SportSurf Seminar
April 2008

Design Issues for Synthetic Turf Surfaces
Mike Abbott April 2008
The introduction of the FIFA Quality concept for 3G artificial grass, or ‘football turf’ as FIFA call it, has meant the introduction of lifetime testing on surfaces. In order to retain the FIFA Two Star badge, a pitch must meet the performance criteria set down by FIFA on a ‘year-on-year’ basis.
The FA have now followed this lead and have embarked on a policy of testing surfaces at installation then after 1, 3 and 6 years.

Recent testing by the FA has raised some issues concerning the ability of surfacing systems, base designs and maintenance regimes to sustain this level of performance.
A basic requirement of Football Foundation in grant aiding a pitch installation has been an availability of 85 hours per week. It now has become apparent that 3G pitches will not sustain such intensity of use without major deterioration in performance criteria. This requirement is now being examined and is likely to be revised.
Design Issues

- Base design
- Drainage design
- System design & quality assurance
- Maintenance requirements
- Environmental aspects.
Base Design
Base Design

- Structural design & capacity
- Drainage properties
- Attenuation properties
- Frost susceptibility
- Contribution to performance characteristics.
Invariably the maximum load applied to a sports surface is the wheel loading from vehicles during construction.
Load transfer to formation

With no base construction

- Shear plane
- Formation level or Sub-grade
Structural Design of Pavements

Total weight 12 tonnes
I.e. 6 tonnes per axle
or 3,000kg per wheel

Pressure at surface
25kg/s.cm

Pressure at 300mm
1 kg/s.cm

300 mm approx.
45deg
Structural Design of Pavements

Essential requirements pre-construction phase:

- Comprehensive Site Investigation
- Topographical survey
- Surface water outfall
California Bearing Ratio
Moisture content and CBR
Typical Pitch Construction
(Engineered)

300 min.

25
40

Dry stone base

Geotex. at formation

Carpet
Shockpad or geotextile
Bitmac binder course
Bitmac base course
(To BS 594987)
Typical Pitch Construction (Dynamic)

- Dry stone base
- Graded stone layer
- Unbound regulating layer
- Shockpad or geotextile
- Carpet
- Geotex. at formation

300 min.
What are the long term loading intentions?
Drainage Design

- Intensity of rainfall
- Capacity of outfalls
- Attenuation of base system
- SUDS
Football or water polo?
Pitch Drainage

DRAIN DIAMS

100mm sub-soil

150 – 200mm peripheral

225mm outfall (solid)

Fall on surface

Inherited from banks
Drainage detail on Pitch

- Surface
- Bitmac
- Dry stone base
- Sub-soil drainage system

Edge detail
Perimeter drain
Fall
SUDS  Sustainable Drainage Systems

Benefits

• Attempts to mimic the natural drainage from a site before development
• Controls surface water run-off reducing peak flows
• Controls the quality of surface water run-off
• Reduces the volume of surface water flowing directly into water courses or sewers
• Improving the environment, wildlife habitat, etc.
• Replicating natural drainage patterns and sustaining existing groundwater.
SUDS Sustainable Drainage Systems

Techniques

• Attenuation in drainage blankets or large volume attenuation tanks
• Filters for fuel etc., settlement chambers, catch pits, etc.
• Open balancing ponds, natural environments
• Porous paving using open textured surfaces, pervious blocks, etc
• Avoidance of sewer connections, especially in combined systems.
Pitch System Design

- Total system design to cover:
  - Porosity - attenuation
  - Tolerances
  - Durability
  - Player - surface properties
  - Ball - surface properties
  - Sustainability
Maintenance of Performance Requirements

- Surface regularity
- Porosity
- Ball roll
- Force reduction
- Durability
Maintenance requirements

- Type of carpet
- Manufacturer/installer requirements
- Performance requirements
- Costs v depreciation
Brushing
Brushing
Environmental issues

- Recycled materials in base
- Recycling of infill materials
- Recycling carpets
- SUDS
Future

- Cost efficient SUDS – attenuation
- Non irrigated pitches
- Sustainability – recycling
- Predictable lifetime performance
- Bespoke maintenance methods to suit carpet systems
Any Questions?