QUALITY PROGRAMME FIH

ENGINEERED FOR HOCKEY

FACILITIES GUIDANCE

Building hockey fields

VER. 01

INTERNATIONAL HOCKEY FEDERATION
FÉDÉRATION INTERNATIONALE DE HOCKEY

fih.ch/qp

1 Welcome

Hockey is the world's third most popular team sport; the *2018 Global Hockey Survey* conducted by the FIH, showed that there are now over 30 million people playing hockey. Fast, technically skilful, and requiring good levels of personal fitness, the sport is renowned for its social inclusiveness, gender equality, and ability to attract players of all ages.

During much of the 20th century, hockey was played on natural grass, and even today this surface is still used by many. In 1976, however, our sport was transformed when an elite level hockey competition was played on synthetic turf for the first time. Today synthetic turf, and especially the versions produced specifically for hockey, has allowed the game to develop into the fast, technically skilful, and exciting sport we now know.

But not all synthetic turf surfaces are the same, and it is important that those investing in hockey facilities select the type that is best suited to the needs of their facility. Deciding on which type of surface is best will depend on many factors. The choice is large, so the FIH has published its guide to *Outdoor Hockey Facilities.*

Having decided which type of hockey turf is most appropriate for your new facility, it is important that the new field (or HOCKEY5s court) is constructed correctly so it meets the needs of hockey, is sustainable and justifies the financial investment being made. To help ensure good quality fields are built, the FIH has produced this guide. It outlines the major considerations that should be considered when designing a new hockey field, and provides guidance on construction options and quality standards, etc. In writing the guide the FIH is aware that there are many ways of constructing a synthetic turf hockey field and these guidelines do not constitute any form of approval from the FIH on any particular form of surfacing or construction; the guide is intended to provide information to potential consumers to allow them to make informed choices when designing a hockey field.

Use of this guide

In many countries there will be building and planning regulations that need to be complied with. These are not addressed in this guide but need to be clearly understood by anyone considering a new hockey field.

Whilst every effort has been made to ensure the accuracy of the information contained in this publication any party who makes use of any part of this document in the development of a hockey field shall indemnify the FIH, its servants, consultants or agents against all claims, proceedings, actions, damages, costs, expenses and any other liabilities for loss or damage to any property, or injury or death to any person that may be made against or incurred by the FIH arising out of or in connection with such use.

2 FIH Quality Programme

A hockey field is a complex and expensive piece of sports engineering that is required to have the right playing characteristics, provide a safe and comfortable playing surface and be durable and long lasting. To help ensure these objectives are achieved, the FIH has developed its **FIH Quality Programme** to assist those developing new hockey facilities. The programme comprises:

- **FIH Hockey Turf and Field Standards**, which describes the qualities required from hockey turf surfaces and the fields on which they are laid; with different categories catering for all types of hockey from elite level, through club and college to community and high school.

- **FIH Approved hockey turfs** have been independently tested and shown to satisfy the requirements of the *FIH Hockey Turf and Field Standards*. Every product is assessed for over 30 different properties ensuring acceptable performance, player welfare, durability, and environmental compatibility.

- **FIH Fields Certification** – fields that have been independently tested and shown to have been designed and builtin accordance with the *FIH Hockey Turf and Field Standards*. FIH field certification is the internationally recognised quality mark for hockey facilities, showing they meet globally accepted standards.

> *" Our new hockey field was a major investment for the club. Knowing that we were using an FIH Preferred Supplier that was installing an FIH Approved Product and that everything was being checked by an FIH Accredited Test Institute, gave us great comfort and ensured we would get the great field we wanted."*
>
> " **MARTIN SCHAFER, Board Member, Club Deportive Manquehue Santiago, Chile**

3 The 9 key steps to a new hockey field

1 – Develop a Project Brief to establish what is required.

The Project Brief should establish the levels of hockey to be played, the anticipated amount of use the field will receive and how it will be managed

2 – Select the most appropriate type of hockey turf for the intended use of the field

See *FIH Facilities Guidance – Outdoor Hockey Facilities*

3 – Appoint a project team to oversee the design and construction of the field

e.g., landscape architect, sports ground consultant, quantity surveyor, etc

4 – Arrange for all necessary site surveys and ground investigations to be undertaken

5 – Develop the layout and specification for the new field

Ensure the design complies with the FIH *Hockey Turf and Field Standards*

6 – Appoint a specialist sports ground contractor to build the field

Wherever possible use an FIH Preferred Supplier or FIH Certified Field Builder

7 – Commence construction ensuring each key stage of the work is inspected & signed off

8 – At completion arrange for the field to be tested in accordance with *FIH Hockey Turf and Field Standards*

FIH Field Certification confirms the field has been built to the appropriate standards for the types of hockey to be played

9 – Play hockey 😊

Maintain the field in accordance with the hockey turf manufacturer's instructions

Establish a sinking fund to cover the cost of resurfacing the field in the future

4 Design & construction specialists

Typically, over 60% of the cost of a new hockey field is incurred by the construction below the playing surface and the surrounding infra-structure. It is, therefore, very important that a field is designed and constructed by experts that are appropriately qualified and have a proven experience in hockey field construction. Whenever a new field is being considered it is recommended a design professional is appointed to oversee the project. Typically, these will be a landscape architect or a specialist sportsground consultant.

For many projects the simplest procurement method is the design and build approach. This is a project delivery system used in the construction industry, where a client specifies what they want, and the design and construction services are contracted to a single company. Selecting the correct contractor to this role is key to ensuring a high-quality hockey field, that is delivered on time, and within budget.

FIH Preferred Suppliers are companies that manufacture hockey turf products and build hockey fields allowing customers to benefit from a one-stop approach to the construction of their new hockey field. The companies meet all the criteria of an FIH Certified Manufacturer and a Field Builder. Additionally, FIH Preferred Suppliers have also demonstrated a global commitment to work with the FIH to provide high-quality hockey fields suitable for international, national, club and development hockey.

FIH Certified Field Builders are construction companies that specialise in building hockey fields. The companies have a proven ability to construct fields to the standards the game requires, having the appropriate in-house civil engineering expertise and quality management systems to ensure consistency in their work. FIH Certified Field Builders partner with FIH Certified Manufacturers or FIH Preferred Suppliers to install FIH Approved Hockey turfs.

It is recommended that these companies are employed wherever possible. Contact details for our FIH Preferred Suppliers and FIH Certified Field Builders can be found at www.fih.ch/qp.

To ensure the new hockey field is constructed properly and meets expectations, it is recommended that proper quality assurance procedures are applied throughout the construction process. Site inspections are undertaken throughout construction with particular attention being paid to the completion of each key stage. A typical schedule of inspections would include:

Stage of construction	Inspected for:	Inspected by:
Formation	profile and gradients compaction	Civil engineer
Drainage system	trench detail, channel spacings and falls permeability of back-fill	Civil engineer
Edgings	design levels haunching and line	Civil engineer
Sub-base & asphalt pavement	construction depth compaction permeability surface regularity	Civil engineer or sports surfacing engineer
Shockpad	construction depth permeability surface regularity	Sports surfacing engineer
Hockey turf carpet	carpet fitting & quality of carpet joints	Sports surfacing engineer
On completion	compliance with FIH Hockey Turf and Field Standards	FIH accredited test institute

Construction supervision is likely to incur professional fees but will comprise a very small percentage of the overall project costs, and experience has repeatedly shown that projects that incorporate appropriate checks deliver higher quality fields that provide more sustainable hockey facilities. A few FIH Accredited Test Institutes offer full construction supervision services, their contact details can be found at www.fih.ch/qp.

5 Selecting a suitable site

The design and cost of a new synthetic turf hockey field will be greatly influenced by the site on which it is to be built and it should be recognised that some sites are probably not cost effective to develop. Factors that will influence the construction costs include topography, access, drainage, availability of an adequate power supply (for lighting) and most importantly ground conditions.

Ideally a pitch should be located:

- close to changing accommodation and other support facilities.
- on relatively flat ground – to reduce construction complexity and costs and to prevent contamination of the playing surface from run–off from adjacent banking, etc.
- so the playing direction is approximately north / south, to minimise the effect of a setting sun on the players, although the inability to achieve this orientation need not preclude the construction of a pitch.

Understanding the ground conditions on which a hockey field is to be located is fundamental to ensuring a good quality, stable, long lasting base construction.

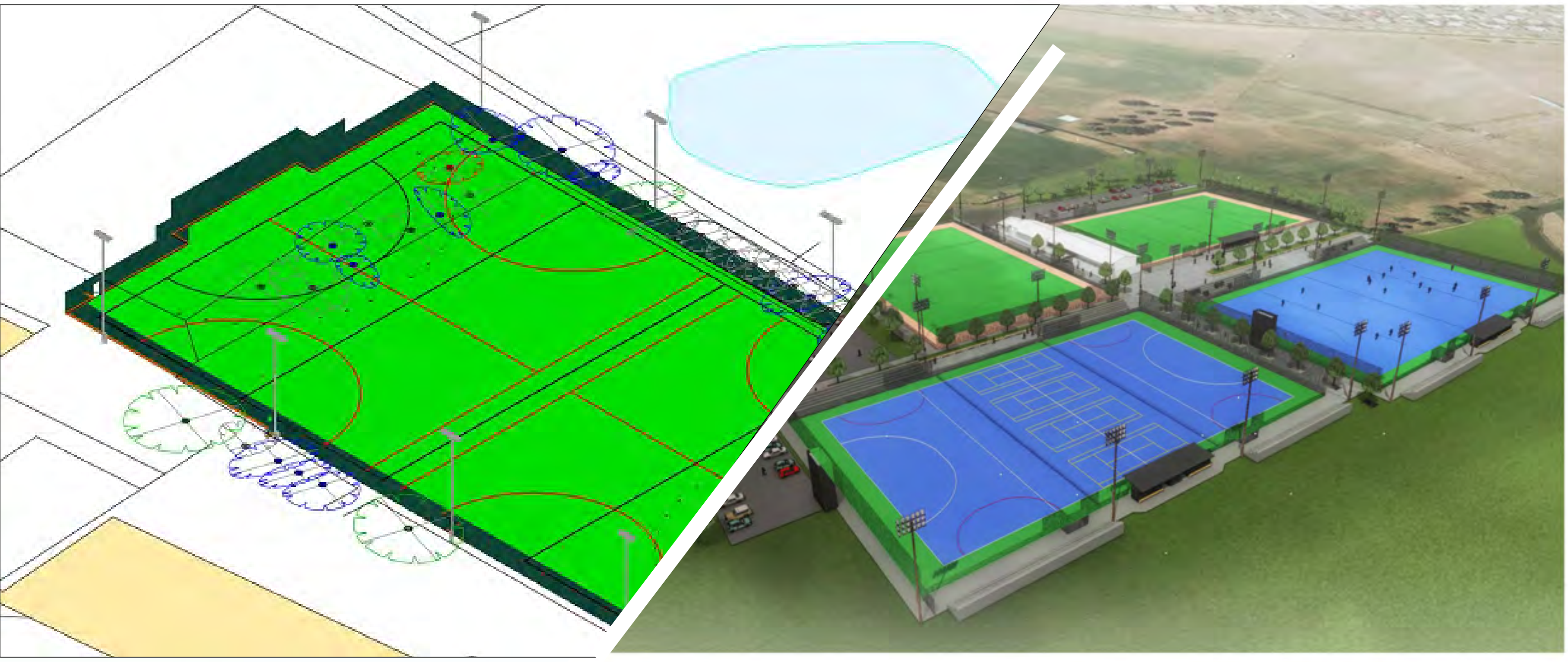
The cost of the facility will be greatly influenced by the ground conditions; costs will be much higher when engineering a difficult site and it should be recognised that on some sites solutions such as soil stabilisation may be required, whilst on others it may just not be cost effective to develop it as a hockey facility.

Therefore, specific investigations should be carried out in the location of the proposed facility to generate the following information:

- Topographical survey showing the profile and levels of the site
- Ground strength
- Groundwater level
- Sub-soil hydraulic conductivity
- Topsoil thickness
- An engineering description of the ground
- Soil classification – particle grading and soil plasticity indices (for fine-graded soils)
- Services, underground and overhead
- Indication of any ground abnormalities (mining, landfill, etc.)

For sites that have previously been used for industrial processes or landfill, a full geo-environmental survey and ground contaminant testing may also be required.

The results of the site investigations should be assessed by a suitably qualified person (e.g., Geotechnical Engineer) and the Designer to determine if any further investigations are required. It should be the responsibility of the Designer to fully understand the characteristics of a site.



6 Design principles

There are many ways of constructing a hockey field and no one method takes priority over another. It is often the case that the availability of specialist equipment and materials will determine which approach is most appropriate for a specific project or country. In many countries a typical construction will be as shown in Figure 1.

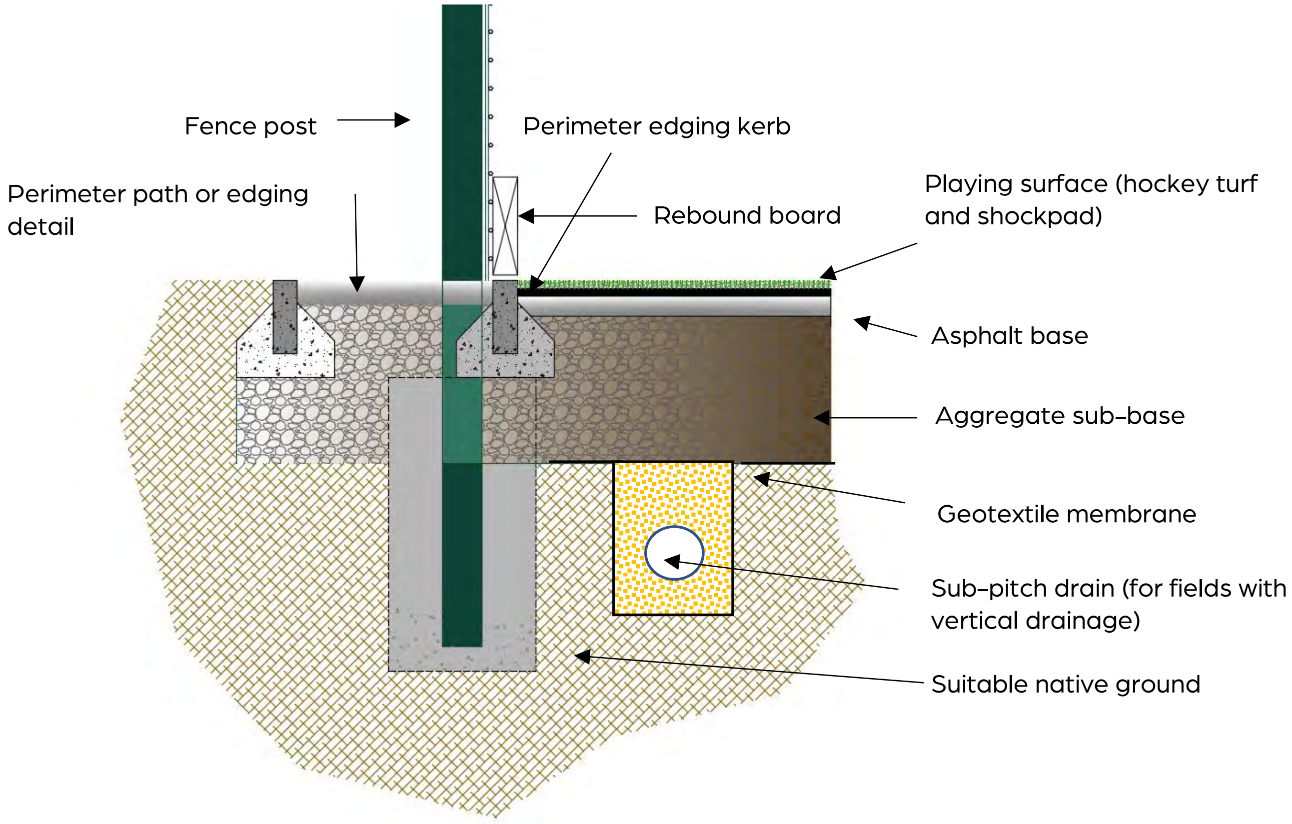


Figure 1 – typical hockey field construction (with vertical drainage)

Designing a hockey field requires specialist expertise. The needs of hockey differ from other sports and are certainly very different to other forms of general construction and civil engineering. Experience has repeatedly shown that employing FIH Preferred Suppliers and FIH Certified Field Builders is the best way of ensuring a new hockey facility meets the needs of hockey.

The criteria detailed in this guide are based on current best practice, but it is not the intention to restrict the innovation of new construction materials and methods. Recent innovation examples include replacement/reduction of aggregate sub-base layers with alternative preformed interlocking systems.

7 Field layouts

7.1 Dimensions

A field comprises the field of play (FOP) and perimeter run-offs. The FOP measures 91.40m by 55.00m. The FIH has established preferred and minimum run-offs. The preferred run-offs should be used on all categories of field, whenever possible, and are mandatory for Category 1 fields. The design of the field must ensure that there are no structures or fixtures located on the run-offs.

Depending on the category of field, the run-offs may be surfaced entirely with hockey turf (same quality as the FOP) or have a combination of hockey turf and some form of paving on the outer run-off. If hard paving is used, the transition between the two surfaces should be smooth and not create a trip hazard. Both surfaces should be laid with the same gradients.

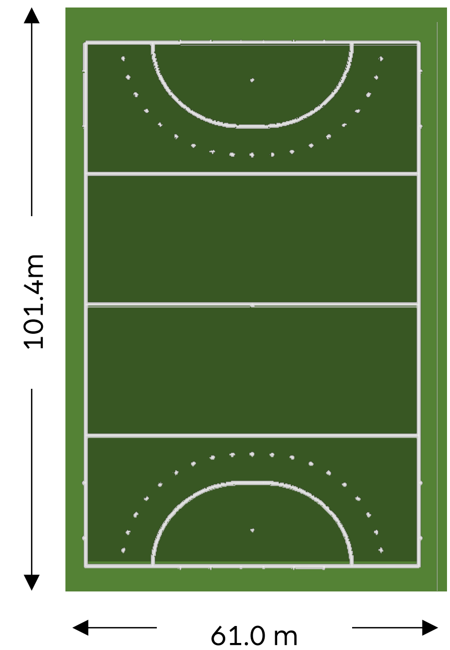


Figure 2 – field with preferred run-offs, fully surfaced with hockey turf

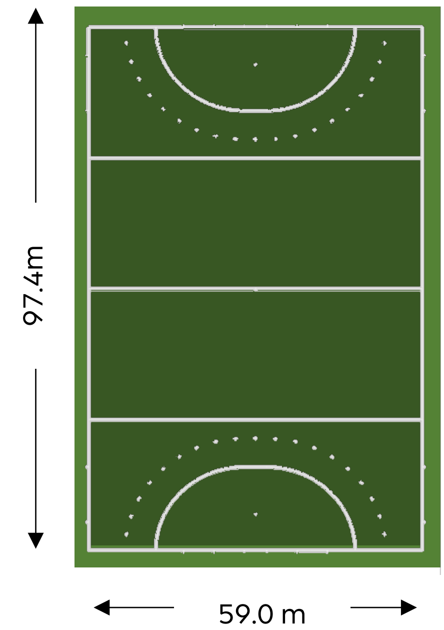


Figure 3 – field with minimum run-offs, fully surfaced with hockey turf

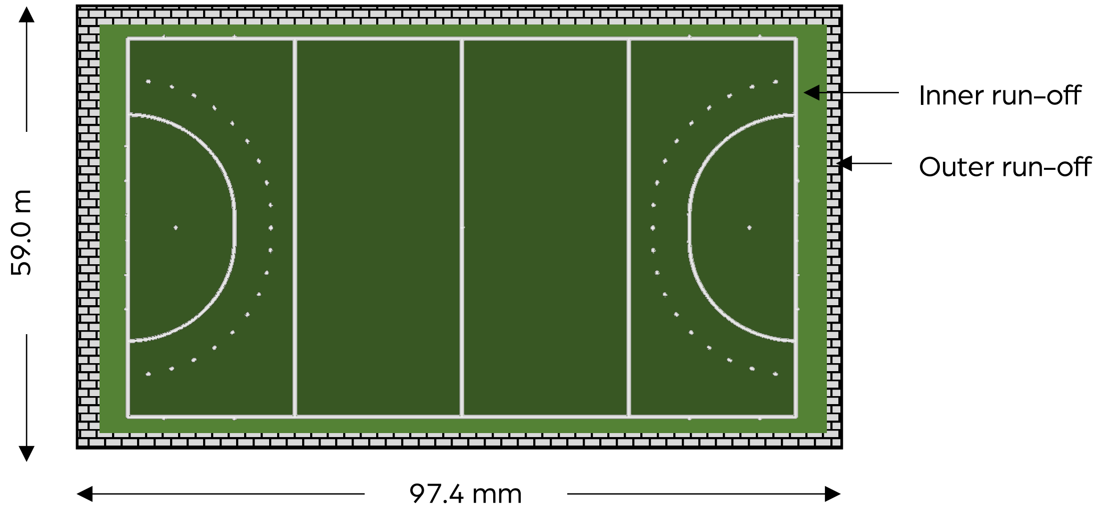


Figure 4 – field with minimum run-offs. Inner run-off in hockey turf, outer run-off hard paving

Table 1 – field run-off dimensions

		Inner run-off (hockey turf)	Outer run-off (hockey turf or paving)	Total field size
Ends	Recommended	3.0 m	2.0 m	101.4 m
	Minimum	2.0 m	1.0 m	97.4 m
Sides	Recommended	2.0 m	1.0 m	61.0 m
	Minimum	1.0 m	1.0 m	59.0 m

Note: Category 1 hockey fields also require a 1m operational zone outside of the run-off margins.

7.2 Field profile and gradients

Hockey desires a field to have unbiased performance and therefore consistency requirements are included in this Standard for certain sports properties. One of these is ball roll, which relates to the speed of the surface. A field with a pronounced slope will give different ball roll results depending on whether the ball is rolling up or down the slope. Therefore, keeping the field as flat as possible will help ensure unbiased ball roll. Fields need, however, to be built in regions that are subjected to intense rainfall and often must be constructed using materials that have low water infiltration rates. In these cases, a field needs to rely on horizontal drainage to allow water to discharge from the playing surface, and to achieve this, an adequate slope is required.

To address these two conflicting requirements the FIH has established preferred and maximum gradient or slope requirements. In all cases the ball roll consistency criteria take precedence over the slope requirements, and it is the field designer's responsibility, in conjunction with the hockey turf manufacturer, to determine the acceptable balance between these two parameters.

Preferred gradients

Longitudinal gradients along the length of the field	≤ 0.2%
Lateral gradients across the width of the field	≤ 0.4%

Maximum gradients

The maximum gradient in any direction (including diagonal and combined gradients, etc.) shall not exceed 1.0%.

Notes:

Experience shows that the latest types of Global category hockey turfs based on texturised–monofilament pile yarns are particularly sensitive to gradients over 0.6% and the advice of the hockey turf manufacturer should always be sought before designing a category 1 or 2 field that does not use FIH Preferred Gradients.

Several different field profiles are successfully used, depending on the type of construction.

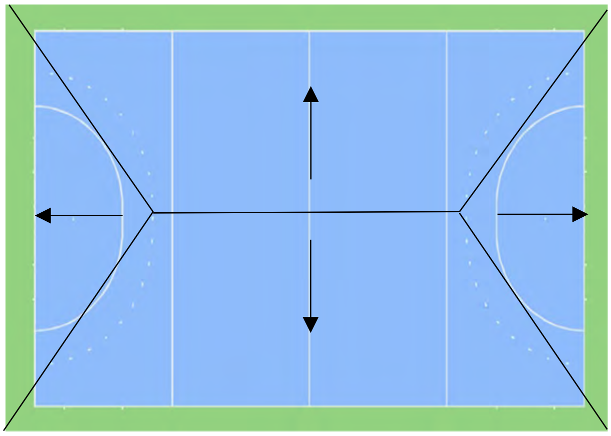


Figure 5 – envelope profile, often used with horizontally draining constructions

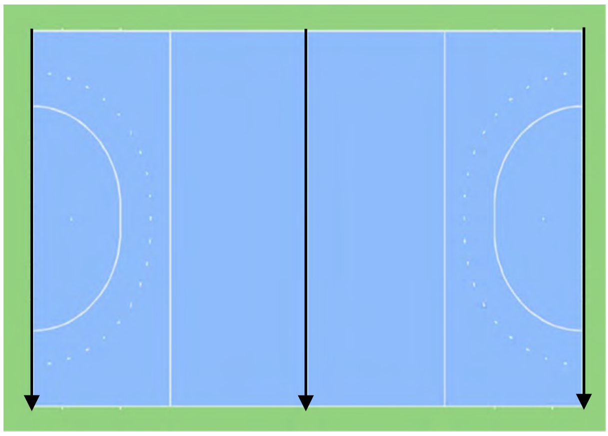


Figure 6 – single plane with cross field slope, most commonly used with vertically draining constructions

8 Field construction

8.1 Formation (or sub-grade)

The formation or sub-grade is commonly (but not exclusively) the native ground on which the field is constructed. Ensuring this is suitably prepared is key to a successful, long-lasting facility. It is typically prepared by engineering the native soils, following removal of topsoils and any other unsuitable materials. Factors that need to be considered and minimised include the potential for:

- Clay shrinkage/swelling
- Frost heave
- Settlement (under the additional weight of the facility above)
- Vegetation disturbance (e.g., tree roots/weed growth)

Normally the formation is created by removing the topsoil and grading the underlying soils to the required profile, before compacting to provide a stable platform on which the field can be built. Any loose, fragmented, or soft materials and any soft spots exposed during the ground preparation should be excavated and replaced with imported crushed rock free from detritus material.

The use of cut and fill techniques to grade a site to the required profile is a commonly used technique. It is very important that any fill materials are adequately compacted so they do not compress under future loadings, causing detrimental settlement of the field. The layer thickness and compaction of fill materials should always be undertaken with consideration of the construction equipment being used.

The prepared formation should be free of all vegetation and chemical treatment should be used as appropriate, ensuring conformity to the relevant environmental standards.

On completion, it is recommended formation levels do not deviate from design levels by more than +20/-30mm.

It is recommended the load-bearing capacity of the prepared formation should be measured. There are many different civil engineering tests that are used, but two that are commonly used are:

- Dynamic Cone Penetrometer (DCP) to a depth of 0.5m below formation
- California Bearing Ratio test

Experience suggests formations having a CBR value of 5% or greater will perform adequately. However, due to the diversity of ground conditions and their sensitivity to ambient conditions (including moisture), this requirement may not always be possible. In such cases alternative engineering solutions may be considered. These include:

- Installation of suitable selected additional material to improve the formation strength and stiffness

- Stabilisation using lime and cement or similar suitable procedures

- Installation of a geo-synthetic supporting material to provide reinforcement between the sub-base and formation

On completion of its preparation a formation should be free from mud or slurry and should have no areas of freestanding water.

Notes:

1. Maturing trees, bushes, and other vegetation near a field can be a cause of ground settlement. As trees and other vegetation mature, their demand for water also grows and their root systems will continually expand and draw moisture from the soil beneath the hockey field. If the soils are clay-rich they may shrink as they lose moisture, resulting in settlement of overlying structures.

2. If trees are removed from a site, consideration must also be given to the potential for the ground to recharge with water and expand, resulting in heave. Generally, the diameter of a tree's root system is at least as large as the tree's canopy.

8.2 Drainage

The drainage of a hockey field should provide sufficient capacity to transport the rainfall levels sustained by the playing surface to a suitable outfall. In terms of discharge rates, many drainage calculations are based on 50 year or even 100-year rainfall event levels. The run-off may reach 100mm per hour in storm situations. The drainage in these situations reach levels at 50 litres per second discharge rates. The design therefore must meet local planning requirements

The field should have a drainage system that is designed to remove rainfall from the playing surface at an adequate rate to ensure excess water does not a build-up on the turf and restrict the use of the facility. Two forms of drainage are commonly used. Vertical drainage is based on having a permeable construction through which rain percolates down to a sub-field drainage system. It allows fields to be built flatter, whilst ensuring a uniform and consistent rate of drainage.

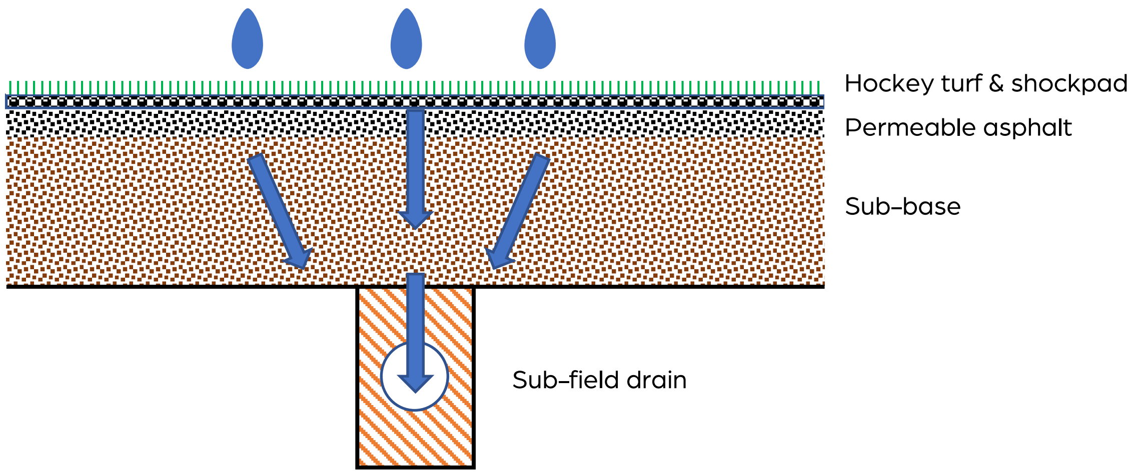


Figure 7 – Principle of vertical field drainage

Depending on the type of sub-soil on the site, some water may then percolate into the sub-soil, but the implications of this need to be assessed depending on the soil type. As most soils are unlikely to have adequate capacity, it is common to install a sub-surface water collection system to augment any natural drainage. This will typically consist of a series of lateral drains laid within the formation to collect the water and take it to perimeter collector drains that carry the water to the discharge point. The spacing between lateral drains will be dependent on the drainage system's design.

Lateral drains should normally be laid to a minimum slope of 0.5%. Perimeter drainpipes with a minimum external diameter of at least 100 mm should be laid when the drainage slope is at least 0.5%; for shallower slopes, pipes with a diameter of at least 125 mm should be used and the minimum drainage slope should be 0.3%.

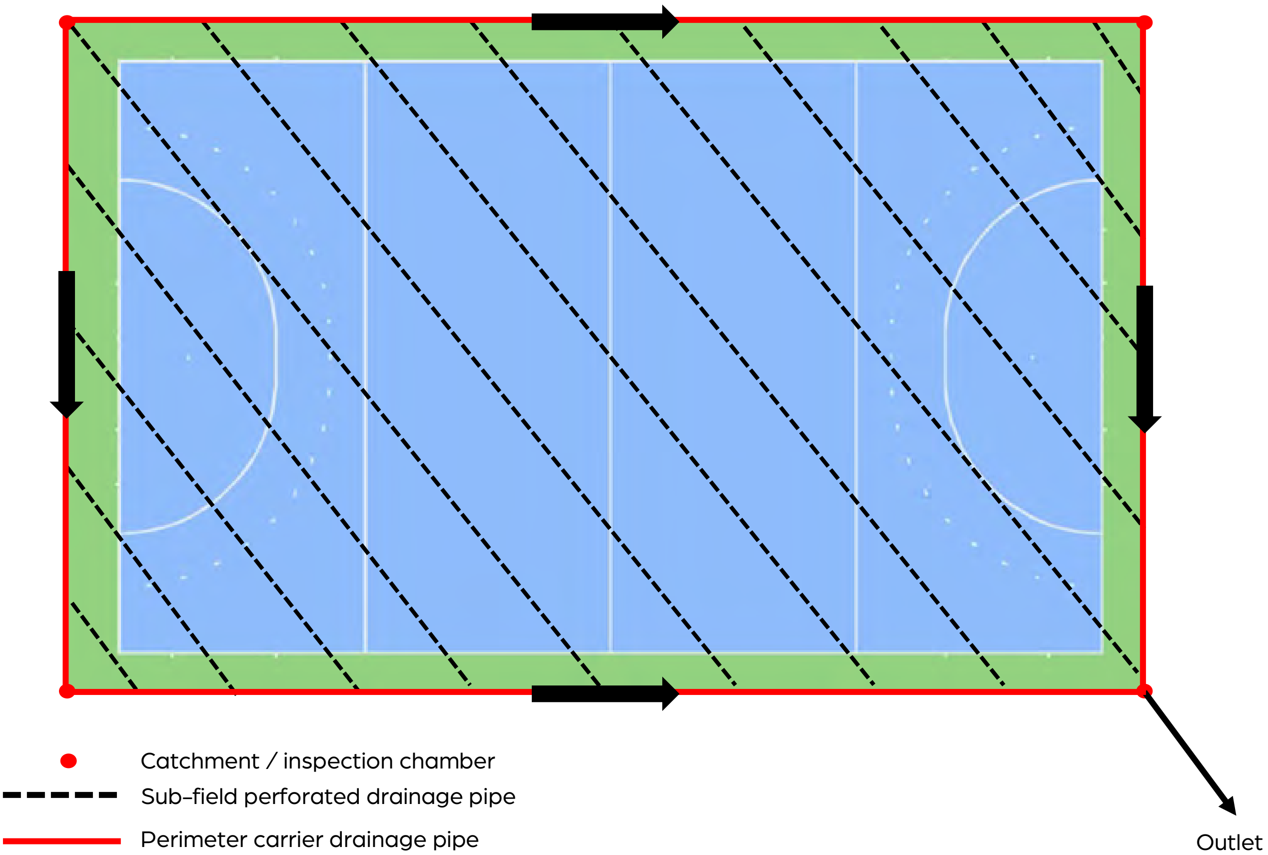


Figure 8 – typical sub-field drainage system used with vertically draining field constructions. Other drainage trench configurations are also used.

In some countries, permeable asphalt and permeable sub-base aggregates are not readily (or economically) available, so fields must have impermeable bases and drain horizontally to the perimeter of the field. In this case the water flows vertically down through the hockey turf and into some form of cavity structure that is designed to allow the water to flow horizontally to perimeter drains.

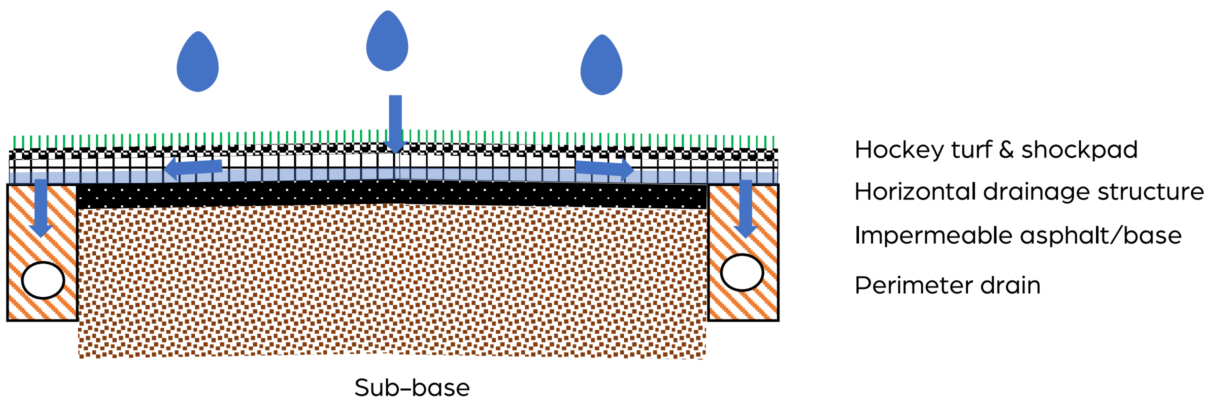


Figure 9 – Principle of horizontal field drainage

Whilst commonly used, this approach does have three limitations:

- The ability to take large quantities of water rapidly from the playing surface is not as great and this can lead to surface flooding in periods of heavy rain.
- To enable an adequate flow of water the field must be built with steeper gradients, and this can adversely affect the consistency of the ball roll, especially if global category hockey turfs are being used.
- The steeper gradients can result in fields drying more rapidly at the centre of the field and becoming wetter at the sides, which again can adversely affect the consistency of the ball roll.

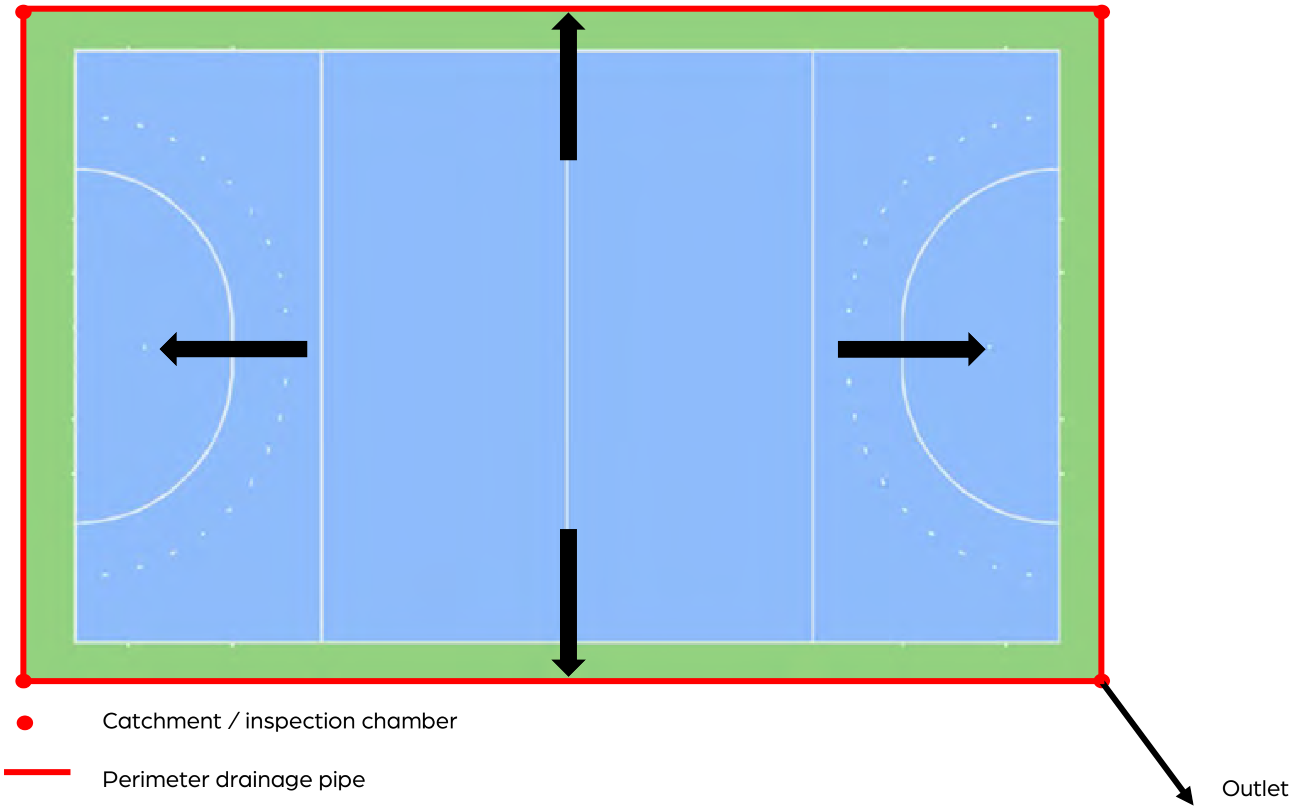


Figure 10 – typical sub-field drainage system used with horizontally draining field construction.

In the absence of any site-specific requirements a drainage system will typically be designed and installed to:

(i) Ensure that all surface water is removed from the playing surface at a rate that ensures no surface flooding will occur during heavy storms.

Note: Drainage calculations are often based on 50 year or even 100-year rainfall events. In some regions this can result in discharge rates more than 100mm per hour in storm situations.

(ii) Protect the installation from the effects of ground or surface water from the areas surrounding the pitch.

(iii) Ensure no excessive water remains present in the construction that may result in a significant reduction in the load bearing capacity or structural stability of the base or formation.

(iv) Prevent run-off from the field to the surrounding land

Generally, the minimum depth of drain trenches should be the diameter of the drainpipe plus 150 mm and the minimum width of the drain trench shall be at least three times the diameter of the pipe which should be centrally located in the trench.

Pipe bedding materials shall be clean aggregates (pea gravel or similar). Flexible pipes should be laid on a bed of 75mm minimum depth. Drainage trenches should be backfilled with similar granular materials to those used for pipe bedding so the minimum depth above the crown of the pipe is 150 mm.

Inspection chambers should be installed to allow inspection and maintenance of the main elements of the drainage system.

If a (multi-sport) hockey field has a rubber granulate infill, micro-filters should be included within the drainage system to capture any granulate that is washed into the drains.

8.3 Sub-base

The sub-base is normally a layer (or layers) of aggregate that are laid above the formation to provide structural strength and load bearing capacity to the field. The primary function of the sub-base is to protect the weaker formation from excessive loads that may lead to deformation or instability.

The sub-base layer may also be used for drainage of surface water (for which it must be porous), and storage and attenuation purposes. The sub-base should:

- Provide adequate internal stability and load-bearing capacity in conjunction with the formation – during construction and in the long-term – to support surface applied loads without excessive deformation or permanent damage.
- Provide adequate stability to resist the effects of swelling, shrinkage or freezing in the formation soils.
- Provide adequate storage of infiltrating surface water when required as part of the design.

Typically, hockey fields are constructed with sub-base depths of between 200 mm and 300 mm, but the precise depth should be determined after considering the specific ground/site conditions and local climate.

It is recommended a geo-textile separating membrane is laid between the native soil (formation) and the sub-base aggregates to ensure the two layers remain separated and are not compromised.

The aggregates used to form the sub-base are commonly used in highway construction and they should comply with nationally recognised standards, ensuring the correct grading for a permeable or impermeable construction is selected.

Typical gradings are:

Open grade aggregate mix used in vertically draining sub-base constructions		Aggregate mix as used in sub-base constructions not intended to drain vertically	
Sieve size (mm)	% passing	Sieve size (mm)	% passing
80	100	63	100
40	80– 99	31.5	75 – 99
20	50 – 78	16	43 – 81
10	31 – 60	8	23 – 66
4	18 – 46	4	12 – 53
2	10 – 35	2	6 – 42
1	6 – 26	1	3 – 32
0.5	0 – 20	0.063	0 – 9
0.063	0 – 5		

Increasingly, fields are built using recycled aggregates (crushed concrete, etc). This has been shown to work well and is recognised as a sustainable method of building sports fields. The quality and grading of recycled aggregates should be comparable to virgin materials.

The sub-base aggregates should be laid and consolidated to provide a stable platform for the overlying layers of construction. The layer thickness and compaction of the aggregates should be determined by the construction equipment being used.

To ensure adequate compaction of the sub-base is achieved, it should ideally be checked. Increasingly, a Light Weight Deflectometer (LWD) as described in British Standard BS 1924 is used, and a minimum surface modulus of 40 MPa is considered acceptable. If innovative sub-base constructions are being used, the field designer should define the required stability/stiffness criteria for the construction.

When areas are found to not satisfy the agreed stiffness/compaction criteria, for whatever reason, specialist civil engineering advice should be sought to determine the implications and risks to the field's design.

8.4 Perimeter edgings

The base of the field should be contained within perimeter edgings. These may either be cast insitu or be hydraulically pressed concrete kerbs. The edging should be laid to a true line and level with adequate up-stand for the subsequent fitting of the hockey turf and shockpad.

8.5 Asphalt base

Most hockey fields have asphalt bases. Whilst increasing costs, experience shows this type of construction provides greater certainty of achieving and retaining a satisfactory platform for the hockey turf.

Asphalt bases may be laid in either one or two layers. If laser controlled paving machines are available and they can also be used to lay the upper layer of the sub-base (typically the top 50mm) a single layer of 0/6 mm or 0/10mm asphalt, laid to a consolidated thickness of between 40 mm and 50 mm. If a suitable paving machine is not available or site conditions justify an enhanced base construction, two layers of asphalt should be used. When two layers are being used, they typically comprise a base layer of 0/10 mm, 0/14 mm, or 0/20 mm asphalt, laid to a consolidated thickness of 40 mm, and an upper layer of 0/6 mm or 0/10mm asphalt laid to a consolidated thickness of 25 mm.

Where the base is designed to drain vertically the asphalt should be permeable or open textured (e.g., as defined in EN 13108-7). Where the base is not required to drain vertically, the asphalt should comply with national standards.

To ensure the finished playing surface complies with the surface regularity requirements of the *FIH Hockey Turf and Field Standards* the asphalt should be laid so there are no depressions or high spots that exceed 6 mm under a 3 m straightedge. It is recommended this is checked prior to the installation of the shockpad.

8.6 Shockpads (or underlayers)

The shockpad is an integral part of the hockey turf system. It provides comfort and protection to players as they run and fall on the playing surface and helps ensure a hockey ball does not bounce excessively.

There are many different types of shockpad and each FIH Approved hockey turf will have a specific shockpad. This will have been tested during the approval process and will be described in the official FIH test report and certificate for the approved hockey turf system.

Shockpads are normally produced from flexible foams that are laid as rolls or tiles or from wet-paved rubber granules, produced from end-of-life tyres, and a polyurethane binder.

The flexible foam versions can be laid without specialist equipment, making them more accessible for some markets. To stop the rolls moving or rucking during use, the joints between the rolls are often taped together.

The rubber granules and polyurethane binders used to form wet paved shockpads are mixed on site using specialist equipment and laid with a small paving machine, typically to a thickness of between 10mm and 15mm, to form a homogenous single layer over the entire field. It is also possible to increase the thickness of this type of shockpad and incorporate stone chippings into the mix. Often described as an elastic-layer, these thicker types of wet-paved shockpad have the performance properties of a shockpad, but also provide the structural stability and load carrying capacity of an asphalt layer, meaning the asphalt layer can be eliminated from the construction.

8.7 Hockey turf installation

The hockey turf carpet will normally be manufactured in rolls that are 4 m wide. If the field is a single colour the rolls can be laid across the full width of the field in continuous lengths. If the run-offs of the field are a different colour to the field of play, the rolls are laid continuously across the field of play and across the end run-offs, two rolls are then laid longitudinally along the length of the field to form the side run-offs.

Carpet rolls can be joined using adhesive joints where the two rolls of carpet are bonded to a jointing tape, or by stitching the rolls together. Both methods are considered satisfactory; although stitching is more suited to turfs having a reinforcement scrim as this increases the strength of the carpet backing and reduces the possibility of it tearing along the line of stitches.

The method of jointing/seaming, including all in-laid line markings, should ensure no ridges, grooves or creases occur. The maximum carpet seam gap should be no greater than the tuft gauge of the carpet. To avoid any risk of player injury, here should be no adhesive beads within the pile of the hockey turf.

Experience suggests bonded joints should be formed using a jointing tape of at least 300 mm wide with the glue applied evenly to either side of the tape.

To minimise the risk of unsatisfactory playing characteristics, head joints (where two rolls of carpet are joined to form one length) should be avoided. Especially within the field of play. Occasionally manufacturing or installation defects can result in a section of turf needing to be replaced. Patching of new carpets is often contentious, and experience suggests patching should be avoided wherever possible, and should only be undertaken if the field owner has agreed in advance.

To prevent dimensional expansion of non-filled (global) category hockey turfs they should either be loose laid but tensioned and clamped along the sides of the field or bonded to the underlying shockpad. Whilst bonding the carpet to the shockpad will give greater certainty of carpet stability, it does increase the risk of the shockpad being damaged when the field is resurfaced in the future, requiring a new shockpad each time the turf is changed. This disadvantage is not as sustainable or cost effective so is not generally recommended. As sand dressed carpets can also suffer from problems caused by dimensional expansion or contraction, it is recommended consideration is also given to installing these in a similar way to non-filled turfs.

Field markings can be permanent or painted. When permanent lines are used some can be incorporated into the carpet when it is manufactured; these are typically the end and side lines and possibly the centre line and the 23m lines. The shooting circle markings and penalty spots must always be cut into the carpet; this involves cutting out a section of the main turf and in-laying the line, so forming an additional carpet joint.

Painted lines allow flexibility, which for some fields is important, but they will wear over time meaning a field has to be re-lined periodically.

If the hockey turf is designed to be dressed/filled with an infill, this should be applied evenly across the field, using the application rates specified by the hockey turf manufacturer. To ensure satisfactory performance and to minimise the risk of excessive fibre abrasion, it is very important that the grading and shape of the infill material is also in accordance with the hockey turf manufacturer's specification.

9 Perimeter fencing

Most hockey fields are enclosed by a perimeter fence. This ensures balls do not leave the field or Court, stops unauthorised use, and helps protect the hockey turf from wildlife, etc. The fencing should be designed and constructed in accordance with local standards and industry guidelines. Fence heights should be determined after assessing the potential for a hockey ball to leave the boundaries of the field and cause injury or damage. Except for Category 1 fields, the FIH do not set specific requirements for fencing. Typical heights used are:

Ends of field – width of shooting circle. Ball containment, no spectator viewing	4.5 m
Ends of field – outside shooting circle. Ball containment, no spectator viewing	3.0 m
Ends of field – tiered spectator seating	7.0 m
Sides – ball containment, no spectator viewing	3.0 m
Sides – spectator viewing	min. 1.0m

Fencing is often based on weldmesh or twin-bar panels. Ball catch netting can also be used, especially for higher sections behind the goals. The fence must not allow hockey balls travelling at speed to pass through it, so a 45 mm mesh-size is often used. To protect the bottom of the fencing from being damaged by the repeated impact of balls hitting it, kickboards (often 250 mm – 300 mm high) are normally fitted to the bottom of the fencing. These boards also help contain any fibre debris or infill and prevent it migrating into the surrounding environment.

If temporary division nets are installed to split a field into sections for cross pitch play, they should be at least 3 m high and have a sufficient excess skirt to ensure balls cannot pass under them. Experience also suggests that fitting a weighted band to the bottom of the net helps prevent it billowing in windy conditions.

When designing a field consideration should also be given to storage areas for goals used for cross-field play, training etc. To minimise the risk of injury to players these should not be stored on the perimeter run-offs so consideration should be given to incorporating storage recesses adjacent to the field.

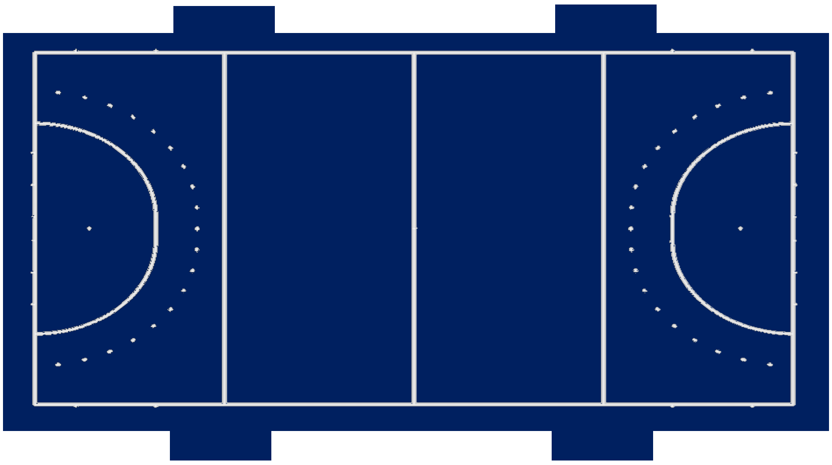


Figure 11 – Field layout with recesses for cross-pitch goal storage

With increasing global awareness about the impact of microplastic pollution, consideration should be given to the potential for fibre and any polymeric infill debris being carried off the hockey field and into the environment. Fitting rebound boards to the bottom of the fencing and installing boot cleaning mats or grates at the entrance points has been shown to ensure that debris is contained within the field boundaries and can be collected when the field is groomed using suitable maintenance equipment.

10 Sports lighting

Many fields will have floodlights to allow use during the hours of darkness. The type of lighting required, and its performance will normally depend on the competition rules applicable for matches that will be played on the field or court. Comprehensive guidance is provided in our *Facilities Guidance – Sports Lighting* for Non-Televised Outdoor Hockey and *Facilities Guidance – Sports Lighting* for Televised Outdoor Hockey publications.

To aid those investing in floodlighting the FIH Quality Programme includes Certified Lighting Suppliers and FIH Approved Lighting Systems. It is recommended these companies and products are used whenever a new lighting system is being installed.

FIH Certified Lighting Suppliers are audited by the FIH and must satisfy a set of stringent criteria including a proven ability to light hockey fields, in-house quality management procedures and the provision of long-term warranties on their lighting systems. FIH Approved lighting systems must comply with FIH lighting standards and use components that comply with demanding internationally recognised quality standards.

11 Field irrigation

If a hockey turf that is designed to be used when wet is being installed, the field will also require a suitably designed irrigation system that meets the watering requirements of the installed hockey turf and FIH standards. The FIH has also published guidance on irrigating hockey fields, and this guide may also be found on our website at www.fih.ch/qp.

12 Field equipment

Ensuring a hockey field is equipped with good quality, durable and safe field equipment is important. To aid those purchasing field equipment the FIH Quality Programme includes FIH Approved, hockey goals, team benches and HOCKEY5s rebound boards and Technical Official's booths.

All FIH approved equipment is independently inspected to verify compliance with our standards. This includes checks on the quality of materials used and compliance with internationally recognised safety standards. For details visit www.fih.ch/qp.

EQUIPMENT TYPE • HOCKEY GOALS
FIH QUALITY
CLASS 1

13 Protect your investment, certify your field

To ensure that hockey fields are being built to the highest standard and that FIH Approved Products are being installed correctly, the FIH Quality Programme for Hockey Turf includes the certification of hockey fields.

An FIH Certified Field is independently tested by an FIH Accredited Test Institute to ensure it meets the requirements of the *FIH Hockey Turf and Field Standards*. Tests include measurements of how the ball interacts with the playing surface, verifies adequate comfort and performance is being provided to ensure the well-being and protection of players and includes checks to confirm the field has been built to the dimensions, line marking, slope, and surface drainage requirements of the FIH.

Field Certification also includes a comprehensive series of quality control checks to ensure the installed hockey turf product is the same as the FIH Approved Product; ensuring manufacturing and installation mistakes do not go undetected.

By certifying your field, you are not only demonstrating your commitment to the sport of hockey, but you are also benefiting from the following:

- **Independent quality assurance** of the construction of the field and hockey turf installed, providing reassurance to players, national hockey associations, funding parties and insurance companies.
- **Demonstration of best practice** by showcasing that your field meets international standards and has benefited from over 30 years of international expertise in hockey turf.
- **Increased worldwide promotion** of your field through your presence on the FIH's website and social media channels as well as the use of the FIH Quality Programme for Hockey Turf logo and an FIH Quality Programme Certificate of Registration for your field.

For **those investing in hockey fields,** certification provides independent assurance that the field has been built to the quality levels recommended, using approved products and proper design methodology, thus ensuring the longevity and sustainability of the facility.

For **facility owners,** field certification demonstrates that the facility is suitable for hockey and helps reduce their potential liability in the event of an accident occurring.

For **competition organisers,** field certification provides proof that the field is suitable for relevant levels of competition and is of a standard quality.

For **players**, field certification provides confidence that the field has been designed and constructed to allow hockey to be played safely.

What types of hockey fields can be certified?

Any 11 a-side or Hockey5s field that is being built or already exists, that has an Approved Hockey Turf playing surface can apply to become certified.

New fields less than 12 months old are certified for a period of three years. Fields older than 12 months that are either being tested for the first time or being retested after their initial certification has expired are certified for a period of two years.

The FIH certifies five different categories of hockey fields:

1. **Category 1**: Non-filled water-based fields with the supporting field infrastructure required to host top-level international competitions.
2. **Category 2**: non-filled water-based surfaces that are primarily used for lower level international and top-level national competitions
3. **Category 3**: normally sand dressed surfaces designed primarily for hockey. This category of surface is normally used for lower level national, regional and community play.
4. **Category 4: fields** with multi-Sport: surfaces and on which basic community and development level hockey can be played.
5. **Category 5:** longer pile 3G surfaces designed to replicate the playing characteristics of natural grass, often used for football with hockey as a secondary sport.


11 A-SIDE HOCKEY FIELD
FIH QUALITY
CATEGORY 4

FIH field certification

Larne High School, Larne, Northern Ireland

The FIH is pleased to confirm that this hockey field has been tested and shown to satisfy the construction, performance, and player welfare requirements of an FIH Category 4 hockey field.

Hockey turf	*Domo Hockey Xtreme MDC Ultra Insitu 15*
Hockey turf manufactured by FIH Preferred Supplier	*Sports & Leisure Group N.V – Domo Sports Grass*
Field built by FIH Certified Field Builder	*McAvoy Construction (N.I) Ltd*

DR. NARINDER DHRUV BATRA
PRESIDENT

Date of Certificate: 20/10/2021 The field is certified until: 08/07/2024

Notes:

1 The field was tested in accordance with FIH Hockey Turf & Field Standards - Part 2 (2021 edition).
2 Failure to maintain the field correctly may result in a deterioration in the performance and safety of the field.
3 FIH reserves the right to retest the field at any time to verify ongoing compliance with its standards.

CERTIFICATE N° CF-21-102

FIH International Hockey Federation
Fédération Internationale de Hockey

How to get certified?

To have your field certified the standards are high, but the process is simple!

1. Contact an [FIH Accredited Test Institute] near you and have them test your field.
2. Once the Institute has made the field test and checked the installed Hockey Turf product is the same as the FIH Approved Product they prepare an FIH Test report and send it to the FIH for review. If everything is found to be okay the report is approved, and you will receive your certification.

FIH facilities guidance – helping you win

This guide is part of a series of facilities documents produced by the FIH. Other information that might assist you is available at www.fih.ch/qp. It includes:

- Facilities Guidance – Outdoor Hockey Facilities
- Facilities Guidance – GEN 2 multi-sports areas
- Facilities Guidance – HOCKEY5s Courts
- Facilities Guidance – Sports Lighting for Non-Televised Outdoor Hockey
- Facilities Guidance – Sports Lighting for Televised Outdoor Hockey
- Facilities Guidance – Hockey Field Irrigation
- Facilities Guidance – Indoor Hockey

- Hockey Turf and Field Standards – Part 1 FIH Approved Hockey Turfs
- Hockey Turf and Field Standards – Part 2 – 11 a-side hockey fields
- Hockey Turf and Field Standards – Part 3 – HOCKEY5s courts
- Hockey Turf and Field Standards – Part 4 – Temporary Overlay Pitches (TOPS)

- FIH Approved Field Equipment – Hockey Goals
- FIH Approved Field Equipment – HOCKEY5s Rebound Boards
- FIH Approved Field Equipment – Team Shelters
- FIH Approved Field Equipment – Technical Officials Booths
- FIH Approved Field Equipment – Indoor Hockey goals
- FIH Approved Sports Lighting

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