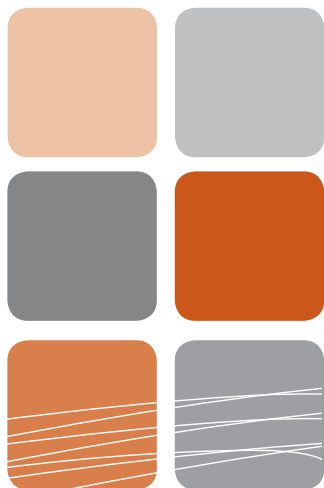




Artificial Grass For Sport

Part 5 of 8



3.13 Pitch Lay-out and Linemarking.

Considerable thought needs to go into likely future uses of your sporting space, so that the facility can be designed to capture the flexibility required.

Activity spaces and their usage can be radically enhanced at the planning stage. Think about special events, school use, cross-field activities, and associated access, lighting, fencing and goal storage requirements.

Top Tip

To enhance and safeguard player footing ensure that:

- The run-off area should provide a similar gradient to the playing area (for the specified distance from the field).
- The pitch or court run-off areas are surfaced with the same type of carpet as the playing area.

It is important to get your dimensions right. Appropriate field space, appropriately sized and safe run-off

zones are mandatory. Think through the trade-off between multi-lined flexibility and line clarity, particularly where tennis is involved – because tennis players need to make repeated, split-second decisions re: ball location and court lines.

Lines placed on the field can be either cut in (inlaid) or painted on. Inlaid lines are permanent and therefore significantly reduce field preparation time, but the use of painted lines for temporary requirements can also be effective.

Most sportspeople are able to cope with multi-lined sports halls and sporting fields, and this process is aided by sticking to the recommended colour hierarchy – the most frequently played sport should use white lines, the second most frequently played in yellow, followed by blue and red. It is important to check with the relevant sport peak body in relation to their requirements.



Painted yellow temporary lines

3.14 Practice, Warm-up and Multi-Games Areas

Many schools are developing smaller artificial grass activity areas similar to what exists in some sporting club facilities. These smaller spaces (500 - 3000m²) can be fantastic attributes where usable activity space is limited, or where there is a desire to remove activity from high-wear areas on the

main sporting field or court, or as a replacement of an underutilised existing activity area.

The 'School Sports' section (1.6.12, p35) highlights potential considerations in developing these smaller projects.



Wembley Primary School, Yarraville



Footscray Hockey Centre



The planning and development of a smaller artificial grass activity area should follow the same planning process and set of general considerations outlined in this guide for large or full court facilities.

The key broad considerations are:

- Assess the likely or potential users of the space.
- Determine the priority order in which those activities or sports will be involved. This may help determine the shape of the required activity space, and the priority of line marking and line colour allocation.

Top Tip

Find the balance between inserting lines for high-use activities (including lines that will help casual users of the space) with minimising the number/length of potentially problematic extra seams being added to the facility. Large, lightly marked spaces can provide greater flexibility through the use of witches hats, cones, etc.

- Develop a draft management plan for the space that includes anticipated use, programs, lines and fittings required for those programs, conceptual design/review of potential site/location, management options and other operational considerations (access, security, access to toilets/changing rooms, etc).
- Review the list of likely activities and determine whether a shock pad is appropriate. Where the space is to be used principally for activities such as soccer, hockey, athletics, netball, etc (remember that we

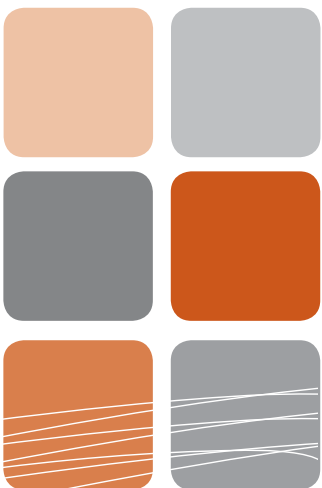
are talking about a multi-use area here, not a specialised sporting field), then a shock pad may be a valuable addition. If the principle activities are to be tennis, mini tennis or basketball, then the need for a higher ball bounce might mitigate against the nomination of a shock pad.



Multi Use/Cricket Net Space

Other specific issues for consideration include:

- Site/location choice: (Refer to Section 3.1).
- Basework: (Refer to Section 3.3).
- In many school installations the emphasis may be on maximising the size of the activity space, possibly at the expense of constructing a solid, long-term base. This likely to have implications for the lifespan and quality of the facility.



Top Tip

Remember that the 'platform' on which the artificial grass surface/ pad sits is ideally solid/stable enough to last the lifetime of many surface carpets. Constructed properly the first time, it can avoid repeated expensive base/sub-grade repairs every time that the surface system is replaced.

- Artificial grass selection: (Refer to Section 3.4). Given the stability of sand-filled surfaces, this type of artificial grass surface is used in most cases where durability and long lifespan are important.
- Line marking: (Refer to Section 3.13).
- Fittings and goal storage (Refer to Section 3.15). Remember that the flexible use of spaces is enhanced by having both an open and unencumbered (ie. removable posts, nets, coaching aids etc) activity area, but is further enhanced by having good adjacent storage space for these items.
- Recessed goals: These are a good idea on courts where small sided soccer is the main activity. They relate to fenced areas where the fences themselves incorporate rebound walls, and there are no external boundary lines. (Refer to photograph on page 73).
- Rebound walls: These facilities are a terrific asset for individual practice (in particular for tennis, volleyball, soccer and hockey goal shooting, casual games such as handball, and so on). This is achieved via the painting of cricket stumps, targets and tennis nets on the wall (Refer to photograph Page 74).
- Fencing or divider nets: (Refer to Sections 3.10 and 3.11).
- Artificial grass protection: Consider the importance of paved access to the practice area and the provision of shoe cleaning equipment (Sections 3.12, 3.18).
- Drainage: (Refer to Section 3.6)
- Concrete kerbs: Particularly effective for hockey hitting practice (Section 3.7)
- Floodlights: (Refer to Section 3.9).
- Access points: (Refer to Section 3.18).
- Signage: particularly if the space involved is small or enclosed, consider installing signage that establishes some basic protocols for the use of the space. Enhancing the safety of the users is a key consideration particularly in confined spaces.

3.15 Goal and Net Storage

At the design stage, thought needs to be given to the storage of goal posts and nets. Recessed areas in fencing are often a satisfactory option, particularly in maintaining safe, clear perimeter run-offs around the field. In such cases ensure

that the storage bay is level with the sporting field, and that the bay is wide enough for adults to fit either side of the goals being moved. Another satisfactory option is the installation of fold-away goals.



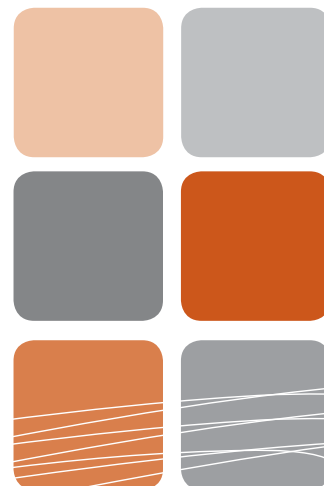
Tennis net storage – Koonung Secondary College



Off field goal storage – Kew Hockey Centre

Top Tip

Consider installing a high-tension wire and netting across the front of the goal/tennis net storage area. This will prevent balls going into that space and becoming difficult to retrieve.



3.16 Player and Umpire Shelters

Player and umpire shelters are invariably built too small. Remember that there is generally an overlap where teams arrive for the following timeslot and need to store their bags, and equipment, while the earlier timeslot teams are still competing. Space therefore needs to be allowed for four teams to all have adequate space for their bags and equipment, and possibly that of the umpires as well.

Too often the shelters cater for the coach and a few interchange players (i.e. those involved on the sideline during a game) rather than the four full squads that need storage before, during and after their game. Nearby taps or water fountains for players to access are also key considerations.



Shelters – Kew Hockey Centre

3.17 Spectator Areas and Furniture

Shelters like the one shown above also provide excellent weather protection for spectators at events where relatively small spectator numbers are the norm. These areas require some provision of seating, rubbish bins and ideally a water fountain or two.



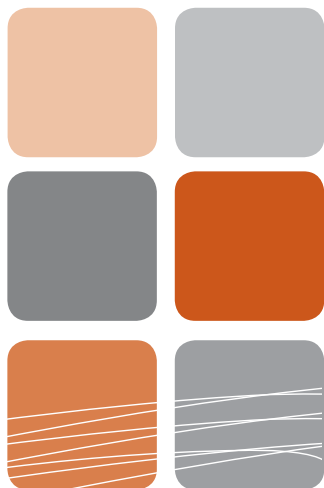
3.18 Access Points (including Ambulance Access)

Consider what is the largest item that might need to be moved on or off your sporting facility (i.e. sets of goals) and plan your access routes and gate sizes accordingly. You may need to request gate-opening sizes (including lintel heights) different to standard provision. Also think about the size and weight of maintenance and repair vehicles that will need access at some stage, including sizeable trucks and equipment that are required intermittently for floodlight maintenance, pitch grooming and repairs.

It is particularly important that clear passage is always maintained for emergency services vehicles such as ambulances.



Access gates – Footscray Hockey Centre



3.19 Trees

While trees can provide both a welcomed screening from the sun and the wind, their proximity to constructed sports facilities can be problematic. Root invasion underneath artificial grass sporting surfaces can lead to surface cracking and upheaval. Artificial grass sporting areas should ideally be located one to two times the tree's mature height away from strong rooted trees, and in other cases where trees are adjacent to the synthetic surface the installation of a root barrier is strongly recommended.

Overhanging branches can be a source of contamination with dripping leaf sap, insect secretions and bird droppings, as well as the dropping of leaves and nuts. If not quickly removed, these elements can be crushed or broken down and will penetrate into the carpet surface and will potentially contaminate infill or lead to algal-type growth. Overhanging branches should be pruned back regularly.

3.20 Relationship to Changerooms and Car Parking

Issues relevant to this topic are mentioned in Section 3.1.1 (Site Selection). A close relationship of the carpark and changeroom to the playing surface is preferable, ideally with wide pathways between all three elements. Players and spectators need to be kept on clean hard surfaces so as not to bring contaminants onto the synthetic grass surfaces.

Note the reference in Section 3.23 to the importance of using Universal Design Principles so that people of all abilities are appropriately provided for.

Top Tip

It is important that the clubroom and surrounding structures are not located such that they overshadow the synthetic surface for long periods – which can lead to algae problems.

3.21 Environmentally Sustainable Design

Economic, environmental and social sustainability is now the logical planning framework around which our communities are designed and maintained. Reducing negative impacts on the environment, repairing damage done, and finding more 'sustainable' processes for the future underpin our communities being prosperous and liveable in the future.

The Victorian State Government Department of Sustainability and Environment developed a publication, 'Environmentally Sustainable Design

and Construction'

www.resourcesmart.vic.gov.au/documents to help integrate environmental sustainability into the planning, design and construction processes for all new capital works.

Providing a detailed methodology to ensure the integration of ESDC principles, these guidelines will help achieve the Government's vision of a future in which all Victorians are living sustainably within their natural and built environments.

3.22 Safety

During the design phase there are many elements to be considered that relate to the safety of facility users. Safety must first be investigated during the Planning (Draft Management Plan – Figure 2, page 57) phase via the development of a preliminary Risk Management Plan for the proposed facility. At this early stage the document would outline a broad policy position, and make reference to a number of key issues to be explored during the design phase. These issues are:

A safe location

- Ensure that the chosen location is safe in terms of visual sight lines. Players and spectators should be generally visible to site managers/supervisors and to passers-by.
- Ensure good lighting for the playing area, but also for access pathways, the car park and change room areas.
- The playing area has some shelter from inclement weather (screen planting, fence screening, etc),

but more so the ancillary facilities (verandas for weather shelter, etc).

- The facility is easily accessible for ambulances and emergency vehicles.

A safe pitch or court (refer to the regular safety check-list noted in Section 6 - 'Maintenance')

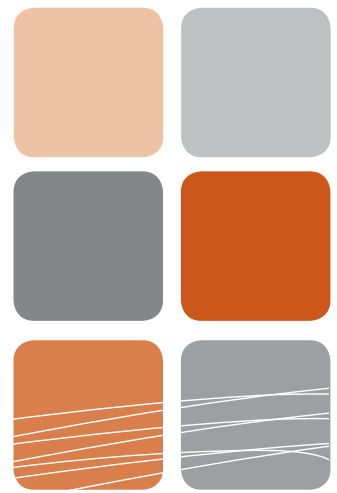
- The initially constructed pitch or court must meet the specified performance criteria mandated by the sports governing body. These performance standards must then be continued by rigorous application of ongoing maintenance and cleaning responsibilities.
- The pitch or courts are designed with the appropriately sized 'run-offs', with these run-off areas built with the current contour to match that of the playing field. The facility is checked daily to ensure it is clear of rubbish and obstructions.
- The run-off areas are carpeted with the same product as was used on the field or court proper.
- Spread the wear and tear across the field, thereby reducing worn areas.
- Select appropriate maintenance equipment, maintain it properly and only let trained and approved personnel utilise it.
- Check that fittings such as goal posts and nets are sturdy, well secured, and appropriately located (particularly when they are not being officially utilised).

- Check for and respond to gaps or bumps in seams (see Section 6).
- Check for and respond to algal growth on the field or the presence of debris such as dirt and leaves, that usually precipitates the development of algal growth.
- Check the age and condition of the floodlight towers.
- Check that fixtures that need safety padding have it installed.
- With wet fields, occasionally sanitize the field (via irrigation and use of enzyme-based cleansers) to counter any potential bacterial, microbial or staph infections that could be present due to bodily fluids, bird droppings, etc.

A safe player

In addition to all of the above:

- Ensure that first-aid equipment is always available (first aid kit, ice, stretcher, etc).
- Ensure that essential emergency phone numbers are clearly on display.
- Ensure that a heat policy is known and observed.
- Ensure via your specification that your contractor produces an acceptable health and safety plan.
- Ensure guidance is provided and that footwear and boot cleaning facilities are being used.
- Ensure that litter bins are provided.



3.23 Disability Standards for Access to Premises / Universal Design

All sport and recreation building projects are to comply with the Disability Standards for Access to Premises. Please visit the following website for copies of the Standards and incorporate them into your building planning: www.aph.gov.au

Universal design is a philosophy that encourages building development beyond what is required by the Disability Standards for Access to Premises. The intent of universal design is to create environments to be usable by all people. To know more about Universal Design, go to: www.design.ncsu.edu

Top Tip

Good access is essential for a variety of people be they the elderly, people with injuries or just parents with prams. As a mandatory part of your planning and design process follow the nominated design principles referred to in the access and inclusion publications available on Sport and Recreation Victoria's website at: www.sport.vic.gov.au

3.24 Designing to Minimise Maintenance

The following text is taken from the English Hockey Board's October 2009 paper 'Pitch Maintenance' (www.englishhockey.co.uk)

"Many facets of good maintenance practice can be incorporated into the design and construction phase of the project. Steps can be taken to keep the pitch and adjacent areas free of litter, gravel, grit, mud, dirt, oil, and toxic materials including:

- Landscaping with non-leaf-shedding trees and bushes.
- Installation of concrete or asphalt paths.
- Specification of static and rolling load limits.
- Control of access to minimize the possibility of vehicles entering the pitch area.

- Availability of artificial grass practice or warm-up areas.
- Provision of markings and extra goals for cross-pitch practice.
- Routing of player traffic to minimise tracking of impurities.
- Installation of brushes, sluices and mats for cleaning boots – and a requirement that boots are cleaned before entering the pitch area.
- Setting up food and beverage facilities well away from the pitch.
- Strategic placement of rubbish bins with provision for regular emptying.
- Erection of prominent signs designating required positive actions and prohibitions for everyone.

Construction must be closely monitored to ensure that specifications are adhered to, that inspection is thorough, and that any corrections have been satisfactorily completed".



Caroline Springs College (Springside Campus)



Port Adelaide F.C. Indoor Training Venue

4.1 Project Stages

The key stages in project delivery are listed below. Many of these elements have been covered in previous sections:

Project brief development

- Business case, preliminary designs and cost estimates, statutory planning issues, funding issues, engagement of project management support, and determination of procurement route.

Design development

- The development of detailed scheme proposals and supporting documentation.

Construction procurement

- Preparation of contracts, selection of possible tenderers, putting the scheme to tender (or single party negotiations), resolving tender queries, reporting on tenders submitted, confirming funding, letting the main construction contracts.

Monitoring construction

- Monitoring the quality of work undertaken, contract administration (including arranging payments,

evaluating variations and extension of time claims).

Completing the project

Ensure:

- That the facility meets specifications.
- That you have obtained required certificates and endorsements.
- That contracts managing defect rectifications are finalised.
- That appropriate maintenance arrangements are in place.

Top Tip

You may wish to consider conducting an **Expression of Interest (EOI)** process, sometimes called a **Registration of Interest** process, prior to the design development/construction procurement phases. The EOI seeks preliminary nomination by interested parties, and enables the project manager(s) to develop a 'shortlist' of best qualified companies which would then be invited to tender.

4.2 Procurement Routes

There are a range of project procurement methods. Common models operating in Australia include:

- Design and Documentation, Tender, Construction (traditional)
- Design and Construct (D and C)
- Construction Management (CM)
- Engineering, Procurement, Construction Management (EPCM)
- Alliancing/Private Public Partnerships (PPP)

The two most commonly used options for artificial grass sporting installation projects are:

Design and Documentation

- Where a comprehensive specification is prepared, including detailed working drawings, a bill of quantities and supporting contract conditions. The project is then tendered for construction.

Design and Construct

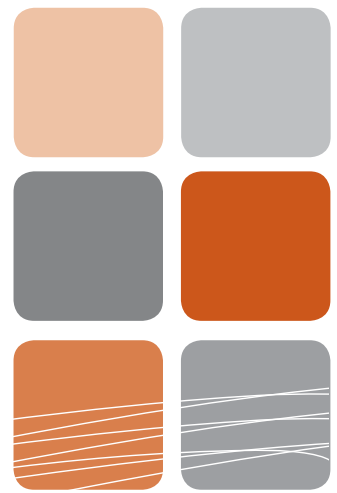
- Where performance outcomes are specified (not design details).

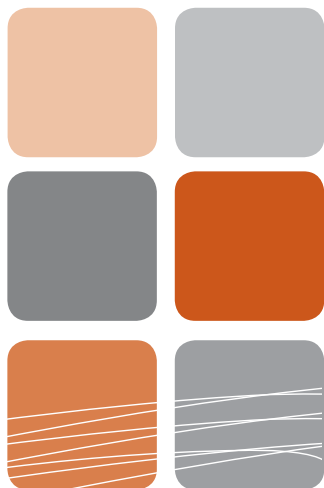
The project is then tendered for design and construction. After acceptance of the successful tender the detailed design and specification are prepared by the contractor and subsequently signed off by the client prior to commencement of construction.

Top Tip

More detailed information on procurement routes can be obtained from the Sport England document: 'A Guide To The Design, Specification and Construction of Multi-Use Games Areas Including Multi-Sport Synthetic Turf Pitches – Part 2: General Procurement and Contracts Guidance, 2004.'

Website: www.sportengland.org





4.3 Choosing the Most Suitable Project Procurement Method

Choosing the project procurement method most suitable to your project requires an assessment of the following key issues:

- Project complexity and cost
- Design responsibility
- Level of cost certainty required
- Risk items (i.e. ground conditions and how to manage them, the risks of having to make changes on site)
- Safety hazards
- Whether sufficient information

can be supplied to potential contractors early enough to enable the contractor to reasonably assess risks

- How much flexibility and financial control is required.

Top Tip

The bottom line is that a procurement method needs to be determined that will deliver maximum value for money over the whole life of the facility.

4.4 Design and Documentation versus Design and Construct

Design Documentation (Detailed Specification)

In relative terms artificial grass sporting facility projects are small, although scale is relative to the financial capacity of the project owner. For local government authorities, and more so local sporting clubs or school councils, artificial grass projects are complex and high-cost, and therefore may warrant comprehensive specifications and detailed drawing development in order to reduce risk and provide certainty with respect to quality and cost.

Documentation will typically include:

- Geotechnical investigation report.
- Detailed drawings for set out, levels and all construction elements.
- Specification.
- Bill of quantities.
- Supporting contract.

This degree of project owner research and preparation is appropriate where there is a need to resolve complex site or interface issues.

Top Tip

The level of specific detail that is defined prior to this type of project being tendered leads to one of its greatest strengths – the capacity for specific line-item bidding over exact quantities/methods and therefore allowing an ‘apples with apples’ comparison of bids.

Design and Construct (Performance Outcome)

The potential strength of the design and construct project delivery method is that it allows bidding contractors to think creatively about options for delivering the required facility or service without being locked into just one specific design or construction resolution.

Although these types of projects are ultimately about a contractor producing a facility that meets a performance specification, the bidding companies (prior to the tender) should still receive:

- Existing Feature Survey.
- Comprehensive utility services survey and associated information.
- Geotechnical Investigation Report.
- Concept and preliminary layout.
- The performance specification (including quality control and warranty requirements).
- Information relating to access to the site and any specific requirements needed eg. storage of materials, tipping of soil, etc.
- Supporting contract.

When putting together this information package for the bidding companies, the project owner, employer or client should also tightly define design and construction standards as well as provide a clear indication of any construction arrangement preferences.

4.5 Project Cost Estimation

Accurate cost estimates are a key element in making sound decisions at each stage of the project. In the case of the design and documentation procurement method, cost estimates should be developed at the following stages:

1. Concept Development and Project Briefing.
2. Preliminary Design.
3. Pre-tender Documentation.

Cost estimates and project budgets are typically established early in the project's life when there is limited information and detail. If a budget or estimate has to be set at this stage, it should be done on the basis of a developed concept drawing, all available site information, independent industry rates, investigation and design (civil works and synthetic) and generous contingencies.

As the level of information and detail increases with progress of the design process, the cost estimate can be refined and the contingency amounts reduced. In the case of a design and construct contract a similar process can be adopted, however the tenderers/bidding companies take on the responsibility for developing and costing the detailed design elements. Cost estimates can be developed with the assistance of an independent consultant, i.e. quantity surveyor or engineer experienced in this work.

Top Tip

Obtain independent costing advice. Be wary of cost estimates provided by just one individual surfacing contractor (particularly in the absence of a reasonable specification).

4.6 Selecting Your Lead Contractor

Artificial grass sporting facility installations generally require two key areas of work:

- The civil engineering and construction tasks of clearing and preparing the sub-grade, the design and preparation of the base, and associated works for drainage, irrigation, fencing, etc.
- The artificial grass installation, involving the possible placement of a shock pad, the laying of artificial grass carpet, the installation of lines into the carpet, and often the application of infill products (such as sand, rubber granules, etc).

Typically companies which regularly undertake this type of work are structured as one of the following:

- Civil contractor with surfacing supplier as subcontractor.
- Surfacing supplier with civil contractor as subcontractor.
- Contractors who have both civil and surfacing expertise 'in house'.
- Alternatively some projects have been delivered with separate contracts:
 - Civil contractor for civil works.
 - Surfacing supplier for surfacing works.

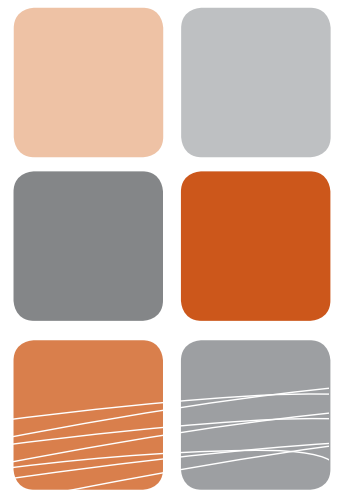
The trend in recent times is for the work to be lead by the synthetic surfacing company with a civil contractor as subcontractor. The project owner/their delegate can have some influence here in terms of specifying expectations and requirements for contractors/tenderers in terms of:

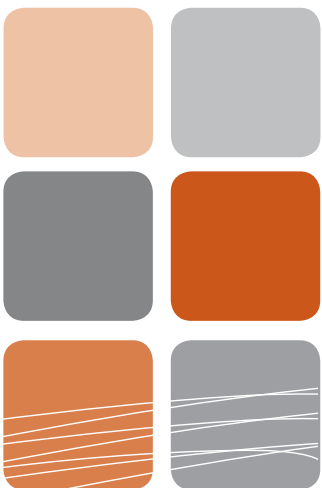
- Expected lead contractor.
- Experience with similar high tolerance work.
- Subcontractor experience.
- Project management capability.
- Project resourcing.
- Program of works.
- Witness and hold points.

Setting expectations and requirements with respect to the lead contractor will be based on the level of complexity of the project and the balance of work types, i.e. civil works versus synthetic surfacing works.

Top Tip

Regardless of the lead contractor arrangement chosen, it is essential that the project owner retains a suitably qualified engineer (expertise across both earth preparation and artificial grass installation) to supervise all works and protect the client's interests.





Top Tip

Regardless of the lead contractor arrangement chosen, it is essential that the selected company is able to accept sign-off on both the design/construction of the baseworks (whether they did that work themselves or not) and the supply and installation of the surface system. The door cannot be left open, if base or surfacing issues arise later, to complaints that the baseworks undertaken were inadequate.

Top Tip

Many companies are producing sports surface systems that are endorsed/licensed by peak bodies such as FIFA, FIH and ITF. Given that some companies on-sell their surfacing systems to other providers or preferred contractors, it is important for the client to seek written assurance that the company actually holding the licence warrants the work of their contractor/sub-contractor in full.

4.7 Selecting a Tender List and Inviting Tenders

There are a number of simple criteria by which decisions can be made as to who goes on your tender shortlist:

- The 'product' being promoted by a particular contractor/supplier must have performed satisfactorily in independent laboratory testing for durability and other required characteristics (copies of relevant independent reports should be requested).
- The contractor/supplier should be able to demonstrate that they have previously constructed similar facilities, or have acquired or has a direct trading relationship with another company that has the experience (request that the contractor provide a list of similar projects completed – not just under construction).
- There is no evidence of the performance of the company, or offered product, being the subject of any outstanding dispute, or that they have previous customers that remain dissatisfied with the facility that they have had constructed.

A useful process to help in collating preliminary information from prospective contractors is to run an Expression of Interest process in which the need to attract interested, suitable contractors is advertised (along with the availability of a brief specification or project outline), and from the response a short-list of best-fit respondents is invited to tender.

As has been said many times in this guide, through all of these phases it is highly recommended that your club or school has independent expert consulting advice available to assist in the decision making.

Top Tip

Personally inspect as many of the bidding companies' previously-constructed facilities as is possible, particularly the oldest of the installations. Question the owners about the performance of the surface, usage levels, the performance of the seams, line creep, wear rates in high-use areas, maintenance needs – and their opinion of the performance of the contractor and subcontractors generally.

4.8 Tender Documentation

Documentation required with a tender release is partly dependant on the procurement route being followed (refer to Sections 4.2, 4.3 and 4.7 of this guide), but in broad principle tender documents should make reference to:

- The role and responsibilities of the client/project owner.
- The role and responsibilities of the client/project owner's consultants.
- General conditions of contract.
- Provide background information such as surveys, geo-technical data, planning permits (including any 'conditions' applicable), floodlighting specifications, construction drawings (if applicable), bill of quantities, etc).
- Guarantees/warranties.
- Performance – standards and specifications.

- Off-site and on-site testing procedures.
- Associated works (fencing, gates, etc).
- Equipment issues.
- Requirement for 'as built' drawings (post-construction).
- Maintenance requirements.
- The process/methodology by which tenders will be assessed.

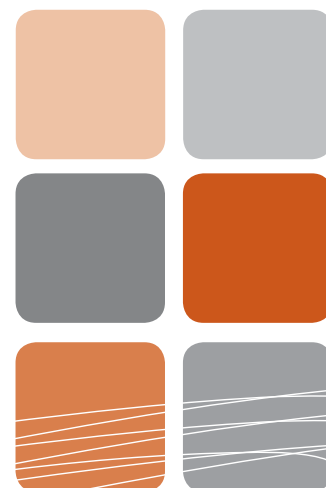
It is extremely important that the tender documents also make strong reference to:

- The need for a quality control

process that defines key stages (hold points) where inspections of key phases of work are to be undertaken and approved.

- The provision, with the tender bids, of data sheets and specifications and actual samples of the materials that are being offered in the tender – carpet and shock pad, sand and/or rubber granule infill, glues, and a sample demonstrating the exact seaming technique to be used.

Some examples of specifications and briefs are noted in Appendix 3.



4.9 Evaluation of Tenders

It is at this stage of the project that decisions made earlier in the process (i.e. procurement route – full design and documentation versus design and construct) can make evaluating tenders difficult.

While providing opportunities for alternative ideas and approaches, the Design and Construct project delivery method can make it difficult to compare tender bids ie. 'apples with apples'. Lack of clarity in this area not only makes the initial assessment process more difficult, but can also set up the possibility of additional changes or variations as the project proceeds.

With the full documentation, drawings, and bill of quantities approach, all of the bids can be analysed on a detailed line-by-line basis which gives clear indication of the true and fair cost for the particular item, and also highlights where a bidding contractor might not fully understand the issue or process in question. It should also help avoid circumstances where the client or their consultant is unaware of key issues or implications that may impact on their project's performance. These issues can be clarified as part of tender negotiations.

For either procurement method (but particularly Design and Construct) it is recommended that you interview the two or three lowest conforming tenderers, going through their proposals in detail. This allows the full exploration of the technical aspects of bids, moving beyond a simple focus on price. At these interviews, contractors should be able to demonstrate:

- A detailed knowledge of the scope of work (Civil and Synthetic).

- What the specific materials or products will be.
- Precisely how they will be installed.
- Critical stages in the process.
- Not just how they do things, but why.
- A detailed program of works.
- A knowledge of the site and its ground conditions, existing and finished levels and services.
- A knowledge of who the subcontractors are and their experiences.

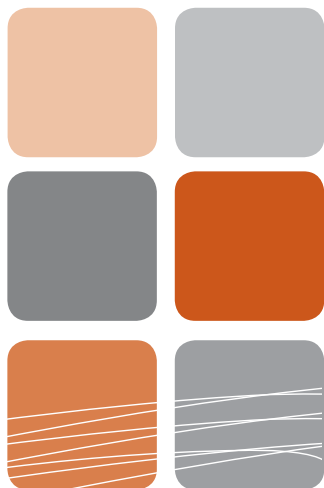
To complete the tender review, check each bid for:

- Compliance with specifications.
- The total value of the package.
- The company's experience.
- The company's reputation.

Visit sites of relevant, finished products and evaluate them for quality and performance. For example, see how the surface/seams are wearing over time.

Top Tip

Obtain samples of the tendered surfaces. Establish whether the samples provided exactly match the written product description/specification offered, and whether they are exactly the same as the product that would be laid. These comparisons (via simple testing) should be made once the product arrives on-site for installation. Testing laboratories are listed in Appendix 6 of this guide.



4.10 Agree to Final Details With Preferred Contractor

Prior to confirming acceptance of the tender from the preferred contractor, a meeting should be held involving all project partners and the preferred contractor. Matters that should be discussed and agreed to include:

- Costs and provisional sums
- Specification and test samples
- Contract monitoring procedures
- Timescale and critical path analysis
- Site working procedure
- Subcontractors and supervision
- Maintenance schedule
- List of equipment
- Guarantee/warranty
- Specific questions related to the surfacing products, their manufacture and their installation.

Top Tip

Prior to signing off on the acceptance of a tender bid, go through the guarantee document in detail with the proposed contractor. Understand specifically what is being offered, particularly extended warranty offers as these often come with restrictions.

Top Tip

Appendix 4 is a sample questionnaire used recently to help clarify tender submission issues with a proposed 'lead contractor'. You may wish to undertake a similar process for your project.

4.11 Awarding the Job

Once your decision has been made, send the contractor a letter of intent and ask for confirmation of their precise starting date on site. Promptly initiate the preparation of formal written agreements, as few contractors will agree to start work on-site before the formal contract has been received.

The Sport England document 'A Guide to the Design, Specification and Construction of Multi-Use Games Areas' (Website: www.sportengland.org) provides the following advice regarding projects where it is intended that work will commence based on a letter of intent:

'If, due to time constraints, a construction contract is to be let initially on the basis of a 'letter of intent' - a letter in which the employer instructs a contractor to proceed before contract documents are executed – particular care should be taken not to issue such a letter without agreement between the project owner and contractor of all contractual terms and conditions. To proceed on any other basis potentially prejudices the negotiating strength of the project owner and can have unexpectedly adverse consequences for him/her.'

Depending on the form of contract chosen and its content, bonds may need to be obtained and financial audits undertaken.

4.12 Establishing a Contract

There are generally a range of contract options available. For works of this scale it is usual for work to be tendered on a 'fixed lump sum' basis which can include provisional sums, amounts and quantities if some elements of scope are not able to be qualified adequately. Other alternatives include a 'schedule of rates' or 'construction management' where the client effectively pays for the contractor on a rates basis or labour and materials with agreed overheads and profit components. There are a number of 'standard' forms of contract that can be used and adopted for the chosen contract type. For example, *Australian Standards AS 4000 General Conditions*

of Contract and AS 4300 General Conditions of contract for Design and Construct are good starting points.

In determining which contract type is most appropriate to your project, the following factors should be considered:

- Project complexity and cost.
- Design responsibility.
- Level of cost certainty required.
- Risk items such as ground conditions, and their management.
- The impact of weather.
- The risk of onsite changes.
- Safety hazards
- How much flexibility and financial control the project owner or client wants.

- Preparedness to deal with late variations or changes and the potential impact of same on proposed completion dates.
- The degree to which you want to leave design and construction risks

with the contractor (could lead to construction problems and almost certainly higher tender prices).

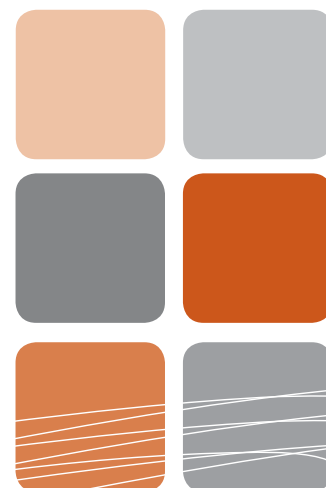
- Eliminate all the unknowns about a project prior to the tender and pricing phase.

Top Tip

Minimise this transferred risk by providing potential tenderers with sufficient ground investigation information.

Top Tip

For the scale of works associated with most artificial grass projects you would generally go with a Fixed Lump Sum contract, whether for a fully-documented or design and construct project.



4.13 Timing and Period of the Contract/Project

Because the final stages of an artificial grass field installation (laying the shock pad and carpet) can be critically dependant on weather conditions, it is sensible to plan a project's timelines so that the construction phase is taking place during the drier or warmer months of the year.

An indicative timeline (working back from when the field might become available for upgrade at the end of a winter playing season – say mid September) for a full field project might be similar to the following:

1 May	Advertise for Expressions of Interest (2 weeks). Finalise the specification during this period.
15 May	Close EOI (3 weeks to review, followed by the selective release of tender).
8 June	Release tender documents (allow 4 weeks).
8 July	Close tenders (allow 4 weeks to decide/have approved).
8 August	Award contract (lead-in time 5 weeks from awarding).
15 September	Field available, construction commences.
22 December	Field completed (14 weeks).

4.14 Terms and Warranties Offered

Refer to Section 1.13 of this guide for information on Warranties.

4.15 Manufacturer/Supplier Licensing

Refer to Section 1.12 of this guide for information on Licensing.

4.16 Product Compliance

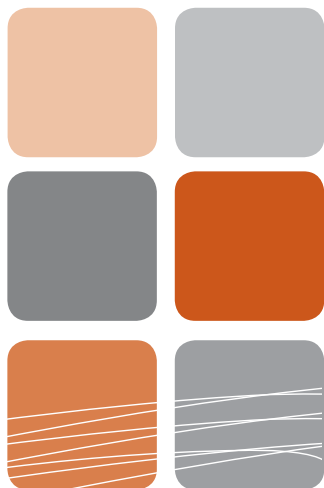
In terms of interpreting product compliance along certification lines, Section 1.12 of this guide lists two references:

- Product certification: 'A product (synthetic turf system) that is approved by a sports parent body via early laboratory testing'.
- Installed field certification: 'The testing and approval of the synthetic grass field or court after it is installed'. For some sports this is mandatory, and for some others it is only mandatory if you want to be

able to bid for or host elite events.

In many cases it is best to wait for several months worth of 'playing-in' time (i.e. time for sand and rubber infill to settle) to lapse before you conduct the post-installation testing.

Product compliance can also refer to compliance in terms of performance and checking processes during construction. This important quality check is discussed in Section 4.17 Monitor and Supervise Construction and the Contract.



4.17 Monitor and Supervise Construction & Contract

During the development of the project specification and contract, there needs to be appropriate reference made to quality systems, particularly the importance of key hold-points involving constant checking of workmanship and materials. The SAPCA Code of Practice for the Construction and Maintenance of Synthetic Turf Sports Pitches²⁰ suggests the following test items and timetable:

4.17.1 Workmanship

The quality of the workmanship should be checked at various key stages during the construction process (against the specification for the works). These stages may include:

- At completion of the sub-grade, to check size, levels, gradients and strength - to compare to the geotechnical report, which will validate the design of the sub-base (thickness, etc).
- At completion of the construction of the drainage system, to ensure that all connections have been made and that the correct falls have been made in pipe work (and that they are clean – many have been used as rubbish pits or have had waste concrete dumped in them!).
- At completion of the base to check that level and thickness requirements have been met and that the materials supplied are

as per tender, eg. crushed rock, concrete, etc.

- At completion of the shock pad to check thickness.
- At completion of the carpet surface to ensure consistency of infill depth across the pitch. Also to ratify lines, dimensions, and so on.

4.17.2 Materials

Shock pad and carpet materials delivered to site should be checked (samples sent for analysis) against the reference sample for:

Shock pad:

- Tensile strength.
- Density.
- Thickness.
- Weight per unit area.

Carpet:

- Fibre type and dtex.
- Pile length. This should match the nominal value to ± 1 mm when tested using the appropriate method.
- Pile density in terms of tufts per square cm.
- Face pile weight per unit area.
- Total weight per unit area.
- Tuft withdrawal force.
- Quality of backing materials.
- Pile filling materials (size, shape, grading).

4.18 Quality Control

Refer to Section 1.13 for extensive coverage of quality control issues.

4.19 Check Final Completion with Consultants and the Contractor

Before the facility is classified as 'Practically Complete', it is recommended that the client or their consultant project manager undertake or commission all necessary tests to ensure the compliance of the facility with your specification/standards. This step is normally linked to the retention of a certain percentage of the contract price.

Checks may include:

- The colour of the pile
- The pile length
- The infill spread rate
- Any deviations in levels (beneath a 3 metre straight edge and according to standard deviation nominated by sports code tolerances)
- Uniformity and acceptability of seams and joins

- A thorough visual examination and preparation of a photographic record of any distinctive features
- The formal tests, such as:
 - Ball rebound resilience
 - Ball rolling resistance and deviation
 - Berlin athlete impact response (deformation)
 - Peak acceleration (g) from 1.0m
 - Limoux surface friction
 - Porosity.

This would also be the time at which the materials (carpet, shock pad, sand, rubber granules, adhesives, etc) are checked to see that they match those first proffered at the time when companies were making their tender bids.

²⁰ 'The Code of Practice for the Construction and Maintenance of Synthetic Turf Sports Pitches' The Sports and Play Construction Association (2009)

Top Tip

While unfilled artificial grass carpets can be tested immediately at the completion of works, with filled/dressed carpets this is often best done a month or two later after the infill materials have settled properly into the carpet, and the redistribution of infill has been completed. With projects calling for filled/dressed carpets, you should consider advising bidding suppliers (in the tender specification) that final payment will be held until the delayed testing is completed.

4.20 Remedial Works and Re-Inspection

Hopefully the monitoring and inspection process during construction has been sufficiently effective, and the final check and testing has revealed no problems. In this case the formal handover (the trigger for the final payments, less retention monies to be retained) can occur.

Should any defects be revealed, establish a rectification program and timetable with the contractor, and

do not accept project handover until satisfied with the resolution. Depending on the extent of the remedial works required, it is possible that further survey and testing work might be necessary. This is where a site supervisor and clients advisor are vital, with a very clear form of contract spelling out the Quality Assurance, Quality Control and payment procedures, and the procedure for defects rectification and payment.

4.21 Field Testing

If there were no defects identified following practical completion (and the carrying-out of appropriate tests at that stage), then by now the facility will be fully operational. If remedial works were identified though, it may be necessary to re-test the surface.

The appropriate testing issues and protocols are listed in Section 4.19 of this guide (Check Final Completion with Consultants and the Contractor).

Top Tip

The formal testing of an artificial grass surface can be an expensive process, but the cost is minor compared with the overall investment in the project.

The stages at which field compliance testing can or should occur are:

- When the carpet arrives on site. Send several samples (min. size 350mm X 350mm) for analysis and comparison with the samples and specifications provided originally with the tenderers bid and product specification.
- Check the thickness and composition of all layers in the base.
- Test the composition and depth of the shock pad before the shock pad laying phase is completed.
- Check the performance to standards or seam strength.

- Check the infill spread rate.
- Performance testing on site immediately or soon after practical completion.
- Performance testing prior to the end of the defects liability period (usually 12 months). Note: This may only be appropriate for high-end facilities, not community level.
- Performance testing prior to the end of the warranty period - five to seven years (also probably only relevant to high-end facilities. Adds cost to the project, but more importantly will place a stronger spotlight on usage levels, maintenance regimes, etc.
- Annual or biannual certification – where required by the sport's parent body. If so required, this needs to be made absolutely clear in the brief and contract details.
- At any time if you think that your surface is failing to meet required playability and performance.



Brisbane Hockey Centre

4.22 Handover and Defects Liability Period

When the client or their representative consultants is satisfied that the facility is satisfactorily finished (practical completion), the formal handover can occur.

At this point the contractor is entitled to receive the balance of their payment,

less the usual retention amount that is held until the end of the defects liability period – usually 12 months from the date of the handover. Some owners may wish to again formally test the facility prior to the end of the defects liability period.

4.23 The Warranty or Guarantee Period

Guarantees on artificial grass pitches are often advertised as being for five to seven years, but what do they actually cover? What facility users and financiers need is a guarantee that the playing performance of their pitch (to standards generally set by their sport's parent body) is guaranteed for a set period of time. In many cases, the warranty provided may just relate to issues such as ultra-violet degradation or general wear.

Follow the trail back and you will often find that the warranties offered by

suppliers or installers are likely to be underpinned by warranties provided by the yarn extruders. Note that these warranties are often linked to things such as:

- hours of play (the general ceiling is 1,500-1,600 hours per annum)
- number and age (size) of participants.

Check Section 1.13 of this guide for important information related to establishing, understanding and implementing warranties.

Top Tip

Make sure that you are clear on the specifics of the warranty. Does it cover minimum playability throughout the warranty period? If so, how is that measured? How does the warranty relate to the yarn, the carpet, the seams? Who is issuing the warranty?

Top Tip

Most warranties will be linked to maintenance, both specialised and in-house, particularly any performance warranty.

Top Tip

Before the warranty period elapses, consider another batch of formal testing if you think that your facility is failing to meet the minimum playability standards specified.

Top Tip

Warranties are generally paid on a pro-rata basis, not full replacement. For example, if your carpet fails, the compensation formula might revolve around the percentage of the warranty period that has elapsed and what percentage of the cost of the installation relates to the carpet.

