track	m2	5,550	366.00	28.82	2,031,300.00	
	20 mm Polyurethane High Impact Surface	m2	235	562.00	1.87	132,070.00	
	25 mm Sandwich Polyurethane to Water Jump	m2	15	703.00	0.15	10,545.00	
	Aluminium Kerbing	m	400	320.00	1.82	128,000.00	
	Colour Coded Indicator Plates	No.	164	100.00	0.23	16,400.00	
	Paint Markings	Item	1	104,000.00	1.48	104,000.00	
	Sand Pit to Long & Triple Jump	No.	2	84,000.00	2.38	168,000.00	
	Take Off Board to Long & Triple Jump	No.	8	9,400.00	1.07	75,200.00	
	Shot Put Ring & Boards	No.	2	6,800.00	0.19	13,600.00	
	Discus & Hammer Throw Ring	No.	2	4,800.00	0.14	9,600.00	
	Hammer Throw Protective Netting	Item	1	76,000.00	1.08	76,000.00	
	Cast-in Stainless Steel Sockets for Above	Set	2	8,000.00	0.23	16,000.00	
	Adjustable Water Jump Steeplechase Hurdle	No.	1	9,600.00	0.14	9,600.00	2,790,315.00
	SUB-TOTALS				64.83		4,568,612.00
	PRELIMINARIES AND GENERAL				7.78		548,233.00
	SUB-TOTALS				72.61		5,116,845.00
	CONTINGENCIES	%	5		3.63		255,842.00
	PROVISION FOR CURRENCY EXCHANGE RATES#				0.71		50,000.00
	PROVISION FOR ESCALATION	Months	4		1.37		96,708.00
	SUB-TOTALS				78.32		5,519,395.00
	PROFESSIONAL FEES	%	12		9.40		662,327.00
	SUB-TOTALS				87.72		6,181,722.00
	VALUE ADDED TAX	%	14		12.28		865,441.00
	EIGHT LANE ATHLETICS TRACK TOTAL				100.00		7,047,163.00

Note: All figures have been rounded up.

BADMINTON

Badminton court as per Multi-Purpose Halls (Internal Court)

BASEBALL DIAMOND

NO.	ITEM	UNITS	QTY	RATE R	%	AMOUNT R	TOTALS R
A. SUB-STRUCTURE, ETC. (Provisional)							
	Removal of Trees (Size	No.	1	3,000.00	0.12	3,000.00	
	Clear site	m2	11460	6.00	2.71	68,760.00	
	Removal of Topsoil incl. Carting Away	m3	1146	105.00	4.75	120,330.00	
	Bulk Earthworks	m3	2292	35.00	3.16	80,220.00	
	Rip & Compact In-Situ Earth to 93 % ModAASHTO	m2	11460	6.00	2.71	68,760.00	
	Herring Bone Sub-Soil Drainage	m	1,200	90.00	4.26	108,000.00	
	Storm Water Reticulation	m	30	145.00	0.17	4,350.00	
	Storm Water Catchpits, etc.	No.	5	2,200.00	0.43	11,000.00	
	Water Supply for Sprinkler System	m	360	85.00	1.21	30,600.00	
	110 mm Diameter Sleeves	m	10	120.00	0.05	1,200.00	
	Automatic Irrigation System	m2	11,460	8.00	3.62	91,680.00	
	Crusher run Base Course	m3	1146	230.00	10.39	263,580.00	
	Coarse River Sand Layer	m2	287	7.00	0.08	2,009.00	
	Compost	m3	567	160.00	3.58	90,736.00	
	Imported Topsoil (Weed Free)	m3	860	130.00	4.41	111,800.00	
	Levelling and Shaping	m2	11,460	3.00	1.36	34,380.00	
	Grass	m2	11,342	15.00	6.71	170,130.00	
	Fertiliser	m2	11,342	3.00	1.34	34,026.00	1,294,561.00
B. SPECIALIST ITEMS							
	Mound	No.	3	125,000.00	14.79	375,000.00	
	Scoreboard	No.	1	24,000.00	0.95	24,000.00	
	Home Plate, etc.	Item	1	3,000.00	0.12	3,000.00	402,000.00
	SUB-TOTALS				66.91		1,696,561.00
	PRELIMINARIES AND GENERAL				8.03		203,587.00
	SUB-TOTALS				74.94		1,900,148.00
	CONTINGENCIES	%	5		3.75		95,007.00
	PROVISION FOR ESCALATION	Months	3		1.06		26,935.00
	SUB-TOTALS				79.75		2,022,090.00
	PROFESSIONAL FEES	%	10		7.97		202,209.00
	SUB-TOTALS				87.72		2,224,299.00
	VALUE ADDED TAX	%	14		12.28		311,402.00
	BASEBALL DIAMOND TOTAL				100.00		2,535,701.00

Note: All figures have been rounded up.

BASKETBALL COURT

The figures indicated below allow for an external hard court 29.0 m long x 15.0 m wide.

NO.	ITEM	UNITS	QTY	RATE R	%	AMOUNT R	TOTALS R
A. SUB-STRUCTURE, ETC. (Provisional)							
	Removal of Trees (Size)	No.	1	3,000.00	1.10	3,000.00	
	Clear site	m2	576	6.00	1.27	3,456.00	
	Removal of Topsoil incl. Carting Away	m3	58	105.00	2.23	6,090.00	
	Bulk Earthworks	m3	115	35.00	1.47	4,025.00	
	Rip & Compact In-Situ Earth to 93 % ModAASHTO	m2	576	6.00	1.27	3,456.00	
	Sub-Soil Drainage to Perimeter	m	88	90.00	2.90	7,920.00	
	Storm Water Reticulation	m	25	145.00	1.33	3,625.00	
	Storm Water Catchpits, etc.	No.	2	2,200.00	1.61	4,400.00	
	Crusher run Base Course	m3	58	230.00	4.89	13,340.00	
	Coarse River Sand Layer	m2	14	7.00	0.04	98.00	
	Concrete in Surface Beds	m2	285	145.00	15.14	41,325.00	
	Asphalt to Final Finish	m2	285	70.00	7.31	19,950.00	
	Polyurethane Coating to Asphalt	m2	285	165.00	17.23	47,025.00	
	Line Markings	m	285	15.00	1.57	4,275.00	161,985.00
B. SPECIALIST ITEMS							
	Posts	No.	2	3,800.00	2.78	7,600.00	
	Backboards	No.	2	4,500.00	3.30	9,000.00	16,600.00
	SUB-TOTALS				65.42		178,585.00
	PRELIMINARIES AND GENERAL				7.85		21,430.00
	SUB-TOTALS				73.27		200,015.00
	CONTINGENCIES	%	5		3.66		10,001.00
	PROVISION FOR ESCALATION	Months	3		1.04		2,835.00
	SUB-TOTALS				77.97		212,851.00
	PROFESSIONAL FEES	%	12.5		9.75		26,606.00
	SUB-TOTALS				87.72		239,457.00
	VALUE ADDED TAX	%	14		12.28		33,524.00
	BASKETBALL HARD COURT TOTAL				100.00		272,981.00

Note: All figures have been rounded up.

Fencing to Perimeter has been excluded

BOWLING GREEN

The bowling green indicated below has been calculated at its maximum allowable size of 40.23m x 40.23 m.

NO.	ITEM	UNITS	QTY	RATE R	%	AMOUNT R	TOTALS R
A. SUB-STRUCTURE, ETC. (Provisional)							
	Removal of Trees (Size)	No.	1	3,000.00	0.60	3,000.00	
	Clear site	m2	1869	6.00	2.24	11,214.00	
	Removal of Topsoil incl. Carting Away	m3	187	105.00	3.93	19,635.00	
	Bulk Earthworks	m3	374	35.00	2.62	13,090.00	
	Rip & Compact In-Situ Earth to 93 % ModAASHTO	m2	1869	6.00	2.24	11,214.00	
	Herring Bone Sub-Soil Drainage	m	480	90.00	8.64	43,200.00	
	Storm Water Reticulation	m	25	145.00	0.73	3,625.00	
	Storm Water Catchpits, etc.	No.	3	2,200.00	1.32	6,600.00	
	Water Supply for Sprinkler System	m	161	85.00	2.74	13,685.00	
	110 mm Diameter Sleeves	m	10	120.00	0.24	1,200.00	
	Automatic Irrigation System	m2	1,869	8.00	2.99	14,952.00	
	Crusher run Base Course	m3	280	230.00	12.89	64,400.00	
	Coarse River Sand Layer	m2	47	7.00	0.07	329.00	
	Compost	m2	93	160.00	2.99	14,952.00	
	Imported Topsoil (Weed Free)	m3	374	130.00	9.73	48,620.00	
	Levelling and Shaping	m2	1,869	3.00	1.12	5,607.00	
	Grass	m2	1,869	20.00	7.48	37,380.00	
	Fertiliser	m2	1,869	3.00	1.12	5,607.00	318,310.00
B. SPECIALIST ITEMS							
	Marker Boards	No.	12	600.00	1.44	7,200.00	7,200.00
	SUB-TOTALS				65.13		325,510.00
	PRELIMINARIES AND GENERAL				7.82		39,061.00
	SUB-TOTALS				72.95		364,571.00
	CONTINGENCIES	%	5		3.65		18,229.00
	PROVISION FOR ESCALATION	Months	4		1.38		6,890.00
	SUB-TOTALS				77.97		389,690.00
	PROFESSIONAL FEES	%	12.5		9.75		48,711.00
	SUB-TOTALS				87.72		438,401.00
	VALUE ADDED TAX	%	14		12.28		61,376.00
	BOWLING GREEN TOTAL				100.00		499,777.00

Note: All figures have been rounded up.

BOXING RING

Provision has been made for an elevated boxing ring with the floor situated 900 mm above the surrounding area.

NO.	ITEM	UNITS	QTY	RATE R	%	AMOUNT R	TOTALS R
B. SPECIALIST ITEMS							
	Structural Steel to Ring Base @ 30 kg/m	Kg.	1589	20.00		31,780.00	
	Structural Steel Sub-Frame @ 16 kg/m	Kg.	658	20.00		13,160.00	
	Tubular Posts to Corners @ 21.6 kg/m	Kg.	119	28.00		3,332.00	
	25 mm Thick Particle Board to Floor	m2	60	120.00		7,200.00	
	Ensolite Boxing Ring Pad	Item	1	48,000.00		48,000.00	
	Rope	Item	1	29,260.00		29,260.00	
	Padding to Posts	Item	1	3,400.00		3,400.00	
	Steps - 900 mm high	No.	1	3,450.00	0.69	3,450.00	139,582.00
	SUB-TOTALS				0.69		139,582.00
	TRANSPORT				7.60		16,750.00
	SUB-TOTALS				8.29		156,332.00
	CONTINGENCIES	%	5		3.55		7,817.00
	PROVISION FOR CURRENCY FLUCTUATIONS	Item	1				7,726.00
	SUB-TOTALS				11.84		171,875.00
	PROFESSIONAL FEES	%	12.5		9.75		21,484.00
	SUB-TOTALS				21.59		193,359.00
	VALUE ADDED TAX	%	14		12.28		27,070.00
	ELEVATED BOXING RING TOTAL				33.87		220,429.00

Note: All figures have been rounded up.

CRICKET

The elemental cost analysis indicated below is based on a centre square that provides for three cricket pitches.

NO.	ITEM	UNITS	QTY	RATE R	%	AMOUNT R	TOTALS R
A. SUB-STRUCTURE, ETC. (Provisional)							
	Removal of Trees (Size)	No.	1	3,000.00	0.06	3,000.00	
	Clear site	m2	25646	6.00	2.88	153,876.00	
	Removal of Topsoil incl. Carting Away	m3	2565	105.00	5.03	269,325.00	
	Bulk Earthworks	m3	5129	35.00	3.35	179,515.00	
	Rip & Compact In-Situ Earth to 93 % ModAASHTO	m2	25646	6.00	2.88	153,876.00	
	Herring Bone Sub-Soil Drainage	m	4,780	90.00	8.04	430,200.00	
	Storm Water Reticulation	m	30	145.00	0.08	4,350.00	
	Storm Water Catchpits, etc.	No.	5	2,200.00	0.21	11,000.00	
	Water Supply for Sprinkler System	m	310	85.00	0.49	26,350.00	
	110 mm Diameter Sleeves	m	90	120.00	0.20	10,800.00	
	Automatic Irrigation System	m2	25,646	8.00	3.83	205,168.00	
	Crusher run Base Course	m3	2565	230.00	11.02	589,950.00	
	Coarse River Sand Layer	m2	641	7.00	0.08	4,487.00	
	Compost	m3	1,282	160.00	3.83	205,168.00	
	Imported Topsoil (Weed Free)	m3	1923	130.00	4.67	249,990.00	
	Levelling and Shaping	m2	25,646	3.00	1.44	76,938.00	
	Grass	m2	25,646	15.00	7.19	384,690.00	
	Fertiliser	m2	25,646	3.00	1.44	76,938.00	3,035,621.00
B. SPECIALIST ITEMS							
	Cricket Pitches	No.	3	125,000.00	7.01	375,000.00	
	Scoreboard	No.	1	18,000.00	0.34	18,000.00	
	Side Screens	No.	2	24,000.00	0.90	48,000.00	
	Boundary Rope	No.	1	35,000.00	0.65	35,000.00	
	Covers	No.	3	15,000.00	0.84	45,000.00	
	Net Facilities	No.	3	30,000.00	1.68	90,000.00	611,000.00
	SUB-TOTALS				68.15		3,646,621.00
	PRELIMINARIES AND GENERAL				8.18		437,595.00
	SUB-TOTALS				76.32		4,084,216.00
	CONTINGENCIES	%	5		3.82		204,211.00
	PROVISION FOR ESCALATION	Months	3		1.08		57,894.00
	SUB-TOTALS				81.22		4,346,321.00
	PROFESSIONAL FEES	%	8		6.50		347,706.00
	SUB-TOTALS				87.72		4,694,027.00
	VALUE ADDED TAX	%	14		12.28		657,164.00
	CRICKET FIELD TOTAL				100.00		5,351,191.00

Note: All figures have been rounded up.

FOOTBALL (SOCCER) FIELD

The elemental cost analysis indicated below is based on a football field with a size of 120 m x 90 m

NO.	ITEM	UNITS	QTY	RATE R	%	AMOUNT R	TOTALS R
A. SUB-STRUCTURE, ETC. (Provisional)							
	Removal of Trees (Size)	No.	1	3,000.00	0.13	3,000.00	
	Clear site	m2	12096	6.00	3.13	72,576.00	
	Removal of Topsoil incl. Carting Away	m3	1210	105.00	5.47	127,050.00	
	Bulk Earthworks	m3	2419	35.00	3.65	84,665.00	
	Rip & Compact In-Situ Earth to 93 % ModAASHTO	m2	12096	6.00	3.13	72,576.00	
	Herring Bone Sub-Soil Drainage	m	2,670	90.00	10.35	240,300.00	
	Storm Water Reticulation	m	30	145.00	0.19	4,350.00	
	Storm Water Catchpits, etc.	No.	5	2,200.00	0.47	11,000.00	
	Water Supply for Sprinkler System	m	420	85.00	1.54	35,700.00	
	110 mm Diameter Sleeves	m	10	120.00	0.05	1,200.00	
	Automatic Irrigation System	m2	12,096	8.00	4.17	96,768.00	
	Crusher run Base Course	m3	1210	230.00	11.99	278,300.00	
	Coarse River Sand Layer	m2	302	7.00	0.09	2,114.00	
	Compost	m3	605	160.00	4.17	96,768.00	
	Imported Topsoil (Weed Free)	m3	907	130.00	5.08	117,910.00	
	Levelling and Shaping	m2	12,096	3.00	1.56	36,288.00	
	Grass	m2	12,096	15.00	7.82	181,440.00	
	Fertiliser	m2	12,096	3.00	1.56	36,288.00	1,498,293.00
B. SPECIALIST ITEMS							
	Goal Posts	No.	2	12,000.00	1.03	24,000.00	
	Net to Goal Posts	No.	2	4,500.00	0.39	9,000.00	
	Demarcation Lines	m	564	12.00	0.29	6,768.00	
	Scoreboard	No.	1	15,000.00	0.65	15,000.00	54,768.00
	SUB-TOTALS				66.91		1,553,061.00
	PRELIMINARIES AND GENERAL				8.03		186,367.00
	SUB-TOTALS				74.94		1,739,428.00
	CONTINGENCIES	%	5		3.75		86,971.00
	PROVISION FOR ESCALATION	Months	3		1.06		24,656.00
	SUB-TOTALS				79.74		1,851,055.00
	PROFESSIONAL FEES	%	10		7.97		185,106.00
	SUB-TOTALS				87.71		2,036,161.00
	VALUE ADDED TAX	%	14		12.28		285,063.00
	FOOTBALL FIELD TOTAL				99.99		2,321,224.00

Note: All figures have been rounded up.

GOLF

The cost of a golf course very specific to the location, topography, standard of play, water features, length of the course and local ground conditions.

The cost of golf courses varies between R 2,000,000.00 to R 4,500,000.00 per hole, which relates to an average cost of R 3,250,000.00 per hole.

Similarly the cost of the other facilities that are provided such as the club house, halfway facilities vary greatly frrom location to location dependant on all of the above and all related commercial facilities that are supplied.

The cost of a club house may vary from R 3,500,000.00 to a much as R 20,000,000.00

GRASSED HOCKEY FIELD

The elemental cost analysis indicated below is based on a centre square that provides for three cricket pitches.

NO.	ITEM	UNITS	QTY	RATE R	%	AMOUNT R	TOTALS R
A. SUB-STRUCTURE, ETC. (Provisional)							
	Removal of Trees (Size)	No.	1	3,000.00	0.13	3,000.00	
	Clear site	m2	5941	6.00	1.54	35,646.00	
	Removal of Topsoil incl. Carting Away	m3	594	105.00	2.69	62,370.00	
	Bulk Earthworks	m3	1188	35.00	1.79	41,580.00	
	Rip & Compact In-Situ Earth to 93 % ModAASHTO	m2	5941	6.00	1.54	35,646.00	
	Herring Bone Sub-Soil Drainage	m	2,670	90.00	10.35	240,300.00	
	Storm Water Reticulation	m	30	145.00	0.19	4,350.00	
	Storm Water Catchpits, etc.	No.	5	2,200.00	0.47	11,000.00	
	Water Supply for Sprinkler System	m	420	85.00	1.54	35,700.00	
	110 mm Diameter Sleeves	m	10	120.00	0.05	1,200.00	
	Automatic Irrigation System	m2	5,941	8.00	2.05	47,528.00	
	Crusher run Base Course	m3	594	230.00	5.89	136,620.00	
	Coarse River Sand Layer	m2	149	7.00	0.04	1,043.00	
	Compost	m3	297	160.00	2.05	47,528.00	
	Imported Topsoil (Weed Free)	m3	446	130.00	2.50	57,980.00	
	Levelling and Shaping	m2	5,941	3.00	0.77	17,823.00	
	Grass	m2	5,941	15.00	3.84	89,115.00	
	Fertiliser	m2	5,941	3.00	0.77	17,823.00	886,252.00
B. SPECIALIST ITEMS							
	Goal Posts (Including Net)	No.	2	15,000.00	1.29	30,000.00	
	Demarcation Lines	m	495	12.00	0.26	5,940.00	
	Scoreboard	No.	1	15,000.00	0.65	15,000.00	50,940.00
	SUB-TOTALS				40.37		937,192.00
	PRELIMINARIES AND GENERAL				8.03		112,463.00
	SUB-TOTALS				48.40		1,049,655.00
	CONTINGENCIES	%	5		3.75		52,483.00
	PROVISION FOR ESCALATION	Months	3		1.06		14,879.00
	SUB-TOTALS				53.21		1,117,017.00
	PROFESSIONAL FEES	%	10		7.97		111,702.00
	SUB-TOTALS				61.18		1,228,719.00
	VALUE ADDED TAX	%	14		12.28		172,021.00
	GRASSED HOCKEY FIELD TOTAL				73.46		1,400,740.00

Note: All figures have been rounded up.

KORFBALL COURT

The Korfball Field indicated below has been calculated at its size of 40.00m x 20.00 m.

NO.	ITEM	UNITS	QTY	RATE R	%	AMOUNT R	TOTALS R
A. SUB-STRUCTURE, ETC. (Provisional)							
	Removal of Trees (Size)	No.	1	3,000.00	0.91	3,000.00	
	Clear site	m2	989	6.00	1.79	5,934.00	
	Removal of Topsoil incl. Carting Away	m3	99	105.00	3.14	10,395.00	
	Bulk Earthworks	m3	198	35.00	2.09	6,930.00	
	Rip & Compact In-Situ Earth to 93 % ModAASHTO	m2	989	6.00	1.79	5,934.00	
	Herring Bone Sub-Soil Drainage	m	480	90.00	13.05	43,200.00	
	Storm Water Reticulation	m	25	145.00	1.10	3,625.00	
	Storm Water Catchpits, etc.	No.	3	2,200.00	1.99	6,600.00	
	Water Supply for Sprinkler System	m	161	85.00	4.13	13,685.00	
	110 mm Diameter Sleeves	m	10	120.00	0.36	1,200.00	
	Automatic Irrigation System	m2	989	8.00	2.39	7,912.00	
	Crusher run Base Course	m3	148	230.00	10.28	34,040.00	
	Coarse River Sand Layer	m2	25	7.00	0.05	175.00	
	DPC Membrane	m2	60	12.00	0.22	720.00	
	Compost	m2	49	160.00	2.39	7,912.00	
	Imported Clay Topsoil	m3	148	180.00	8.05	26,640.00	
	Levelling and Shaping	m2	989	3.00	0.90	2,967.00	
	Grass	m2	989	20.00	5.98	19,780.00	
	Fertiliser	m2	989	3.00	0.90	2,967.00	203,616.00
B. SPECIALIST ITEMS							
	Posts	No.	2	4,800.00	2.90	9,600.00	
	Demarcation Lines	m	197	12.00	0.71	2,364.00	11,964.00
	SUB-TOTALS				65.13		215,580.00
	PRELIMINARIES AND GENERAL				7.82		25,870.00
	SUB-TOTALS				72.95		241,450.00
	CONTINGENCIES	%	5		3.65		12,073.00
	PROVISION FOR ESCALATION	Months	4		1.38		4,563.00
	SUB-TOTALS				77.97		258,086.00
	PROFESSIONAL FEES	%	12.5		9.75		32,261.00
	SUB-TOTALS				87.72		290,347.00
	VALUE ADDED TAX	%	14		12.28		40,649.00
	KORFBALL TOTAL				100.00		330,996.00

Note: All figures have been rounded up.

NETBALL COURT

The figures indicated below allow for an external hard court 30.50 m long x 15.25 m wide.

NO.	ITEM	UNITS	QTY	RATE R	%	AMOUNT R	TOTALS R
A. SUB-STRUCTURE, ETC. (Provisional)							
	Removal of Trees (Size)	No.	1	3,000.00	1.17	3,000.00	
	Clear site	m2	611	6.00	1.43	3,666.00	
	Removal of Topsoil incl. Carting Away	m3	61	105.00	2.49	6,405.00	
	Bulk Earthworks	m3	122	35.00	1.66	4,270.00	
	Rip & Compact In-Situ Earth to 93 % ModAASHTO	m2	611	6.00	1.43	3,666.00	
	Sub-Soil Drainage to Perimeter	m	88	90.00	3.08	7,920.00	
	Storm Water Reticulation	m	25	145.00	1.41	3,625.00	
	Storm Water Catchpits, etc.	No.	2	2,200.00	1.71	4,400.00	
	Crusher run Base Course	m3	61	230.00	5.46	14,030.00	
	Coarse River Sand Layer	m2	15	7.00	0.04	105.00	
	Concrete in Surface Beds	m2	285	145.00	16.09	41,325.00	
	Asphalt to Final Finish	m2	285	70.00	7.77	19,950.00	
	Polyurethane Coating to Asphalt	m2	285	165.00	18.30	47,025.00	
	Line Markings	m	153	12.00	0.71	1,836.00	161,223.00
B. SPECIALIST ITEMS							
	Posts	No.	2	3,800.00	2.96	7,600.00	7,600.00
	SUB-TOTALS				65.71		168,823.00
	PRELIMINARIES AND GENERAL				7.89		20,259.00
	SUB-TOTALS				73.60		189,082.00
	CONTINGENCIES	%	5		3.68		9,454.00
	PROVISION FOR ESCALATION	Months	2		0.70		1,787.00
	SUB-TOTALS				77.97		200,323.00
	PROFESSIONAL FEES	%	12.5		9.75		25,040.00
	SUB-TOTALS				87.72		225,363.00
	VALUE ADDED TAX	%	14		12.28		31,551.00
	NETBALL HARD COURT TOTAL				100.00		256,914.00

Note: All figures have been rounded up.

RUGBY FIELD

The elemental cost analysis indicated below is based on a football field with a size of 144 m x 70 m.

NO.	ITEM	UNITS	QTY	RATE R	%	AMOUNT R	TOTALS R
A. SUB-STRUCTURE, ETC. (Provisional)							
	Removal of Trees (Size)	No.	1	3,000.00	0.13	3,000.00	
	Clear site	m2	11400	6.00	3.05	68,400.00	
	Removal of Topsoil incl. Carting Away	m3	1140	105.00	5.34	119,700.00	
	Bulk Earthworks	m3	2280	35.00	3.56	79,800.00	
	Rip & Compact In-Situ Earth to 93 % ModAASHTO	m2	11400	6.00	3.05	68,400.00	
	Herring Bone Sub-Soil Drainage	m	2,520	90.00	10.11	226,800.00	
	Storm Water Reticulation	m	30	145.00	0.19	4,350.00	
	Storm Water Catchpits, etc.	No.	5	2,200.00	0.49	11,000.00	
	Water Supply for Sprinkler System	m	428	85.00	1.62	36,380.00	
	110 mm Diameter Sleeves	m	10	120.00	0.05	1,200.00	
	Automatic Irrigation System	m2	11,400	8.00	4.07	91,200.00	
	Crusher run Base Course	m3	1140	230.00	11.69	262,200.00	
	Coarse River Sand Layer	m2	285	7.00	0.09	1,995.00	
	Compost	m3	570	160.00	4.07	91,200.00	
	Imported Topsoil (Weed Free)	m3	855	130.00	4.96	111,150.00	
	Levelling and Shaping	m2	11,400	3.00	1.53	34,200.00	
	Grass	m2	11,400	15.00	7.63	171,000.00	
	Fertiliser	m2	11,400	3.00	1.53	34,200.00	1,416,175.00
B. SPECIALIST ITEMS							
	Goal Posts	No.	2	15,000.00	1.34	30,000.00	
	Padding to Goal Posts	No.	4	4,500.00	0.80	18,000.00	
	Demarcation Lines	m	1,206	12.00	0.65	14,472.00	
	Scoreboard	No.	1	15,000.00	0.67	15,000.00	77,472.00
	SUB-TOTALS				66.61		1,493,647.00
	PRELIMINARIES AND GENERAL				7.99		179,238.00
	SUB-TOTALS				74.60		1,672,885.00
	CONTINGENCIES	%	5		3.73		83,644.00
	PROVISION FOR ESCALATION	Months	4		1.41		31,618.00
	SUB-TOTALS				79.74		1,788,147.00
	PROFESSIONAL FEES	%	10		7.98		178,815.00
	SUB-TOTALS				87.72		1,966,962.00
	VALUE ADDED TAX	%	14		12.28		275,375.00
	RUGBY FIELD TOTAL				100.00		2,242,337.00

Note: All figures have been rounded up.

TENNIS COURT

The figures indicated below allow for an external hard court 36.576 m long x 18.288 m wide which allows for run-off areas next too and behind the area of play.

NO.	ITEM	UNITS	QTY	RATE R	%	AMOUNT R	TOTALS R
A. SUB-STRUCTURE, ETC. (Provisional)							
	Removal of Trees (Size)	No.	1	3,000.00	1.21	3,000.00	
	Clear site	m2	842	6.00	2.03	5,052.00	
	Removal of Topsoil incl. Carting Away	m3	84	105.00	3.54	8,820.00	
	Bulk Earthworks	m3	168	35.00	2.36	5,880.00	
	Rip & Compact In-Situ Earth to 93 % ModAASHTO	m2	842	6.00	2.03	5,052.00	
	Sub-Soil Drainage to Perimeter	m	70	90.00	2.53	6,300.00	
	Storm Water Reticulation	m	25	145.00	1.46	3,625.00	
	Storm Water Catchpits, etc.	No.	2	2,200.00	1.77	4,400.00	
	Crusher run Base Course	m3	84	230.00	7.76	19,320.00	
	Coarse River Sand Layer	m2	21	7.00	0.06	147.00	
	Concrete in Surface Beds	m2	261	145.00	15.19	37,809.75	
	Cement Screed	m2	261	36.00	3.77	9,387.25	
	Polyurethane Coating to Asphalt	m2	261	165.00	17.28	43,024.89	
	Line Markings	m	146	12.00	0.70	1,752.00	153,569.89
B. SPECIALIST ITEMS							
	Net & Posts	Item	1	10,000.00	4.02	10,000.00	10,000.00
	SUB-TOTALS				65.71		163,569.89
	PRELIMINARIES AND GENERAL				7.89		19,628.00
	SUB-TOTALS				73.60		183,197.89
	CONTINGENCIES	%	5		3.68		9,160.00
	PROVISION FOR ESCALATION	Months	2		0.70		1,731.00
	SUB-TOTALS				77.97		194,088.89
	PROFESSIONAL FEES	%	12.5		9.75		24,261.00
	SUB-TOTALS				87.72		218,349.89
	VALUE ADDED TAX	%	14		12.28		30,569.00
	TENNIS HARD COURT TOTAL				100.00		248,918.89

Note: All figures have been rounded up.
Excluding fencing.

SOFTBALL DIAMOND

NO.	ITEM	UNITS	QTY	RATE R	%	AMOUNT R	TOTALS R
A. SUB-STRUCTURE, ETC. (Provisional)							
	Removal of Trees (Size	No.	1	3,000.00	0.12	3,000.00	
	Clear site	m2	11460	6.00	2.71	68,760.00	
	Removal of Topsoil incl. Carting Away	m3	1146	105.00	4.75	120,330.00	
	Bulk Earthworks	m3	2292	35.00	3.16	80,220.00	
	Rip & Compact In-Situ Earth to 93 % ModAASHTO	m2	11460	6.00	2.71	68,760.00	
	Herring Bone Sub-Soil Drainage	m	1,200	90.00	4.26	108,000.00	
	Storm Water Reticulation	m	30	145.00	0.17	4,350.00	
	Storm Water Catchpits, etc.	No.	5	2,200.00	0.43	11,000.00	
	Water Supply for Sprinkler System	m	360	85.00	1.21	30,600.00	
	110 mm Diameter Sleeves	m	10	120.00	0.05	1,200.00	
	Automatic Irrigation System	m2	11,460	8.00	3.62	91,680.00	
	Crusher run Base Course	m3	1146	230.00	10.39	263,580.00	
	Coarse River Sand Layer	m2	287	7.00	0.08	2,009.00	
	Compost	m3	567	160.00	3.58	90,736.00	
	Imported Topsoil (Weed Free)	m3	860	130.00	4.41	111,800.00	
	Levelling and Shaping	m2	11,460	3.00	1.36	34,380.00	
	Grass	m2	11,342	15.00	6.71	170,130.00	
	Fertiliser	m2	11,342	3.00	1.34	34,026.00	1,294,561.00
B. SPECIALIST ITEMS							
	Mound	No.	3	125,000.00	14.79	375,000.00	
	Scoreboard	No.	1	24,000.00	0.95	24,000.00	
	Home Plate, etc.	Item	1	3,000.00	0.12	3,000.00	402,000.00
	SUB-TOTALS				66.91		1,696,561.00
	PRELIMINARIES AND GENERAL				8.03		203,587.00
	SUB-TOTALS				74.94		1,900,148.00
	CONTINGENCIES	%	5		3.75		95,007.00
	PROVISION FOR ESCALATION	Months	3		1.06		26,935.00
	SUB-TOTALS				79.75		2,022,090.00
	PROFESSIONAL FEES	%	10		7.97		202,209.00
	SUB-TOTALS				87.72		2,224,299.00
	VALUE ADDED TAX	%	14		12.28		311,402.00
	SOFTBALL DIAMOND TOTAL				100.00		2,535,701.00

Note: All figures have been rounded up.

SWIMMING POOL

The cost of an olympic sized swimming pool will vary from location to location, an example is however, included below:

NO.	ITEM	UNITS	QTY	RATE R	%	AMOUNT R	TOTALS R
A. GENERAL SITE WORKS (Provisional)							
	Removal of Trees (Size)	No.	1	3,000.00	0.09	3,000.00	
	Clear site	m2	3500	6.00	0.62	21,000.00	
	Removal of Topsoil incl. Carting Away	m3	350	105.00	1.09	36,750.00	
	Bulk Earthworks	m3	3080	35.00	3.19	107,800.00	
	Rip & Compact In-Situ Earth to 93 % ModAASHTO	m2	290	6.00	0.05	1,740.00	
	Back Filling to Excavations	m3	225	35.00	0.23	7,875.00	
	Herring Bone Sub-Soil Drainage	m	150	90.00	0.40	13,500.00	
	Storm Water Reticulation	m	150	145.00	0.64	21,750.00	
	Storm Water Catchpits, etc.	No.	10	2,200.00	0.65	22,000.00	
	Water Supply	m	100	85.00	0.25	8,500.00	
	110 mm Diameter Sleeves	m	50	120.00	0.18	6,000.00	
	Automatic Irrigation System to Grassed Areas	m2	500	8.00	0.12	4,000.00	
	Crusher run Base Course	m3	350	230.00	2.38	80,500.00	
	Coarse River Sand Layer	m2	88	7.00	0.02	616.00	
	Compost	m3	175	160.00	0.83	28,000.00	
	Imported Topsoil (Weed Free)	m3	263	130.00	1.01	34,190.00	
	Levelling and Shaping	m2	500	3.00	0.04	1,500.00	
	Grass	m2	500	15.00	0.22	7,500.00	
	Fertiliser	m2	500	3.00	0.04	1,500.00	407,721.00
B. POOL STRUCTURE							
	25 Mpa Concrete to Walls & Floor	m3	450	900.00	11.98	405,000.00	
	Formwork to Walls	m2	600	120.00	2.13	72,000.00	
	Steel Reinforcing	T	36	9,000.00	9.59	324,000.00	
	Boxing to Outlets, etc.	Item	1	15,000.00	0.44	15,000.00	
	Screeding to Concrete	m2	1	45.00	0.00	45.00	
	Marbelite Surfacing & Polyurethane Finish	m2	1	85.00	0.00	85.00	
	Coping	m	150	90.00	0.40	13,500.00	
	Pool Deck Including Slip Resistant Surface	m2	318	400.00	3.76	127,200.00	
	Overflow Collection	m	75	350.00	0.78	26,250.00	
	Steps to Pool	m2	25	450.00	0.33	11,250.00	
	Stainless Steel Pool Ladders	No.	4	24,000.00	2.84	96,000.00	1,090,330.00
C. SPECIALIST ITEMS							
	Outlets to Pool including grates	No.	10	15,000.00	4.59	155,000.00	
	Inlets to Pool	No.	22	4,500.00	2.96	100,000.00	
	Outlet Closed Loop Piping System	m	200	145.00	0.86	29,000.00	
	Inlet Closed Loop Piping System	m	200	145.00	0.86	29,000.00	
	Water Supply	m	200	85.00	0.50	17,000.00	
	Overflow Water Piping	m	200	145.00	0.86	29,000.00	
	Waste Water	m	25	145.00	0.11	3,625.00	
	Water Pumps	Item	1	125,000.00	3.70	125,000.00	
	Filtration Equipment	Item	1	165,000.00	4.88	165,000.00	
	Chlorination Feeder Equipment	Item	1	85,000.00	2.51	85,000.00	
	Demarcation Lines	Item	1	15,800.00	0.47	15,800.00	753,425.00
	SUB-TOTALS				66.61		2,251,476.00
	PRELIMINARIES AND GENERAL				7.99		270,177.00
	SUB-TOTALS				74.60		2,521,653.00
	CONTINGENCIES	%	5		3.73		126,083.00
	PROVISION FOR ESCALATION	Months	4		1.41		47,659.00
	SUB-TOTAL CARRIED FORWARD				79.74		2,695,395.00

The cost of an olympic sized swimming pool will vary from location to location, an example is however, included below:

NO.	ITEM	UNITS	QTY	RATE R	%	AMOUNT R	TOTALS R
	SUB-TOTALS BROUGHT FORWARD				79.74		2,695,395.00
	PROFESSIONAL FEES	%	10		7.98		269,540.00
	SUB-TOTALS				87.72		2,964,935.00
	VALUE ADDED TAX	%	14		12.28		415,091.00
	SWIMMING POOL TOTAL				100.00		3,380,026.00

Note: All figures have been rounded up.

BILLS OF QUANTITIES

NEW SPORTS HALL AND ABLUSION BLOCK

***NOTE:** These Bills of Quantities are to be read inconjunction with the following:*

- a. Standard Preliminaries as published by the Joint Building Contracts Committee
- b. Model Preambles as published by the Association of South African Quantity Surveyors

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FINAL SUMMARY

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
	MULTI-PURPOSE SPORTS HALL BILL NO. 1 PRELIMINARIES AND GENERAL				
	FIXED CHARGE ITEMS				
1	Contractual requirements. Establish facilities on site:	Item			250,000.00
2	a. Facilities for the Contractor.	Item			
3	Offices and storage sheds.	Item			
4	Workshops.	Item			
5	Living accommodation.	Item			
6	Ablusion and latrine facilities.	Item			
7	Tools and equipment.	Item			
8	Water supplies, electric power and communications.	Item			
9	Other fixed charge obligations.	Item			
10	Remove Contractor's site establishment on completion:	Item			
	a. Facilities for the Project Manager/ Engineer.				
11	Office complete as per document.	Item			
	TIME RELATED ITEMS				
12	Contractual requirements.	Item			
	Operate and maintain facilities on site:				
13	a. Facilities for the Contractor for duration of the construction, except where otherwise stated.	Item			
14	Offices and storage sheds.	Item			
15	Workshops.	Item			
16	Living accommodation.	Item			
17	Ablusion and latrine facilities.	Item			
18	Tools and equipment.	Item			
19	Water supplies, electric power and communications.	Item			
	SUB-TOTAL TO COLLECTION		Rand		250,000.00

Preliminaries

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
20	Other fixed charge obligations.	Item			
21	Supervision.	Item			
22	Company and head office overheads.	Item			
23	Other time related obligations.	Item			
	ISD PROGRAMME				
24	ISD programme presented by others.	Item			
	CONSTRUCTION REGULATIONS				
25	All work is to be carried out in terms with the Government Regulations of 2003.	Item			
	RISKS				
26	All work is to be carried out in terms with the Occupational Health and Safety Act 1993 (Act No. 85, 1993) including the compilation of a risk report prior to the commencement of construction.	Item			
	SUB-TOTAL TO COLLECTION		Rand		-

Preliminaries

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
	PRELIMINARIES				
	COLLECTION				
	Total from Page Number	2			250,000.00
	Total from Page Number	3			-
	TOTAL TO SUMMARY		Rand		250,000.00

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
	BILL NO. 2 FOUNDATIONS (PROVISIONAL)				
	For preambles see Model Preambles as per Preliminaries				
	EARTHWORKS, ETC.				
1	Digging up and removing rubbish, debris, vegetation, shrubs and trees not exceeding 200 mm diameter.	m2	1327	3.40	4,511.80
	Surface Trenches, etc.:				
2	Excavate for bulk excavations.	m3	995	22.10	21,989.50
3	Excavate for surface trenches.	m3	41	36.00	1,476.00
4	Excavate for column bases.	m3	189	36.00	6,804.00
5	Extra over excavations for soft rock	m3	5	102.00	510.00
6	Ditto for hard rock	m3	4	306.00	1,224.00
	Sundries				
7	Allow for keeping excavations free of water and mud by pumping or bailing.	Item	1		1,200.00
	FILLING, ETC.				
8	Excavated material in backfill, saturated to optimum moisture content and compacted to 95% modified AASHTO under solid floors, etc. including haulage not exceeding 100 m from the perimeter of the excavation.	m3	230	20.40	4,692.00
9	Ditto but imported.	m3	765	110.50	84,532.50
10	Rip and compact in-situ earth to 95 % modified AASHTO under pavings, etc.	m2	1045	16.00	16,720.00
11	Spread and level top soil in 75 mm thick layer from stockpile on site.	m2	35900	6.00	215,400.00
12	Risk of collapse of sides of excavations from ground level not exceeding 1.5 m deep.	m2	177	1.70	300.90
13	Ditto exceeding 1.5 m deep.	m2	504	4.25	2,142.00
14	Chlorinated hydrocarbon soil poisoning applied by an approved specialist under minimum guarantee of ten years.	m2	1045	7.00	7,315.00
	CONCRETE, FORMWORK AND REINFORCEMENT				
	MASS CONCRETE				
15	Mass concrete (15 Mpa) in blinding.	m3	9	645.00	5,805.00
16	Mass concrete (20 MPa) in surface trenches.	m3	1	740.00	740.00
	SUB-TOTAL TO COLLECTION		Rand		375,362.70

Foundations

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
REINFORCED CONCRETE					
17	Reinforced concrete (25 MPa) in ground beams.	m3	48	785.00	37,680.00
18	Reinforced concrete (25 MPa) in column bases.	m3	41	785.00	32,185.00
19	Reinforced concrete (30 MPa) in stub columns.	m3	8	845.00	6,760.00
FORMWORK, ETC. TO CONCRETE					
General formwork (use and waste) to:					
20	Side of ground beams.	m2	276	86.00	23,736.00
21	Sides of square or rectangular columns.	m2	68	86.00	5,848.00
22	Side of ground beams circular on plan exceeding 2.0 m radius.	m2	6	145.00	870.00
REINFORCING					
For reinforcing see Concrete, Formwork and Reinforcement section in these Bills of Quantities					
BRICKWORK					
Brickwork in clay stock bricks to Architect's approval in cement mortar in:					
23	One brick wall.	m2	100	210.00	21,000.00
24	One brick wall circular on plan not exceeding 2.0 metre radius.	m2	2	210.00	420.00
Sundries					
25	High tensile welded steel wire brick reinforcement 150 mm wide built horizontally into brickwork, including all laps, bending, cutting, notching, etc.	m	205	2.00	410.00
POLYSTYRENE					
Expansion joints with 25 mm polystyrene below ground beams.					
26	25 mm Layer 500 mm wide.	m2	148	24.00	3,552.00
SUB-SOIL DRAINAGE					
27	Excavate in earth for surface trenches for sub-soil drainage.	m3	648	40.00	25,920.00
28	Supply and install sub-soil drainage trenches with Bidum fabric, laying of 110 mm diameter perforated uPVC agricultural drains and back filling with concrete stone to required levels and topping up with soil from the excavations (Note: All pipes, fittings, Bidum fabrics and concrete stone supplied to the site by the Employer) to trenches not exceeding 750 mm deep.	m	385	267.00	102,795.00
SUB-TOTAL TO COLLECTION				Rand	261,176.00

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
FOUNDATIONS					
COLLECTION					
	Total from Page Number	5			375,362.70
	Total from Page Number	6			261,176.00
TOTAL TO SUMMARY				Rand	636,538.70

Foundations

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
	BILL NO. 4 CONCRETE, FORMWORK AND REINFORCEMENT For preambles see Model Preambles				
	CONCRETE TESTS				
1	Prepare a set of three concrete cubes each size 150 x 150 x 150 mm for strength tests and deliver to an approved laboratory for testing and pay all charges in connection therewith.	No	12	136.00	1,632.00
2	The cost of preliminary tests prior to approval of the Contractor's materials and mixes shall be borne by the Contractor.	Item	1		-
3	The cost of subsequent tests shall be borne by the Employer unless the results show that the materials or concrete do not conform to the specified requirements.	Item	1		
4	All concrete slump tests must be prepared and paid for by the Contractor.	Item	1		-
	MASS CONCRETE				
	Mass concrete (25 MPa) in:				
5	Surface beds.	m3	94	785.00	73,790.00
6	In thickening out of surface beds when casting against rock.	m3	1	785.00	785.00
7	Steps.	m3	3	840.00	2,520.00
	REINFORCED CONCRETE				
	Reinforced concrete (25 MPa) in:				
8	Slabs.	m3	131	785.00	102,835.00
9	Ramps	m3	14	785.00	10,990.00
10	Beams.	m3	86	785.00	67,510.00
11	Inverted beams.	m3	6	785.00	4,710.00
12	Stairs and raking slabs.	m3	7	840.00	5,880.00
	Reinforced concrete (40 MPa) in:				
13	Columns	m3	15	895.00	13,425.00
	Sundries				
14	Strike off and cure top surface of concrete to smooth uniform level.	m2	2097	12.00	25,164.00
	SUB-TOTAL TO COLLECTION			Rand	309,241.00

Concrete Formwork & Reinforcement

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
15	Ditto to falls.	m2	80	15.00	1,200.00
16	Strike off and cure top surface of concrete and power float to a smooth uniform level.	m2	621	16.00	9,936.00
FORMWORK, ETC. TO CONCRETE					
General formwork (use and waste) to:					
15	Soffits of slabs	m2	603	90.00	54,270.00
16	Sides and soffits of beams.	m2	576	90.00	51,840.00
17	Sides of inverted beams.	m2	59	90.00	5,310.00
18	Sides of square or rectangular columns.	m2	224	94.00	21,056.00
19	Raking soffit of stairs	m2	26	120.00	3,120.00
20	Edge not exceeding 150 mm high.	m	85	23.80	2,023.00
21	Risers exceeding 150 mm and not exceeding 300 mm high.	m	83	27.20	2,257.60
22	Raking spandril edge of stairs	m	29	27.20	788.80
SLEEVES, SLIP JOINTS etc.					
23	50 mm Diameter sleeves through 220 mm thick reinforced concrete beam.	No.	8	4.25	34.00
24	110 mm Diameter sleeves through 175 mm thick reinforced concrete slab.	No.	4	6.80	27.20
25	Slip joint comprising two layers of 3 mm tempered hardwood with well greased abutting surfaces between concrete and brick bearing surfaces not exceeding 230 mm wide.	m	120	18.70	2,244.00
EXPANSION JOINTS					
Expansion joints with polysulphide sealant filled into joints in concrete surfaces : (Provisional)					
26	3 mm Wide x 40 mm deep saw cut joint.	m	212	20.40	4,324.80
HOISTING INTO POSITION AND FIXING OF STEEL					
REINFORCING (Provisional)					
27	Mild tensile steel reinforcing bars in various lengths.	t	2	8,450.00	16,900.00
28	High tensile ditto.	t	28	8,450.00	236,600.00
HOISTING INTO POSITION AND FIXING STEEL MESH					
REINFORCING (Provisional)					
29	Mesh Ref. 193	m2	995	27.00	26,865.00
30	Mesh Ref. 345	m2	5	43.00	215.00
SUB-TOTAL TO COLLECTION				Rand	439,011.40

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
CONCRETE FORMWORK & REINFORCEMENT					
COLLECTION					
	Total from Page Number	8			309,241.00
	Total from Page Number	9			439,011.40
TOTAL TO SUMMARY				Rand	748,252.40

Concrete Formwork & Reinforcement

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
	BILL NO. 5 MASONRY For preambles see Model Preambles				
	Brickwork in approved selected cement stock bricks in cement mortar in:				
1	Mass brickwork in piers	m3	3	914.00	2,742.00
2	Half brick wall.	m2	356	105.00	37,380.00
3	Half brick wall in beam filling.	m2	40	110.00	4,400.00
4	One brick wall.	m2	1,715	210.00	360,150.00
5	Ditto but circular on plan not exceeding 2.0 meter radius	m2	25	240.00	6,000.00
	SUNDRIES.				
7	Prestressed 'Fabcon' 110 mm wide lintols in lengtgs not exceeding 3.0 m long built into brickwork.	m	188	24.00	4,512.00
8	High tensile welded steel wire brick reinforcement 75 mm wide built horizontally into brickwork, including all laps, bending, cutting, notching, etc.	m	1,422	1.00	1,422.00
9	High tensile welded steel wire brick reinforcement 150 mm wide built horizontally into brickwork, including all laps, bending, cutting, notching, etc.	m	6,861	1.00	6,861.00
10	4 mm Diameter galvanized wire roof tie 2 m girth bent double with one end fixed to timber and other end built into brickwork.	No.	66	5.00	330.00
11	1.6 x 32 mm Galvanised iron cramp 350 mm long with one end fixed to concrete column and other end built into brickwork.	No.	10	7.00	70.00
12	1.6 x 32 mm Galvanised iron cramp 350 mm long with one end fixed to steel column and other end built into brickwork.	No.	250	7.00	1,750.00
	EXPANSION JOINTS (Provisional)				
	10 mm Thick polystyrene in expansion joints :				
13	10 mm Fibre board built in vertically between brick skins	m2	9	24.00	216.00
14	Rake out 10 mm wide fibre board 10 mm deep and point with polysulphide sealant.	m	78	32.00	2,496.00
	SUB-TOTAL TO COLLECTION		Rand		428,329.00

Masonry

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
FAIR FACE BRICKS (Provisional)					
	Selected clay stock bricks with ruled horizontal and vertical joints.				
15	Extra over ordinary brickwork for fair face brickwork.	m2	102	42.50	4,335.00
16	Extra for brick-on-edge coping to top of 230 mm wall.	m	15	49.30	739.50
17	Extra for brick-on-edge header course lintol.	m	15	49.30	739.50
18	Extra for brick-on-edge 150 mm wide window cill set sloping and slightly projecting.	m	15	49.30	739.50
19	Fair circular cutting.	m	15	21.25	318.75
PAVING (Provisional)					
	Note:				
	Paving blocks and pre-cast concrete kerbs				
20	200 x 100 x 50 mm Thick light grey pre-cast concrete paving blocks laid with butt joints on 25 mm thick layer of river sand bed with sand swept into joints including preparation of ground or filling including edge blocks.	m2	200	135.00	27,000.00
21	Pre-cast concrete kerbing.	m	288	148.00	42,624.00
22	Ditto circular on plan not exceeding 2.0 m radius.	m	2	165.00	330.00
23	Ditto circular on plan exceeding 2.0 m radius.	m	222	165.00	36,630.00
SUB-TOTAL TO COLLECTION				Rand	113,456.25

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
MASONRY					
COLLECTION					
	Total from Page Number	11			428,329.00
	Total from Page Number	12			113,456.25
TOTAL TO SUMMARY				Rand	541,785.25

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
BILL NO. 6					
WATERPROOFING					
For preambles see Model Preambles					
DAMP PROOFING					
	One layer 250 micron 'Gunplas USB Green' polyethylene waterproofing.				
1	On compacted earth under concrete surface beds, lapped 150 mm and sealed at all joints (measured net).	m2	1023	10.00	10,230.00
	One layer 375 micron embossed 'Gunplas Brikgrip' polyethylene damp proof course :				
2	On walls.	m2	98	12.00	1,176.00
WATERPROOFING					
	Torch on bitumastic waterproofing membrane with a ten year maintenance free guarantee, laid in strict accordance with the manufacturer's instructions:				
3	To vertical surfaces of brick walls, including turnups, turndown, working to angles, dressing into outlets, around pipes, etc.	m2	67	105.00	7,035.00
4	Ditto but to horizontal surfaces.	m2	253	105.00	26,565.00
TOTAL TO SUMMARY				Rand	45,006.00

Waterproofing

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
	BILL NO. 7 ROOF COVERINGS For preambles see Model Preambles				
	PROFILED METAL SHEETING AND ACCESSORIES				
1	0.6 mm Galvanised 686 IBR sheeting fixed to steel or to timber purlins.	m2	943	89.00	83,927.00
2	Apex flashing.	m	39	60.00	2,340.00
3	Gable trim.	m	54	60.00	3,240.00
4	"Compriband" neoprene closure flashings.	m	39	40.00	1,560.00
	INSULATION				
5	"Sisalation 420" grade glass fibre reinforced aluminium foil bonded insulation laid taunt over purlins at 1100 mm centers and fixed concurrent with roof sheeting including stay wires.	m2	943	29.00	27,347.00
	TOTAL TO SUMMARY				118,414.00
	Rand				

Roof Coverings

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
	BILL NO. 8 CARPENTRY AND JOINERY For preambles see Model Preambles				
	PLATE NAILED TIMBER ROOF TRUSSES				
	NOTE: The dimesions in the descriptions of the trusses are nominal and the actual measurements are to be obtained from the site prior to design or fabrication.				
	Sawn South African Pine (Roofing Grade)				
1	Provide the prime cost amount of R 35,000.00 for timber roof truss members supplied and installed complete.	Item	1		35,000.00
2	Allow for profit.	Item	1		1,750.00
3	Allow for attendance on sub-contractor supplying and installing roof truss members.	Item	1		1,750.00
	SUNDRIES				
	Sawn South African Pine				
4	50 x 75 mm Purlins.	m	96	18.00	1,728.00
5	38 x 114 mm Wall plates.	m	12	18.00	216.00
	DOORS				
	Commercial Veneered Semi-Solid Doors				
6	44 mm Door, size 813 x 2032 mm.	No.	27	365.00	9,855.00
7	44 mm Double door size 1620 x 2032 mm.	No.	7	720.00	5,040.00
	Solid doors				
8	44 mm Standard flush backed meranti framed ledged braced and battened door, size 813 x 2032 mm including hanging to steel frame (Elsewhere measured).	No.	8	768.00	6,144.00
9	44 mm Ditto but double door with rebated meeting styles size 1620 x 2032 mm including hanging to steel frame (ditto).	No.	7	1,536.00	10,752.00
	Fire Doors				
10	44 mm "Bitcon" Class D fire door and frame size 900 x 2100 mm.	No.	1	2,780.00	2,780.00
	SKIRTINGS, ETC.				
11	25 x 76 mm Wrought meranti skirtings with 19 mm quadrant planted on plugged to walls.	m	100	26.00	2,600.00
	SUB-TOTAL TO COLLECTION				77,615.00
	Rand				

Carpentry and Joinery

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
	CEILINGS				
	White vinyl clad 1200 x 600 x 9.5 mm "rhinoboard" panels on and including white powder coated "Donn" exposed tee suspension system including main and cross tees, necessary hangers, grids, wall angles, etc.				
12	Ceilings suspended not exceeding 1.0 m below timber trusses.	m2	928	128.00	118,784.00
	SUB-TOTAL TO COLLECTION		Rand		118,784.00

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
	CARPENTRY AND JOINERY				
	COLLECTION				
	Total from Page Number	16			77,615.00
	Total from Page Number	17			118,784.00
	TOTAL TO SUMMARY		Rand		196,399.00

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
	BILL NO. 9 FLOOR COVERINGS, PLASTIC LININGS, ETC. For preambles see Model Preambles				
	FLOORS				
	2.5 mm Semi-flexible heavy duty vinyl asbestos floor sheeting (Colour to Architect's approval) with welded joints				
1	To floors.	m2	478	98.00	46,844.00
	CARPETS				
2	Provide the prime cost amount of R 100.00 per square metre (PC R 100.00/m2) for carpets supplied, delivered to site and layed as per manufacturer's instructions on cement screeds (elsewhere measured)	m2	350	120.00	42,000.00
	SUNDRIES				
3	Aluminium cover strip to expansion joints in floors pulgged and screwed to floors.	m	25	32.00	800.00
	TOTAL TO SUMMARY		Rand		89,644.00

Floor Coverings

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
	BILL NO. 10 IRONMONGERY For preambles see Model Preambles as per Preliminaries				
	SUPPLY AND FIXING OF THE FOLLOWING IRONMONGERY:				
1	"Solid Art 390/311" two lever lockset with door furniture.	No.	34	128.00	4,352.00
2	"Solid Art 390/311" three lever lockset with door furniture.	No.	16	320.00	5,120.00
3	Rebated double door conversion set.	No.	14	165.00	2,310.00
4	120 mm Flush bolt.	No.	28	130.00	3,640.00
5	WC indicator bolt.	No.	14	80.00	1,120.00
6	"Solid Art 252" coat hook.	No.	14	105.00	1,470.00
7	"Solid Art 255/E41" door stop.	No.	64	78.00	4,992.00
8	Chrome plated toilet roll holder plugged to walls.	No.	14	154.00	2,156.00
9	19 mm Diameter x 750 mm long towel rail plugged to walls complete with holder brackets.	No.	8	210.00	1,680.00
10	"Geze 3000V" or other approved door closer	No.	6	701.25	4,207.50
	TOTAL TO SUMMARY		Rand		31,047.50

Ironmongery

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
	BILL NO. 11 METALWORK For preambles see Model Preambles				
	DOOR FRAMES				
1	1.6 mm Rebated frame suitable for half brick walls for door size 813 x 2032 mm.	No.	27	245.00	6,615.00
2	Ditto for one brick walls for door size 813 x 2032 mm.	No.	7	245.00	1,715.00
3	Ditto for double door size 1620 x 2032 mm.	No.	14	364.00	5,096.00
	BRASS (Provisional)				
4	6 X 25 mm Dividing strip set flush between different floor finishes.	m	16	45.00	720.00
	STRUCTURAL STEEL (Provisional)				
	NOTE: Descriptions of bolts shall be deemed to included for nuts and washers.				
	Descriptions of holding down bolts shall be deemed to include bending, threading, nuts, washers and embedding in concrete.				
	All descriptions of structural steel shall be deemed to include the removal of all grease, wire brushing of all members and applying one coat red oxide primer prior to delivery to site				
	Welded columns and beams in single lengths with flat section base, top, bearer and connection plates to:				
5	IPE 180 columns.	Kg	1,923	16.00	30,768.00
6	IPE 200 columns.	Kg	3,321	16.00	53,136.00
7	305 x 102 x 28.6 Kg/m rafters.	Kg	3,232	16.00	51,712.00
8	150 x 50 x 20 x 2.5 mm Cold formed lipped channels.	Kg	123	16.00	1,968.00
9	200 x 75 x 20 x 2.5 mm Cold formed lipped channels.	Kg	3,344	17.00	56,848.00
10	60 x 40 x 2.5 mm Mild steel rectangular hollow section.	Kg	1,941	19.00	36,879.00
10	60 x 60 x 4 mm Mild steel angle false rafters.	Kg	151	16.00	2,416.00
11	20 mm Diameter holding down bolts 1200 mm long.	No.	22	178.00	3,916.00
12	High tensile bolts.	Kg	600	22.00	13,200.00
13	16 mm Thick base plates size 350 x 450 mm with four 22 mm diameter holes.	No.	22	365.00	8,030.00
	TOTAL TO SUMMARY	Rand			273,019.00

Metalwork

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
	BILL NO. 12 PLASTERING For preambles see Model Preambles				
	SCREEDS, ETC:				
	25 mm Thick to horizontal surfaces to receive:				
1	Vinyl sheeting.	m2	478	36.00	17,208.00
2	Ceramic tiling.	m2	125	36.00	4,500.00
3	Carpetting, etc.	m2	80	36.00	2,880.00
	To falls and cross falls to receive waterproofing:				
4	Average 60 mm thick.	m2	253	84.00	21,252.00
	Granolithic Screeds				
5	25 mm Thick tinted ganolithic screed to floors to falls.	m2	32	38.00	1,216.00
6	25 mm Thick to treads and risers of steps.	m2	30	68.00	2,040.00
	EXTERNAL PLASTER				
	One coat cement plaster as described finished to a smooth, true and even surface with a steel trowel:				
7	To vertical surfaces.	m2	1,024	37.00	37,888.00
8	To horizontal surfaces.	m2	28	37.00	1,036.00
9	To horizontal soffits.	m2	28	42.00	1,176.00
	Labours				
10	Narrow widths.	m2	28	43.00	1,204.00
	INTERNAL PLASTER				
	One coat cement plaster as described finished to a smooth, true and even surface with a steel trowel:				
11	To vertical surfaces.	m2	2,652	37.00	98,124.00
12	To horizontal surfaces.	m2	28	37.00	1,036.00
13	To horizontal soffits.	m2	28	42.00	1,176.00
	Labours				
14	Narrow widths.	m2	28	43.00	1,204.00
15	Coved skirting not exceeding 300 mm girth. (Provisional)	m	18	13.00	234.00
	SUB-TOTAL TO COLLECTION	Rand			192,174.00

Plastering

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
	One coat hardwall gypsum plaster to cement plaster: (Provisional)				
15	To vertical surfaces.	m2	15	18.00	270.00
16	To horizontal surfaces.	m2	5	18.00	90.00
17	To horizontal soffits.	m2	5	22.00	110.00
	Labours				
18	Narrow widths.	m2	5	24.00	120.00
	SUB-TOTAL TO COLLECTION				590.00
	Rand				

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
	PLASTERING				
	COLLECTION				
	Total from Page Number	22			192,174.00
	Total from Page Number	23			590.00
	SUB-TOTAL TO COLLECTION				192,764.00
	Rand				

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
	BILL NO. 13 TILING For preambles see Model Preambles				
	Ceramic tiling (PC R 120.00 per square meter supplied and delivered to site) glued with an approved adhesive to cement plaster backing (elsewhere measured) including grouting and cleaning down on completion.				
1	To Floors.	m2	125	210.00	26,250.00
2	To walls.	m2	392	210.00	82,320.00
3	In narrow widths.	m2	5	240.00	1,200.00
	SUNDRIES (Provisional)				
4	Polysuphide sealant to expansion joints.	m	6	36.00	216.00
5	Soap dish	No.	12	134.00	1,608.00
6	Toilet roll holder.	No.	5	80.00	400.00
	SUB-TOTAL TO COLLECTION				111,994.00
	Rand				

Tiling

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
	BILL NO. 14 PLUMBING (Provisional) For preambles see Model Preambles				
	RAINWATER DISPOSAL				
	0.8 mm Glavanised sheet iron				
1	125 x 125 mm Eaves gutter with beaded front egde fixed to rafter feet.	m	37	56.00	2,072.00
2	Extra over for stopped ends.	No.	6	32.00	192.00
3	Extra over for angle.	No.	6	32.00	192.00
4	Extra over for outlet for 76 x 76 mm down pipe.	No.	6	54.00	324.00
5	76 x 76 mm Rainwater pipes fixed to walls.	m	39	44.00	1,716.00
6	Extra over for shoe.	No.	6	41.40	248.40
7	Extra for bend.	No.	12	41.40	496.80
	Fullbore cast iron outlets				
8	150 mm Diameter 90 degree side outlet.	No.	5	774.00	3,870.00
	uPVC Piping				
9	150 mm Diameter piping fixed to walls.	m	82	127.80	10,479.60
10	Extra over uPVC piping for bend.	No.	16	288.00	4,608.00
	PUPOSE MADE MILD STEEL GUTTERS				
	2 mm Glavanised sheet iron				
11	0.80 Metre girth three times bent gutter welded joints fixed to steel truss members.	m	37	89.00	3,293.00
12	Extra over for stopped ends.	No.	2	76.00	152.00
13	Extra over for angle.	No.	2	148.50	297.00
14	Extra over for outlet for 150 mm diameter down pipe.	No.	3	65.00	195.00
	SUB-TOTAL TO COLLECTION			Rand	28,135.80

Plumbing

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
SANITARY FITTINGS					
15	"Vaal Potteries" ceramic fireclay 560 x 405 mm rectangular "Springbok" wash hand basin complete with two "Cobra Star 111-15" CP pillar taps, 40 mm diameter CP waste outlet, plug and chain fixed to walls with and including heavy duty cast iron wall brackets.	No.	17	840.00	14,280.00
16	"Vaal Potteries" ceramic fireclay 450 x 290 mm semi-rounded "Bantam" wash hand basin complete with one "Cobra Star 111-15" CP Pillar tap, 40 mm diameter CP waste outlet, plug and chain fixed to walls with and including heavy duty cast iron wall brackets.	No.	1	865.00	865.00
17	Stainless steel sink and drainer 1500 mm long x 457 mm wide with two center bowls fixed into position onto built-in-cupboard unit (Cupboard supplied by others) complete with one "Cobra Star 166/041" sink mixer complete with swivel outlet, adjustable wall flanges, etc. and 50 mm CP waste outlet, plug and chain.	No.	2	3,260.00	6,520.00
18	"Vaal Potteries Klip 104 degrees low volume low level washdown pan with enlarged pedestal and matching cistern complete with lid and fittings.	No.	16	1,365.00	21,840.00
19	"Vaal Potteries Lavatera" wall mounted bowl urinal with top inlet, "Cobra Junior Flushmaster flushvalve FJ2.000 and FJT5.4 CP flush pipe, 38 mm diameter CP domical grating and outlet complete with hanger brackets.	No.	7	2,240.00	15,680.00
GEYSERS					
20	150 Litre "Kwikot - Megaflor" horizontal electric water heater fixed to wall.	No.	2	3,650.00	7,300.00
21	200 Litre "Kwikot - Megaflor" horizontal electric water heater fixed to wall.	No.	2	4,638.00	9,276.00
TRAPS, etc.					
	"Cobra Watertech"				
22	"108-15" Standard brass hose bibtap.	No.	1	78.00	78.00
23	"121-15" Standard brass stoptap.	No.	2	103.50	207.00
24	"121-20" Standard brass stoptap.	No.	1	118.80	118.80
25	"121-25" Standard brass stoptap.	No.	1	133.20	133.20
26	"232/350" Angle valve with 10 mm bendable CP copper outlet tube service connection.	No.	55	65.70	3,613.50
27	"139-15" Undertile stoptap with sliding wall flange.	No.	1	67.50	67.50
28	"345/50" CP bottle trap.	No.	25	167.40	4,185.00
SUB-TOTAL TO COLLECTION				Rand	84,164.00

Plumbing

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
29	"PA1.1" Kwikot 400kPa pressure control valve.	No.	4	645.00	2,580.00
30	"PB1.10RB" vacuum breaker.	No.	8	118.00	944.00
31	"547/C-15" Draincock.	No.	4	90.00	360.00
32	"1001/125-25" Gate valve.	No.	4	154.00	616.00
"Marley"					
33	40 x 300 mm Sink combination for double bowl with deepseal "P" trap.	No.	2	243.00	486.00
DRAINAGE					
34	Excavation not exceeding 2.0 m deep for pipe trenches.	m3	9	36.00	324.00
35	Back filling to pipe trenches.	m3	9	36.00	324.00
uPVC Pipes					
36	50 mm Diameter pipes fixed to walls.	m	8	24.00	192.00
37	50 mm Diameter pipes laid in trenches (excavation elsewhere).	m	2	24.00	48.00
38	110 mm Diameter pipes fixed to walls.	m	3	68.00	204.00
39	110 mm Diameter pipes laid in trenches (excavation elsewhere).	m	15	68.00	1,020.00
40	160 mm Diameter pipes laid in trenches (excavation elsewhere).	m	2	260.00	520.00
Extra Over uPVC Pipes for Fittings					
41	50 mm Bend.	No.	8	15.00	120.00
42	50 mm IE bend.	No.	2	26.00	52.00
43	50 mm Reducer.	No.	1	18.00	18.00
44	50 mm Junction.	No.	3	28.00	84.00
45	50 mm IE junction.	No.	2	32.00	64.00
46	110 mm Bend.	No.	8	60.00	480.00
47	110 mm IE bend	No.	2	76.00	152.00
48	110 mm Reducer.	No.	1	65.00	65.00
49	110 mm Pan connector.	No.	2	60.00	120.00
50	110 mm Junction.	No.	1	85.00	85.00
51	110 mm IE junction.	No.	2	97.00	194.00
52	110 mm IE bend with anti-syphon horn.	No.	2	106.00	212.00
SUB-TOTAL TO COLLECTION			Rand		9,264.00

Plumbing

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
53	110 mm Vent valve	No.	2	65.00	130.00
54	110 mm IE reducing junction.	No.	1	120.00	120.00
55	110 mm Cleaning eye.	No.	2	65.00	130.00
56	110 mm Gully trap complete with hopper.	No.	1	234.00	234.00
57	160 mm Bend.	No.	1	278.00	278.00
58	160 mm Junction.	No.	2	384.00	768.00
59	160 mm IE junction.	No.	1	420.00	420.00
60	160 mm IE reducing junction.	No.	1	420.00	420.00
WATER SUPPLIES					
61	Excavation not exceeding 2.0 m deep for pipe trenches.	m3	22	36.00	792.00
62	Back filling to pipe trenches.	m3	22	36.00	792.00
	"Polycop" polypropylene pipes with brass compression fittings				
63	25 mm Diameter pipes laid in trenches (trenches elsewhere)	m	12	8.00	96.00
64	25 mm Pipes fixed to walls.	m	6	8.00	48.00
65	Extra over "Polycop" pipes for brass compression fittings.	No.	8	32.00	256.00
Copper Piping					
66	15 mm Diameter pipes chased into walls.	m	16	7.00	112.00
67	22 mm Diameter pipes chased into walls.	m	6	14.00	84.00
68	22 mm Diameter pipes laid in trenches (trenches elsewhere)	m	5	12.00	60.00
69	Extra over copper pipes for capillary fittings.	No.	15	23.00	345.00
Galvanised steel pipes					
70	25 mm Diameter pipes laid in trenches (trenches elsewhere)	m	4	68.00	272.00
71	25 mm Pipes fixed to walls.	m	2	72.00	144.00
72	32 mm Diameter pipes laid in trenches (trenches elsewhere)	m	15	96.00	1,440.00
73	32 mm Pipes fixed to walls.	m	6	102.00	612.00
74	50 mm Diameter pipes laid in trenches (trenches elsewhere)	m	12	120.00	1,440.00
75	50 mm Pipes fixed to walls.	m	1	124.00	124.00
SUB-TOTAL TO COLLECTION			Rand		9,117.00

Plumbing

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
Extra over galvanised steel pipes for steel fittings					
76	25 mm Fittings.	No.	10	8.00	80.00
77	32 mm Plug	No.	1	14.00	14.00
78	32 mm Bush	No.	1	15.00	15.00
79	32 mm Elbow	No.	2	36.00	72.00
80	32 mm Tee	No.	1	38.00	38.00
81	32 mm Reducing tee.	No.	1	38.00	38.00
82	32 mm Union.	No.	1	64.00	64.00
83	50 mm Plug	No.	1	48.00	48.00
84	50 mm Bush	No.	1	52.00	52.00
85	50 mm Elbow	No.	1	59.00	59.00
86	50 mm Tee	No.	1	64.00	64.00
87	50 mm Reducing tee.	No.	1	67.00	67.00
88	50 mm Union.	No.	1	87.00	87.00
SUNDRIES					
89	300 x 450 mm Cast iron valve box including brick chamber below, not exceeding 600 mm deep internally.	No.	3	2,430.00	7,290.00
TESTING					
90	Test drainage system.	Item	1		800.00
91	Test water supply system.	Item	1		800.00
FIRE SERVICES					
92	"Chubb Everyway" hose reel complete with 30 m plastic hose, chromium plated stopcock, shut-off nozzle and wall bracket.	No.	3	2,560.00	7,680.00
93	9 Kg Dry chemical fire extinguisher.	No.	6	780.00	4,680.00
HOLES					
	Core drilling of hole for pipes				
94	Not exceeding 50 mm diameter.	No.	5	143.00	715.00
95	Exceeding 50 mm diameter and not exceeding 160 mm diameter.	No.	6	165.00	990.00
SUB-TOTAL TO COLLECTION					23,653.00

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
PLUMBING					
COLLECTION					
	Total from Page Number	26			28,135.80
	Total from Page Number	27			84,164.00
	Total from Page Number	28			9,264.00
	Total from Page Number	29			9,117.00
	Total from Page Number	30			23,653.00
SUB-TOTAL TO COLLECTION					154,333.80

Plumbing

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
	BILL NO. 14 GLAZING For preambles see Model Preambles				
	GLAZING TO STEEL WINDOWS WITH PUTTY (Provisional)				
1	4 mm Clear float glass in panes exceeding 0,1 and not exceeding 0,5 m2.	m2	2	165.00	330.00
2	'Pasific' obscure glass in panes not exceeding 0.1 m2.	m2	21	186.00	3,906.00
	MIRRORS				
3	6 mm Thick float glass silvered mirror with bevelled and polished edges, plugged and screwed to walls with chromium plated loose dome-headed screws and rubber pad washers.	m2	8	569.00	4,552.00
	SUB-TOTAL TO COLLECTION			Rand	8,788.00

Glazing

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
	BILL NO. 15 PAINTING For preambles see Model Preambles				
	ON PLASTER, ETC				
	The following specifications have been based on Dulux standard specification, which could be substituted by another Manufacturer specification on Architect's approval: Prepare, stop and paint one coat Primer and two coats Dulux Acrylic PVA emulsion paint on				
1	Internally plastered ceilings and beams.	m2	603	28.00	16,884.00
	Prepare, stop and paint one coat Bonding Liquid thinned up to a maximum of 30% and one coat Plaster Primer and two coats Dulux Satin Sheen paint on				
2	Internally plastered walls.	m2	15	28.00	420.00
	Prepare, stop and paint one coat Plaster Primer and two coats Dulux Weather Guard Exterior Grade Acrylic PVA paint on				
3	Externally plastered walls.	m2	1,024	28.00	28,672.00
4	Externally plastered ceilings and beams.	m2	28	28.00	784.00
	ON METAL				
	Prepare and apply one coat primer and two coats Silthane Silk Enamel paint on:				
5	Sashes and frames.	m2	32	32.00	1,024.00
6	Rails, etc. not exceeding 300 mm girth.	m	15	15.00	225.00
7	Structural steel members.	kg	14,484	5.00	72,420.00
	ON WOOD, ETC.				
	Prepare and apply one coat primer and two coats 'Dulux' Silthane Silk Enamel paint on:				
8	General surfaces of timber.	m2	139	32.00	4,448.00
	Prepare, stop and paint three coats Dulux Woodgard Varnish on:				
9	General surfaces of timber.	m2	26	26.00	676.00
	SUB-TOTAL TO COLLECTION			Rand	125,553.00

Painting

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
	BILL NO. 16 PROVISIONAL SUMS				
	Unless otherwise described the Preambles and full descriptions of the items in the previous sections will apply equally to this section.				
	NOTE: The following Prime Cost Amounts are NET and do not include any Builder's Discount.				
	Sundry Steelwork, Gates, Screens, etc.				
1	Allow the sum of R 75,000.00 for the sundry steelwork				
	Installation complete.	Item			75,000.00
2	Allow for profit upon above if required.	Item			1,875.00
3	Attend upon the sundry steelwork installation firm.	Item			1,875.00
	Aluminium Windows				
4	Allow the sum of R 265,000.00 for the aluminium windows installed complete.	Item			265,000.00
5	Allow for profit upon above if required.	Item			6,625.00
6	Attend upon the aluminium window installation firm.	Item			6,625.00
	Paraplegic Fittings				
7	Allow the sum of R 15,000.00 for the paraplegic fittings				
	installed complete.	Item			15,000.00
8	Allow for profit upon above if required.	Item			375.00
9	Attend upon the paraplegic fittings installation firm.	Item			375.00
	Change Room Fittings, Built-In-Cupboards, etc.				
10	Allow the sum of R 50,000.00 for the built-in-cupboard installation complete.	Item			50,000.00
11	Allow for profit upon above if required.	Item			1,250.00
12	Attend upon the built-in-cupboard installation firm.	Item			1,250.00
	Roller Shutter Doors				
13	Allow the sum of R 18,000.00 for the roller shutter door installation complete.	Item			18,000.00
14	Allow for profit upon above if required.	Item			450.00
15	Attend upon the roller shutter door installation firm.	Item			450.00
	SUB-TOTAL TO COLLECTION	Rand			444,150.00

Provisional Sums

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
Grassing and Landscaping					
16	Allow the sum of R 450,000.00 for the landscaping complete.	Item			450,000.00
17	Allow for profit upon above if required.	Item			11,250.00
18	Attend upon the roller shutter door installation firm.	Item			11,250.00
Sprung Sports Floor					
16	Allow the sum of R 650,000.00 for the sprung sports floor	Item			650,000.00
17	Allow for profit upon above if required.	Item			16,250.00
18	Attend upon the sprung sports floor installation firm.	Item			16,250.00
Electrical Installation					
	Allow the sum of R 850,000.00 for the electrical installation complete.	Item			850,000.00
	Allow for profit upon above if required.	Item			21,250.00
	Attend upon the electrical installation firm.	Item			21,250.00
Mechanical Installation					
	Allow the sum of R 500,000.00 for the mechanical ventilation.	Item			500,000.00
	Allow for profit upon above if required.	Item			12,500.00
	Attend upon the roller shutter door installation firm.	Item			12,500.00
Training					
	Allow the sum of R 450,000.00 for accredited training.	Item			450,000.00
	Allow for profit upon above if required.	Item			11,250.00
	Attend upon the training firm.	Item			11,250.00
Client Liason Officers					
	Allow the sum of R 60,000.00 for Client Liason Officers	Item			60,000.00
SUB-TOTAL TO COLLECTION			Rand		3,105,000.00

Provisional Sums

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
PROVISIONAL SUMS					
COLLECTION					
	Total from Page Number	34			444,150.00
	Total from Page Number	35			3,105,000.00
SUB-TOTAL TO COLLECTION			Rand		3,549,150.00

Provisional Sums

ITEM	DESCRIPTION	page	AMOUNT R
	MULTI-PURPOSE SPORTS HALL		
	SUMMARY		
1	PRELIMINARIES	4	250,000.00
2	FOUNDATIONS	7	636,538.70
3	CONCRETE, FORMWORK & REINFORCEMENT	10	748,252.40
4	MASONRY	13	541,785.25
5	WATERPROOFING	14	45,006.00
6	ROOF COVERINGS	15	118,414.00
7	CARPENTRY & JOINERY	18	196,399.00
8	FLOOR COVERINGS	19	89,644.00
9	IRONMONGERY	20	31,047.50
10	METALWORK	21	273,019.00
11	PLASTERING	24	192,764.00
12	TILING	25	111,994.00
13	PLUMBING	31	154,333.80
14	GLAZING	32	8,788.00
15	PAINTING	33	125,553.00
16	PROVISIONAL SUMS	36	3,549,150.00
	SUB-TOTAL	R	7,072,688.65
	CONTINGENCIES		
	Allow an amount of R 300,000.00 (Three hundred thousand Rand) contingency amount to be deducted in whole or in part as directed by the Project Manager	Item	300,000.00
	ESCALATION		
	Provision for escalation in terms with published indices to be deducted in part as per detailed calculation.	Item	220,000.00
	SUB-TOTAL	R	7,592,688.65
	Value Added Tax (14%)		1,062,976.41
	TOTAL CONTRACT SUM	R	8,655,665.06

The image features a solid dark green background. A horizontal white band runs across the middle. Below this band, there are several overlapping geometric shapes in shades of green and yellow, creating a dynamic, layered effect. The text "An Active and Winning Nation" is written in a white, italicized serif font, positioned within the white band.

An Active and Winning Nation