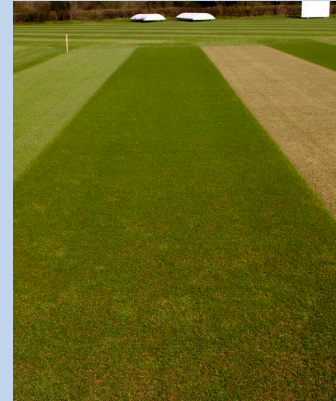




Recommended Guidelines for the construction, preparation and maintenance of cricket pitches and outfields at all levels of the game





The England and Wales Cricket Board is committed to raising standards in all areas of the game and the provision of better pitches and outfields is central to that aim. No matter which level of cricket you play the desire is always to perform on the best possible pitches which offer both the batsmen and bowlers the chance to hone their skills and techniques.

We all recognise that the better techniques the players have, the better the standard of cricket they will deliver. For England – at every level in both the men's and women's games – to continue to prosper we need to produce players with outstanding technical ability. The first step to delivering those players is taken by the groundsmen and groundstaff, whose skills are so important to our game, as they strive to produce the best possible playing conditions.



Across the world, all forms of the game of cricket are evolving and developing with increasing popularity and the demand, from village green to Test Arena, requires safe, high quality surfaces in order that players can perform and improve their talents.

To meet these demands the knowledge and skills of the cricket groundsman have to develop alongside that of the game itself. Never before have today's generation of Turf Managers, of all codes of sport, been better supported by specific educational courses and qualifications and where ongoing scientific research and the development of

innovative machinery facilitate the essential and traditional core methodology. Furthermore, the increased availability of funding through grant aid and interest free loan schemes have provided opportunities for the refurbishment or development of new facilities, resources and prospects for new career paths.

We are also living in a technological age of computers and communication networks where information can be swiftly gathered from all over the world. The same technology is used by the media to highlight sporting events and at the highest levels of the game, the work of our stadia groundstaff have come under the spotlight as never before. In return, it presents the opportunity to raise the profile of cricket groundsmanship as a universally recognised and highly skilled profession, from the enthusiastic volunteer of a village club to the grounds managers of the Test Match venues. I passionately believe that the persons who prepare the playing surfaces are as important as the finest players as neither can perform to the best of their abilities without each other.

I trust that this document encapsulates an awareness and understanding of contemporary procedures and methodology and provides the necessary guidelines for cricket groundsmanship at all levels, to assist in the preparation of the best possible surfaces their skills and available resources allow.

Chris Wood
ECB Pitches Consultant

Section	Page	Section	Page
1 Introduction	5	5 Performance Quality Standards (PQS)	53
2 Cricket Ground Maintenance and Pitch Preparation	7	I. Introduction to PQS	
I. Spring/Pre-Season & Summer		II. Monitoring	
II. Pitch Preparation & Post-Match Renovation		III. County Pitch Advisors	
III. Autumn/Post-Season & Winter		IV. Test Methods	
3 Cricket Ground Construction and Restoration of Squares	23	V. Pitch Research	
I. Funding Compliance, Contracts & Project Management		6 The MCC Laws of Cricket, Pitch Markings & ICC/ECB Playing Conditions	59
II. Outfield Areas & Drainage		7 Premier League Criteria	67
III. Cricket Squares & Pitches		8 Recommended Minimum Grounds Maintenance Equipment	69
IV. Restoration		I. Club Cricket	
V. After Care		II. Centres of Excellence	
4 Non-Turf Pitches (NTP)	49	9 Health and Safety/Environmental Issues	72
I. Types of Pitches & Classification		10 Training Courses & County Board Details	73
II. Maintenance			
III. ECB Approved Non-Turf Pitches System Suppliers			

Acknowledgements

Chris Wood ECB
Bruce Cruse ECB
Institute of Groundsmanship
Peter Dury NDT D Uni Essex
Len Smith Glamorgan CCC
Stuart Kerrison Essex CCC

Laws and Illustrations by kind permission of MCC and ICC

Some images by kind permission of: MCC, Surrey CCC, STRI, Lloyds & Co Letchworth Ltd, Autoguide Equipment Ltd, AT Bone Sports Solutions, Notts Sport Ltd, Gifford.





The guidelines contained in this document are intended as a general guide to all aspects of construction, management, maintenance and pitch preparation of cricket grounds. It is accepted that with the groundsman's knowledge of the local conditions, he may find it necessary to vary the recommended treatment to suit a particular site. Likewise, due to varying weather conditions, the judgement of the groundsman is necessary to determine exactly when each operation should be carried out.

Preparation and maintenance of pitches suitable for first and non-first class matches, premier leagues, clubs and schools

Aim

To achieve the best possible playing surface at all levels of the game – at the top level a minimum of a two day game.

Objective

First class and matches of three days or more

At the commencement of the match the whole surface should be completely dry, firm and true, providing even bounce. The surface of the pitch should ideally wear sufficiently to give spinners some assistance later in the game.

Limited over one-day matches

For the duration of the match, the whole surface of the pitch should be completely dry, firm and true providing good carry and even bounce throughout. There should be little or no turn and little or no seam movement.

At the club/school level of the game, the pitch should give a consistent and safe bounce.

Guideline Maintenance Schedules

I. SPRING/PRE-SEASON & SUMMER

Pre-season rolling is absolutely crucial to the production of fast pitches, as the cricket square requires a firm, even surface and rolling should commence as soon as conditions permit. The groundsmen is the only person who can decide when conditions are suitable.

The use of rollers to firm the surface over a period of several weeks will slowly consolidate the square. Use a light roller at the earliest opportunity in the spring, possibly at the end of February or the beginning of March, gradually increasing the weight, if possible, up to a 2028kg (2 ton) heavy roller.

Rolling Weights

Light Roller: up to 254kg (5cwt)

Medium Roller: up to 508kg (10cwt)

Heavy Roller: 1014kg (1 ton) or more

The pitch should be rolled in all directions, but with the emphasis on cross rolling in the early stages, but finish on the line of the pitches. The aim is to consolidate the square to a depth of 100mm (4 inches) before the commencement of the season. Light scarification may be necessary in the early spring, but this should only be done in moderation with great care being taken not to destroy grasses sown in the previous autumn. Heavy mechanised scarification/verticutting that would cut into the surface may well lead to cracking of pitches later in the season, however a scarifying unit with brush attachment is recommended.

Spring fertilisers may be used at the discretion of the groundsmen (according to manufacturer's instructions). Nutritional analysis of the soil is a must and will assist decision making.

A summer-based fertiliser contains more nitrogen, which encourages top growth increasing the need for mowing more often.

Brush or dragmat the square regularly, especially when dew is on the ground, as this will remove moisture from the leaves and discourage disease. Maintain observation of infestation of weeds and worm casts. Take control measures using the appropriate products assuring all legislation compliance.

Mowing

Gradually reduce the height of cut on the square approaching the start the season to a height of 12mm ($\frac{1}{2}$ inch). This height should be maintained all season over the square, with it being cut at least once a week if not twice during growing conditions. Always ensure blades are kept sharp and set correctly to ensure a good clean cut with no "ribbing" or tearing.



II. PITCH PREPARATION & POST-MATCH RENOVATION

When the fixture list is available it is possible to establish a plan to programme pitch allocation for the whole season. You should aim to produce equal usage of each pitch. It will be necessary to place the more important fixtures towards the centre of the square and then work out accordingly.

Consecutive matches should not follow on adjacent pitches as this could mean using a strip which may be damaged from the bowlers run-off from a previous match. The two outside pitches are often reserved for junior games or practice/artificial pitches.

To facilitate this, the table should be “squared off” prior to the playing season, using the “3-4-5 triangle” method to establish the corners, stump lines and individual pitches set out with white “T” markings. (See Fig 1.1).

Pitch Preparation Prior to a Match

- For first class pitches, this should ideally commence at least 14-10 days prior to the match, or in the case of clubs, schools etc. a minimum of 5 days before the match.
- Select the pitch to be used, outlined by “T” marks to a width of 3.05m (10ft) and preferably using strings and mow, ideally using a mower with a thin bottom blade

and having at least an 8-bladed cylinder set to a height just lower than the rest of the square (eg.6mm or $\frac{1}{4}$ inch) Cut along the line of the pitch and return on the same line you have just cut.

- Work your way across the pitch to complete the full width. Dependant on how much grass is present on the surface it may be necessary to repeat this operation.
- Scarification should be carried out between the popping creases, to reduce the density of grass using pedestrian or mechanical brush/rake machinery (not thatch removal or similar type tines), hand rake or a strong broom, care being taken not to disturb the soil surface. The bowling ends should not be scarified as this will assist in reducing the wear and tear, and aid recovery from the damage caused by players.

Scarification should continue until the grass sward has been sufficiently reduced in density. There should be no mat of grass and the surface soil should be visible between the blades of grass.

- Check for small scars or depressions, particularly on a length and repair where necessary. (Carefully lever up depressions. Do not simply fill hollows with loose soil as such would only disintegrate if struck by the ball)
- If the surface is dry, it is generally considered that water, either by rain or applied by irrigation, is essential in the preparation of a pitch in order to give it a firmer, solid surface for match play. Water copiously if necessary with the aim to soak the profile to a depth of 75-100mm (3-4 inches). There is no fixed period for the watering of a pitch, but this should be done well in advance of a match in order to ensure that the pitch is completely dry at the start of play. Ideally this should start no less than 10 days prior to the match. The rolling of the pitch should commence with a light roller when



all surface water has disappeared. As the pitch dries, the weight of the roller should increase. The groundsman should use the heavy roller at every suitable opportunity prior to a match whilst any moisture content remains. The heavy roller should not be used once all the moisture has gone from the pitch. In prevailing hot, dry weather conditions it may be necessary for further light irrigation or “flashing” nearer the match day although such a decision would rely on the experience and expertise of the Ground Authority as is the deployment of covers where provided to prevent unwanted wetting of the surface or control the rate of drying during the course of preparation.

If the square has been consolidated before the season, pitch preparation is greatly assisted and possible rolling times reduced.

- For the remaining pre-match days during the course of preparation, mow every day or at least every other day between the popping creases and in combination with light scarification/brushing, progressively lowering the cylinder to the desired height of cut (typically between 3-5mm, ($\frac{1}{8}$ – $\frac{3}{16}$ inches) or as low as possible, without scalping and the surface is not scarred or disturbed in any way.



- On the morning of the match, start early and brush, close mow and roll (Typically for around 15-20 minutes). Finally, if not done the previous day, Mark out the creases on the pitch, clearly, accurately and neatly with lines not more than 25mm (1 inch) wide nor less than 12mm ($\frac{1}{2}$ inch) using string lines or a marking frame if available. (see the paragraphs on marking out for details). Use a proprietary marking compound or whitening powder or combination of both. Finally set the stumps in the correct positions on the crease with a little water placed in the stump holes prior. This will ensure that the stumps remain firmly in place during the duration of the game.

At the start of the match the pitch should not be excessively green in colour to favour sideways, seam movement and be completely dry. This applies not only to the top surface but also progressively to a depth of 75-100mm (3 - 4 inches). Weather conditions may make this difficult, but, if the weather is fine or with the correct use of covers, it should usually be possible to obtain complete dryness. A pitch which is completely dry at the start of a game is more likely to assist spin bowlers later in a game.

A pitch prepared in the above manner should, given good ground and weather conditions, be expected to last for 3-5 days of first class or 3-4 games of average club standard.

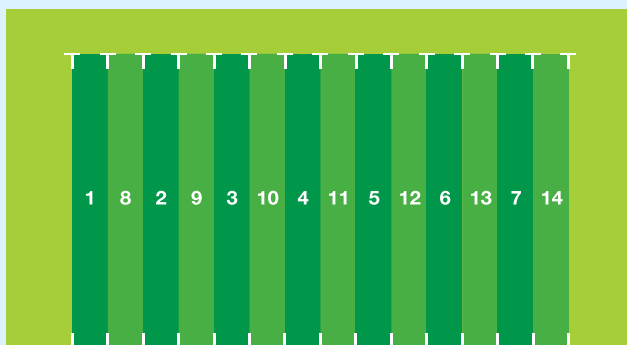


Fig 1.1

Surface Stabilisation Agents (SSA)

At the commencement of the 2006 season, the ECB sanctioned the application of a surface stabilising agent, in particular PVA (Poly Vinyl Acetate) adhesive solely for county one day matches. The application of Surface Stabilisation Agents during the preparation of pitches for first class matches is not permitted. Any pitch that has had the agent applied at any stage during the season in question (eg for use in other matches) may not be used for first class matches. This is because first class pitches should naturally deteriorate as the game progresses and the use of an SSA would work against this process. The ICC also gave permission for international one day usage where deemed appropriate and always with the agreement of all interested parties involved.

The material works by binding the surface to prevent excessive deterioration and assist a degree of uniform pitch performance. It has proved to be successful on smaller squares where already worn pitches have to be re-used in order to accommodate a heavy schedule of matches and will also add longevity to outdoor grass net practice facilities. It can also be useful for the recreational game to retain a safe playing surface in times of drought and subsequent watering restrictions. It should never be applied with the notion of turning a pitch with poor playing characteristics into a good one, nor a substitute for a correct maintenance regime.

It should be noted that if there is evidence of moisture in the surface of the pitch then it will effectively be sealed in with the resultant likely consequence of excessive seam movement.

Although occasionally used in New Zealand since 1996-97, this is a relatively new concept in England and Wales and there has been no evidence to date of deterioration of growth or soil conditions by residual build-up although more research over time will allow for re-evaluation. However, with the contemporary restorative machinery available today, this should not be an issue.

Application Guidelines

The best way to apply the mixture is through a knapsack or a "walkover sprayer". It takes between 10-15 litres to do a strip.

The rates of glue can vary from anywhere between 5-10 litres of glue per pitch but generally 5 litres of adhesive to 5-10 litres of water are the favoured norm as long as the glue is mixed well with water before putting in the knapsack and it goes through the nozzles.

Apply the contents of the knapsack/sprayer evenly over the entire surface of the pitch or practice area. Do not stop or the mixture will quickly coagulate in the lines. It will look white when first applied, but it will dry clear. The spray container must be well washed out immediately after use.

The optimum time to apply is when all pitch preparation is complete ie the evening before match day. Allow approx. 45-60 minutes to cure & dry before putting the covers on for the night. On the morning of the match, a quick cut if necessary and light roll will suffice.

Whether or not any grass remains on the surface, once sprayed, then it is possible to re-use the pitches again after the game easily enough. Treat the pitch as normal ie water up, re-roll, mow etc, the glue should not alter anything in that respect. More can be applied if needed. This procedure can prolong the lifespan of grass practice facilities especially where confined or restricted by available space.

When no longer in use, the pitches are easily re-instated and renovated by simply vigorous brushing of the surface, thorough watering and overseeding under normal procedures.

After Match Pitch Repairs and Renovation

It is essential to proceed with repairs and renovations as soon as the pitch becomes available after play and not wait, as the whole square will soon be looking very sparse. Un-repaired ends on used/worn pitches can be dangerous and are not conducive to a good game of cricket. The selection and rotation of fresh pitches, of a good standard, will become increasingly difficult if the ends are not repaired promptly and correctly.

Maintenance and Repairs to Foot Holes

The umpires shall see that wherever possible and whenever it is considered necessary, action is taken during all intervals on play (including designated drinks intervals) to do whatever is practicable to improve the bowlers' foot holes.

In matches of two days or more, as soon as is possible after the conclusion of each day's play, bowlers' foot holes will be repaired

If the pitch is to be used the following day they will need to be filled in using the following method:

- a. Use a cricket clay loam that has been prepared a day in advance of a game. Make this up in a wheelbarrow. Screen two shovelfuls of soil into a wheelbarrow and sprinkle with water until there is sufficient moisture to have a light covering. Repeat this operation until the barrow is full. Keep under cover until required.
- b. Brush with a besom or a yard broom within the creases and slightly up the pitch (no further than the protected areas) cleaning out any loose material.
- c. The footholds need to be thoroughly drenched. Then using hands, remove all excess water. This dampening has the effect of creating a bond for the new soil to adhere to. By the addition of mixing some grass seed with the soil there will often be no need to remove the repair once the match has finished.



- d. When infilling a depression ensure that it is done in one mass, if applied in layers, the soil will not bind sufficiently.
- e. Start to consolidate from the outside of the foot hole and tread down with the foot, or with a heavy panner/thumper/'elephants foot', preferably one made of metal.
- f. Ensure that the finished filled area is no higher than the rest of the surrounding surface within the crease by means of a suitable straight edge. This will help to prevent raised ends or 'saddles' from gradually forming.
- g. Brush some dry soil/dust over the repaired area and mark out afresh.

Renovation and Reinstatement of Used Pitches

As soon as possible after the game is over, start reinstatement of the whole pitch.

First vigorously brush the pitch with a besom or yard broom to remove any loose soil and debris. Check that no foreign objects such as studs have been left on the playing surface, if they are not picked up they could seriously damage the mower. Worn bowler's footholds need particular care and attention.



Flood the pitch three or four times depending on how much water it will take to become soft enough to take a Sarel spiked roller or studded type overseeding device, which will produce a good seed bed of many small holes.

It is a waste of time and money to merely scatter seed on an unprepared surface. In order to give the seed a better chance of germinating it is important that it is well embedded in the soil. The making of a seed bed is essential and the seed worked/brushed well into the holes produced by the overseeder.

Pay particular attention to the bowling ends and run through areas where most of the wear and tear has taken place. Do this by raking lightly to form grooves, or use a border fork, or dibber to loosen the base. Evenly sprinkle the grass seed into the repaired footholds and cover with a light coating of loam. Always use a straight edge to level off with the surrounding area to prevent raised bowling ends and a saucer shaped square!

Any deep ball or heel marks should be attended to by raising with a screwdriver and plugging with moulded loam, level to the surface, and consolidated.

Finally, overseed the rest of the pitch brushing the seed into the holes made by the overseeding equipment. Apply an autumn fertiliser at a rate recommended by the manufacturer. If needed give a light dressing of loam, work in and lightly water with a sprinkler.

In normal British summer conditions, grass seed will germinate with the pitch ready for use in four to five weeks. Use of plastic or mesh sheets (germination sheets) will speed up the germination process.

Grass Net Practice Facilities

Where grass net areas are provided it is imperative that they are constructed and maintained to exactly the same criteria as the square, with true and predictable bounce enabling players to practise and perfect their skills, a very important aspect of today's modern game.

Ideally these facilities should be allocated off the playing area so that practise can take place during match days. However, if not possible, consideration can be given to a suitable area on the outfield or provision made for use at the edge of the square. Such an area should allow for a minimum of 3.66m (12ft) or maximum 4.75m (15ft) wide bay or multiples of, with an adequate allowance as possible for a full safe bowlers run up. A batting end of a minimum of 10.67m (35ft) length would suffice providing the run-ups are on a similar level surface. However, an audit survey of international and first class practice facilities, undertaken in 2001, found that players prefer full cut net pitches with firm bowler's footholds and no discernible line across the middle that detracts from the judgement of line and length for bowlers and batsmen alike.



The net system deployed can have a direct bearing on the lasting quality of the surface in that where a permanent cage is in situ, the practice lanes have to be used and renovated in rotation as they wear, whereas a moveable system like a simple Brodie pole/guide rope assembly can utilise the entire space of a designated "block" and allow easy access for managerial procedures like cross rolling and swift covering with a flat-sheet. For clubs with a healthy financial income, more complex and costly systems have been developed for designated areas. One has poles set into sockets. The batting end poles have fitted boxes containing the side netting that pull out to form the separate lanes whereas the most advanced has permanent pylon stanchions to the side supporting wires that carry a number of net bays that can be situated anywhere on the practice pitch area and winched up quickly to leave a completely clear zone for maintenance and even mini-cricket practice. One of the many benefits of this system is that there are no metal pole supports that the ball can rebound off, a much safer aspect as is full length side nets that prevent a strongly hit ball from the path of a bowler or persons in an adjoining net bay.

Mobile net cages can allow for many recreational clubs, cost effective and instant use of a pitch on the square or set aside area, and stored away afterwards thus limiting unauthorised usage and unnecessary wear.

Because the upkeep of grass net facilities is as high maintenance as the square, it can be a luxury that many clubs cannot afford and if considered for development,

sustainability must be taken into account as there is nothing so worse for a player's skill progress than a badly maintained net surface especially where a high intake of youth and junior cricket is to be supported.

In this scenario Non Turf Pitch (NTP) outdoor practice facilities offer the best option in terms of low maintenance, readily available in most weather conditions and safe playing performance rating.

Outfield Areas

The outfield should provide a fast and true surface for the ball to run without deviation and should be firm enough to provide a good and safe foot hold for the fielder.

Some outfields perform a dual role and will be utilised for football or other winter sports after the cricket season. In these circumstances there is a greater opportunity for the provision of a wider range of machinery and equipment for the outfield. Many village/community grounds will have an outfield that does not display satisfactory levels and may contain many humps and hollows that may radically prevent a good maintenance programme being implemented. To bring a poor surface to a good standard may incur huge expense and is not always affordable by small clubs/schools without financial assistance.

Drainage is another major problem on the outfield and the installation of a pipe drainage system may be required.

The outfield should ideally be made up of a good free draining loam with suitable grasses and weed free. It must be cleared of any objects that could cause injury to players or damage to machinery.

The majority of first class county grounds have made commitments towards enhancing and improving the quality of their outfields, improving drainage to ensure that playing time/television coverage is maximised after cessation of heavy rainfall. Some counties have installed pop-up irrigation that is computer controlled to precise and optimum measures and is often deployed overnight as we become increasingly mindful of water conservation and the necessity to maintain a uniform visual presentation and safe playing performance rating.

Perimeter Ball Stop Safety Netting

There are many grounds in the UK historically sited or newly constructed within residential areas with adjacent housing or railway lines or public highways in close proximity to the boundary extremities. Over the years there have been reported incidences of damage to property and persons with insurance company indemnity policies becoming costlier and increasingly reluctant to cover without the consideration on safety grounds, of installing protective ball stop netting situated reasonably high enough to prevent the trajectory of a hit cricket ball encroaching outside the ground perimeters. Where installation is contemplated, local planning permission should be sought although there is on the market a temporary system that can be erected and dismantled as required, without the need for planning approval.

Maintenance and Presentation

Mowing is the main operation carried out on the cricket field, the standard and quality of the facility will determine the height of cut. A good outfield should play true if maintained on a regular basis at 10-12mm ($\frac{3}{16}$ - $\frac{1}{2}$ inch). Any unevenness in the surface would prevent close mowing and a cutting height of up to 25mm (1 inch) will be required.

For all first class and international competitions, the outfield shall be mown daily before play begins, upon cessation of the days play or whenever weather permits. (Law 10.3(d)).

Every opportunity should be taken to enhance the presentation of the ground, for both spectators and players. This can be achieved easily by the sensible use of the mower (or trailed equipment, such as the brush or harrow).

For the best results the outfield should be cut with a 36 inches (90cm) box cylinder mower. The use of a roller mounted trailed seat with the mower will assist the smoothness of the surface. A Triplex type ride-on mowing unit will also produce a similar quality boxed finish, without effecting surface consolidation, whilst allowing increased time efficiency. Where the grass clippings are removed on a regular basis, there will unfortunately be a greater demand on the nutrients and additional fertiliser applications may be required.

Many village/community clubs will have the outfield cut by gang mowers towed behind a tractor or other vehicle. These will reduce the cutting time and return the clippings to the surface. The lack of rolling from the gang mowers will reduce the need to aerate the outfield with spiking equipment.

A light rolling prior to the commencement of the playing season will resolve soil disturbance and firm the sward. A larger mower, with the cutting cylinder disengaged, will prove ideal for the purpose and may also be used during the playing season to firm the outfield should the need arise. This latter difficulty often arises when gang units are used as the sole means of cutting the outfield.

Although fertiliser on the outfield is not as important as on the square, one dressing a year, usually in spring is sufficient for most grounds. However a supplement at the end of the season to enhance growth for winter sports may be useful.

Other maintenance operations could include the control of weeds, pests and diseases as required.

Where provision is allowed for the irrigation of the outfield areas, either by self-travelling or pop up systems, these should be used at the discretion of the groundsman.



III. AUTUMN/POST SEASON AND WINTER

End of Season Renovation

It has long been recognised that post season cricket square renovation, undertaken in a correct and professional manner, forms the foundation for quality pitches throughout the forthcoming season. For many clubs this work can often be unsubstantial due to lack of resources either in funding or lack of machinery/materials or plain absence of knowledgeable trained manpower.

All materials required should be ordered and delivered to site well in advance to ensure that all workings are commenced and completed at the earliest opportunity as soon as the playing season is over whilst climatic conditions facilitate germination and early growth. There is never a guarantee that completion of programmes of recommended operations will result in distinct improvements in quality playing standards if the correct after care and resources of the ground authority are insufficient to maintain facilities.

Type of Soil and Top Dressing

The use of the right soil is most important for the production of pitches of optimum playing performance. The soil must have strong binding qualities and this is dependant on the percentage of clay content in conjunction with the other constituents of the soil structure.

The soil selection is dictated by the standard of pitch required:

First Class and Premier Leagues:

Minimum of 28-35% of clay

Club standard: Minimum of 25-30% of clay

School: Minimum of 25-28% of clay

If there is any doubt regarding the quality of topsoil loam, then samples should be sent to an ECB recommended organisation for analysis and report using the appropriate methodology (Sedimentation/ Pipette method). There may be a cost for this service.

A light sandy soil should never be used as a top dressing.



Under 45kg (100lb) = poor soil
55-65kg (120-145lb) = good for club cricket
65-90kg (145-200lb) = good for county cricket
Above 91kg (200lb) = difficult to manage

Soil Strength (ASSB Test)

The results of the soil strength tests indicate the ability of the soil to bind together when prepared as a pitch by rolling.



Soils that have a breaking strength of less than 35kg will not hold together when dry under the impact of the ball and therefore such soils should never be allowed to dry out. Soils that break between 45kg and 55kg can be allowed to dry out but preparation must be very good. Soils with a breaking strength of 56-75kg are ideal for club cricket and provided they are prepared well can be allowed to dry out.

Core Sample Testing

This test will determine how good the soil is in your square. This analysis must be for both the soil texture on the square and the loam being supplied.

The aim of top dressing is to restore the levels of the pitch to produce a consistent surface while also maintaining the quality of the playing surface.

The use of top dressings on a cricket square must follow two fundamental principles;

1. Must be compatible with the existing soil in terms of particle size distribution.
2. Must be compatible with the existing soil in relation to swell /shrinkage characteristics.

Top dressing involves the application of sieved/screened clay loam to the surface of the square to improve the surface and ameliorate the underlying soil.

The top dressing should be a heavy clay loam with a binding strength of between 55-90kg (120-200lbs) and approximately 25-35% clay, with a sand and silt fraction ranging between 25%-50%. The organic matter content should be between 2-8% with the pH above 5.5 and the soil screened through 4mm (3/16 inches) Mesh.

As a working estimate the depth of clay loam applied as a top dressing should be 2-3kg/m² (4-6lb/yd).

A "Motty" (ASSB) test should be carried out to ascertain the soil strength and binding quality. To make motties take approximately 150 – 170g (5-6oz) of air dried soil passed between a 5mm screen (assuring any organic debris is removed), moisten slowly and mould the mixture into a plastic state. Then roll into a cylindrical shape of approximately 20mm (3/4 inch) diameter. Cut into 25mm (1 inch) lengths and roll carefully into smooth spherical balls of approximately 25mm diameter. Retain 6 of the most evenly shaped and allow to dry at room temperature (not in direct sunlight) for a period of 4 days.

When dry and using suitable bathroom scales, place the motty between 2 firm, flat surfaces and press down to determine the weight required to break the ball.

The clay percentage & soil strength guidance scales provide the required information.

The clay percentage scale gives the answers.

Types of Grasses

Pace and evenness of bounce can be influenced by the growth habit and performance of the turfgrass cultivar(s) and/or specie(s) used.

Leading turfgrass research centres are continuously striving to breed new varieties that meet the unique nature and demand of cricket pitches, for example, speed of germination, fineness of leaf, tolerance of close mowing, strong re-growth and regeneration, drought and wind-chill resistance, deep and vigorous rooting, disease resistance, and in the case of Perennial Ryegrass (*Lolium Perenne*), less tendency to "crowning".

Today all first class county squares use a 100% Perennial Ryegrass blend although some squares in community/ recreational cricket still include a few traditional species such as Chewings Fescue (*Festuca rubra communtata*) and Brown Top Bent (*Agrostis capillaris*).

Some cultivars perform better than others according to location, topography, and prevailing climatic conditions. The turf manager should decide on the best grass cultivar/blend/mixture for his/her purpose, dependant upon the demands of the pitch, club fixtures, and management regime. Further information and site-specific guidance is available from a reputable seed supplier.

Only those cultivars on the National and EU Common Catalogue List can be legally sold, supplied and seeded in the UK. All seed produced, in accordance with the above, must conform to D.E.F.R.A regulations for seed purity, germination, and non-crop species.

Turfgrass cultivar characteristics, scores, and rankings can be found in the current edition of Turfgrass Seed published each year by the Sports Turf Research Institute (STRI) in association with the British Society of Plant Breeders Ltd (BSPB)

Typical seed mixtures for the square and renovation are;

- A) 40% Perennial Ryegrass
40% Perennial Ryegrass
30% Chewings Fescue
- B) 65% Perennial Ryegrass
20% Perennial Ryegrass
5% Browntop Bent

The Turfing of pitch or square is strongly discouraged!

Guideline Renovation Procedures

The recommended procedures are an example of a square comprising of 10 strips or pitches. Each pitch measuring 22.67m x 3.05m (75 x 10ft) a total of 69.6°m (83.3°m) with the area of the square 696°m (833 sq.yd) as follows:

Upon cessation of the playing season any remaining worn bowling ends to be filled and consolidated level to the surface and seeded.

The entire square to be in a condition that is immediately receptive of a renovation programme by shaving down to a cutting height of 3mm (³/₁₆ inches), match height, or as low as possible without scalping the surface. Use a well set cylinder mower with a low height of cut to provide a clean surface, this may take two or three cuts.

If rainfall is absent and prior to further operations, soften the surface sufficiently by artificial watering. It is imperative that imminent weather conditions are taken into consideration before commencement where possible. (This is important for optimum effect of scarification/verticut operations unless groovers/linear aerators are implemented)

(Both the above measures can be implemented by the home authorities before arrival of contractors to ensure optimum results).

The entire square to be heavily verticut in preferably 2 or 3 directions (diagonally & in line with play) according to density of surface vegetation or organic matter, by an approved machine capable of penetrating the surface without labouring the engine. The new generation of grooving/linear aerator machines are capable of achieving this to a depth of 6-12mm (¹/₄ - ¹/₂ inch) under dry conditions, without resultant sealing of grooves by foot or tyre traffic. All resultant arisings must be removed from the surface by sweeper, blower or equally efficient device. In the main many clubs do not possess such a heavy-duty machine so should hire. Costs can vary per day according to type and whether pedestrian or tractor mounted and with or without operator. (Possible implications with Health and Safety competence in operation of machinery)

The linear grooves created by the verticut facilitate a receptive surface for overseeding and keying in loam top-dressings although an overseeding implement such as a Sarel type spike roller or studded variseeder would maximise application of recommended grass seed at a minimum of 50gm per °m (1 ³/₄ oz per °yard) for the square and brushed into the surface. The majority of cricket squares these days are sown using a total perennial ryegrass blend using 2 or 3 cultivars tabled under the name of the respective seedhouses in the annual performance listings provided by the Sports Turf Research Institute. Where specified or requested to match an indigenous sward of finer grasses such as fescues, bents or smooth-stalked meadow, consideration should be given to their slower to establish properties or whether survival rates diminish on account of wear and relative pH values.

An application of a suitable pre-seeding or autumn/winter low nitrogen fertiliser to encourage an aggressive primary root growth and hardy plant health. Some groundmen prefer to apply a week or so prior to commencement of renovations and follow up with another application later on when the grasses are fully established. Also there are

now forms of root-enhancement products available to consider.

A nutritional analysis beforehand is always advisable to determine the specific requirements of the square.

Applied top-dressing of a suitable proprietary recommended loam ideally in continuity of that already established in use or as close a match to the shrinkage values of the indigenous loam. This should be spread by hand or machine and thoroughly luted and keyed into the surface by use of an implement such as a wide tru-lute or straight edge to approx. 8 x 25kg per pitch (2.85kg per °m or 5.5lb per °yds) unless pronounced saddled ends are evident and dressings should then be applied only to where levels meet the rise. Any small deviation in the levels should be corrected at this stage.

It is important to maintain the same consistency of top dressing and it is often advisable to order a small surplus to store for seasonal repairs.

Irrigate the square if necessary during prolonged dry spells and lightly top off the grass sward when the seed has germinated and the square is dry enough to take the mower.

Linear Aeration (Surface Grooving) for Cricket Squares

One of the most important operations of the calendar year towards the production of high standard cricket squares, has been heavy scarification at the end of the season to reduce the build-up of surface organic material, lift and sever procumbent growth, reduce the percentage content of thatch producing Poa Annua and assist incorporating heavy cricket clay loam top dressings. Until the concept of motorised verti-cutting machines, much of this had to be accomplished by pedestrian operated rakes, a laborious task that still allowed some organic content to be buried under top-dressing that sat as a "skin" on the surface. Even the arrival of the motorised scarifier was extremely limited in the removal of accumulated thatch that lay beneath the surface because the blades were unable to effectively penetrate the immediate surface without labouring the engine or causing severe wearing of the blades.



Softening of the surface by application of water/rainfall assisted the operation but the resultant grooves closed up under pressure from foot and wheeled traffic and mud frequently sticking to the front rollers, if not cleaned regularly, meant that the height adjustment was affected. The surface then had to dry out before top-dressing could be applied.

Throughout the UK, core sampling of the profile of many squares reveals how the ineffectiveness of this operation has resulted in bands of buried organic layers causing breaks and air pockets caused by the yearly applications of top-dressings not being able to be keyed into the underlying surface.

The gradual results are squares underperforming, with possible uneven bounce and a drastic reduction in pace because the impact of the ball is diffused and cushioned.

In 2000, an Australian engineer introduced into the UK a heavy-duty scarifier powerful enough to penetrate uncompacted sports turf down to 45mm thus removing bigger quantities of buried and surface fibre than previous hollow-tining methods. This has become known as Linear Aeration. However, for the far harder and consolidated surfaces required for cricket and especially the high clay bullies of Australian pitches, the tungsten-tipped blades proved ideal for surface grooving producing a superior environment under much dryer conditions that facilitate removal of fibrous matter, a seedbed with a higher percentage of germination and most importantly, integration of the top-dressing.



It is recommended that a depth of no more than 12mm ($\frac{1}{2}$ inch) is set to lessen the risk of linear cracking during seasonal pitch preparation. If surface thatch or buried fibre deeper than 12mm ($\frac{1}{2}$ inch) is evident then removal by Fraise Mowing/Topping is far more effective followed by surface grooving as a tilth medium.

Aeration and the Soil Profile

Aeration has always been considered as one of the most essential requirements of managing a healthy soil profile in particular relieving the dense consolidation, a natural feature of all cricket squares, that impedes the pore size and air spaces between soil aggregates and severely limits the depth and health of the root system. Traditionally, this operation was done before top-dressing but rarely sufficient depth of penetration was achieved due to the density of the sub-surface in late autumn. It is now recognised that roller drum type of spikers with a consistent depth of tine can be detrimental to any square with underlying layering and rootbreaks due to its pulling action.

It is recommended is to use a cam or vertical punch type of aerator fitted with a solid "pencil" tine to minimise side wall compaction at a minimum depth of 100mm (4 inches) at 50–100mm (2–4 inches) centres avoiding any form of "heave" by the addition of finger bars between the tines. Therefore the tendency of timing of the operation is later in for example, mid-November when the soil profile is more likely to be moist and in a more receptive condition after early re-establishment of the grasses whilst the soil temperatures are favourable and top dressing has been weathered in.

Taking a profile reading from a core sample is essential towards making informed decisions on aeration such using the right type of machine in optimum conditions at the right time. Surface thatch and layering lend towards shrinkage discontinuities between layers that cause rootbreaks thus inhibiting the development of healthy rooting and differences in density values. Water penetration can be impeded also to the detriment of grass health and pitch performance. Even in late autumn the top 50mm (2 inches) can appear malleable but beneath be dry and crumbly lending towards underestimating the effectiveness of a spiking operation and subsequently exacerbating the problem by the chosen machine's inability to achieve a full depth of penetration and pulling the top layer away. The plant will choose the favourable option of horizontal rooting instead of vertical.

The paradox is that in a layered profile, deep aeration is paramount towards development of a root system to bind the layers together and although the many advances in machinery and tine development have produced equipment to achieve this, it is often put beyond the purchase budget of many clubs, although for some the initial outlay could be offset by cluster sharing with neighbouring clubs.

For many grounds, consideration for hiring in may prove more favourable, rather than have a capital item sitting in the workshop for the best part of the working year.

One of the most effective aeration equipment available today for cricket squares in particular is the deep-drill. It is costly to hire but can achieve penetration depths up to 250mm (10 inches) without sidewall

smearing/compaction and absence of any heave or pull. Follow-up regular operations with standard pedestrian machines have subsequently proved to be more efficient.

Using large drill bits (20mm diameter or $\frac{3}{4}$ inch), back filling and consolidating with the appropriate cricket loam down the tine holes by hand (only on cricket squares) has proved to be successful in "nailing" a layered profile together and has become known as "Drill & Fill".

Similar deep aeration success has been monitored by deployment of Verti-Drain type of aerators, especially the modern high-speed cam action versions. However it is recommended that a recognised professional adviser should oversee the operation with an experienced operator to ensure that no heave is evident or severe damage to the square could result.

The use of soil exchange or hollow core aeration tines pre top-dressing has been traditionally used to remove plugs of layered and buried fibre and replace with fresh loam or as a means to introduce a different loam into the profile. There is some debate on the effectiveness as the operation is seldom achieved efficiently as it is quite impossible to fill the void of the tine hole with a sufficient volume of loam. It would now be considered more practical to undertake some form of removal of the offending profile by use of modern innovative procedures such as fraise topping restoration which to date has been monitored to great success at affordable costs, *where they met the right criteria*.

Winter Work

Further operations may include supplementary aeration during the winter months. *It is generally recognised that all aeration operations should cease by mid-January.* Maintain ongoing regular inspection and brushing/drag matting to minimise the opportunity of any disease developing and ensure the dispersal of worm casts, if present.

The occasional surveillance of the square will provide the opportunity of investigating any outbreak of fungal

disease, treating with fungicide when the first signs appear (following any legal requirements) and also enable the detection of any excessive grass growth. In any mild spells it may be necessary to top the grass to ensure that the sward growth is not too retarded in the Spring by removing too much growth in a short period of time. Any growth over 25mm (1 inch) should be lowered to 18–20mm (approx $\frac{3}{4}$ inch).

It may be necessary for additional nutrient applications, especially during mild winters but it is recommended to be guided by professional analysis.

If the presence of moss algae is detected, they should be treated with a suitable proprietary product at the first opportunity and the possible cause investigated

When the surface conditions allow, regularly walk the square to remove any debris that may have accumulated to ensure that no damage will be caused to equipment and to keep a watchful eye for damage caused by animal activity.

During prolonged wet spells, heavy frost or under a blanket of snow it is advisable to stay off the area completely.

Mid-winter is a good time to assess the condition of equipment and preparing a budget for approval for the forthcoming year. Orders for the forthcoming season can be prepared and submitted well in advance.

I. FUNDING COMPLIANCE, CONTRACTS & PROJECT MANAGEMENT

Project Development

Developments in technological understanding of sports surfaces, machinery and equipment and provision of considerable funding sources via central government, charitable foundations and sponsored organisations assisted and distributed by sporting governing bodies like the ECB.

Programmes such as the ECB interest free loan scheme and the ECB Grant Aid Programme, have provided grant/loan opportunities for refurbishment and improvement of existing facilities or for new sites to be developed. They are often linked to land acquisition for urbanisation, increased demand for new housing and re-instatement of land-fill sites. Multi or dual sport areas are considered especially for local community and junior usage.

Where once the sole domain of only the wealthy and professional clubs, funding availability has also provided opportunities for many recreational clubs and schools to reconstruct or restore old and underperforming pitches and squares in order to meet the demands for ever increasing safe standards of player performance and general physical health of future generations.

Funding Compliance Points

The following guidelines can be used for clubs seeking advice for developing and submitting a quality bid for funding.

- Provide details of all parties who have prepared technical, financial and programme advice and scheduling
- Provide details of the person who will be responsible for coordinating and managing the on site works
- Provide details of the in-kind contributions the club has received or will receive
- Provide evidence of tenure

Drawn information

- Identify the current amount of drawn information
- If not available agree the appropriate level of information to be obtained
- Identify the specification of materials as appropriate
- Ascertain compliance with ECB/Sport England guidelines
- Identify the result of any site investigations or exploratory work



Third party approvals

- Provide the status of planning permission and details of the submission (unless none required)
- Obtain Building Control Approval (unless none required)
- Provide copies of the approvals received
- Submit a detailed breakdown of costs
- Submit a full tender analysis (2 or 3 quotes required depending on value)
- Identify what level of contingency funding is required and the basis of this calculation
- Submit written confirmation of all partnership funding including in kind contributions
- Provide details of asbestos survey (unless none required)
- Provide information on existing services
- Identify risk assessments arising from the design
- Provide information on access and egress points on site
- Identify procedures of welfare facilities for the workforce
- Identify site mobilisation and access
- Provide information on the security of the site
- Provide information with regard to assessing the competency of any party directly involved with designing, coordinating, managing and constructing the project

Design Consultation & Project Planning

The range of services available to clubs to design and manage works is increasing dramatically and as such clubs should not naturally assume a design and build approach to be the most appropriate. Clubs should consider carefully the roles of designers, project managers and contractors to create the best team to deliver the project. Clearly an independent signoff of works and a detailed after care package assembled by the designer is recommended.

Therefore, it is essential that before undertaking any new cricket ground project, professional consultation should be sought to ensure that every possible aspect and suitability of the site is taken into account before a specification is drawn up and contractors invited to tender. These factors should include:

- (1) General proposed layout plan and local survey maps of site relative to size of area and facilities required.
- (2) Identify any known planning restrictions, ie existing tree preservation orders machinery storage buildings etc.
- (3) Local topography, waterways and levels relative to likely implications of drainage requirements.
- (4) Availability of services to the site (water, gas, electricity, sewerage).
- (5) Site access and local road restrictions.
- (6) Analysis of site top and sub soil.

The Contract

Once the above measures have been enacted on, the design consultant can draw up a detailed, carefully worded and cost effective specification, inclusive of detailed drawings showing the layout, levels and drainage etc. Based on a common design, tenders can then be put out to invite specialist contractors to price up on with the winning company entering into a contracted agreement with the client.

Fine turf works are subject to a higher risk of inclement climatic conditions the further into the autumn works are scheduled. To alleviate some of this risk planning and contractual arrangements for projects should be completed by April of each year.

Project Management

Even the most comprehensive specification does not guarantee a satisfactory outcome on completion unless the various stages of the project are carefully supervised by the consultant or an appointed project manager acting on behalf of the client.

This is to ensure that the details in the specification are adhered to, correct materials provided and the progress of each stage of the operation is monitored, approved and signed off. Also in the event of unforeseen circumstances occurring, any variations in the contract, can be approved and acted upon swiftly to avoid costly delays.

Liaison with the client's ground authority where employed, is important both during construction, timing of the works and dovetailing into the post-construction and maintenance period.

Schedule of Works

An agreed programmed schedule of works will outline the projected timescale of each stage of the contract. It is always subject to the vagaries of the weather and allowances should be made accordingly so that planning, temperatures, ground conditions etc, can fall in line with the various stages of the construction period.

Employers Requirements (an example)

This criteria can be used as an example for guidelines to ensure that strict supervision can be maintained when employing contractors to complete construction work. There are a number of general points to any specification, which can be set out in the form of a preamble known as the Employers Requirements.

Form of Contract

The contractor shall include in his tender for entering into a formal contract with the client in accordance with the Article of Agreement and Conditions of Contract drawn up by the designer.

Where additional unforeseen works are required, the contractor shall submit to the client/client's representative a written price for the additional works. If these works are deemed necessary, the client/client's representative will raise a variation order or a written instruction for the contractor to proceed.

Drawings and Specifications

The accompanying drawings and specifications are intended to convey an accurate description of the nature, extent and standard of work to be performed by the contractor. The contractor must visit the site, and be fully acquainted with what is required and quote accordingly. Should the contractor be in any doubt regarding the true meaning and intent of any clauses in the conditions of contract, specifications or details shown in the drawings, is to be invited to have these fully resolved before submitting his tender, as no extras will be allowed for, nor any loss or expense involved through any misunderstanding arising from his failure to comply with this requirement.

The tender must include for carrying out the work strictly in accordance with the true intent and meaning of the drawings and specifications. Minor works not specifically mentioned but obviously necessary and customary in the trade will be deemed to be allowed for in the contractor's price.

Sub-contracting

The contractor shall not sub-let any part of the works without the written consent of the client's representative. Any intention to sub-contract any part of the works shall be notified at the time of tendering,

to the client's representative when the tender is submitted and full details of the sub-contractor/s shall be provided, eg name and address and the phase/s of the work they are to complete.

Supervision

The contractor shall ensure adequate managerial supervision of the site and shall provide in his tender for a competent foreman to be continuously employed on the site while work is in progress and for him, as the contractor's representative, to receive and carry out any instructions given him by the client's representative.

Documents

The contractor shall keep at the site of the works copies of the contract drawings and specification; these to be available at all times to his foreman and the client's representative.

Handwork

The contractor shall allow in his pricing for the hand working on parts and conditions where the use of machinery will not produce results to the satisfaction of the client's representative even though specific reference is not made to such in the body of this specification.

Procedure

No variation from the sequence and nature of the works detailed in this specification will be permitted except with the prior written consent of the client's representative.

Site Meetings

The contractor will attend periodic meetings on site as required.

Labour, plant etc.

The contractor shall supply all labour, approved tools, plant and equipment fitted with turf/low ground pressure tyre/track, necessary to the efficient execution of the work. He shall comply with all statutory regulations and shall provide such storage sheds, canteens, latrines and shelters as may be required, maintaining same during the contract in a thoroughly sanitary and hygienic manner and clear away on completion to the satisfaction of the client's representative.

Machinery

All traffic shall be confined to approved routes within the site. The use or passage of heavy earth moving equipment will not be allowed on site following the return of the top-soil. Only recognised construction machinery of an approved type shall then be used to complete the specified works unless otherwise agreed by the client's representative.

Provision of Materials

As soon after the contract has been awarded, the contractor shall submit to the client's representative a list of suppliers from whom he wishes to purchase the materials necessary for the execution of the work.

Storage of Equipment and Materials

All equipment and materials shall be approved and stored on areas as shown on the drawings or otherwise as agreed. The Contractor shall be responsible for reinstating any such areas at his cost unless otherwise allowed for in the Bill of Quantities.

Health and Safety

The contractor shall ensure that all CDM Legislation conditions on site are met and adhered to.

Insurance

The tender and rates shown in the Bill of Quantities shall be deemed to cover all insurance, in particular the following:

- Employer's Liability
- Fatal Accidents
- National Insurance
- Third Party Risks

and to indemnify the client against all claims and losses. The contractor will not be allowed to take possession of the site until the insurance policies required under the General Specification have been examined and approved. The contractor is to forward the insurance policies suitably endorsed to the client as soon as possible after the acceptance of the tender and before entering the site.

Water for Working

The contractor shall be permitted to use the client's water supply free of charge for the purpose of the works but must supply the necessary hose or temporary piping, etc and exercise due care in the use thereof to avoid waste.

Private and Publicly Owned Services

The information in the contract as to the whereabouts of existing services and mains is believed to be correct but it shall be the responsibility of the contractor to verify the completeness and accuracy of the information prior to the commencement of any works.

Any services affected by the works must be temporarily supported or protected by the Contractor who must take all measures required by the various bodies to protect their services and property during the progress of the works.

Standard of Work

The standard of work is to be completed to the satisfaction of the client's representative. Drainage works should be carried out to current Land Drainage Contractors Association (LDCA) guidelines.

Approval of Work

No work shall be proceeded with until any previous operations thereby likely to be concealed have been inspected and approved

Inclement Weather

The works or any part thereof shall be suspended temporarily by the client's representative when, in his opinion, working conditions are unsuitable due to inclement weather. Work must cease when conditions are such that puddling and/or deep rutting of the soil, or any other detriment could result.

Defects Liability Period

The contractor shall be responsible for correcting any faults arising from poor work or faulty materials for 12 months after the completion date.

Maintenance of Public Roads Etc.

The Contractor shall be responsible for keeping clean all public roads, pavements, verges and other areas and for making good at his own expense any damage thereto when carrying out the works.

Contingencies

In the event of unforeseen difficulties occurring during the contract period, a percentage of the total cost of the specified work providing for such items, to be suitably worded and shown within the Bill of Quantities.

Payments

Payments can be made at valuation points to the extent of 90% of the estimated value of the work completed to date. The balance is to be paid 5% on certified completion of the work and the remaining 5% at the end of the defects liability period provided all the conditions in respect of rectification of defects have been complied with.

In valuation for interim certificates 80% of the value of any materials delivered on site but not used may be taken into account.

Interim certificates will not normally be issued where the total value of the amount of any payment would be less than £20k.

The contractor shall pay sub-contractors for works completed by them within 21 days following payment to the contractor of interim certificates. The client's representative must receive a receipt from the sub-contractors verifying that payment has been made to them before further interim payments can be made.

Tidiness and clearance

At all times the site shall be kept in a tidy condition, all surplus earth and rubbish being cleared as work proceeds. The contractor shall clear away all surplus materials on completion and leave the site in a clean and tidy condition right to contract boundaries to the satisfaction of the client's representative.

Spec Item	Item Description	Quantity	Unit	Cost
	SECTION ONE – OUTFIELD			
	Earthmoving and Grading proposals Clearing of site Removal of all vegetation and debris Strip off top soil from site. Cut and fill sub soil and laser assisted final grading of area. Return top-soil to site		m ² m ² m ² m ²	
	Sub-soil cultivations Use of sub-soiler to break sub surface compaction.		m ²	
	Water supply Allow a sum for the provision of a water supply to the cricket square and net area. Hydrant boxes with 22 mm fittings m. of 32 mm pipe		item m ²	
	Primary Drainage Excavate trench to an average depth of 600 mm deep to pre-determined gradient. Supply and lay 110 mm diameter pipe. Backfill trench using 6-10mm gravel to within 150mm of the finished surface level, followed by a 50mm layer of blinding sand and then a sandy free-draining top soil or imported rootzone to the surface As above, but supply and lay 80 mm diameter laterals at 5 / 10 m centres, average of 500 mm deep. Supply and install purpose-made junctions. @ Supply and install pre-cast concrete silt traps. x 2.5 m deep @ Supply and install pre-cast concrete manholes. x 2.5 m deep @ x 1.3 m deep @		m m item item item item	

Spec Item	Item Description	Quantity	Unit	Cost
	SECTION ONE – OUTFIELD (continued)			
	Initial cultivations Cultivate site using; plough, harrows or cultivator. Blade grade the whole site as many times as necessary using laser controlled equipment. Where possible, use a stone burying machine so that no stones above 30 mm are visible on the surface.			
	Seed bed preparation Produce a satisfactory seed bed using harrows and roller to form a fine tilth. Just before seeding a pre-seeding fertiliser should be applied to the whole site excluding the cricket square. Lightly harrow fertiliser into the immediate surface.			
	Seeding Supply and sow the area with grass seed at a rate of 250 kg / ha.		25kg	
	Maintenance Allow a sum for the first cut of the outfield.		m ²	

Spec Item	Item Description	Quantity	Unit	Cost
	SECTION TWO – CRICKET SQUARE			
	Excavation Excavate original soil down to a depth of 325 mm formation level.		m ²	
	Weed control Apply suitable herbicide to formation level to prevent weed growth.		m ²	
	Drainage Excavate trench and provide perimeter drain around the square using 100 mm diameter pipe. Use 3-10 mm of angular stone to backfill the trench and provide 100 mm of 3-10 mm angular stone drainage raft. Supply and lay 50 mm course sand blinding layer.		m m ² m ²	
	Rootzone Return 75 mm of free draining soil and topped with 125 mm of cricket loam.		m ² m ²	
	Seed bed preparation Using powered or hand rakes prepare a suitable tilth and firm seed bed. Before final raking apply a pre-seeding fertiliser to the square.		m ²	
	Seeding Sow grass seed over the square and rake in.		kg m ²	
	Management & Maintenance To achieve desired standard		item	
	TOTAL COST			

II. OUTFIELD AREAS & DRAINAGE

The quality playing capability of any newly constructed facility and the associated financial income and expenditure is substantially governed by the ability of ensuring maximum playability and maintenance conditions within as short a time as possible after the cessation of rainfall and to restrict the effects of localised flooding and high water tables especially where situated on a flood plane. This is especially important where winter sports are designated on the site plan.

To achieve this it is advisable to acquire the services of an independent drainage expert to survey and design on a scientific basis, an optimum scheme that would determine, the materials required and the most cost effective process relative to the site, usually on calculation of the amount of water to be removed within a defined period. Major grading of heavily sloped sites can interfere with the passage of natural underground water movements and some indigenous soils may prove water retentive and impair surface drainage without the addition of importing free-draining materials.

Therefore, the financial outlay of an independent survey could ultimately save a considerable amount of money on an unnecessary and over-elaborate or under achieving scheme.

Gradients

Final gradient levels can facilitate drainage but may be determined by the local topography of the site. It is an advantage to have a slight slope, ideally running away from the centre of the square where appropriate but in all cases not exceeding 1:50.

Irrigation and Water Management

Liaison between a drainage expert and the consultant designer would facilitate meeting the future requirements for irrigation mindful of increasing demands for water and possible re-cycling of rainwater for sports turf. Creating holding reservoir areas on site at drain outlets, can allow for carefully controlled water management although legislation for monitoring fertiliser leaching and other undesirable chemical infiltration, possibility by incorporated filter units would have to be investigated along with intended machine wash down areas at the pre-planning stage as would be the Water authority regulations for the irrigation supply to the cricket squares and any holding tanks. Increasingly where afforded, pop-up sprinkling systems are being considered at the construction stage to ensure optimum and effective irrigation of outfield areas.



Grasses

(1) Seed

The choice of sward is often determined by the demands required. If no winter sports are planned a fine quality surface might be desirable where a typical blend might be:

45% Creeping Red Fescue (*Festuca Rubra*)

25% Chewings Fescue (*Festuca Rubra Commutata*)

25% Smooth-Stalked Meadow Grass (*Poa Pratensis*)

10% Browntop Bent (*Agrostis*)

If the outfield is intended for winter sports, a harder wearing blend would include a 40-50% of a suitable high performing cultivar of Perennial Ryegrass (*Lolium Perenne*) or even a total blend of 3-5 Perennial Ryegrass cultivars, eg:

40% Perennial Ryegrass	or: 25%	
20% Creeping Red Fescue	25%	Perennial Ryegrass
20% Smooth-stalked Meadow Grass	20%	- (<i>Lolium Perenne</i>)
15% Chewings Fescue	15%	
5% Browntop Bent	15%	

(2) Turf

Turfing of large areas as cricket outfields is a very expensive outlay and would normally only be considered if it is absolutely imperative that play would commence at the earliest opportunity. It is recommended that the turf should be of high quality and has been cultivated by specialist companies in a suitably compatible root zone specifically for the purpose and laid accordingly with no disparity of surface levels between the joints.



Guideline specification of work for construction of outfield areas

The outline specifications are intended for general guidance only. They must be interpreted and the wording adjusted to suit the job in hand and not applied regardless of local conditions and requirements. Generally, however the type of works and sequence should be maintained

Scope of work

To prepare and establish the cricket ground outlined on provided drawings. The work involves site clearance, herbicide application, minor grading, major grading, sub-soil cultivation, drainage, general cultivation, blade grading, seed bed preparation, seeding.

Clearing site

- In this work and throughout preserve carefully all trees marked on the plan for retention.
- Grub out any roots of all trees, shrubs and hedges shown on the drawings for removal, all rubbish to be removed off site at contractors expense.
- Remove all vegetation by the use of translocated herbicide.
- Break up any foundations, roadways and similar obstructions and clear site of all tins, rubbish, large stones or any material detrimental to the establishment of a good turf sward and its use thereafter. Cart away to contractor's tip.

Grading

Three categories of grading can be identified:

- Where surface levels are acceptable after small adjustments
- Where minor grading is required
- Where major grading is required

Type a

Plough to top-soil depth

Cultivate by approved implements to break down plough furrows.

Regulate the entire surface by transference of top-soil as agreed, using a box grader to produce a surface with smoothly running contours free from marked mounds or depressions. Special care should be taken to produce a true boned level for the cricket square and to marry this in smoothly with the surrounding land.

Blade grade with an approved laser guided type blade grader to produce a smooth surface with running falls to existing main contours. An absolute minimum depth of 100mm (4 inches) final firmed true top-soil should be left throughout on completion.

Type b

Strip top-soil from areas indicated on the plan and stack in approved position convenient for re-use.

Adjust levels in sub-soil to smooth out irregularities to produce a final surface marrying in with adjacent land.

Cultivate and trim sub-soil surface.

Replace top-soil carefully using only approved equipment, being the lightest convenient to the size of the project. Top-soil should be replaced to the original depth subject to an absolute minimum of 100mm (4 inches) consolidated.

Sub-soil cultivate the whole area in the direction of maximum fall by means of approved sub-soiler to a minimum depth of 450mm (1ft 6 inches) and no more than 600mm (2ft) centres.

Plough whole site to top-soil depth.

Type c

Scrape off all true top-soil to a nominal depth of *mm and mound conveniently for re-spreading. Sub-soil shall be avoided. Top-soil heaps shall be made as small as reasonably convenient and kept mounded for as short a time as possible.

The contractor must carefully select the site of his soil dumps so as not to interfere with the sequence of operations and agree them with the client's representative. Any double handling necessary through lack of foresight in this respect will not be recognised as an extra.

Adjust the sub-soil levels to produce a smooth surface with regular gradients as indicated on the drawing (including cricket square area). The sub-soil to be excavated, transported average *metres and filled on the cut and fill principle, filling to be consolidated in consecutive layers of not more than 225mm (10 inches) deep. Trim to uniform true surface leaving it free of noticeable ruts and depressions.

Sub-soil cultivate and trim the whole area.

On the smoothed out surface spread all top-soil to form a uniform surface layer which at no point is less than 100 mm (4 inches) firmed depth. Where soiled areas are next to kerbs or similar the finished level to be 25mm (1 inch) above kerbing level. The replacement and spreading of the top-soil shall be reduced to an absolute minimum by using the lightest equipment possible and so arranging the operations that heavy loads do not have to be taken across areas on which top-soil has already been restored.

Sub-soil cultivation

Sub-soil cultivate the whole area, using a low ground pressure tyre tractor-mounted type of sub-soiler fitted with a sub-soil shoe, or other approved sub-soiler implement. The operation shall be carried out in the direction of the maximum depth of 450mm (18 inches) Care must be taken not to bring sub-soil to surface.

Water supply to cricket square

Before draining the contractor shall lay a water supply to the cricket square consisting of 32mm (1¼ inches) heavy gauge polythene or rigid PVC pipe complete with all necessary fittings and hydrant boxes and connected to the water system at the point indicated by the client's representative. The pipes shall be laid at a depth of 750mm (2ft 6 inches) below ground level. All hydrant boxes to be fitted with screw connectors for a 25 mm (1 inch) diameter hose pipe.

The hydrant box shall be 300mm (12 inch) inside measurements and be constructed of 100mm (4 inch) thick brick walls. The base to be constructed of concrete, using 40mm (1½ inches) aggregate. Allowance should be made for an inlet to except the polythene pipework. As an alternative, preformed pvc can be installed.

The box should be covered with a timber top of 50mm (2 inches) timber treated with an approved wood preservative and wrapped with an appropriate artificial turf carpet with a means of lifting the cover ie a bore hole. The timber top should be finished slightly lower than the surface surrounds so as not to cause damage to equipment and a trip hazard for players.

A stop valve shall be fitted at the point where the polythene tubing is connected to the mains water system so that the water supply may be turned off. A stop non-return valve to the same specification as the hydrant box shall be constructed. Provision shall be made for emptying the system before frosty weather.

Surplus sub-soil shall be disposed of as specified for drainage and care should be taken to preserve the top-soil.

The contractor shall pay all fees necessary for connection to public mains and for the installation of meter.

Drainage

Working from the outlet, a piped drainage system shall be installed as shown in the design drawings. The drainage system shall be laid in a * with lateral drains of 80 mm at intervals of * metres and at an angle of flow to the main drain (110 mm) of 450 or 600. PVC drain pipes and appropriate angle junctions shall be to BS 4962:1989.

Introduce pipe drains around the perimeter of the square, allowing an extra 3m at either end of the square. Perforated plastic drain pipes with a diameter of 80mm diameter to be used. All joints in the line of drains shall be made with purpose made connectors by slotting or by other approved method according to type of pipe. End stops shall be provided to seal open ends and all connections shall be formed with purpose made junctions of appropriate sizes.

All drains shall be laid to true lines on a firm foundation at a depth of 600mm (2ft) at invert level and with steady falls of not less than 1:200.

Catchwater drains shall be constructed at the top and bottom of any banks as shown on the drawings.

Any existing drains that are cut through or damaged at any time should be pointed out to the client's representative. They may be connected to the new drainage system at an opportune time to the satisfaction of the client's representative or treated as directed.

Excavate soil to required depth, load via conveyor belt and cart away as work proceeds. Trenches shall be kept as narrow as practicable. Any surplus sub-soil from trench excavation which cannot be used in the general grading of the site shall be carted from the site to a tip provided by the contractor at his own expense. On no account may sub-soil be spread on the surface between the drains or be deposited on or mixed with the top-soil that is to be used for seeding.

Lay plastic piping to correct falls, the upper end of each drain being effectively sealed by plugging.

Approved junctions shall be carefully laid to form perfect connections so that the free flow of water is not way impeded.

Test all drain runs for line and gradient before filling in. Backfilling shall not commence until the client's representative has inspected the drains to satisfaction.

Backfill drainage trenches using 6-10mm gravel to within 150mm (6 inches) of the finished surface level, followed by a 50mm layer of blinding sand and then a sandy, free draining top-soil or imported rootzone to the surface.

All backfill shall be carried out carefully to avoid displacement of or damage to pipes or the inclusion of sub-soil. Backfilling to be carefully shovelled in or introduced with an approved mechanical trench filler.

Catchwater drains should be filled to within 50mm (2 inches) of the finished surface with approved permeable filling and topped with a fine grit or other suitable material.

Samples of materials thought suitable for use in backfilling drain trenches shall be submitted for approval before bulk purchase is made. Any material used that does not compare favourably with the approved sample will be rejected.

Excavate and build silt pits shown on drawing with inside measurements of 900x600 mm (3ft x 2ft) and depth of 300mm (1ft) below the outlet pipe. The silt pits shall be constructed with 225mm (9 inches) thick brick walls with 150 mm (6 inches) thick concrete using 40mm (1½ inches) aggregate bottoms and with 100mm (4 inches) thick reinforced concrete tops mixed with 20mm (¾ inch) aggregate in four sections with rebated joints and countersunk lifting rings to each section set 150mm (6 inches) below ground surface. Allowance must be made for forming inlet and outlet pipes in salt glazed pipes.

Purpose made precast concrete units are acceptable as an alternative to the traditional brick chambers.

Where silt pits etc are brought to the surface, heavy duty metal covers (BS 497) Grade A galvanised may be used as a convenient alternative to concrete.

Similarly, excavate for and build inspection chambers as specified for silt traps except that the inside measurements shall be 600mm x 600mm (2ft x 2ft) with 225mm (9 inches) thick brick walls. The bottom shall be the same depth as the outlet pipe and channelled. Tops shall be 75 mm (3 inches) thick reinforced concrete in two sections and shall be finished 150mm (6 inches) below ground level.

Excavate for and construct 100mm (4 inch) concrete using 40mm (1½ inches) aggregate head wall and aprons, as shown on the drawings, in stream, each consisting of head wall 750mm (2ft 6 inches) wide x 1.07m (3ft 6 inches) high with angled apron walls 900mm (3ft) long on 100mm (4 inches) hardcore bed. Cut and pin in end of drain (the last pipe being salt glazed) and provide and fix 450mm x 600mm (18 x 24 inches) galvanised mild steel grating. Allow for all necessary damming and pumping, form work, planking and strutting, backfilling and carting away of surplus materials to contractor's tip.

All existing ditches to be cleaned out and properly trimmed to the maximum uniform gradients permitted by the general configuration of the ground, or to the definite levels indicated. These ditches are to be piped to the dimensions indicated on the drawings.



* Insert amount/item as required

Cultivations

Plough the site to the depth of top-soil. Cultivate the site using tine cultivators or heavy disc harrows to break down the furrows. At least four passes shall be made in transverse directions.

When a sufficiently fine tilth has been produced blade grade the whole site using an approved laser guided blade grader as many times as required to produce even falls. At no point must the site finish with less than 100mm (4 inches) true top-soil on completion.

Before completing the cultivations, sub-soil cultivate the site with an approved sub-soiler. The operation will be carried out in the direction of the maximum fall. It shall be carried out no more than 600mm (2 ft) centres at a constant depth of 380mm (15 inches).

Blade grade the whole site using an approved laser guided blade grader to provide an even surface.

Seed bed preparation

Produce a satisfactory seed bed using approved harrows and roller or purpose made seeding implement as necessary to form a fine tilth for grass seeding. The seed bed shall be fine, smooth and evenly firm but not compacted.

Shortly before seeding apply evenly to the outfield (except the square) a fertiliser to be specified. The fertiliser to be of ratio 10N:15P:10K or approved alternative applied at 250-300kg/hectare. The fertiliser for the cricket square shall be reserved for the appropriate time.

Lightly harrow fertiliser into the immediate surface.

During the above operations all surplus vegetation, debris and all stones having one dimension of over 38mm (1½ inches) should be removed from the outfield area.

Seeding

Provide a seed mixture composed of (typically):
 25% Smooth stalked meadow grass
 25% Strong creeping red fescue
 20% Slender creeping red fescue
 20% Chewings fescue
 10% Brown top bent

Sown at 350kg/Ha. The contractor will provide a certificate of composition, purity, germination, year of harvest and country of origin for the above.

Seeding should be carried out during suitable weather conditions. The total quantity of seed required should be divided into half and each half sown in transverse directions.

Lightly chain harrow seed into immediate surface, care to be taken not to ridge the surface.

Maintenance

When the grass reaches a height of 50mm (2 inches) it should be tipped using a rotary or appropriate mowing machine, not more than 1/3 of the leaf should be removed in any one cutting operation.

After the first cut the maintenance will be the responsibility of the client. This does not absolve the contractor from his liability to make good all defects due to faulty materials and/or workmanship for twelve months from the certified date of completion.

III. CRICKET SQUARES & PITCHES

These guidelines have been produced to assist clubs contemplating square or pitch construction. Outlined below are the planning and resource considerations along with example specifications, which will assist when assessing contractors or consultant reports.

Initial Planning

Identify the level of cricket to be played and therefore the standard of the pitches required. Plan on the square having an unspecified life span, dependant on maintenance standards and financial/human resources available.

It is unwise to standardise on a type of construction for a cricket square as a number of factors are involved and the cost of such provision may be unnecessary bearing in mind the condition of the site and what materials are available.

Existing material on site may be suitable and all that is needed is to grade out an area to the required gradients followed by cultivations and seeding. On the other hand a total excavation may be required. As a general rule squares are made up of:

- A clay-loam surfacing zone laid on an
- Intermediary zone, which supports the clay loam,
- Supported by a free drainage zone, which may or may not require a blinding layer to prevent particles migrating into the free draining layer.
- Around the perimeter an interception drain may be desirable.

The depth of each zone shall be consistent but will vary depending on the ground conditions, the top soil and subsoil profile in the location where the square is to be laid, prevailing climatic conditions, and the grade of cricket to be catered for.

At club level the clay loam shall have an ASSB soil binding strength of no less than 45kg where as at higher levels a binding strength of no less than 60kg is more desirable.

Typical consistent depth of each zone shall be within the range as indicated below:

Clay loam zone: 50mm to 150mm

Intermediary Zone: 100mm to 150mm

Drainage Zone: 100mm to 200mm

Instead of specifying a construction it is advantageous to specify a performance quality requirement to which the facility must conform and use a "design and build approach" to procuring the square.

A competent Cricket Facility Adviser, professional consultant or expert should be approached with a view to designing the square or producing a performance specification.

The ECB Development (Facilities) Department (facilities@ecb.co.uk) or the Institute of Groundsmanship will be able to advise or make recommendations.

Initial Site Investigation

One pitch area is 75ft x 10ft (22.87m x 3.05m) therefore the size of the square will depend on the likely fixture list (suggested maximum of five matches per pitch during the season). The number of teams that will use the facility (consideration for future club expansion and development should be taken into account), boundary restrictions and time allowance to groundstaff to maintain and prepare pitches. Once the size of the square has been determined, the pitch orientation must be taken into account when considering the overall layout. A north/south orientation is preferable to minimise the effects of the sun on the bowlers and batsman, though a possible east/west variation of 55° from the point of north is acceptable.

The boundary must be considered when planning the site; the boundary should be a minimum of 45.72m (50 yards) from the centre of the pitch in use although the ideal planning size should be a minimum of 50 yards from the centre stump of any designated pitch to be used on each side of the square to allow for League and Premier legislation ruling.

The local indigenous soil must be identified for its texture and compatibility characteristics before any construction is undertaken. It is recommended that when soil analysis be carried out, a minimum of six locations in a W formation, on the site are used and a professional report gained. Both topsoil and subsoil should be analysed.

Drainage

Identify the natural run off and any drainage lines if present. If the site has been previously used, any drainage plans must be obtained. If a survey has determined the necessity of a ring-drain around the square then sufficient distance from the edges should be regarded to allow for future club development considerations for extending the square and to minimise the risk of removal and alterations.

Drains should not be located below the surface area of the square or laid at a fall of less than 1:200.

Site Access

When considering a site, confirm reasonable access for construction vehicles and consider what protection will be required for the outfield during construction. Heavy laden vehicles if allowed to drive to the square, will damage the outfield.

Result of initial site investigation

This must provide:

- Size of the square
- The depth to excavate for square construction
- Drainage requirements (when planning, allow for future increase of size).

Decision on suitable materials

Selection of the wrong sort of materials (or taking the cheaper option) could be the cause of future problems. All materials should be obtained from recommended suppliers. A consultant or professional Advisor would possess knowledge of the appropriate selection of materials, in

particular the choice of loams within the profile and the grass cultivars.

Cricket Loam

Choice will be dictated by the standard of pitch required.

- First Class and county standard: minimum of 28-35% of clay
- Club standard: minimum of 25-30% of clay
- School: minimum of 25-28% of clay
- Should be compatible with the local indigenous soil
- Initial planning will indicate depth and therefore quantities
- The use of marl is not recommended

Useful Quantity Guide

(Per Pitch area of 75x10ft (22.87x3.05m) and inclusive of allowances for consolidation & element of wastage)

Depth mm (Inches)	Exact Quantity (Cubic metres)	Suggested Delivered Quantity (Cubic metres)
25 (1)	2.2	2.5
50 (2)	4.4	4.5
75 (3)	6.6	7.0
100 (4)	8.8	9.0
125 (5)	11.0	11.0
150 (6)	13.3	14.0



Grasses

There are a number of cultivar blends on the market, notably Perennial Ryegrass (*Lolium Perenne*) and advice should be sought for those recommended specifically for cricket purposes and considerations for the level of play and maintenance resources.

Individual cultivars of different species can be evaluated from the yearly edition of "Turfgrass Seed" published by the Sports Turf Research Institute (STRI)

The Turfing of a square is strongly discouraged!

Construction Methodology

1. Excavation and removal of topsoil/subsoil to an agreed depth and to uniform, graded level.

2. Drainage laid as planned and inclusive of stone layer and course sand blinding layer if site survey indicates the necessity.

3. Sub-Base. If the depth excavated exceeds 100mm (4 inches) then a loam can be used as a sub-base – this should be as compatible possible with the shrinkage values of the topsoil and thoroughly keyed in during construction.



4. Consolidation This is the most important element of construction – Uniform consolidation should be undertaken approximately every 50 mm (2 inches) by using an appropriate method. The best and time-honoured process is by "heeling" but is very time consuming and labour intensive to be cost effective for most contractors who prefer usage of appropriate machinery such as the caterpillar tracks or tractor tyres or "sheeps foot" rollers. Whatever method is used care must be taken to ensure uniformity with no air pockets remaining and each layer to be keyed in. The projected optimum playing performance rating will only be achieved if this process is completed correctly. The final surface levelling should not be done by a heavy roller as it may leave isolated and uneven pockets

5. Levelling can be accomplished by using basic strings and pegs or rails/shuttering. The most modern method used by many contractors is by laser guided grading technology and equipment that has proved to be precise and rapid thus minimising the chance of inclement weather interfering with the construction schedule. The final surface should be level along the direction of play although a fall of 1:100 is acceptable with a cross fall of 1:60-1:80. In all cases the square should blend smoothly into the outfield and be finished proud of the surrounds by 25mm (1 inch) to allow for water run-off and prevent standing winter rainfall to the detriment of grass health and build up of associated algae or "squidge".

6. Seeding can be achieved by raking the surface by powered or hand rake or by using seeding equipment specially made for the purpose, preferably leaving a "slotted" or "dimple" type finish, sowing at a rate of 50gm²m (1³/₄ oz per ²yard). Lightly rake the seed into the surface and finish with a light hand roller. A pre-seeding fertiliser can be applied before seeding or after establishment if considered necessary.

7. Irrigate when necessary to encourage germination and establishment. Germination sheets can be considered to facilitate and prevent the occurrence of damage from wash-off cause by severe rain storms.

8. After-care. Erect a form of protective fencing around the area of the square to prevent unwanted encroachments and follow the appropriate after care maintenance measures.

ALLOW 18 MONTHS TO 2 YEARS BEFORE THE SQUARE IS READY FOR USE.

Example Specification for the Construction of a New Cricket Square.

Schedule of Works

This specification provides a summary of information for a comprehensive construction of a cricket square to be constructed for a cricket club. The area being approximately 46m x 24m to a total depth of 325 mm. The work involves excavation, drainage, construction, seed bed preparation and seeding.

General

The new cricket square shall be located on the outfield at the position shown on Drawing No* and in agreement with the client's representative

Excavations

Excavations should be carried out when there are suitable ground conditions so that minimal damage is caused to the surrounding area. Top soil should be removed from the area of cricket square, if it is to be re-used it should be stored in an approved place on the outfield. No sub soil should be scraped off with the top soil. Any surplus top soil should be disposed of as agreed by the client's representative. The exposed sub soil can then be excavated to a depth of 325mm (13 inches) from the original surface level. All sub-soil to be disposed of off site at contractor's tip. The sub-soil should then be accurately graded to allow for build up of the drainage layer, blinding layer and cricket loam for

the square as shown in the cross section. The formation level should be of even consolidation and a tolerance of +/- 19 mm (³/₄ inches). Any surplus sub soil should be disposed of as agreed by the supervising officer.

Weed control

If necessary and in agreement with the client's representative, apply approved total herbicide to the formation level of the square in the manner recommended by the manufacturer.

Drainage

On completion of the previous items a perimeter drainage system is to be introduced. The drainage system shall run along the four edges of the square and link to an existing drain on the outfield. Trenches excavated to a width of 100–150 mm with all arising carted off site to approved tip. All drainage pipes to be 100mm of polymer perforated corrugated pipes, laid to a minimum depth of 600 mm-minimum gradient of 1:100. and level checked before backfilling. Backfill all drains with 3-10mm of angular stone to the top of the formation.

Stone Drainage Layer

A drainage layer of a similar filling to the trenches to be laid to a consolidated thickness of 100mm (4 inches) over the entire construction area.

Blinding Layer

A 50mm (2 inches) layer of coarse sand laid to form a blinding layer and ensuring that the correct level is formed ready for the clay loam. Rake the blinding layer to form a key for the loam.

Rootzone Profile

Lay and grade to level a 75mm (3 inches) depth of recommended base loam and consolidate as required. Rake surface to create key for next layer.

Lay and grade to level a 62mm (2 inches) layer of recommended cricket loam and consolidate as required. Rake surface to create key for next layer.

Lay and grade to level a final 62mm (2 inches) layer of recommended cricket loam and consolidate as required. The final level to be 25mm proud of and trimmed into the surrounding area.

Surface and Seed Bed Preparation

Carry out final grade to a tolerance is +/- 3 mm (¹/₈ inch). Apply evenly to the whole area an approved pre-seeding fertiliser and power/hand rake surface to prepare for seeding.

Seeding

An approved grass seed blend to be sown in two directions by seeding device at 50gm per ²m. Hand rake in to surface.

Establishment

Attend site as and irrigate area to aid establishment for up to * visits if required.

Maintenance

Carry out initial mowing operations when the sward is established to a height of 50mm (2 inches) primary with a rotary type machine then by a cylinder mower (preferably 10 bladed) allowing for up to * cutting operations.

Further Maintenance Operations

As agreed by client's representative.



IV. RESTORATION

(Fraise Topping –Fraise Mowing)

In the UK, in almost every town and village can be found a cricket ground, many having been established over the course of a century as they have on the playing fields at some of the oldest public schools.

Small wonder then that players complain that they find many pitch playing characteristics notoriously low and slow. This can be observed by examination of the makeup of the soil profile. Years of applications of top-dressings can be seen forming layers often with differing loams that became incompatible or separated by bands of buried fibrous organic matter. Many performance ratings are also exacerbated by depths of surface thatch acting as a cushion and preventing water and air from promoting a healthy sward and vital root establishment. Top-dressings of heavy cricket loam applied to “stiffen” the surface just sit on top of the fibrous organic material without truly being incorporated into the soil below, at best diluting the fibrous content but susceptible to the ball impact causing the familiar expression, “going through the top” and associated unpredictable, even dangerous bounce. When they occur the square is considered “tired out”. Strictly speaking they are the results of incorrect management procedures over many years that were unwittingly passed down as standard practice although of course there were not the resources of equipment available today. In the majority of cases the original level of the square underneath the build-up of years of top-dressings, show that the soil is firm and consolidated without prohibitive layers or breaks present.

Effecting a cure in the past necessitated excavating the offending profile and replacing with a new approved cricket loam. Indeed throughout the mid 1970s up to the present day, many of the top Test and County grounds were systematically having individual pitches relayed, some to depths of 300-400mm (12-16 inches).

This is of course an expensive exercise implemented over a number of years to complete the whole square with consideration towards continuity of materials and sound, consistent construction techniques, each pitch taking up to 5 years to fulfil maturity and optimum playing performance ratings. Improving the levels of the square, especially where slight “saddles” were present were limited due to using adjacent pitches as a level profile “template” and the associated dangers of leaving an undesirable “step” especially at the professional first class level of the game.

For the recreational game few clubs could even contemplate such a cost prohibitive initiative with the associated high level of management skills required to nurture the young pitches to maturity. Not so much a cure but more of a remedial measure, the only cost effective operation was to aerate using hollow tines to remove plugs of at most 75-100mm of the top profile and work fresh loam into the holes. If done proficiently this operation did improve some poorly rated squares but it was more the exception to the rule with no real estimation of a realistic time span to really enhance and improve the playing characteristics.

A recent innovation invented in Holland has been introduced into the UK. Originally intended for general winter Sports Turf like soccer pitches, its use has been monitored carefully since 2001 for restoring cricket squares very cost effectively and swiftly (in most cases 1-2 days given favourable weather conditions) generally without compromising the club's fixtures the following season yet drastically changing the levels, quality of grass content and overall playing performance characteristics *but only where the correct conditions of the profile have been identified by qualified advisors as being suitable.*

Restoration of Cricket Squares System



1. Planing off the surface to establish a primary level



2. Creating a uniform tilth



3. Spreading and integrating cricket loam



4. Grading to level



5. Overseeding the final surface



6. Six weeks after completion

The machinery is basically a tractor mounted, surface planing device similar to a flail mower that can remove the top surface down to a maximum depth adjustment of 40mm (1½ inches) in one pass with all arisings deposited on a conveyor belt straight into an accompanying trailer. An average ten pitch square (100 x 75 feet or 30.48 x 22.86 meters) can be stripped of years of history in a couple of hours.

Experience has guided experts and contractors who understand the unique dynamics demanded of cricket squares into 3 types of restoration operations according to soil profile make-ups and adviser's recommendations.

These are:

1. Fraise Topping

2. Fraise Topping & Cultivation

3. Fraise Mowing

The basic principles of each are outlined as follows:

Fraise Topping

This is the most popular method of swift restoration whereby the device removes the grass surface and underlying soil. Experience has shown that with a succession of passes with a shallow setting at apposing angles, gradually shaving off offending layers with special attention given to raised bowling ends, a basic primary level can be satisfactorily established.

The next step is to form a shallow tilth of no more than 25mm in order to incorporate an approved Cricket loam displaying as near compatibility features to the indigenous soil. This is graded out with a levelling device before a final top soil is added, graded, fertilised and overseeded with an approved cultivar blend. It is essential that the smooth, final levels should remain proud of the surrounding outfield to allow for rainfall run-off and prevent formation of algae/moss.

Occasionally, some of the arisings, once devoid of organic content, are removed so cleanly and fine that it can be re-cycled and blended with the new loam to save costs but again this must be determined by expert advice beforehand.

Inexpensive germination sheets will assist maximising grass uptake and preventing drying out or wash-off in the event of extremely heavy rainfall. The result of most operations if not completed too late in the year display excellent grass coverage within 3-4 weeks as the seedlings are in direct contact with the soil and not inhibited by thatch. Initial rooting is normally very aggressive so in the majority of cases there is no need for aeration until the following autumn. A worm suppressant is useful early on to prevent castings from spoiling the smooth new levels during late winter and early spring.

Careful aftercare should ensure that cricket will commence as normal in the new season, the principle being that as the square has not been re-laid it does not need to settle and the firmness of the surface will be immediately felt underfoot.

However, if the final surface is level or below that of the surrounding outfield, an added determined depth of loam may be considered necessary in order to ensure surface water run-off. Under these circumstances, the aftercare management would be similar to that of a re-laid square.

Many clubs have benefited by the addition of extra pitches on the edges of the square, for youth matches and practice sessions. These being created by a single pass at maximum depth with the replacement loam incorporated with ongoing grading operations on the rest of the table.

Fraise Topping & Cultivation

Where the soil profile of the square displays certain traits such as deep underlying rootbreaks, a bed soil that is unsuitably too light to sustain a solid

foundation or levels that dip below that of the surrounding outfield then this method is often recommended and deployed.

The top surface is removed with the planing device almost acting as a turf cutter and a suitable implement is used to cultivate the layers and indigenous soil into a fine tilth. This is essential as air pockets trapped between larger aggregates will inhibit bounce and may cause subsequent localised fluctuations in surface levels over time.

An approved quantity of cricket loam is blended in and graded to level whilst consolidating the tilled profile until the final finish is established as already outlined in the previous Topping method.

Again grass uptake is very quick to establish but aftercare is quite different and more intense as this method effectively will act as a newly constructed square does in its first season with possibilities of cracking and "rippling" during settlement.

Experience has shown that the performance ratings in the first season are generally low slow with pace and bounce not picking up until the following year. There remains a possibility that some fixtures might be compromised during the first year of establishment. The costs of this operation are generally higher due to more labour intensive work and the price of the extra loam required. However it remains far cheaper than conventional methods of reconstruction.

Fraise Mowing

This operation is simply the machine being set at an adjustment height to remove only the herbage whereby the surface is cleaned out of shallow rooting Poa Annua and any thatch accumulations. Deeper rooting Rye grass is also removed including old "woody" stems & crowns but the body of the plant remains intact allowing for regeneration to take place. With all arisings removed immediately this effectively far outweighs the benefits of traditional scarification.

Usually two passes at right angles are sufficient and also assist in maintaining smooth levels, leaving the area ready for surface grooving or a dimpled finish for the purpose of overseeding and incorporating top-dressing.

It is envisaged that this can be undertaken every 3 years and therefore build-up of top-dressings, saddles and layering will become a feature of the past to the benefit of quality pitches and players' performance standards in the UK. County grounds have now had the confidence to embrace this technology with positive results and considerable improvements.

V. AFTER CARE

A most important aspect towards facilitating early settlement, maturity and maximising the performance ratings of newly laid or restored squares and pitches, is the correct deployment of after care procedures. Many first-rate contractors' specifications on completion have been seriously compromised by an absence or lack of post-work measures to ensure a successful outcome.

A contractor will normally agree to undertake the first cut and re-check surface levels after completion. This can be advantageous to the client as it encompasses the contractor's desire to advise and ensure that the maximum germination of seed is obtained by irrigation if necessary during very dry spells and re-establish if wash-off from severe rain storms are experienced. Cheap germination sheets that cover the entire area are an extra expense but well worth considering to avoid wash-off and retain moisture to prevent seed failure. At their discretion, some contractors have adopted the practice of lightly rolling the surface (no more than the weight of a 20 inch (50.8cm) fine turf mower approx 110kg/ 2.16cwt) when the grasses are just coming through. This action appears to encourage tillering and conserve moisture in the surface.

A surround fence will assist to deter wildlife from damaging the completed project and indicate a restricted area to unauthorised personnel.

For those that undertake these tasks themselves, the first cut can be with the usage of an airborne (Hover) or rotary mower ensuring sharpened blades to avoid tearing or pulling at the delicate new grasses. This should occur about four weeks after germination depending on climatic conditions and growth rate or at least when the sward is around 50-75mm (2-3 inches). It is detrimental to allow the sward to become long and lanky as the soft top growth will obscure worm casting and lend towards a thin open surface when eventually cut back. The aim is to cut no more than a third of the grass leaf at a time until a maintenance height of cut is achieved (Approx. 20-25mm, $\frac{3}{4}$ - 1 inches in winter, 20-15mm in summer).

If the surface is too soft to walk on or take machine traffic, then a hover type mower can be deployed by using two people and pull ropes. (Ensuring that relevant risk assessment and health & safety measures are adhered to).

Weed infestation can be quite alarming even to professional groundsmen but indicates that the loam is not inert. The broader leaved species normally succumb to closer mowing regimes and once the sward is strong enough, an application of selective weed control will account for the remaining weed content.

Cricket loam companies will not normally supply sterilised loam unless specifically requested and this is usually at a higher cost.

There are around 25 species of earthworm occurring in the UK although only three are responsible for the majority of worm casting activity, if allowed to go unchecked can ruin the smooth surface levels with resultant unsafe playing conditions and create bare areas ideal for weed establishment. There are no chemical worm eradication products available but

there remain for an uncertain period of time products classified as worm control.

These should be applied by a competent and certified operator whenever worm activity is present.

All chemical control measures should not be undertaken until the grass plant has matured to the three leafed stage of growth.

Regular brushing or drag-matting of the square will assist to disperse casts when friable. Nutrient levels are generally in more demand in a new construction so these need to be attended to when necessary. It is advisable to seek a nutritional analysis at intervals to ensure the correct nutrient and Ph levels are maintained for optimum grass health.

Initial rolling procedures are one of the most important yet less understood operations that are essential towards achieving the deep seated consolidation required of a square/pitches. This is an essential element towards the requirements of the game of cricket, good pace, carry and consistency of even bounce. The timing is not an exact science but recent rolling trials indicate that the condition of the soil profile and optimum moisture content is the key. A 36 inch motor mower weighs around 254kg (5cwt) and is ideal for initial settlement, especially during winter months when the soil is in a "plasticine" condition. The cutters can be engaged during mild spells to tidy up the sward but again ensuring that the blades are sharpened.

Sooner or later the decision will have to be made to introduce the heavy roller and this will solely depend on the moisture content of the new square. Neither too wet nor too dry. It is advisable though to err on the side of caution for the initial rolling so as not to cause pushing the surface in a "bow-wave" fashion and capping the surface or induce "rippling" that can lead to very unsafe playing conditions. The operation should not be excessive in the first year and priority to cross and diagonal passes with speeds progressively slower as even consolidation is achieved.

A feature of newly laid squares or pitches are that during the process of maturing a certain amount of settlement can occur, the severity of which usually depends on how well accomplished the construction methods were applied, specifically the condition and quality of rootzone materials and consolidation. This may appear as overall slight or deeper sinkage, excessive cracking and associated movement of "plates", during the formative years.

To counteract this primary settlement and expedite maturity, wide cracks should be methodically filled with finely screened loam and firmed using an implement such as a builder's wide cold chisel and seeding in order to knit the cracks together. Just rubbing in top dressing will not facilitate the procedure. Deep tine aeration to break large plates into smaller cracking patterns is known to improve irregular bounce characteristics but should only be undertaken under expert supervision.

The fine cracks that appear during normal pitch preparation are an accepted feature that can often be limited by use of covers to prevent the surface from drying too rapidly.

By use of a 12 foot straight edge or similar device, routine checks on surface levels should be made especially if "rippling" has occurred, so that, where considered necessary, carefully applied top dressing can be administered to correct levels. It is important though to thoroughly key the dressing in and not trap organic matter in low spots as it would lend towards a root-break discontinuity in the profile years later after many seasons of applied clay loam top dressings.

Aeration (spiking) is generally not necessary within the first year of use for newly laid squares. It may however be extremely beneficial for some restored squares but in all cases observation and management of the profile should be undertaken before considering the type of machine and timing of the operation.

Outfield Areas

Standard Turf Culture maintenance practices will apply to outfield areas during the post - construction stages ie observation of any stones remaining on the surface and picking if necessary, Initial topping of the grasses to encourage tilling and subsequent mowing operations, light rolling, fertiliser applications when required, control of worm and weed activity, regular brushing/drag-matting etc.

Frequently a feature of newly constructed outfields in the first year of usage, is that they can become very firm, prohibiting player safety and preventing water percolation in the event of prolonged periods of rainfall. Some form of de-compaction may be required by deep aeration methodology.

Some ground authorities deliberately allow thatch to develop to cushion the surface hardness but could lend towards compromising the future health of the sward, especially during periods of drought and associated problems.



Non-turf pitches and facilities are best described as facilities that do not support grass or vegetation. They are designed to perform without any form of vegetation.

1. TYPES OF PITCHES AND CLASSIFICATION

There two types of structures as indicated below:-

1. **Bound:** like concrete or bitmac supporting one or more surfaces.
2. **Unbound:** like water bound or interlocking minerals supporting one or more surfaces.

The pitch systems can be classified into four groups based on the way pitches perform. The determining factor is the effect of water on the way pitches play.

The playing performance of pitches affected by water are described as Dynamic and those that are not significantly affected, as Static.

ECB Performance Standard

All pitches shall perform within the limits as specified in the ECB performance standard specification which indicates the range of performance criteria within which all pitches shall perform in order to emulate a good natural grass pitch.

Parameters are set for vertical ball bounce, friction, hardness, traction, surface evenness, (smoothness), gradients plus other performance criteria applicable to the material component used within the structural design of the pitch.

Classification

Practical research during the past 25 years has shown the top 100mm of a non-turf pitch influence the playing performance. The ability of this zone to absorb moisture is a major factor in determining how a pitch plays.

The number and depth of moisture absorbing components in the zone affect the extent to which a pitch performs thereby providing the nearest comparison to a grass pitch. It is the combination of components and the extent to which they are affected by moisture that determine “the changeability” in a pitch in the same way a grass pitch is affected.

Based on the ability of the structure to absorb moisture and its affect on playing performance pitches are classified as.

Totally Dynamic

All the components to a depth of 100mm (4 inches) absorb moisture and therefore provide the nearest performance to a grass pitch.

Semi Dynamic

Where one or more components absorb moisture and others don't, thereby controlling the playing performance within defined limits.

Totally Static

None of the components absorb or are affected by moisture and therefore the pitch plays the same at all times.

Semi Static

When one component is affected by moisture and the remainder don't, providing a little variation in the performance.

(Note: No totally static or semi static pitches are approved within the ECB approval scheme at the time of publication of this document).

Further information on Non-Turf Pitches can be obtained from the ECB, NTP Guidance Notes and the Codes of Practice and Technical Requirements for the Design and Installation of NTP's.

II. MAINTENANCE

All non-turf pitches require maintenance and need managing if they are to last and fulfil their role providing an essential facility to clubs at an affordable cost.

Like grass, NTPs must be maintained or they deteriorate. All types need some maintenance on a regular basis as indicated below:

Static systems

Weekly:	Inspection and keeping free of debris Perhaps marking out Cutting the grass around the perimeter of the pitch
Monthly:	As above and any repairs
Twice a year:	Weed, moss, algae control Repairs to the ends

Dynamic systems

Weekly:	Inspection and keeping free of debris Perhaps marking out Cutting the grass around the perimeter of the pitch Perhaps rolling
Monthly:	As above and any repairs
Twice a year:	Weed, moss, algae control Repairs to the ends

Some dynamic systems require the surface components to be lifted and the unbound base renovated once a year or every other year.

Detailed information on the maintenance should be obtained from the system supplier.

Managing the facility will include:

1. They way the pitch is used and by whom.
2. Planning material requirements to ensure it is maintained in a satisfactory condition.
3. Planning labour requirements, who does what, players, the groundsman, contractor etc.
Are the personnel adequately trained?

Maintaining a typical Non-Turf Pitch

Remark the crease areas on a weekly basis, particularly during early days of settlement.

Remove any debris from the surface of the pitch by brushing, particularly the bowling ends and popping crease. This needs to be carried out regularly, twice a week if possible.

On unbound pitches occasionally roll, perhaps once or twice a week for the first few weeks. Use a 5-6 cwt (254-305 kg) roller in order to settle the base formation. During such work, wrinkles may appear in the surface at each end of the pitch as a result of rolling. The nails at the end of the mat should be removed and the wrinkles pulled out followed by re-fixing with nails.



The stump holes will need weekly repair by watering and firming with clay loam if required.

The pitch surrounds should be mown weekly to blend in with the rest of the square.

Occasionally it may be necessary to apply a weed/moss control to pitch exercising great care and being mindful not to leach the materials into the surrounding ground, killing vegetation, therefore 'contact herbicide' are recommended. Calcined sulphate of iron is effective on moss on synthetic pitches.

No vehicles should be allowed on to the surface especially when newly laid.

On some pitches it may be necessary to refill the bowlers delivery area with particulate material, this taking place on a regular basis.

Out of season maintenance

During the autumn, following the cleaning of the ends, on some pitches, a top dressing should be applied and worked in to the bowler's delivery area. After the pitch has settled down and been used for a season, it may be necessary to carry out remedial work to the base formation undertaken as follows:

- Remove the surface matting.
- Remove the underlay if one is used.
- Break up the unbound mineral base by lightly pricking with a fork, particularly in areas with depressions.
- Incorporate new material in to the disturbed unbound mineral base.
- Level the base with a straight edge and appropriate equipment.
- The underlay should then be relaid and tensioned.
- Relay the surface and tension, followed by filling the stump holes with new clay loam.

Where major depressions have formed, it is important to fork to a greater depth, working in sufficient new material in to the holes to build up levels. This is then followed by pricking the remainder of the unbound mineral material, top dressing with new material and working in after which the area is screened and consolidated. Consolidation can either be with a roller or preferably, a vibrator plate. The underlay, if used, and the surface mat carpet is then re-laid.

Potential hours of use per week: 30 plus

Maintenance inputs, time allocation.

- When first laid: 1-2 hours per week
- After first 3 months: 1 hour per week
- Autumn work: 8 to 10 hours
- Spring work: 3 to 4 hours

The allocation of time and the input of maintenance will ensure the pitch lasts for years. In order to obtain value for money it is essential Non-Turf cricket pitches are regularly maintained and used intelligently otherwise they will soon deteriorate and cease to be suitable for the game.

Further comprehensive guidance can be obtained from the ECB TS6 document on Artificial Surfaces, from the system suppliers or the Institute of Groundsmanship, Specialist consultant and advisors on NTP's obtainable from the ECB.

ECB Approved NTP System Suppliers**Notts Sport Ltd**

Premier House
18 Mandervell Road
Oadby
Leicester LE2 5LQ
Tel 0116 272 0222

Approved pitch systems:

1. The Nottsbase "D" System
2. The Envelope System
3. The 3 D System

Exclusive Leisure Ltd

28 Cannock Street
Leicester LE4 9HR
Tel 0116 233 2255

Approved pitch systems:

1. The Cricketweave System
2. The "T" based System

Clubturf Cricket Ltd

Lea House
5 Middlewich Road
Sandbach
Cheshire CW11 1XR
Tel 01270 753344

Approved pitch systems:

1. The Clubturf Natural Pitch System
2. The Clubturf International System

Verde Sports (Cricket) Ltd

Gabbotts Farm Barn
Bury Lane
Withnell
Chorley
Lancs PR6 8SW
Tel 01254 831666

Approved pitch systems:

1. The Test Match System
2. The Premier System

Total Turf Solutions Ltd

PO BOX 250
Northampton NN5 5WZ
Tel 01604 750555
Fax 01604 750780
Email enquiry@totalturf solutions.co.uk

Approved pitch system :

1. The Total Play System

I. INTRODUCTION TO PQS

Performance Quality Standards provides a means of determining the quality of a square or pitch at a given time. They are best described as 'a tool' in the management process and can be used for a range of applications as well as providing a series of 'Benchmarks' against which judgements can be made following the assessment/measurement of a square or pitch.

Each Performance Standard has a stated method of test of which the majority recommended are British Standards.

Within the PQS there are three categories of measurement that relate to the overall quality of a facility. These are:

- 1. The physical structure** – The profile make-up
- 2. The presentation quality** – The visual aspect
- 3. The playing quality** – The performance Ratings

Performance Quality Assessment Parameters and Test Method Measurements are used to determine the current quality and the information obtained can then be used to:

- Determine the current quality of the square/pitches
- Compare test results to Identify deterioration of the square/pitches
- Improve the playing quality of the pitches
- Determine the purchase of materials and equipment
- Set management objectives
- Prepare short and long term plans of a realistic standard expectation including future development
- Introduce a monitoring system including: testing, assessment, recording and review.

II. MONITORING

An essential part of managing and maintaining cricket facilities is to monitor the condition of the square, pitches and the outfield throughout the year particularly during the playing season. Using performance quality standards monitoring forms provides a means of monitoring quality which can be used to help in the management and maintenance programme, allocation of resources, finance, planning etc.

Forms for the cricket square and the outfield can be modified and the properties adjusted or reduced depending on the clubs needs and the extent to which the information will be used, ie renovation work, construction etc and provide an indication as to the quality of the facility provided.

It is suggested that the properties indicated in each table on the forms are the minimum required in "building a picture" of the way the facility is developing and highlighting areas where action is required.

The intervals between assessments can also be adjusted to suit the needs of the club. For instance, it may be desirable to monitor the Square four times a year but individual pitches say three times during the period a pitch is in existence in which case one form for each pitch would be used monitoring during each stage of preparation, during use and when under repair.

It is also helpful if clubs develop a programme for the activities required to manage and maintain the square, pitches and outfield.

This would include grass cutting, fertilising, rolling, repairs, and all activities required throughout the year. This can be used to quantify the resources required and the estimated cost.



NTP Quality Performance Standards

For Non Turf Cricket Pitches the following classifications for grading are:

1. First Class and Centres of Excellence
2. Club/Recreational
3. Junior (under 12)

III. COUNTY PITCH ADVISERS

Between 2001-03, the ECB with the support of Sport England, instigated the Pitch Adviser Scheme to improve the standard of recreational pitches across the UK, in line with the requirements and objectives of the National Facilities Strategy.

The project involved each of the County Cricket Boards nominating a candidate recognised to have had a minimum of:

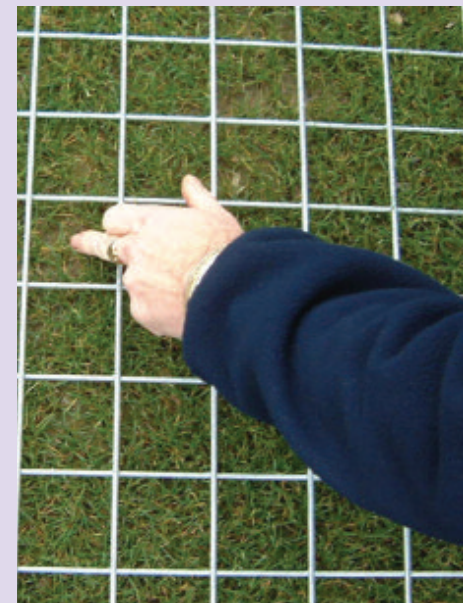
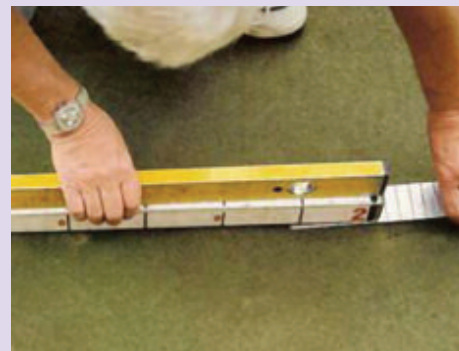
- 10 years of full time practical experience in cricket groundsmanship of a good quality standard facility.
- Attained an ECB/IOG level 2 certificate or other nationally recognised qualifications.
- Possession of good communication skills (Especially report writing).

A total of 45 appointed pitch advisors attended comprehensive residential training courses in order to attain standardised assessment and advisory skills and deployed to fulfil the following roles:

- Prioritised detailed assessment and recommendations that may include grant aid schemes, using Performance Quality Standard methodology.
- Create a response system for basic assessment duties that may include local League criteria.
- Monitoring the development of facilities where recommendations have been implemented.
- Assist in establishing effective County groundsman's Associations.

IV. BASIC METHODS

The pitch advisor will use a group of five basic items of equipment to make measured assessments on a square or prepared pitch. Once trained, any competent turf manager can purchase or make their own and use them to monitor their own facilities. There are other forms of equipment that can be used for more serious problems but are costly and perhaps preferably hired in or a qualified operative employed.



The five main items are:

- 1 Soil profile sampler & measure...**
To assess the profile make-up & depth of rootzone.
- 2 3m straight edge, spirit level, graduated wedge or measure...**
For determining the evenness of the surface & localised gradients
- 3 Square quadrant frame, divided into 100 equal squares...**
For identifying percentage values of ground cover composition, pests & diseases
- 4 Ball drop device, measuring post and good quality cricket ball...**
For testing vertical ball bounce on a pitch.*
- 5 Bathroom scales, 2 boards, dishes, knife...**
For ASSB (Motty) Test (not pictured)

*This test is only carried out on prepared pitches, pre or post match and indicates: the consistency of bounce (when a ball is dropped vertically) and when the ball bounce results are combined with friction measurements the true pace of a pitch can be calculated.



The bounce test results have been used for over 30 years to determine the binding qualities (ie clay content) of a pitch and its potential pace, which is expressed in percentage terms, as a guideline:

Less than 8%	very slow pitches
8% to 11% slow	
12% to 16%	easy paced
17% to 21%	fast
22% to 24%	very fast

Pitch Advisers can be contacted through the relevant ECB County Board

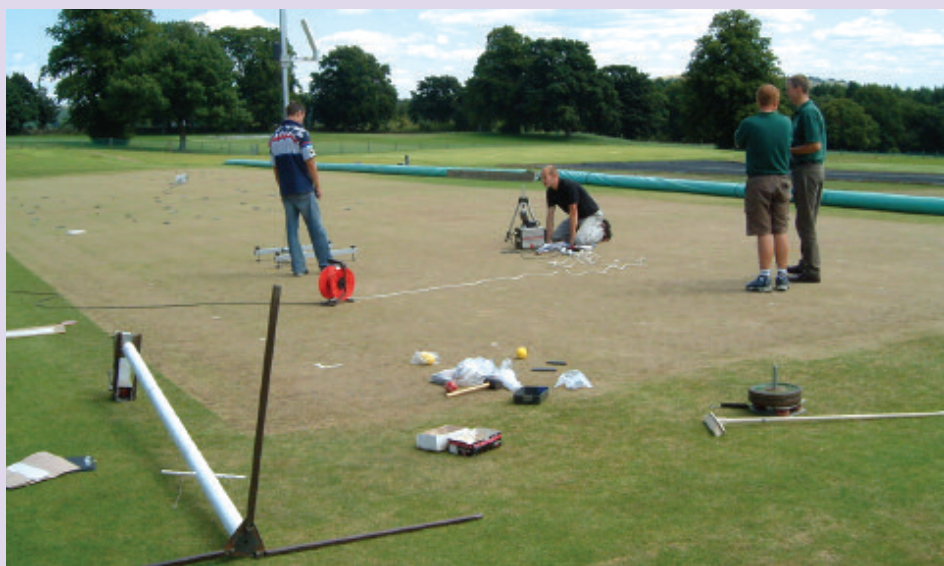
V. PITCH RESEARCH

In 1995 the ECB formed the Pitches Research Group and invited and commissioned experts, test houses and representatives to participate in the group. The work of the group has been enormous value to the game of cricket dispelling long held beliefs about pitches, substantiating others and introducing scientific evidence which will be of major importance to the game in the future.

A great deal of documentation has been produced and is encapsulated in a document under the title "Pitch Properties and Performance" which is obtainable from the ECB. Some of the work can be used within the performance quality standards at the senior levels of the game Premier league and above. It has a great deal to commend it as a source of information for all levels of the game including the providers of cricket facilities. It is not only beneficial for grass provision it provides information which can be used in NTP provision particularly by the developers of facilities.

For more comprehensive information on Performance Quality Standards, the Institute of Groundsmanship publish a document for a range of cricket applications.

For further information please contact the Institute of Groundsmanship (Tel: 01908 312511)
Email iog@iog.org



Example Basic PQS Form

Performance Standard	Cricket Club	Quality Standard		
		High	Standard	Basic
A. Herbage				
i) Length of herbage: (a) during the growing season (b) during the non-growing season		(a) 6 to 10mm (b) 8 to 13mm	(a) 8 to 12mm (b) 13 to 18mm	(a) 8 to 14mm (b) 16 to 25mm
ii) Bare area				
(a) total area		(a) Max. 5%	(a) Max. 10%	(a) Max. 20%
(b) diameter of any individual bare area		(b) Max. 25mm	(b) Max. 25mm	(b) Max. 40mm
iii) Total ground cover		Min. 95%	Min. 90%	Min. 80%
iv) Desirable grass species		Min. 90%	Min. 80%	Min. 60%
v) Poa annua		Max. 10%	Max. 15%	Max. 30%
vi) Other undesirable grass species		Nil	Nil	Max. 10%
vii) Weeds - Large-leaved		Nil	Nil	Nil
viii) Weeds - Small-leaved		Nil	Max. 2%	Max. 5%
ix) Moss		Nil	Nil	Nil
x) Algae and Lichen		Nil	Nil	Nil
B. Pests and Diseases				
i) Diseases		Nil	Nil	Nil
ii) Earthworms		Nil	Max. 2%	Max. 6%
iii) Pests		Nil	Nil	Nil
C. Profile				
i) Root depth		Min. 150mm	Min. 100mm	Min. 75mm
ii) Thatch depth		Nil	Nil	Max. 2mm
iii) Rootzone medium (of appropriate clay loam)		Min. 150mm	Min. 100mm	Min. 75mm
vi) Evenness: 2m straight edge, or 0.5m straight edge		Max. variation 4mm 3mm	Max. variation 8mm 4mm	Max. variation 10mm 6mm
xi) Gradient: (a)Length ways (b) Across the pitch		1:100+ 1:70 - 1:90	1:100+ 1:70 - 1:90	1:90+ 1:60 - 1:80

Pitch Measurements (Law 8)

	Pitch	Stumps	Bails (length)
Adult	20.12m (22 yards)	71.1 x 22.86cm (28 x 9 inches)	10.95cm ($4\frac{5}{16}$ inches)
Junior (Under 13)	19.20m (21 yards)	68.58 x 20.32cm (27 x 8 inches)	9.58cm ($3\frac{13}{16}$ inches)
Junior (Under 11)	18.29m (20 yards)	68.58 x 20.32cm (27x8 inches)	9.58cm ($3\frac{13}{16}$ inches)
Junior (Under 9)	16.46m (18 yards)	68.58 x 20.32cm (27.8 inches)	9.58cm ($3\frac{13}{16}$ inches)

ECB Recommendations for Junior Cricket

	Pitch	Stumps	Bails (length)
Under 15	20.12m (22 yards)	68.58 x 22.86cm (27x9 inches)	10.95cm ($4\frac{5}{16}$ inches)
Under 14	20.12m (22 yards)	68.58 x 22.86cm (27x9 inches)	10.95cm (4 inches)
Under 13	19.20m (21 yards)	68.58 x 20.32cm (27x8 inches)	9.58cm ($3\frac{13}{16}$ inches)
Under 12	19.20m (21 yards)	68.58 x 20.32cm (27x8 inches)	9.58cm ($3\frac{13}{16}$ inches)
Under 11	18.29m (20 yards)	68.58 x 20.32cm (27x8 inches)	9.58cm ($3\frac{13}{16}$ inches)
Under 10	17.37m (19 yards)	68.58 x 20.32cm (27x8 inches)	9.58cm ($3\frac{13}{16}$ inches)
Under 9	16.46m (18 yards)	68.58 x 20.32cm (27x8 inches)	9.58cm ($3\frac{13}{16}$ inches)

Area of Pitch (Law 7.1)

The pitch is a rectangular area 20.12m (22 yards) in length and 3.05m (10 feet) in width. It is bounded at either end by the bowling creases, which shall measure 1.52m (5 feet) in width on either side of a line joining the two middle stumps of the wickets, each parallel to it. (Law 7).

Width and Pitching (Law 8.1)

Two sets of wickets, each 22.86cm (9 inches) wide, (junior cricket is 20.32 cm (8 inches) and consisting of three wooden stumps with two wooden bails upon the top shall be pitched opposite and parallel to each other and at a distance of 20.12m (22 yards), (junior cricket 19.2m (21 yards) between the centres of the two middle stumps.

Stumps (Law 8.2)

Stumps shall be of equal and sufficient size to prevent the ball from passing between them. Their tops shall be 71.1cm (28 inches) above the ground, junior cricket 68.58cm (27 inches). The portion of a stump above the playing surface shall be cylindrical, apart from the domed top, with circular section of a diameter not less than 3.49cm ($1\frac{3}{8}$ inches) nor more than 3.81cm ($1\frac{1}{2}$ inches) (Law 8).

Stumps shall conform to the following specifications:

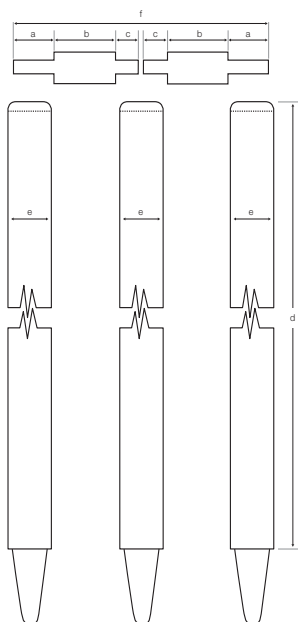
	Senior	Junior
Height (d)	71.1cm (28 inches)	68.58cm (27 inches)
Width (e) max	3.81cm ($1\frac{1}{2}$ inches)	3.49cm ($1\frac{3}{8}$ inches)
Width (e) min	3.49cm ($1\frac{3}{8}$ inches)	3.18cm ($1\frac{1}{4}$ inches)
Overall width of Wicket (f)	22.86cm (9 inches)	20.32cm (8 inches)

Bails

The bails, when in position on top of the stumps (i) shall not project more than 1.27cm ($\frac{1}{2}$ inch) above them (ii) shall fit between the stumps without forcing them out of the vertical.

Bails shall conform to the following specifications:

	Senior	Junior
Overall (a+b+c)	10.95cm ($4\frac{5}{16}$ inches)	9.68cm ($3\frac{13}{16}$ inches)
Longer Spigot (a)	3.49cm ($1\frac{3}{8}$ inches)	3.18cm ($1\frac{1}{4}$ inches)
Length of Barrel (b)	5.40cm ($2\frac{1}{8}$ inches)	4.60cm ($1\frac{13}{16}$ inches)
Shorter Spigot (c)	2.06cm ($1\frac{3}{16}$ inches)	1.91cm ($\frac{9}{4}$ inches)

**The bowling crease (Law 9.1)**

This is the back edge of the crease marking, shall be marked in line with the stumps at each end and shall be 2.64m (8 feet 8 inches) in length with the stumps in the centre.

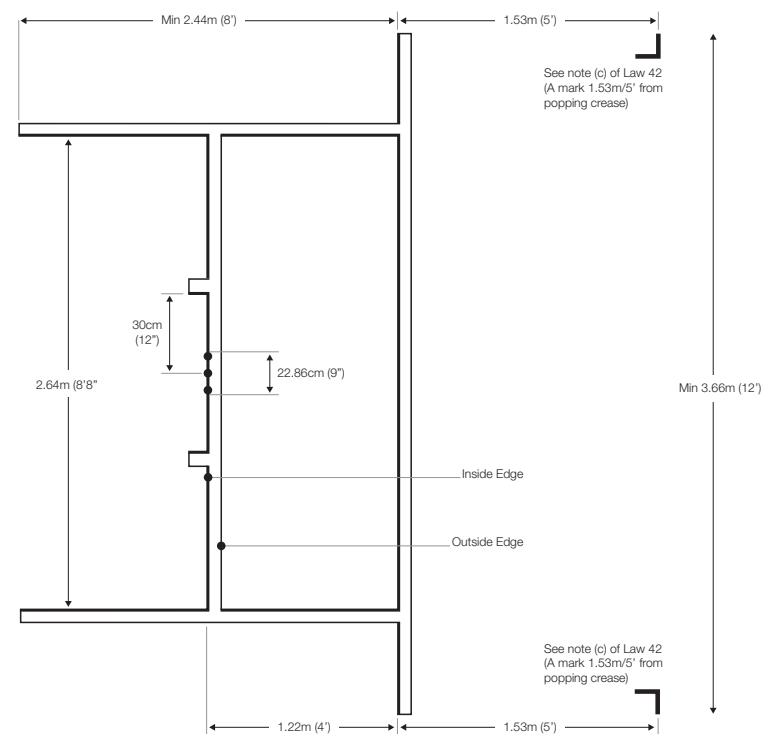
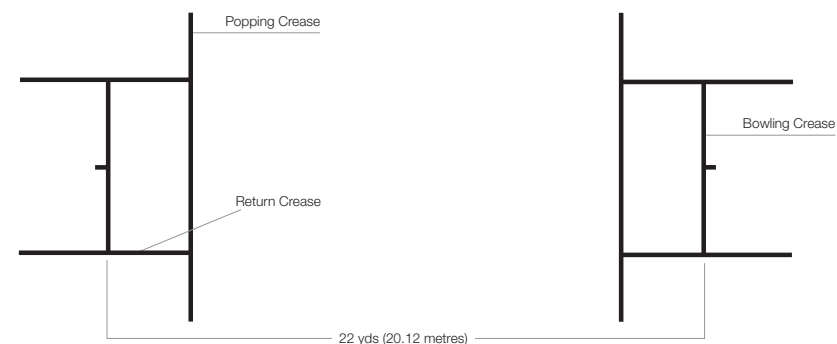
The popping crease (Law 9.2)

This is the back edge of the crease marking, shall be in front of, and parallel with, the bowling crease. It shall have the back edge of the crease marking 1.22m (4 feet) from the centre of the stumps and shall extend to

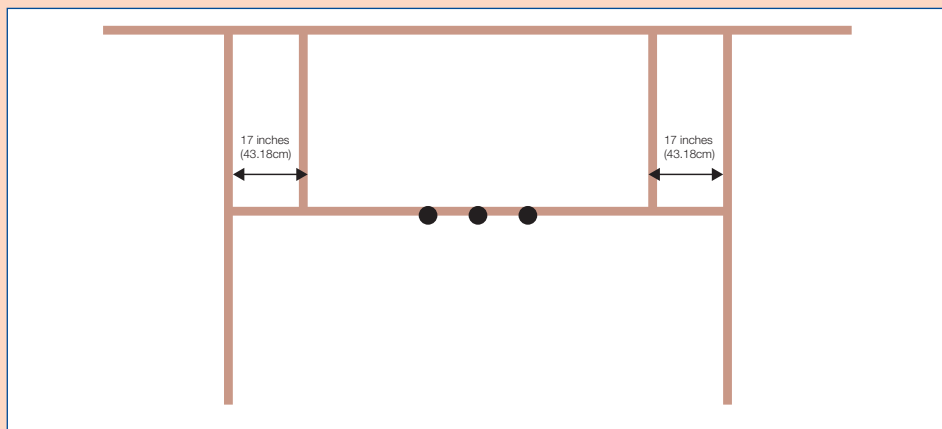
a minimum of 1.83m (6 feet) on either side of the line of the wicket. For Test and International Competitions, the 6 feet minimum will be replaced by a minimum of 15 yards. The popping crease shall be considered to unlimited in length.

The return creases (Law 9.3)

These are the inside edges of the crease markings, shall be at right angles to the popping crease at a distance of 1.32m (4 feet 4 inches) to either side of the line joining the centres of the two centre stumps. Each return crease shall be marked to a

Appendix B: Law 7 (The Pitch) and 9 (The Bowling, Popping and Return Creases)**Pitch Markings**

ICC One Day International Wides Crease Markings



minimum of 2.44m (8 feet) behind the popping crease and shall be considered to be unlimited in length. Wherever possible the creases shall be remarked during the game. The width of all lines shall be under 25mm (1 inch) and as near to 12.5mm (½ inch) as possible.

Preparation and Maintenance of the Playing Area (Law 10)

1. Rolling

The pitch shall not be rolled during the match except as permitted in a) and (b) below.

(a) Frequency and duration of rolling

During the match the pitch may be rolled at the request of the captain of the batting side, for a period of not more than 7 minutes, before the start of each innings, other than the first innings of the match, and before the start of each day's play.

(b) Rolling after a delayed start

In addition to the rolling permitted above, if, after the toss and before the first innings of the match, the start is delayed, the captain of the batting side may request to have the pitch rolled for not more than 7 minutes. However, if the umpires together agree that the delay has had no significant effect on the state of the pitch, they shall refuse the request for the rolling pitch.

(c) Choice of Rollers

If there is more than one roller available the captain of the batting side shall have the choice.

(d) Timing of permitted rolling

The rolling permitted (maximum 7 minutes) before play begins on any day shall be started not more than 30 minutes before the start of play. The captain of the batting side may, however, delay the start of such rolling until not less than 10 minutes before the time scheduled or rescheduled for play to begin, should he so desire.

(e) Insufficient time to complete rolling

If a captain declares an innings closed, or forfeits an innings, or enforces the follow-on, and the other captain is prevented thereby from exercising his option of the rolling permitted (maximum 7 minutes), or if he is so prevented for any other reason, the extra time required to complete the rolling shall be taken out of the normal playing time.

2. Sweeping

(a) If rolling is to take place the pitch shall first be swept to avoid any possible damage by rolling in debris. This sweeping shall be done so that the 7 minutes allowed for rolling is not affected.

(b) If no rolling is to take place the pitch shall be cleared of any debris before the start of each day's play, between innings and at all intervals for meals. See Law 15.1 (An interval)

(c) Notwithstanding the provisions of (a) and (b) above, the umpires shall not allow sweeping to take place where they consider it may be detrimental to the surface of the pitch. (It is considered normal practice to sweep back to behind the stumps from the 5ft mark and avoiding the protected area other than manually removing larger debris)

3. Mowing

(a) Initial Mowing

All mowings which are carried out before the toss shall be the responsibility of the Ground Authority. The pitch shall be mown before play begins on the day the match is scheduled to start or, in the case of a delayed start, on the day the match is expected to start.

(b) Subsequent mowings in a match of more than one day's duration. All subsequent mowings shall be carried out under the supervision of the umpires. The pitch shall be mown daily. Mowing shall be completed at least 30 minutes before the time scheduled or rescheduled for play to begin. Should it not be possible to mow the pitch in any day because of weather conditions, rest days or other reasons, the pitch shall be mown on the first day on which the match is due to be resumed.

(c) Mowing of the outfield in a match of more than one day's duration. In order to ensure that conditions are as similar as possible for both sides, the outfield shall be mown before the commencement of play on each day of the match, if ground and weather conditions allow. If for reasons other than ground and weather conditions complete mowing of the outfield is not possible, the Ground Authority shall notify the captains and umpires of the procedure to be adopted for such mowing during the match.

4. Watering

The pitch shall not be watered during the match.

5. Re-marking creases

The creases shall be re-marked whenever either umpire considers it necessary.

6. Maintenance of footholes

The umpires shall ensure that the holes made by the bowlers and batsmen are cleaned out and dried whenever necessary to facilitate play. In matches of more than one day's duration, the umpires shall allow, if necessary, the re-turfing of footholes made by the bowler in his delivery stride, or the use of quick-setting fillings for the same purpose.

7. Securing of footholds and maintenance of pitch.

During play, the umpires shall allow the players to secure their footholds by the use of sawdust provided that no damage to the pitch is caused and that Law 42 (Fair and unfair play) is not contravened.

8. Non-turf pitches

Wherever appropriate, the provisions set out in 1 to 7 above shall apply.

Covering the Pitch Before, During and After a Match (Law 11)

Test and International competitions

The pitch shall be entirely protected against rain up to the commencement of play and for the duration of the period of the match. It shall be wholly covered at the termination of each day's play, or provided the weather is fine, within a period of two hours thereafter.

The covers shall be removed no earlier than 05.00am and no later than 07.00am on each morning of the match (including the rest day) provided it is not raining at the time, but they will be replaced if it rains prior to the commencement of play.

The following areas shall also be covered unless the umpires decide otherwise:

- The covers must totally protect the pitch.
- The pitch surroundings, a minimum of 5 metres either side of the pitch.
- The bowler's run-ups to a distance of at least 10x10 metres.
- Any other soft or worn areas in the outfield.

Championship and other First Class matches

In addition or instead of the above:

- The whole pitch shall be covered the night before the match and if necessary, until the first ball is bowled; and whenever necessary and possible at any time prior to that during the preparation of the pitch.
- On each night of the match and if necessary, throughout any rest days.
- In the event of play being suspended on account of bad light or rain during the specified hours of play, and at lunch, tea and between innings on account of rain.

The covers shall be removed before 8.00am on each morning of the match (including the first day and rest days) providing it is not raining at the time, but they will be replaced if rain falls prior to the commencement of play.

For one-day matches there is no time stipulated for the removal of covers prior to play. This is at the groundsmen's discretion.

The following other areas shall also be covered unless the umpires decide otherwise.

- The bowler's "run up" to a distance of at least 10 yards, with a width of 4 yards.
- At least 20 feet either side of the length of the pitch.
- In addition to the above, further areas and in particular worn patches should, if possible and practicable, also be covered.

If flat sheet covers are to be used on championship pitches from 48 hours before the start through to the end of matches, a dry coir mat or equivalent must be placed under the sheet.

When play is interrupted on account of the weather and/or bad light, and raised covers have been the normal method of covering the pitch, a flat sheet cover can be used as a temporary measure to cover the pitch if so desired, instead of the wheeled covers having to be brought on immediately.

The flat sheet can remain on the pitch for a maximum of 30 minutes, after which time raised wheeled covers must be put on and the sheet removed. This should be done earlier if the weather appears likely to worsen, or if the interruption looks as though it will last longer than 30 minutes. In exceptional weather the flat sheet can remain longer than 30 minutes at the umpires' discretion.

In order to make play possible, the Umpires may decide, following consultation with the Captains, to have particularly wet or muddy areas covered by mats or blankets whilst play is in progress.

A pitch being prepared for a future match may be protected by a porous mat in order to avoid unnecessary damage. A second porous mat may be put down if an additional pitch which is intended to be used for a future Test match, One Day international or an ECB Cup/Trophy Final requires protection.

Premier Leagues

The covers must protect an area of at least 80 feet by 12 feet and clubs are encouraged to protect a larger area, including the bowlers' run-ups, whenever possible.

Clubs and Schools

If covers are possessed then Law 11 may apply.

Drying of Pitch and Ground

Test & International matches
Groundsmen may use any equipment available, including any roller, for the purpose of drying the pitch and making it fit for play.

Note: An absorbent roller may be used to remove water from the covers, including the cover on the match pitch (when flat sheet covers are used an absorbent hessian type underlay matting should also be used on the match pitch).

Boundaries: (Law 19)

The boundary is the perimeter of the field of play. For senior matches the Ground Authority shall aim to provide the largest playing area, subject to no boundary exceeding a distance of 90 yards or less than a minimum of 50 yards (45.72m). For Test and International matches, the playing area shall be a minimum of 140 yards (128.01m) from boundary to boundary square of the pitch. The pitch shall be a minimum of 60 yards (54.86m) from one boundary square of the pitch. When this minimum distance is used, the pitch has to be a minimum of 80 yards (73.15m) from the opposite square boundary. The straight boundary at both ends of the pitch will be a minimum of 60 yards. Distances shall be measured from the centre of the pitch to be used. For Women's International matches, the boundary shall be a minimum of 60 metres and a maximum of 65 metres. Distances shall be measured from the middle stump at each end of the pitch forming two semi-circles which shall then be joined by a straight line to form the complete boundary.

Defining the Boundary

On grounds where the boundary is not clearly defined by a perimeter fence or edge of grass area, it must be marked by a rope. For Test and International matches, all boundaries must be designated by a rope or similar object of a minimum standard as authorised by the ICC from time to time. Where appropriate the rope should be a required distance (3 yards / 2.74m minimum) inside the perimeter fencing or advertising signs. For grounds with a large playing area the maximum length of boundary should be used before applying the minimum 3 yards (2.74m) between the boundary and the fence.

Protected Area*

The protected area on a pitch is the area contained by an imaginary line 1.22m (5 feet) from the Popping Crease and parallel to it and within two imaginary lines drawn down the pitch from points on that line 30.48cm (1 ft) on either side of the middle stump, (Law 42).

Selection and Preparation

Before the toss for innings the groundsmen and Grounds Authority shall be responsible for the selection and preparation of the pitch. Thereafter, the Umpires shall control its use and maintenance.

Fitness of the Pitch for Play

The umpires shall be the final judges of the fitness of the pitch for play.

The pitch – ICC rulings

Covering the pitch – ECB Pitches. Reference Document.

Changing the Pitch

The pitch shall not be changed during the match unless the Umpires decided that it is dangerous for play to continue on it and then only with the consent of the two Captains.

Non-Turf Pitches

In the event of a non-turf pitch being used, the artificial surface shall conform to the following measurement (Law 10.8):

Length: a minimum of 17.68m (58 feet)

Width: a minimum of 1.83m (6 feet)

ICC/ECB Restrictions on the Placement of Fielders

Applies to competitions where regulations require restriction on the placement of fielders. This may vary subject to the playing regulations of the competition authority.

Markings

27.5m (30 yards) Outer Circle

Two semicircles shall be drawn on the field of play.

The semi-circles have as their centre the middle stump at either end of the pitch. The radius of each of the semicircles is 27.5m (30 yards). The ends of each semicircle are joined to each other by a straight line drawn on the field on the same side of the pitch.

The field restriction area should be marked by a continuous painted white line or 'dots' at 4.5m (5 yards) intervals, each 'dot' to be covered by a white plastic or rubber (not metal) disc measuring 18cm (7 inches) in diameter.

At the instant of delivery, there may not be more than five fielders on the leg side.

For the first 15 overs only two fielders are permitted to be outside the field restriction marking at the instant of delivery. For the remaining overs only five fielders are permitted to be outside the field restriction at the instant of delivery.

13.72m (15 yards) Inner Circles

Two inner circles shall be drawn on the field of play.

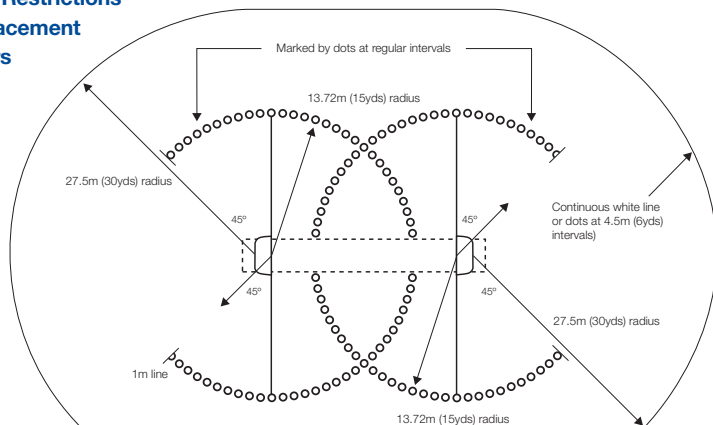
The circles have as their centres the centre point of the popping crease at either end of the pitch. The radius of each of the circles is 13.72m (15 yards). The field restriction area should be marked by 'dots'. The segment of the circles reserved for the slip positions shall not be demarcated (See marking plan).

In the first 15 overs there must be a minimum of two stationary fielders within the 15 yards field restriction of the striker at the point of delivery. The two stationary fielders may be permitted to stand deeper than 15 yards (in the demarcated area) provided only that they are standing in the slip, leg slip and gully positions.

Where play is delayed or interrupted affecting the innings of the team batting first, and the total number of overs available is reduced, the number of overs in regards to field restrictions shall be reduced proportionately. Fractions are to be ignored.

In the event of an infringement, the square leg umpire shall call and signal a no ball.

ICC/ECB Restrictions on the Placement of Fielders



Relevant to Groundsmanship

These guidelines describe the standards of facilities required by Premier League Clubs. Umpires will be asked to mark the playing facilities after each game and to comment on any deficiencies.

1. Pitch & Square

The square should be well maintained and in good condition with the whole of it being cut within 2 days of the start of each match. The pitch should be clearly distinguishable from the remainder of the square and shall be marked and rolled before play. The pitch should be appropriate for matches of at least 100 overs duration. The bounce of the pitch should be true and predictable throughout the match, and should not produce excessive spin or movement off the seam. Any holes or ruts on the square caused by previous matches must have been levelled, filled and firmed. It shall not have been artificially watered within forty-eight hours of the match. The popping crease shall be marked for a minimum of twelve feet to conform with Law 9 and the restricted area for the bowlers' follow-through (Law 42 Note C) shall be indicated with markings off the playing surface five feet in front of the popping crease and also on the bowling crease one foot on either side of the middle stump.

Stumps, which should be properly matched sets in good condition and with matching bails, shall be pitched by the groundsmen with holes adequately watered to allow easy resetting by the umpires. The pitch shall be brushed and re-marked (rolled if required) during the interval between innings. At least one roller must be available for use during the match.

2. Outfield

The outfield should be well maintained and adequately drained. It should be closely mown with no noticeable grass cuttings. Balls should be able to run true and the outfield should be free of holes, ruts or other obstructions that might pose a hazard to fielders.

3. Boundary

The boundary should be clearly marked by rope or a white line with markers approximately 20 yards apart. Alternatively where a gutter is used the edge shall be cleanly cut; if a picket fence or advertising boards form part of the boundary they shall be secure and in good conditions. No boundary shall be less than 50 yards or more than 90 yards from the nearer middle stump on the match pitch unless explicit dispensation is given by the League Management Committee.

4. Sight scenes

The structure and non-reflective paintwork of the sight screens should be in good condition. They should be of an adequate and appropriate size for the ground and should be completely outside the playing area whenever possible. Screens should be properly positioned before the commencement of play. Screens are to be provided at both ends unless explicit dispensation is given by the League Management Committee. A rope or boards should be provided to define the boundary if the sight screen(s) stand within the playing area, and the roped/boarded area must be of sufficient size to allow screens to be moved from side to side without adjusting the ropes/boards.

5. Covers

Covers must be available to protect the pitch and the bowler's run-ups from rain both during the match and in the preceding days as appropriate. Arrangements should be made for the groundstaff, players or other helpers to put the covers in place as quickly as possible. Wheeled covers are recommended, although plastic sheets/tarpaulins can be used provided that they are well maintained and are laid over a hessian underlay or coconut matting which covers the pitch area. The covers must protect an area of at least 80 feet by 12 feet and clubs are encouraged to protect a larger area, including the bowler's run-ups, whenever possible.



Clubs will be required to show that their covering arrangements are adequate to protect the pitch, taking into account the contours and draining characteristics of the ground.

6. Drying Equipment

An adequate supply of sawdust and cloths should be available to minimise lost playing time due to wet ground conditions. Additional covering for areas likely to cause a delay in play (eg the ends of previously used pitches) should be provided whenever possible. Coconut matting can be used to protect pitches under preparation. Other drying facilities, including brushes, forks, squeegee, absorbent rollers etc, can also be useful.

7. Rollers

Light (5-10cwt, 254-508 kg) and heavy (minimum 30cwt, 1524 kg) rollers should be available for use on the pitch. At least one roller must be available for use during the match.

8. Ground Surrounds

The surrounds should be maintained by regular cutting. Fences and walls should be well maintained. The entrance(s) to the ground should be clearly signed, showing the name of the club. Seating for spectators should be in good condition. Suitable measures should be taken to ensure that lost balls do not delay play.

9. Practice Facilities

Club should ensure that they have access to good quality practice facilities for mid-week practise for senior players and either mid-week or weekend practise for juniors. Net practise facilities should be available for use by both sides (ideally a minimum of two nets) before matches whenever possible. Any grass nets must be in good condition with true and predictable bounce. Artificial net pitches should be regularly maintained and rolled where appropriate to ensure true and predictable bounce.

10. Umpires

The Umpires will assume responsibility for the pitch and ground 30 minutes before the scheduled start of play on each day. Their responsibility will end at the close of play on each day or when play has been abandoned for the day. The home ground authority is responsible at all other times.

1. CLUB CRICKET

The equipment listed below is the minimum recommended items required to maintain a cricket pitch to a safe and consistent condition. Some items may be hired/borrowed at the optimum operation time as opposed to owned.

1. Mowers

- Pitch Mower
Cylinder mower (with no less than 8 blades, capable of a minimum of 130 cuts per metre, no wider than 600mm, variable speed and collection box), suitable for pitch / square preparation, with adjustment tools. (minimum of 1 machine per square)
- Outfield Mower
 - Either, trailed or mounted gangs, width 1.8-2.1m or,
 - ride-on, width 1.2-1.8m

2. Rollers

- Hand Roller
 - Weight 750-250 kg (light)
 - Width 0.6-1.0m
- Motor Roller
 - Self propelled
 - Medium up to 500kg, heavy 1,016kg or more
 - Width 1.2m

3. Scarifiers

- Hand Width 68cm
- Self propelled
 - Width 35-50cm (operating)
 - Engine 5hp (3.7 kW)
 - Tines; thatch control, thatch prevention, brush attachment

4. Aerators

- Sarrel Roller
 - Width 900mm-1.2m
 - Solid tines 37-50mm deep, set spirally along the drum

- Pedestrian/self propelled-hydraulic ram
 - Width 1.0-1.2m
 - Tine depth 75-100mm
 - Tine spacing 50-100mm
 - 75-100 holes per sq metre
- Tractor mounted
 - Width 1.2-2.5m
 - Tine depth 230mm
 - Tine Spacing 100mm

5. Fertiliser distributors

- Belt 61-92cm
- Cyclone/disc 1.2-2.4 distribution pattern

6. Pesticide Applicator

- Knapsack/walk over sprayer (groundsperson must be qualified)

7. Setting out Equipment

- Tape measures 2x30m, 1x50m, 1x100m
- Lines (Non stretch) 2x50m
- Pegs 12x150mm (minimum)

8. Marking Out Equipment

- straight edge 1x3.6m
- marking frame/template
- paint brushes/line marking material
- Boundary marking equipment/material

9. Irrigation Equipment

- system to get water to the square in sufficient quantities

10. Hand Tools

- | | |
|----------------------------|-------------------------|
| a. Springbok rake | i. Wooden mallet |
| b. Wheel barrow | j. Setting bar |
| c. Switch/whale bone brush | k. Shovel |
| d. True lute | l. Fork |
| e. Drag mat/drag brush | m. Tool kit |
| f. Besom broom/stiff brush | n. Bucket |
| g. Stump hole marker | o. Thumper/heavy panner |
| h. Hammer | p. Straight edge |

II. CENTRES OF EXCELLENCE

The equipment listed below is the minimum recommended items required to maintain a cricket pitch to a safe and consistent condition.

1. Tractor

Tractor unit, 25hp (or equivalent), low pressure tyres.

2. Mowers

- a. Pitch Mower
Cylinder mower (with no less than 8 blades, capable of a minimum of 130 cuts per metre, no wider than 600mm, variable speed and collection box), suitable for pitch/square preparation, with adjustment tools (minimum of 1 per square).
- b. Outfield Mower
 - 36 in cylinder mower, suitable for outfield preparation (ideally 2 required)
 - Either triplex ride-on, width 1.2-1.8m or,
 - Trailed / Mounted gangs, width 1.8-2.1m

3. Rollers

- a. Hand roller (x 2)
 - Weight 75-250 kg (light)
 - Width 0.6-1.0m
- b. Motor roller (x2)
 - Self propelled
 - Weight up to 500kg (medium),
 - Weight 1,524kg or more (heavy)
 - Width 1.2m

4. Scarifiers

- a. Hand Width 68cm
- b. Self propelled
 - Width 35-50cm (operating)
 - Engine 5hp (3.7kW)
 - Reels; thatch control/thatch prevention/ brush
- c. Outfield Tractor drawn (Single or multiple unit)

5. Aerators

- a. Sarel Roller
 - Width 900mm-1.2m
 - Solid Tines 37-50mm deep, set spirally along the drum
- c. Pedestrian / self propelled
 - Hydraulic ram
 - Width 1.0-1.2m
 - Tine depth 75-100mm
 - Tine spacing 50-100mm
 - 75 to 100 holes per sq metre.
- d. Tractor mounted
 - Width 1.2-2.5m
 - Tine depth 230mm
 - Tine Spacing 100mm

6. Fertiliser distributors

- a. Belt 61-92cm
- b. Cyclone/disc 1.2-2.4 distribution pattern
- c. Tractor mounted Distributor (also used as top dresser)

7. Pesticide distributors

- Knapsack/walk-over sprayer (groundsman must be qualified)
- Tractor mounted (used within regulations)

8. Setting Out Equipment

- a. Tape measures 2x30m, 1x50m, 1x100m
- b. Lines (non-stretch) 2x50m
- c. Pegs 12x150mm (minimum)

9. Marking Out Equipment

- a. Straight edge 1x3.6m
- b. Marking frame/template
- c. Paint brushes/line marking material
- d. Boundary marking equipment/material (wheeled marker, whitening, paint, rope etc.)

10. Irrigation Equipment

- System to irrigate the square in sufficient quantities
- Underground system (Pop-up), Self-travelling system to cover square, outfield & practise areas, with sufficient pressure. Standpipe of a minimum of 25mm bore.

11. Tractor attachments

- Drag brush/Mat/Harrow
- Overseeder
- Trailer
- Leaf sweeper
- Top dresser distributor
- Pesticide Applicator (qualified operators only)

12. Hand Tools

- a. Springbok rakes
- b. Wheel barrow
- c. Switch/whale bone brushes
- d. True lutes
- e. Drag mat / drag brushes

- f. Besom broom / brushes
- g. Stump hole markers
- h. Hammers
- i. Wooden mallets
- j. Setting bars
- k. Shovels & Forks
- l. Watering cans
- m. Tool Kit
- n. Buckets
- o. Thumper / heavy panner
- p. Straight Edge

13. Covers / Pitch Protection

- Mobile wheel-on or flat sheet covers
- Sponge water absorbent rollers (ride on/pedestrian) drying equipment
- Coconut matting

14. Miscellaneous

- Airline/Power washer



Consideration for the surrounding environment and welfare/safety of players, spectators and the general public is an important issue that is often neglected or ignored. Health and safety is a misunderstood and feared issue that is designed to protect individuals, damage to property and appoint responsibility.

Health and safety law is made under Acts of Parliament, the enforcement of being the responsibility of the Health and Safety Executive (HSE). Therefore any proven contravention can be enforceable by fine or imprisonment so apart from the legal requirements to follow regulations, there is a duty of care for all Sports Turf managers and users of grounds to protect the environment and surrounds. Pesticides and fertilisers are the most obvious threats but polluting machinery and destruction of habitats & waterways also need to be considered and possible cultural method investigated in their place.

All employers have a general duty of care to ensure the welfare of all their employees that may be affected by the activities of their business just as all employees, whilst at work must take care of themselves and others who may be affected by their actions.

Risk Assessments

To identify significant work place hazards so that all employees are aware of risks the employers have a duty to ensure that the two formats of assessment of risk (Generic & Local) are carried out by an appointed competent person, evaluated and logged to the various categories and levels.

Policy documents

An organisation must have a written copy of a Health and Safety policy document readily available and to the attention of all employees unless five or less are employed.

Regulations

These are some of the main regulations under the The Health and Safety at Work Act 1974 that involve general Groundsmanship duties

- The Provision and Use of Work Equipment Regs. 1998
- The Control of Substances Hazardous to Health Reg. 2002 (COSHH)
- The Management of Health and Safety at Work Regs. 1999
- The Provision and Use of Work Equipment Regs. 1998
- The Personal Protective Equipment Regs. 1992
- The Manual Handling Regs. 1998
- The Noise at Work Regs. 1989
- The Supply of Machinery (Safety) Regs. 1992 (Includes CE Marking)

For more comprehensive information contact The Institute of Groundsmanship who publish a document "Health and Safety Guidance for Sports Ground Managers, or the Environment and relevant Government Agencies.



The England and Wales Cricket Board in association with The Institute of Groundsmanship have developed a structured short course scheme to develop the skills and expertise of cricket groundsmen. The scheme consists of three levels of progressive training offered in four courses. The initial stage is the Spring and Autumn Practical courses, Level 1 Parts A & B, then followed by 'Understanding The Science', Level 2 and culminating in the 'Management Practises', Level 3 course.

A Five Day course is run annually that encompasses all three levels and specific Performance Quality Standards instructional day courses are also available.

The outline programme for each course is:

Level 1, Part A 'Spring Preparation'

Early Spring Maintenance
Preparation of the Square
Machinery, Mowing
Rolling, Watering
Scarifying & brushing
Fertiliser Application
Preparation of the Match Pitch
After Match Repairs & Renovation
Maintenance of the Non-Turf Pitches

Level 1, Part B 'Autumn Renovation'

Sequence of Operation
End of Season Repairs & renovation
Scarification, Aeration
Overseeding
Top Dressing
Fertiliser Application
Care of the Outfield
Maintenance of the Non-turf Pitches
Winter Work

These are one day courses at various sites around the counties.

Level 2

'Understanding the Science'

Pitch Specification
Soils Grasses
Fertilisers used in Turfculture
Pest, Diseases & Weeds of Turf
Synthetic Pitches
Machinery & Equipment

Level 3

'Management Practises'

Pitch construction
Preparing the Ideal Pitch
Pitch Allocation – The Outfield
Net and Practise Areas
Budgeting – Resources
Health & Safety management

These are two day courses at specific sites in the British Isles

Five Day Course

All Levels

PQS (Performance Quality Standards)

All courses are certified and accompanied by comprehensive handouts

For further information and application forms contact your County Cricket Development Office, County Cricket Board or The Institute of Groundsmanship on 01908 312511
Email training@iog.org
Website www.iog.org

For County Board contact details please visit www.ecb.co.uk







England and Wales Cricket Board

Lord's Cricket Ground London NW8 8QZ

T: 020 7432 1200 **F:** 020 7289 5619 **E:** info@ecb.co.uk

www.ecb.co.uk

From playground to Test arena