ORGANIZATION NAME	SASPI South African Sports and Play Industry	REGISTRATION NUMBER	NPO 165 -218
DOCUMENT NAME	The SASPI Code of Practice for the Construction and Installation of Artifical 3G & Hockey Pitches		
ORIGIN	Adopted from the SRSA Best practice for the Construction and Installation of Artifical 3G & Hockey Pitches		
SRSA 1st Edition	April 2021	ISBN	N/A
VERSION NUMBER	001	REVIEW DATE	2023

CODE OF PRACTICE

FOR THE CONSTRUCTION AND INSTALLATION OF 3G SOCCER & HOCKEY ARTIFICIAL PITCHES

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Contents

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PROLOGUE

The South African Sports and Play Industry (SASPI) has with permission adopted the South and Recreation South Africa (SRSA) Code of Practice for the Construction and Installation of 3G Soccer & Hockey Artificial pitches that has been produced to provide prospective clients and specifiers with guidance on the basic construction requirements, specification and maintenance currently employed in 3G Soccer & Hockey Artificial pitches . The document calls on the experience of our member companies who have constructed a wide range of installations for a variety of clients over many years. The requirements of the relevant South African Standards are also incorporated, where appropriate, in the document. Whilst it is not intended that this document should become part of a contract, it is hoped that it will prove useful in the selection of an appropriate system and surface and form a useful reference in the design and construction process.

Please Note: *Users of the Code of Practice are advised to ensure that they are fully aware of any further technical requirements or criteria which may be imposed by a specific funding body for individual facility development projects.*

Notes To Be Read In Conjunction with the Code of Practice

This Code of Practice is intended for use by sports surfacing contractors, sports facility design professionals and sports facility purchasers and owners. The Code of Practice should not be used as a substitute for carrying out appropriate surveys and obtaining professional advice in individual circumstances. Although the Code of Practice has been produced by reference to facilities constructed under normal climatic conditions, the South African Sports and Play Industry cannot accept any responsibility whatsoever for any loss, damage or injury whatsoever arising from reliance on the specifications within the Code of Practice.

The Code of Practice provides minimum guideline specifications which members of the South African Sports and Play Industry are committed to meet. As guideline specifications, however, they do not supersede a reasonable interpretation of the specification and terms of contract applying in each contract. For individual projects, variations in climate, soil conditions, topography, equipment design and other site specific conditions may necessitate standards of specification greater than those recommended in the Code of Practice. Parties not experienced in play facility construction are strongly advised to consult qualified contractors and/or consultants. The South African Sports and Play Industry (SASPI) can provide details of experienced contractors and consultants.

The term 'asphalt' is the internationally accepted technical name for all surfaces which are composed of a mixture of bitumen and stone, hence this Code of Practice will use this generic term, as this is still the commonly used name for asphalts. For Hockey specifically there has been as change in the industry to move to a 8mm slurry layer prior to installing the in-situ or prefab E-layer shock pad as an alternative to an asphalt. It has to be noted that a asphalt is still the the preferred method for construction of the base.

In accordance with common practice within the construction industry (used, for example, in BS EN 13108-7), the depth of any individual construction layer is specified within the Code of Practice as the nominal compacted depth. The nominal depth can be regarded as the design depth of a layer of construction within a surfacing system.

The information contained within the Code of Practice, whilst accurate at the time of publication, may be subject to change at a future date. Due to changing technology and new developments in construction methods as well as the changing requirements of the Standards, revisions to the recommendations are likely, and only the most recent edition of the Code of Practice should therefore be used. A permanent joint committee will keep under review the use of the Code of Practice and will consider any suggestions for amendment, which should be addressed to The Chairman, The South African Sports and Play Industry (info@saspi.co.za). Revision to the Code of Practice will be made when it is considered appropriate. Due to the fact that many of the processes used in constructing wet-pour surfacing systems are highly susceptible to weather conditions such as temperature, humidity, rainfall, etc., it is advisable to check with the specialist contractor as to the most suitable time of year for the installation of their proprietary product.

South African Sports and Play Industry (SASPI)

As the recognised South African trade association, SASPI fosters excellence, professionalism and continuous improvement throughout the sports and play construction industry, in order to provide the high quality facilities necessary for the success of South African sport.

SASPI's Aims and Objectives

To promote high standards of design, construction and workmanship for sports facilities in the South Africa.
To regulate the industry through the vetting and monitoring of SASPI members.
To participate fully in the development of South African standards for the construction and performance of sports facilities, for all levels of play.
To liaise closely with the governing bodies of sport, both nationally and internationally.
To encourage the use of new technology in the design and construction of sports facilities.
To provide and support training and education for the industry's workforce.
To provide a strong voice for the sports construction industry in South Africa.

The SASPI website **www.saspi.co.za** provides a wealth of valuable information for anyone involved in the development of sports facilities. Visit www.saspi.co.za for Industry News, Technical Guidance, Exhibitions & Events, the SASPI Membership Database, and more.

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Acknowledgements

SASPI would like to acknowledge the assistance and permission of SRSA who developed the production of this code of practice and allowed us to adopt their SRSA BP.

From the first considerations regarding the construction of a sports surface through to final completion, a clear understanding is required of the process. The processes and decisions that need to be made can be complex and will depend upon many contributing factors.

This code of practice for 3G Soccer & Hockey Artificial pitches has **fifteen main sections** that cover requirements and provide technical information on the installation and maintenance of 3G Soccer & Hockey Artificial pitches .These include;

1. Overview
2. Summary of construction requirements for pitch
3. Dimensions
4. Earthworks
5. Drainage requirement
6. Sub-base stone
7. Kerbs
8. Bituminous Asphalt material
9. Shock pad
10. Artificial playing surface
11. Sustainability in Construction and End of Life Recycling
12. Equipment
13. Maintenance
14. Influence of Use
15. Management of the playing surface

***Please note**: depending on the size and cost of a project the full process outlined below will not be necessary. For example, small projects may not need to employ a consultant or indeed go through the same level of pre-build surveys. Many projects will involve a design and build element from the contractor and will consequently follow a different plan.*

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Introduction

This document sets out guidance on the installation of a 3G-artificial turf pitches in a community environment. It outlines the key elements that must be considered in terms of:

Procurement;
Installation;
Post-installation – including maintenance and sustainability.

The document also outlines the key surface characteristics, requirements and testing parameters, which will help to ensure that the **quality** of surface becomes as fundamental a consideration in the procurement process as cost.

The guidance establishes much needed minimum standards for the quality and performance of a synthetic pitch to be installed in a Municipality or community setting where community football activity equates to a significant proportion of the overall use. It is designed to assist Municipalities, Clubs, Architects, Engineers, schools etc. embarking on such a project and ensure as far as possible that player safety and quality of the resultant playing surface remains a priority prior to, during, and beyond installation.

It should be noted that every project is unique with local factors such as land characteristics, site conditions and time constraints requiring to be considered on a project-by-project basis. Ultimately, the field must comply with the requirements outlined in the version of the FIFA Quality Programme for Football Turf that is valid at the date of commencement of the project.

Frequently Asked Questions - 3G installations in Municipalities and communities

Construction Timescales & Optimum Installation Period

Conversion of a grass pitch to a 3G pitch typically takes from 12 to 20 weeks in a community environment. This is entirely dependant on the nature of the conversion and is a baseline guide only.

The variation in timescale is due to a number of critical factors including base construction, i.e. whether there is full base construction required or if there is an existing base under the grass pitch that will reduce work required and in turn cost.
Favourable weather is also an important factor at certain stages of the 3G-installation process, which is best carried out during dry conditions and ideally above 5 degrees centigrade.

In that respect, the football close season offers the optimum window both in terms of time, albeit tight at the higher end of the time-scale noted above, and weather.

Indicative Costs

- Conversion from natural grass to a FIFA compliant 3G football turf within a stadium environment is likely to be in the region of R6, 000,000 to R 8 000 000.00. This is dependent upon elements including overall pitch dimensions, existing sub base, the extent of immediate pitch surround works required (usually for a combination of health & safety and aesthetic reasons) and new equipment, floodlights and fencing requirements.
- Where there is a sub-base in place beneath the existing grass pitch and which could be utilised as part of the 3G install, this can result in a significant saving.
- Professional services engaged in delivering the project will typically cost approximately 5-10% of the overall project cost, depending on the individual circumstances of each project as mentioned above.

Maintenance Training Programme & Equipment

- **Under no circumstances should a 3G turf pitch be regarded as maintenance free.** This was the case with the previous sand-filled second generation (2G) artificial surfaces and has resulted in a legacy of poorly maintained and, in some cases, redundant pitches.
- A thorough and robust maintenance programme to keep the pitch at optimum standard and quality is **absolutely essential**.
- This should be the responsibility of the suitably trained ground staff on a day-to-day, week-to-week basis, but **must be complimented by regular programmed visits by an identified specialist pitch maintenance contractor.**
- These specialist visits should be **at least quarterly** with specific works carried out at this interval. The nature of the work undertaken during these visits will require specialist equipment. Given this equipment would receive relatively infrequent use it is unlikely to be cost effective for a club to purchase it itself.
- It must be remembered that the levels of use and overall footfall on the surface has a direct correlation to the maintenance programme required. In layman's terms, the heavier the use the more intense and indeed crucial the maintenance programme is. Current guidelines suggest that for every 10 hours of playing use the surface should be groomed for 1 hour. See Table 1.
- **It cannot be emphasised enough that the quality and effectiveness of the maintenance programme has a direct impact on the overall lifespan and quality of that surface.**
- 3G-specific maintenance equipment such as drag brushes, grooming mats and infill distribution equipment are also absolutely essential and are probably the most cost-effectively purchased as part of the overall pitch installation contract. Without this equipment, the level and quality of maintenance required will simply not be achieved.
- In most instances, the 3G-specific equipment can be used on plant apparatus already utilised to maintain a natural grass pitch (e.g. small tractor), providing it is well cleaned and fitted with appropriate couplings. However, where such plant apparatus does not exist this will require to be purchased. As stated above, including purchase of such items in the pitch installation contract is a cost effective way forward.
- The necessary equipment can normally be easily procured for around 2% of the total pitch installation cost.

Establishment of a Surface Replacement Fund

- A surface replacement fund, also referred to as a 'sinking' fund, must be established in order that the 3G surface, along with any remedial works required to the pitch as it ages, can be replaced within a specified timescale.
- As a guide, good quality 3G / Hockey pitches can be expected to last from 7 to 10 years although this is directly aligned to a robust and well-managed maintenance programme that takes into consideration the level of footfall on the pitch. For example, a heavily used and well-maintained pitch will last longer than a poorly maintained pitch with significantly less footfall.
- With surface replacement likely to be in the region of R3, 000,000, to R 4 000 000,00 at the lower end of the pitch lifespan of 7 years, contributions to the surface replacement fund should equate to circa R600,000 per annum. Revenues from community pitch hire are usually directed toward the establishment of this fund. However, community use requires to be carefully balanced to maintain surface quality for professional activity, whether matches or training.
- Should the pitch lifespan last beyond 7 years then the additional years' contributions can be directed elsewhere, e.g. toward further replacement or into reserves for any unforeseen issues.

Sustainability in Construction and End of Life Recycling

- **Sustainable Procurement –** South African Sports and Recreation, funding bodies and the Government all promote sustainable procurement policies in public procurement where funding from the public purse is part of the overall funding package for the project. Sports pitches can incorporate recycled materials and products and sustainable practices.

Technical Element

1. Overview

1.1 General

This guidance document aims to set out best practice for the construction of a 3G pitch for use for football in a **community** environment. The requirements aim for a high quality surface for use by all levels football. The facilities may also be accessed by the local community groups for football development and for the purposes of recreational football. The primary objectives, which underpin the need for this guidance, are player safety and the need to provide a pitch that is durable and performs to as high a standard as possible. **For this reason the pitch must play at FIFA Quality level at all times**.

1.2 Specification v Guidance

This document is NOT a specification for the construction of a 3G / Hockey turf pitch and should not be used as such. It provides guidance and minimum standards, which should be applied in the design, specifications and construction of 3G turf pitches for football.

1.3 Establishment of the Project Team

Construction and installation of a 3G / Hockey pitch is a costly and specialist exercise and therefore a project team must be established to oversee the design, specification and overall project management. This team should consist of proven professionals with expertise in delivery of such projects, particularly those in a stadium environment. Such a team will go far to ensuring the success of the project and should include the following individuals;

Pitch Consultant (please see 1.5 below for further detail on this particularly specialist role). Project Manager (if not covered through the services provided by the Pitch Consultant).
Contract Administrator.
FIFA-accredited test house for football turf.
A health and safety Co-coordinator (if not already covered by another member of the project team).

1.4 Employment of an expert Pitch Consultant

The design, specification and project management of 3G turf pitches is a specialist discipline. As such SASR recommend that those wishing to convert, construct or refurbish a pitch to meet the requirements of the FIFA Quality Programme and this guidance document, should employ the services of a suitably qualified, specialist pitch consultant with extensive experience in the design, specification, procurement and project management of 3G pitches.

1.5 Formal Inspections/Testing at Key Stages

The construction or refurbishment of a 3G pitch involves complex processes to meet stringent construction tolerances. For this reason it is essential that a specialist Test Institute monitors the works being undertaken. The Test Institute will be engaged to inspect, sample and test aspects of the works at milestone points in the construction process, ensuring that the specification is met and that the resultant construction will meet the requirements of the FQC. It may be that the FIFA-accredited test house for football turf testing (noted in 1.4) may also be able to conduct the key stage tests/inspections. Further detail on these recommendations is given in Appendix 1.

1.6 Pitch Utilisation

In general, the expectation is community pitches will be subject to high use. This would be defined as approximately 40 hours use per week. This would typically be a football pitch used in a full-length format. However some pitches may also set up the pitch to accommodate small-sided formats of the game, such as 4s and 7s and/or training activity. A source of reference for various pitch layouts is available from the English FA which can be viewed on The FA Guide to 3G Football Turf Pitch Design Principles and Layouts;

FA Guide to dimensions and goals

1.7 Balancing Cost and Quality in the procurement process

It should also be noted that making the right choices regarding the selection of 3G turf is very important as **the cost differential involved in selecting high quality turf over lower quality turf can amount to a fraction of the overall cost of the project.**

Selection of high quality, proven 3G turf systems, which will provide a durable, high performance-playing surface, safe for players is a primary objective of this guidance. Given this backdrop and the discussions regarding the use and maintenance of the pitch, installations will be constructed or refurbished in such a way that they conform to the requirements of the FQC at FIFA Quality level. The facility will then be maintained at that level for the duration of its life and tested formally to that standard on a regular basis.

Table 1- Hours of Use v Estimated Playing Surface Lifespan

Average of hours per week	12 hours	35 hours	60hours
Life expectancy of a pitch when maintained to the manufacturers recommendation at FIFA / FIH Quality Level	10 years	7-8 years	Less than 7 years

2. Typical of construction make-up for pitch

A pitch needs to be built to minimum construction standards. Table 2 below provides guidance on the minimum standards expected for the various aspects of the make-up of any pitch. It makes specific reference to new build construction but applies equally to refurbished pitches where relevant.

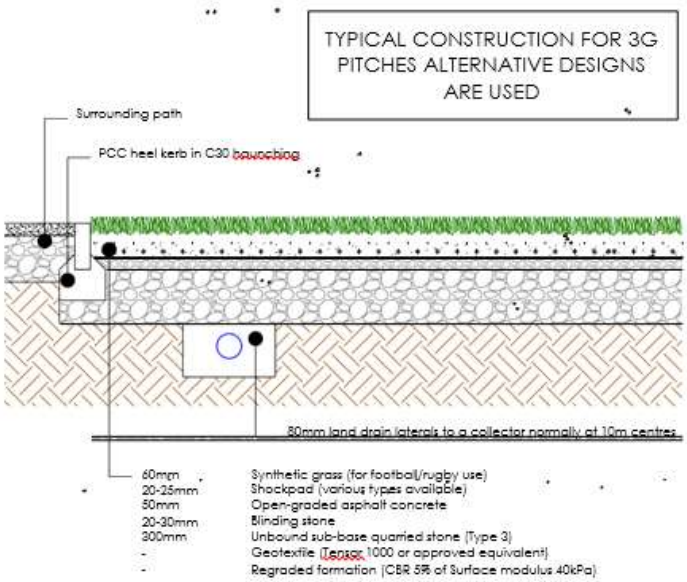
Table 2 –Typical Construction for the Make-up of the Pitch Base

Note - whilst the design detailed in this table is typical, alternative designs may be used.

Element of works	Description of aspect of construction of base related to specific technical requirements
Sub-grade, ground, soil base	**Formation**: to be trimmed to a tolerance of plus or minus 10mm and be within 10mm of design level. The surface modulus of the soil platform should be measured by using in-situ CBR tests recording moisture conditions to allow for proper sub-base design to be carried out.
Sub-base layer	**Sub-base**: to be adequately compacted to achieve a surface modulus of an absolute minimum of 40Mpa and an average of 60Mpa when measured using a LWD device. The normal convention for the thickness of the stone layer is for 150mm (compacted thickness). It should be laid to exacting tolerances and should be trimmed so that no gap under a 3m straight edge of greater than 6mm is found.
Asphalt base (optional for soccer but recommended for hockey)	**Asphalt Base**: to be measured as a compacted thickness the normal convention for a Asphalt layer depth of +/- 30mm and should be trimmed so that no gap under a 3m straight edge of greater than 6mm is found. The surface modulus of the Asphalt platform should be no less than 100Mpa with no deformation when tested using a LWD device
Slurry Base (Alternative For Hockey & not required for soccer)	**Slurry Base**: to be measured as a compacted thickness the normal convention for a Asphalt layer depth of 8mm and should be trimmed so that no gap under a 3m straight edge of greater than 6mm is found.

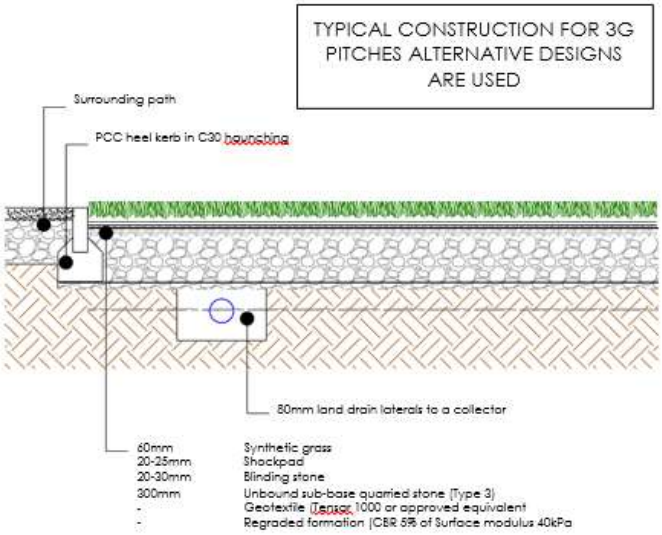
It is recommended that the pitch be designed with a thick stone sub-base foundation which would be defined as the 'base' of the pitch. This construction would, in general, be designed to be free draining. Further guidance on the various elements of the foundation, base and synthetic system, which together form the pitch, is given in the sections highlighted herein:

1. Formation preparation should be in accordance with the Specification for Highway Works or equivalent;
2. Drainage typically would be set out in accordance with Clause 5 of this guidance document;
3. A geotextile membrane to separate layers would normally be required in accordance with the Specification for Highway Works.
4. Sub-base would be set out in accordance with Clause 6 of this guidance document.
5. Kerbs would be set out in accordance with Clause 7 of this guidance document.
6. Asphalt would be set out in accordance with Clause 8 of this guidance document.



Bound base (asphalt)

2.1 Sketch of 'Typical 'make-up of a 3G Artificial Turf Pitch



Dynamic base (no asphalt)

Note - whilst this make-up is typical other base designs may be acceptable

3. Dimensions

The dimensions of the pitch should i) conform to the rules of football if space is available, and ii) consider the criteria outlined within SAFA's guidance. Smaller pitches will be constructed where space or budget restricts development, the minimum recommended size for a football pitch is 90m x 45m exclusive of run-offs.

The minimum dimensions applicable at the various levels within the game are:

Sizes	Playing Area	Run-off (Recommended)	Total Area of Synthetic Turf
Minimum – Entry Level	90m x 45m	3m	96m x 51m
Best Practice	105m x 68m	3m	111m x 74m
International Matches	100m x 64m to 110m x 75m	3m	116m x 81m
International FIH Standards For Hockey	91.4m x 55m	3m on Headers & 2m on sides	97.4m x 59m

4. Earthworks

Earthworking – scraping away the topsoil, organic materials and other non re-usable soils – is designed to produce a flat, stable footprint onto which to build the pitch. The overall design of the drainage and sub-base platform will be based on the properties of the ground and soils, which the pitch is founded on. The properties of the soils must therefore be defined by a site investigation, which will assist the pitch specialist to design the pitch taking account of any issues highlighted by the investigation. It should be emphasised that this is where the services of an experienced pitch specialist are particularly valuable when providing interpretation of the information provided in the site investigation report.

There are a number of processes and materials, which can be used to improve the formation of a pitch, such as soil stabilization, and geotextile membranes and grids. These treatments and supplementary measures can render what would have been unacceptable soils to be acceptable, thus creating a suitable surface onto which the pitch can be founded. Geotextiles or grids can be used to cover the soils acting as a separator membrane and/or areinforcing structure to the interface between soils and stone. Powders, such as lime or cement can be ameliorated with the soils to enhance the bearing capacity of the formation after treatment.

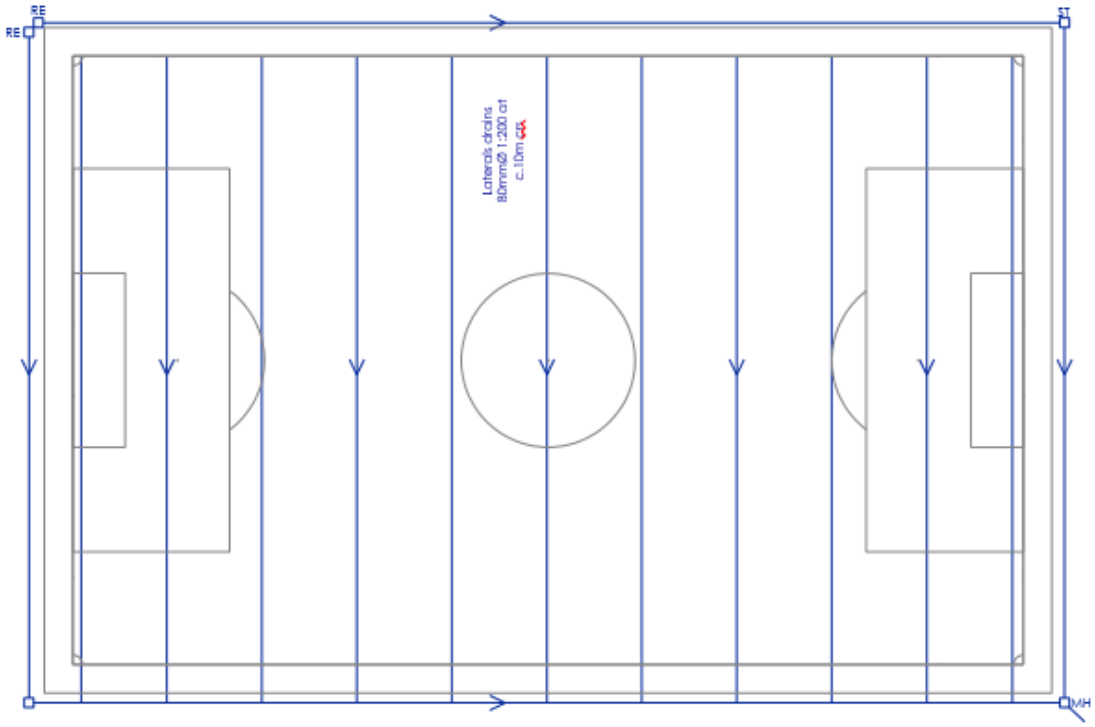
5. Drainage

5.1 Drainage Requirements

The drainage to an artificial pitch must provide sufficient capacity to transport the rainfall levels sustained by the pitch surface to a suitable outfall. In terms of discharge rates many drainage calculations are based on 100 year or even 200-year rainfall event levels. The run-off may reach 100mm per hour in storm situations. The drainage in these situations reach levels at 50 liters per second discharge rates. The design therefore must be designed to meet local planning requirements. In some regions there is very low rainfall, here alternate designs can be developed with minimum design on sub surface drainage being given.

5.2 Typical layout for Drainage

* Note - whilst the design detailed in this drawing is typical, alternative designs may be used.



Community pitches have particular requirements for efficient drainage. This depends on how the pitch is laid out, the levels and falls constructed into the pitch and the soil conditions where the drainage is situated. It is not unusual for a community pitch to have a crown in the middle. This is not necessarily the preferred design for a 3G pitch where a fall to a low corner or side is considered more football friendly. These factors influence the design of the drainage and its subsequent layout. Where lateral drainage is part of the design concept it is normally installed at 8 to 12m centres, all connected to a land drain, which circumnavigates the perimeter. The drainage will connect to an outfall, which takes the run-off away from the site. There are many less complex designs which have been employed successfully in South Africa and each site will need to be judged on the prevailing environmental conditions which exist locally where the pitch is to be located.

5.3 Performance of Drainage

3G pitches need to discharge run-off quickly due to the requirements for play in all conditions. The design makes an allowance for rainfall events which occur infrequently but which would be classified as a storm under normal circumstances. Rainfall, which results in heavy run-off, is measured in mm/hr. or l/s and it is important to understand this terminology. FIFA do not regulate drainage. However a normal convention applied to 3G pitches is a rate of discharge greater than 150mm/hr. This value is considered very low and designs should consider a rate of 600mm/hr as the minimum requirements.

6. Sub base stone

6.1 Materials

There are a number of ways a 3G-pitch base can be constructed. This guidance document highlights the most common method currently used. The main criterion, which is applied to all base construction, is provision of a stable platform, which allows through drainage to an appropriate drainage scheme. The base should be stable, durable and flat.

Typically, crushed quarried stone of a particular grading is used to form the base of the pitch. This material is called 'sub-base' and is regulated by the Specification for Highway Works or equivalent. The sub-base is normally a good quality, crushed stone aggregate, which is laid approximately 150mm thick when compacted in place. The sub-base is a pre-cursor to achieving the exacting tolerances imposed by the FIFA requirements and will typically be laid so that no irregularity (bump, dip) greater than 6mm is found under a 3m calibrated straight edge beam. The sub-base is normally laid to design levels and would be found to be within +5/-5mm of the datum set when measured against said requirements for the construction of the pitch. Deviations from these requirements will result in unacceptable irregularities in the playing surface. Other materials may be considered.

Table 3 – Typical Materials for Sub-Base Modified G1 – G3, Particle Size Distribution

BS Sieve Size	Percentage by Mass Passing
63mm	100
31.5mm	75-99
16mm	43-70
8mm	23-50
4mm	12-40
2mm	6-25
1mm	3-15
63µm	>3
This particle size distribution shall be determined the by washing and sieving methods given in EN 933 – 1:1997.	

Note; it is important that the sub base is 'free draining' therefore there must be low fines content less than 1mm in size. Modifed G1 - G3 is suitable if the fines content is reduced.

6.2 Quality and Consistency of Sub-Base

The sub-base will need to be consistent across the supply chain to ensure that the base performs across what is a large surface area. There are a number of checks, which can be carried out to ensure the quality and consistency of the materials supplied (see Appendix 1). A SANAS accredited laboratory should be appointed to monitor the quality of materials and workmanship achieved. Testing should also be carried out on as-laid materials for surface modulus achieved within this important layer.

6.3 Leveling Layer

Sub-base can present an irregular surface profile onto which to lay the artificial turf layer. In these circumstances it is normal to deploy a leveling layer to provide an even platform for the Asphalt to be laid onto. The leveling layer can have the dual effect of stabilizing the crushed stone, dependent on the grading of the sub-base stone used, as well as providing a flat surface. A typical proven grading for the leveling layer is provided in Table 4. **Other gradings have been employed successfully**. **Also, other methodologies have been employed to level the base prior to laying Asphalt layers.**

Table 4 – Typical Leveling Layer Materials - Particle Size Distribution

BS Sieve Size	Percentage by Mass Passing
10mm	100
8mm	90-100
6.3mm	70-90
4mm	25-40
2mm	10-25
0.500mm	4-10
0.125mm	0-5
0.063mm	0
This particle size distribution shall be determined the by washing and sieving methods given in EN 933 – 1:1997.	

Note; it is important that the leveling layer is 'free draining' therefore there must be low fines content less than 0.5mm in size.

7. Kerbs

In community pitches where there is not a continuous perimeter wall or edge detail it may be necessary to use pre-cast concrete kerbs to form a fixed edge of which to abut the stone and artificial turf surface and the sub- base. Pre-cast concrete kerbs are normally 150mm x 50mm nominal size or nearest equivalent. All kerbs should be installed to make due allowance for the subsequent fitting of the 3G turf system to be used. Subsequently, the 3G surface shall finish slightly proud of the kerbs so there is no tripping hazard or depression between the 3G turf and kerb. The contractor as appropriate will in general, select this and is dependent on carpet and infill combinations used in the construction of the pitch. There shall be no sharp kerb edge presented to the user following installation of the carpet system. All kerbs shall be located on the inside aspect of the pitch surrounds.

8. Bituminous Asphalt Materials when used

New asphalt may be required as part of the pitch construction. Asphalt is used to increase the strength of the base and is recommended, if budgets allow. Asphalt increases the stiffness of the base and increases the bearing capacity in overall terms. Asphalt should be a homogenous platform with no noticeable irregularities greater than 6mm under a 3m straight edge. It should have minimal corrective patching in it and be free from fretting, cracking, surface blemishes, areas of segregation, excessive joints, dips, bumps and rich or lean areas of binder. It should consist of a single layer system comprising of a 35mm open graded surfacing layer overlying the sub-base stone layer.

9. Shock Pads

9.1 Shock Pad Recommendations

Shock pads are proven to improve safety, performance and lifespan of the pitch surface, and also can assist in the long-term retention of the safety of the playing surface. All shock pads being considered for a project must be assessed as part of the 3G-turf/pad systems and tested together against the FIFA requirements. All shock pad systems will be supported by a comprehensive data-sheet and a method statement for installation. Shock pads can be problematic to install but form a very important part of the performance of the playing surface so should be subject to scrutiny in detail prior to use in a project.

Shock pads systems in general should be very flat and shock absorptive. They do not vary at any point in the laid pad or deviate from the nominated value (i.e. 15mm/20mm etc) by more than +2mm or -2mm. Deviations out with these tolerances may lead to variations in performance. Pads supplied with interlocking tiles or in sheet/roll form shall have joints, which abut each other, do not buckle, warp or ride up on each other. Where the manufacturer recommends taping and gluing the joints this must be done.

9.2 In-situ Shock Pads

Where shock pads are to be laid using in-situ laying techniques, the shock pad is normally required to achieve a minimum tensile strength of 0.15 MPa (this is a FIFA requirement) and an elongation at break of 30% when tested in accordance with the methods given in EN 12230:2003 where SBR rubber is used. In-situ shock pads should be checked so that the properties of tensile strength and elongation are met. It is advisable that a test report is obtained highlighting the name of the rubber used, its granulation, density, tensile strength and elongation at break.

9.3 Prefabricated/Factory Produced Shock Pads

There is a plethora of prefabricated shock pads available. These are manufactured from a variety of materials. This makes it difficult to be aware of all the benefits or demerits of a particular shock pad. Common types include closed cell foam shock pads, compressed rubber, expanded polypropylene cellular or filament-encapsulated types. In general, the expectation of these factory-produced products is that they are consistent in performance by virtue of their origin. Most, but not all, are relatively easy to install not requiring high tech equipment to lay onsite. When considering this type of shock pad it is important that its performance within the artificial grass/shock pad system is properly evaluated and certification confirming performance is provided at tender.

10. Artificial Playing Surface

10.1 Surfacing Requirements

The synthetic carpet will meet the requirements of the FIFA / FIH Quality level. See the following web links for further information;

http://quality.fifa.com/en/Football-Turf

http://www.fih.ch/

The artificial turf system shall have independent certification demonstrating that this is the case. All certificates should be to the current standard and in any case shall not be more than one year old.The artificial turf shall typically have a monofilament yarn matrix. However mixed filaments or artificial turf incorporating a thatch can all meet the requirements set out by FIFA. A recommended minimum carpet specification is given below in Table 5.

Table 5 - Recommended Construction for Synthetic Turf System - Mono Filament Yarn Type

SOCCER

Product description	3G Artificial Turf which complies with FIFA/World Rugby requirements
Materials/properties	Minimum requirements
Ribbon Polymer	Polyethylene monofilament yarns (non fibrillating)
Colour	Green
UV Stabilized	In accordance with Din 53387; must be UV stabilised
Face Primary Backing	Polypropylene
Secondary Backing	Fiber glass or polyester scrim
Shock pad	In-situ and or prefabricated/factory produced
Backing Coating	Latex or PU
Ribbon Nominal Denier	Not restricted to be provided by manufacturer
Total Weight of product	Not less than 2800 gms/m^2 [-0%, +10%]
Pile weight	Not less than 1700 gms/m^2 [-0%, +10%]
Backing weight – primary	Not less than 180 gms/m^2
Backing weight – secondary	Not less than 180 gms/m^2
Coating Weight	Not less than 800 gms/m^2
Pile Height (should comply with World Rugby Regulation 22)	Not less than 60mm*
Quality	Must be a heavy metal free product

**Where football only use is the user requirements for a pitch then alterative pile heights can be considered, however the pile height should not be less than 40mm*

HOCKEY

Product description	Hockey Artificial Turf which complies with FIH Requirements
Materials/properties	Minimum requirements
Ribbon Polymer	Polyethylene monofilament yarns (non fibrillating)
Colour	Green
UV Stabilized	In accordance with Din 53387; must be UV stabilised
Face Primary Backing	Polypropylene
Secondary Backing	Fiber glass or polyester scrim
Shock pad	In-situ and or prefabricated/factory produced
Backing Coating	Latex or PU
Ribbon Nominal Denier	Not restricted to be provided by manufacturer
Total Weight of product	Not less than 2800 gms/m^2 [-0%, +10%]
Pile weight	Not less than 1700 gms/m^2 [-0%, +10%]
Backing weight – primary	Not less than 180 gms/m^2
Backing weight – secondary	Not less than 180 gms/m^2
Coating Weight	Not less than 800 gms/m^2**
Pile Height (should comply with World Rugby Regulation 22)	Not less than 10mm for non-filled, 12mm for sand dressed and 18mm for sand filled
Quality	Must be a heavy metal free product

***Certain products may have alternate backing systems which deviate from this requirements. Data sheets should be provided and*

checked to determine the acceptability of alternate backing systems.

10.2 Colour

The colour in general should be green and match the reference sample to be submitted within one position of the green colour to BS 5252/4800. The synthetic surface should accord with the following table.

10.3 Wear Tests

It is recommended that turf systems subjected to at least 100,000 cycles of accelerated wear in the Classic Lisport Test and still demonstrate compliance with FIFA Quality and World Rugby requirements be procured.

10.4 Surface Construction

Table 5 above recognizes the majority of artificial turf systems available being of a tufted construction, latex backed, with a monofilament yarn. There are however woven artificial turf systems to which this table does not apply. Where woven artificial turf systems are used then an alternate minimum specification may apply.

10.5 Performance Requirements

Table 6 details the specific performance requirements to be met.

10.6 Line Markings

Line markings should be installed for football in compliance with the Laws of the Game as laid down by FIFA. The principal lines should be in white and marked out to delineate a full size pitch marking for football. Lining for other sports that may be played on such pitches will be required to be temporary in nature. If line markings are to be cut, taped, or glued into the carpet, the carpet specification for line markings materials must be of the exact same carpet as the parent turf system and shall be in accordance with the main carpet specification.

10.6.1 Method of installation

All line markings which are cut into the turf should be installed and bonded to the panels of carpet using broad woven backing tape, 400mm wide with a 3mm application of glue spread using a box screed onto the backing tape in even, regular, wide strips. Stitching of seams is acceptable where the carpet system allows. The gluing is viewed as a very important part of the works and, as such, the expectation is that the installer shall exercise a high degree of quality control on this element. Samples should be taken from all days of making seams.

The Contractor should ensure that line markings are accurately set out and installed. The line markings must be true and straight and must not deviate by more than 0.1% from straight over the length of the line. Further lines should be set so that their width does not deviate by more than +/- 5mm. The top surface of all line markings shall be within a tolerance of +/- 2mm of the adjacent carpet surface when measured under a 300mm straightedge, regardless of type, and shall be consistently laid so there are no bumpy, irregular seams presented after installation.

Nibs for goals shall be small white squares 100mm x 100mm and should be securely fixed to the backing tape and set out so as to be flush with the surrounding turf. Penalty spots should be in accordance with the rules of football and shall be round. All cut in lines should be fitted prior to adding fill materials.

Table 6 - Performance requirements for the pitch

***Note:** Current FIFA and World Rugby regulations supersede all other requirements.

Standard Requirements		FIFA Quality
Ball Surface Interaction	Ball Rebound (m)	**0.6 - 0.85**
	Ball Roll (m)	Initial = **4.0 – 8.0** Re-test = **4.0 – 10.0**
Player Surface Interaction	Shock Absorption (%)	**60 - 70**
	Standard Vertical Deformation (mm)	**4.0 - 10**
	Energy Restitution (%)	
	Rotational Resistance (Nm)	**30 - 45**
	Head Injury Criteria (m)	
	Straight Edge (mm)	**No Deviations ≥10**
Field of play	Dimensions (m)	**FIFA Requirements** Length = **90 – 120** Width = **45 – 90** **International matches** Length = **100 – 110** Width = **64 – 75** Recommended Run-offs = **3**

10.6.2 The smaller sided game

Lining for smaller sided versions of the game (4 a-sides and 7 a-sides) should be denoted by the use of markers on the pitch surface. Markings may be painted on, should they be required on the surface.

10.6.3 Governing Body Requirements

It is important to understand that both FIFA certification systems place restrictions on what type of line markings can be installed on a pitch.

10.7 Infill Comprising of Sand

Typically sand infill shall consist of non-abrasive, non-staining, well-rounded and dust-free particles (sub-angular sands do not perform well in artificial sports surfaces and it would be advisable to reject these). Chemical treatments to either bleach or to coat the sand should be avoided. The preferred size range is 0.2mm to 1.0mm.

Alternative gradings may be tested within the carpet system and therefore will be offered in the FIFA Lab test report. It is therefore advisable to have the sand approved before placing an order.

10.8 Performance Infill Comprising of Rubber or Other Materials

Rubber infill shall comprise of granulated SBR rubber, or synthetic rubber such as TPU, or a non-synthetic cork or other fibrous material. The performance infill shall match the type, gradation and quality of the declared infill of that provided in the Laboratory test report for the artificial turf system tested using it.

10.9 Infill and Top Dressing

Due to the settlement of infill in the initial commissioning period for the pitch, it is good practice to build in additional maintenance measures to protect the pitch in its early life. This depends on many factors such as turf system, use, weather conditions, method of infilling and maintenance. It is common in the first 3 to 6 months of use for the Contractor to top-dress the pitch. This operation is designed to a) ensure that the pitch performs as intended very early in the life of the facility, and b) to ensure that, when tested, the pitch meets the FIFA requirements. This work should be called up in any works specification and/or tender offered in order to avoid any confusion as to who is responsible for the work when required. It is anticipated that a minimum of up to 10 tonnes of rubber will be set-a-side for this operation to top up the pitch in the first year.

10.10 Flammability Requirement

There is also a need for the Contractor to provided assurances in terms of flammability via certification in accordance with BS 5867-1:2004.

10.11 Sockets

Sockets are required for goals and flags. Sockets can be the source of a problem in a 3G pitch when goals are changed to accommodate multi-use, and flags are installed and removed during games of football or rugby. Sockets are effectively foundations and as such need to be properly designed to reflect the site's prevailing soil conditions. Sockets should be properly formed with structural concrete, have a metal tube suitably sized to accommodate the post or flag and be fitted flush with the base so a suitably designed bung can be used to seal off the socket when not in use. When not in use sockets must be covered with 3G turfs and filled such that the area complies with the requirements of FIFA.

10.12 Pitch Irrigation Sprinkler Systems

The aforementioned pro player survey indicated that pro players preferred a wet surface to play on. Therefore the pitch **may** be furnished with a suitable means of irrigation via a pop up mounted sprinkler system. It is not mandatory to include an irrigation system with a 3G pitch. If used this should be located **off** the playing surface, but may be in the run-off. The sprinkler system therefore must be able to throw water to the central part of the pitch (approximately 35m). Irrigation systems require large water storage tanks and this must be factored into the specification. Water availability, water pressure, and location for the tanks and power for the pumps all need to be considered.

10.13 Sprinkler Heads

It should be noted that sprinkler heads must be covered with 3G turf and shock pad where included in the pitch footprint. There is a requirement for the sprinkler head cover to comply with the FIFA requirements, to the same standard as the rest of the field, and it will be tested as part of assessment of the pitch if included within the playing lines.

10.14 Landscaping/Run-offs/Pitch Thresholds

It is not recommended that the immediate threshold of the pitch run-off is natural grass, pebbles, or other mineral dust etc. Where possible the run-off should all be artificial turf to minimize contamination.

11. Sustainability in Construction and End of Life Recycling

11.1 Sustainable Procurement

SRSA, funding bodies and the Government all promote sustainable procurement policies in public procurement where funding from the public purse is part of the overall funding package for the project. Sports pitches can incorporate recycled materials and products and sustainable practices

11.2 End of Life Recycling

There are a limited number of manufacturers who offer pitch construction cradle-to-cradle products. These products include shock pad systems and 3G turf systems. It is also possible to recycle old artificial turf systems by removal of the infill. A small number of companies will recover the infill and turf, and recycle it for subsidiary use.

12. Equipment

12.1 Football Goals

12.1.1 Typically goals should be quick release and designed for situations where goals are assembled and disassembled on a regular basis, e.g. to allow quick changeover from football to rugby or vice versa. Normal construction incorporates quick release corner joints to allow the crossbar to detach from the uprights without the need for tools.

12.1.2 Typically the goals should be manufactured from 100mm x 107mm elliptical x 2.5mm thick reinforced aluminum, ensuring that the goals are appropriate for professional matches. All exposed surfaces should be powder coated.

12.1.3 Typically goalpost sockets should be mounted in a concrete foundation, designed to take into account the soil conditions encountered on the site. The foundation shall be mounted underneath a shock pad system to protect players from potential injury. A socket shall be fitted with a 3G turf covered bung, which mates securely with the surrounding surface.

12.1.4 The sizes for senior use shall be: 7.32m x 2.44m (24' x 8') - independently tested to BS EN 748:2004.

12.1.5 Equipment should be high quality, durable and safe. All equipment supplied must comply with the relevant codes. Goals should be in accordance with EN 748 and should be erected by a specialist contractor and checked in accordance with EN 356: 2007 prior to handover. An experienced installer should check the equipment and a certificate of conformity shall be issued by the Contractor stating that the equipment is installed correctly.

12.1.6 Where the Client seeks equipment from the Contractor details of the guarantees provided shall be supplied with the prices submitted.

13. Maintenance

Maintenance should include, in the main, the synthetic surface and infill, and, where a piped drainage system is installed, it also should be checked and cleaned periodically.

The Contractor should be asked to provide details of maintenance equipment and procedures required to properly look after the pitch and it's infrastructure at the point of handover. There should also be training session(s) provided to highlight the precise details for use of equipment, brushes and localised infilling. Also details of the emergency treatments, which can be applied to the pitch for purposes of snow removal, spillage of oils, fuels etc. should be provided at this point.

The maintenance required will include a routine maintenance service and a specialist de-compaction service (which lifts the contaminated infill from the surface and then removes the ground in-debris from the infill). By following these maintenance procedures the pitch will provide:

- Consistent play quality over the life of the surface;
- A safe surface in terms of traction and drainage;
- Extended life of the synthetic playing surface.

13.1 General Guidance

The manufacturer will provide guidance for the proper maintenance of their specific 3G-turf system. This must be followed to protect and maintain the pitch in the best possible condition. It is important to protect the warranty for the products installed by regularly maintaining the surface in an approved fashion. There are general maintenance principals, which apply in general to all 3G pitches used for football. These principals are influenced by use, management, equipment used for maintenance and environmental issues.

13.2 Drainage

The drainage system should be inspected and checked for serviceability at least every 5 years, unless a drainage issue has been noted with the pitch. Checks to be carried out will include:

- Check all manholes to ensure that the run-off is free running;
- Check the outfall to ensure that it is not blocked;
- Check all components for cracking, sinking and other damage.

The Contractor should provide all such equipment and procedures, which will allow effective maintenance of the drainage to be carried out.

13.3 Goals

Goals must be checked regularly. This could be as often as daily, depending on level use.

13.4 Maintenance Equipment

Example of minimum basic maintenance kit

Tractor

Drag Brush

Drag Mat

Ball Roll

There are a limited number of suitable brushes and drag mats for the maintenance of 3G pitches. In a recent FIFA study http://m.fifa.com/newscentre/news/newsid=2159761/index.html it was demonstrated that certain types of equipment were particularly effective at maintaining surfaces in good condition.

The FIFA study showed that the above maintenance equipment was sufficient to keep a field maintained to a good level, however more specialised equipment such as oscillating or rotating brushes and tines were also required to be used on surfaces periodically. These had a much greater effect at reducing ball surface interaction characteristics. Advice of a specialist maintenance contractor should be sought before the use of such equipment as constant and improper use of such equipment can actually cause damage to the surface rather than improving it.

13.5 Environmental issues affecting Maintenance

The general environment around the pitch can affect the amount and type of maintenance required. The proximity of trees can be a problem due to debris, leaves and seeds falling onto the pitch. Shade and moisture can encourage moss and algae to form in the margins, while dust and other particulates can contaminate the fill materials.

13.6 Inappropriate Maintenance

Inappropriate procedures will inevitably reduce the life expectancy of the playing surface. For this reason all related maintenance information must be available at the point the pitch is commissioned, if not before.

13.7 Maintenance Reporting

All pitch maintenance activity should be recorded via a maintenance log. This must be made available by the Contractor. After every maintenance visit a report will be given to the Client detailing the nature of the maintenance activity carried out, any further work which may be required and the timescales the Contractor may place on it. The drainage report should detail the nature of the inspection carried out and any significant findings.

13.8 Maintenance Procedures

Maintenance procedures for the pitch will cover the following areas:

- Removal of litter/debris;
- Cleaning and monitoring of access, entrance and exit gates;
- Brushing of the surface as appropriate;
- Rubber dressing and monitoring of infill levels;
- Monitoring of seams and carpet rippling;
- Leveling and equalization of infill;
- Remarking of lines with specialist paint if lines are not inlaid;
- Vegetation control in terms of weed removal, moss and algae growth;
- De-compaction and deep cleaning of synthetic carpet annually.

14. Influence of Use

14.1 Hours of Use

Use is considered as the number of hours that the pitch is available for lettings and the actual number of hours that football is played on the surface. This is a broad assessment of the footfall on a particular surface and does not provide the full picture of potential wear-and-tear a pitch surface can sustain. Only the actual number of hours a pitch is used for should be factored into the wear-and-tear assessment.

14.2 Pitch size

The size of the pitch may have a bearing on the density of footfall. Not all pitches are the same size and some vary significantly from the standard size due to local factors such as available space and multi-use requirements.

14.3 Type of Use

Stadium pitches may be used on a limited basis for development of squads and competition games. However current practice encourages greater use of stadium pitches for community play. This will increase hours of use significantly and, therefore, the wear the playing surface will sustain.

14.4 Categorising Use

Where a playing surface is being used for more than 35 hours per week it can be categorised as a moderately used pitch.

However many pitches can be used up to 60 hours per week. This type of use is categorised as heavy use. Heavy use affects the durability and performance of the playing surface over the long–term, and maintenance therefore needs to be tailored to match the intensity of use.

15. Management of the playing surface

Experience has shown that stadium pitches can be used to support small-sided versions of the game and wider developmental activity. This increases the amount of use on specific areas of the pitch. Goal areas, shooting areas and sides can experience much higher footfall levels than the rest of the pitch.

15.1 Rotation of high footfall areas

Moving the goal areas can be accommodated on a pitch when there are no dividing lines installed. This helps by distributing the high footfall areas across a wider area and so avoids specific areas of the pitch becoming damaged.

15.2 Access and egress

The access point of the pitch can experience very high levels of use. If possible footwear-cleaning equipment should be positioned at this point. Good practice is to lay down appropriate lengths of 3G turf at the entrance/tunnel to the pitch to prevent excessive wear.

15.3 Footwear

There are certain types of footwear recommended for use on 3G surfaces. Detailed guidance is given in Appendix 5. It is generally agreed that normal moulded boots are the best footwear for football use. Blades can be used but some manufacturers ban their use. Where extensively used blades can lead to a general compaction of the pile, affecting performance in the long-term. BS 6366:2011 details approved studs for use in football and rugby, and is the main guidance standard which should be referred to when considering the acceptability of studs.

References

1. BS 7044-1:1990 Artificial sports surfaces. Classification and general introduction

2 . BS EN 12234:2002 Surfaces for sports areas. Determination of ball roll behavior

3. BS EN 14808:2005 Surfaces for sports areas. Determination of shock absorption.

4. BS EN 14837:2006 Surfaces for sports areas. Determination of slip resistance.

5. BS EN 14810:2006 Surfaces for sports areas. Determination of spike resistance.

6. BS EN 14836:2005 Synthetic surfaces for outdoor sports areas. Exposure to artificial weathering.

7. BS EN 12228:2002 Surfaces for sports areas. Determination of joint strength of synthetic surfaces.

8. BS EN 12616:2003 Surfaces for sports areas. Determination of water infiltration rate.

9. MCHW Volume 1 – Specification for Highway Works (November 2006), Department of Transport, Highways Agency.

10. BS 1377-2:1990 Methods of test for soils for civil engineering purposes. Classification tests.

11. BS EN ISO 22476-2:2005 Geotechnical investigation and testing. Field testing. Dynamic probing.

12. BS EN ISO 22476-3:2005 Geotechnical investigation and testing. Field testing. Standard penetration test.

13. ISO/DIS 8771 Specification for plastics pipes and fittings for use as subsoil field drains.

14. BS EN 12620:2002 Aggregates for Concrete.

15. BS 5911-4:2002 Concrete pipes and ancillary concrete products. Specification for unreinforced and reinforced concrete inspection chambers.

16. BS EN 1917:2002 Concrete manholes and inspection chambers, unreinforced, steel fiber and reinforced.

17. BS EN 124:1994 Gully tops and manhole tops for vehicular and pedestrian areas.

18. BS EN 1008:2002 Mixing water for concrete. Specification for sampling, testing and assessing the suitability of water, including water removed from processes in the concrete industry as mixing water for concrete.

19. BS 1722:-10: 2006 Fences. Specification for anti-intruder fences in chain link and welded mesh.

20. BS 5252:1976 Framework for colour co-ordination for building purposes.

21. BS 4800:1989 Schedule of paint colours for building purposes.

22. BS EN 933-1:1997 Tests for geometrical properties of aggregates. Determination of particle size distribution. Sieving method.

23. BS 4987-1:2005 Coated Asphalt (asphalt concrete) for roads and other paved areas. Specification for constituent materials and for mixtures.

24. BS EN 1339:2003 Concrete paving flags. Requirements and test methods.

25. BS EN 1340:2003 Concrete kerb units. Requirements and test methods.

26. BS 434: Part 1:1984 Bitumen road emulsions (anionic and cationic). Specification for bitumen road emulsions.

27. BS EN 197-1:2000 Cement. Composition, specifications and conformity criteria for common cements.

28. BS 4027:1996 Specification for sulphate resisting Portland cement.

29. BS 4449:2005 Steel for the reinforcement of concrete. Weldable reinforcing steel. Bar, coil and decoiled product.

30. BS 4482:2005 Steel wire for the reinforcement of concrete products.

31. BS 4483:2005 Steel fabric for the reinforcement of concrete.

32. BS EN 206-1:2000 Concrete. Specification, performance, production and conformity.

33. BS 8500-1:2006 Concrete. Complementary British Standard to BS EN 206-1. Method of specifying and guidance for the specifier.

34. BS 8500-2:2006 Concrete. Complementary British Standard to BS EN 206-1. Specification for constituent materials and concrete.

35. BS 6366:2011 Specification for studs for rugby football boots.

Appendix 1

Recommended Quality Plan for Key Stage Inspection and Testing during Refurbishment or Construction of a 3G Pitch

The principal of this quality plan is to provide a means of identifying by inspection and testing – or a combination of both – that a high standard is being achieved in terms of materials and workmanship.

1.1 Table of Quality Control Requirements

Item	Type of Testing or Inspection	Reason for Test or Inspection	Outcome	Number of Tests
A)	Tests on formation and sub-base.	To confirm the bearing capacity of the soils and stone base.	Ensuring the formation and sub-base provides a suitable platform for the required application.	20m grid.
B)	Level checks to be done using a 3m straight edge on stone sub-base, checks for surface irregularities to be done.	To test for porosity and regularity.	To ensure that the stone sub-base provides the level of performance required by the specification.	3 tests for porosity. Straight edge survey.
C)	Inspection of bituminous surface for surface regularity and porosity.	To ensure the surface is fit for purpose.	Ensuring the base provides a suitable platform for the required application.	6 locations for porosity testing. Straight edge survey.
D)	Inspection of shock pad, sampling of materials and laid pad, level checks to be done using a 3m straight edge, check for blemishes to be done.	To test for porosity and regularity and most importantly test for tensile strength and elongation of shock pad as well as thickness.	To ensure that the shock pad provides the level of performance required by the specification.	10 In-situ pad samples for tensile strength and elongation. 50 thickness measurements over the entire surface. Sample of prefabricated pad for inspection only.
E)	Inspection of synthetic turf installation and sampling of seams for testing.	Test seam samples for tensile strength.	To negate seam failure at a later date.	10 seam samples for tensile strength or peel strength.
F)	Initial test on completed pitch/ full compliance testing.	For compliance and to ensure that the pitch receives a certification.	To ensure that the pitch gets a certificate.	2 tests: 1 no later than 3 months after hand over & 1 at the end of effects period.

1.2 Quality Control & Sampling

1.2.1 The Contractor should employ all means necessary in order to maintain a clear, explicit, and efficient Quality Control Scheme in tandem with the Employer's Representative.

1.2.2 At the request of the Employer's Representative, the Contractor will be expected to produce information and samples at any time throughout the term of the Works. A delay by the Contractor in the production of such detail may adversely affect the scheduling of the contract programme. The Contractor may not claim for an extension of time because of a delay in the programme because of poor, unsatisfactory or unsuitable Quality Control detail, as dictated by the Employer's Representative.

1.2.3 The Employer should have the right to select any material samples from batches delivered to site and destined for permanent works as required. Samples will be provided at the Contractor's cost. Samples which do not conform to the quality requirements will be resubmitted at the contractors cost.

Appendix 2

Recommended list of items which should be supplied by a contractor when submitting a Tender

2.1 Current product certificate for the synthetic turf system to be supplied (alternate certificates may be supplied by agreement with the employer's agent).

2.2 Technical reports for field-testing demonstrating that the synthetic system offered complies with the requirements of FIFA.

2.3 Certificate of conformance for shock pad must be submitted for in-situ shock pads.

2.4 Contractor's warranty.

2.5 Future maintenance requirements for installed pitch.

2.6 Reference samples of shock pad (A4 size).

Appendix 3

Warranty

3.1 The Contractor shall provide a written warranty in respect of the installation and performance of the various aspects of infrastructure supplied to the Client, in particular the synthetic turf.

3.2 In the case of materials selected by the Principal Contractor and placed in the permanent works he/she shall provide the warranty.

3.3 In the case of the shock pad and synthetic carpet the manufacturer of the shock pad/synthetic carpet shall provide a warranty. This will be assignable to the Client. The warranty offered by the Contractor shall cover the workmanship, for example, the installation works.

3.4 The warranty will be such that the Contractor will indemnify the Client for all aspects of the works whether sub-contracted or not, including but not exclusive to, drainage, base works, shock pad and synthetic systems. In the case of the synthetic turf system the manufacturer will be expected to produce a collateral warranty with regard to the manufacture and performance of the synthetic turf. The warranty for the manufactured product is normally one which provides diminishing cover with time (for example, at Year 1 there would be 100% replacement but at Year 8 there would be 10% replacement). The warranty therefore diminishes with time. Other warranties for base works will be fixed for a set period of time, as will those provided to cover shock pads. The performance of the pitch can be incorporated into a warranty: here the manufacturer guarantees performance for a period of time – FIFA Qulaity performance for 3 consecutive years – subject to maintenance being carried out in accordance with the manufacturer's recommendations.

3.5 It is important to obtain a clear definition of the terms of what the warranty covers when assessing the Contractor's offer. The following details what is typical for 3G pitches:

- For base works a normal warranty would be for 20 years;
- For shock pad a normal warranty would be for 20 years;
- For synthetic carpet a normal warranty would be for 5 to 8 years.

3.6 Insurance backed warranties or third party warranties, which can be assigned, add extra protection for a Client and should be investigated when considering a contractor's sign off.

Appendix 4

Suitable Footwear Guidance – Reference should be made to individual manufacturers recommendations

FOOTWEAR GUIDELINES FOR 3G SYNTHETIC SURFACE

To protect & maintain the high quality playing surface, approved footwear must be worn at all times.

NO BLADES OF ANY TYPE ARE ALLOWED

Under no circumstances should any type of blades, trainers or spiked running shoes be worn on the pitch.
Only approved footwear may be carried onto pitch.

Any player with incorrect footwear will not be allowed to participate. Failure to comply may lead to loss of future bookings.

In this statement we are not endorsing any of the brands or footwear shown but are merely using them as an example of the types of footwear allowed on our 3G synthetic pitches. The amount of sports footwear available is enormous and we cannot include all, therefore these are only guidelines, and are subject to change if the manufacturer of our pitches change their policy.

We reserves the right to amend their footwear policy at any time, and although will endeavour to give notice of any change we cannot guarantee it.

- **Use appropriate, recommended footwear only**
- **Footwear should be clean and in good condition**
- **No smoking / naked flames**
- **No chewing gum**

No food
No drinks (other than water)
No animals allowed
No vehicles (other than approved equipment)

A SELECTION OF SUITABLE FOOTWEAR

Only approved footwear can be taken onto the pitch

A SELECTION OF NON-SUITABLE FOOTWEAR

Please note it is your responsibility to ensure your footwear meets our footwear policy

Hockey Footwear examples

Appendix 5

Typical Maintenance Log, which would be completed routinely by a maintenance contractor or a member of the ground staff.

Week No.

Week Commencing: Monday

MAINTENANCE LOG

Maintenance								
Activity	Material Used	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Equalizing with drag net								
Removal of debris-garbage								
Brushing (enter a number including 0)								
Decompaction - aering								
Topdressing rubber (penalty point/corner)								
Weed killing/Moss killing								
Ball Roll Test								
Checking of bonding joints/penalty point/repairs								
Checking drains								
Other activities								
Remarks								
Name/Signature (Groundsman)								
DAILY PLAYING HOURS		Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday

Weekly Total Playing Hours
Times Brushed