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## Management of Skinned Infields

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### Components of an Infield Mix

Every skinned infield is comprised of three unique components: Sand, Silt, and Clay. Understanding the characteristics of each component goes a long way toward helping with the management of a baseball or softball field.

Sand, for example, is going to drain very well but will have a tendency to be loose or shifty.

Theoretically, you might be able to play a baseball game on an infield made out of 100% sand, but only if you have a sufficient amount of water after every pitch to keep the surface firm and playable. Since this is not a very practical method to maintaining a field, it is important that sand is balanced out by enough silt and clay to bind the infield mix together and provide sufficient water-holding, giving the infield skin stability and firmness.

Clay particles, however, will be slick, slimy, and slippery when wet – and are often the cause of rainouts. In contrast, during hot, dry summer months, clay will dry out, crack, and harden – causing a dangerous sliding surface and creating potentially unsafe ball hops.

Silt is considered the binder or bridge between sand and clay. In some respects, it is a necessary evil – silt holds the mix together, but becomes unruly to manage in high concentrations. A mix that has significantly more silt than clay, for example, will resemble a flour consistency: moisture is unable to penetrate into the mix and silty particles will cake to the bottom of athletes' cleats. Also, as silt dries out, it can create a hard pan layer on the surface of the infield and often needs to be removed or rototilled into the field to prevent water build-up over time.

It is highly recommended that an infield has a balanced Silt to Clay Ratio, or SCR, of 1:1 or even 0.5:1, whereby there is never more silt than clay on the field. This will be a far easier field to maintain than one where the silt level is two or three times the amount of clay on the field.

### Selecting an Infield Mix

There is no 'perfect' infield mix, but there are mixes that are better suited for various climates, available maintenance resources, and different levels and amounts of play.

A field that is high in sand content, for example, will be more forgiving in rain situations and can also withstand significantly more wear and tear if there is a limited maintenance staff managing multiple facilities at a complex. Often at the recreational level, the sand content on a field may be between 70 – 75% while the silt and clay would total 25 – 30% of the mix.

At higher levels of play (collegiate, Minor League, and Major League), the clay content will be increased since field managers likely have the ability to tarp, add water, and manage a single field on a day to day basis (often with plenty of assistants to help with the maintenance practices!).

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A professional mix, for example, may only be 55% sand with the silt and clay totaling about 45% of the mix (and striving for an SCR of less than 1:1, which could mean 20% silt and 25% clay in the mix).

### Testing a Mix

Prior to developing a maintenance program for a field, it is critical to conduct a soil test to identify the percentages of sand, silt, and clay. This can be done through a soils lab or your local Cooperative Extension office. Not only will results show percentages of each component, but will further break down the particle size distribution. This allows a field manager to determine whether the field has a significant amount of coarse or medium sand, as opposed to a high concentration of fine and very fine particles.

At the recreational level it is common to see fields that are 70 – 75% sand content, but within the sand particles it is desirable for the majority of the particles to be medium to medium-coarse sand. Too many fine particles have a tendency to behave more like undesirable silt.

Once a baseline is determined from a soil test, it is easier to develop a maintenance program and to select amendments to improve the playing surface. Amendments include incorporating more infield mix to bring a field into a more desirable sand/silt/clay range, or utilizing infield conditioners as a maintenance practice.

### Managing Your Moisture

The single most critical element in field management is water. Too many fields lack access to water and in turn fail to manage moisture by adding water to the infield skin. Added moisture is necessary to act as a ‘glue’ to provide a stable infield mix. Moisture also creates a level of consistency if a sufficient amount of water is added to the mix.



Photo courtesy of Jeff Langner

For groundskeepers at the professional level, this means flooding the field the night before a day game, or first thing in the morning for an early evening game. This healthy soak of the skin – which can take up to an hour, or can require 2-3 soakings of the field – creates a moisture reservoir and ensures that the surface remains firm, but not hard, throughout the upcoming game.

There are several considerations when determining just how much water should be added to the skin. The temperature, humidity, cloud cover, and wind are all factors that influence evaporation rates; and of course potential rainfall should be taken into account as well.

Other considerations include the amount of time before the game starts, the forecast for game time and the rate at which the skin will absorb water. It takes hours of practice to be able to apply water evenly. Even distribution is just as important as the amount of water applied. A consistent, uniform watering will promote a consistent, uniform bounce. Deep watering after the last game of the day will help the next day's work go smoother.

Ultimately, a groundskeeper is striving for something known as a ‘corkboard effect’ – almost a sponginess to the skinned surface. A skinned infield should be firm, but not hard. A good way to gauge this is that a player should see a ‘cleat in / cleat out’ effect when they are running on the infield.

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A cleat that doesn't adequately penetrate the top of the infield skin or causes a chunking out of the clay, indicates that the mix is too dry (and possibly that there is too much silt and clay at the surface). In contrast, a cleat that comes out mucky indicates that the infield mix has become oversaturated. Following a game on a professional field, hundreds of individual cleat marks will be visible, but none of the infield clay will have blown out or come apart. This is the idea of cleat in / cleat out; firm but not hard.

### Rainout Prevention

Certainly, oversaturation is a common concern for coaches and groundskeepers when unexpected rains arrive - especially on an infield that has low spots or is improperly graded. To that end, laser grading of a field is one of the most beneficial management techniques a field manager can employ. Grading should be done once a season if possible and especially any time new infield mix is added to an existing field.



Photo courtesy of Jeff Langner

A grade of about 0.5-1% is usually sufficient to move water laterally off an infield surface, but care should be taken to ensure that the grade runs toward the outfield grass and / or toward foul territory, and not directly toward home plate.

If professional laser grading is not in the budget, there are economical ways to evaluate a field and identify problematic low spots. Tom Burns, former groundskeeper for the Texas Rangers, provides a good method for hand-grading a field:

“One way is to check the grade using string lines. The first step is to make sure that all the lips are the proper size. Run a string line from the front edge to the back edge of

the infield. This line should be very tight and make contact with the turf on both ends. Stand to the side and look for spots where the string is touching the infield. Using the flat edge of a landscape rake or a leveling board, scrape the high spots first and work the excess into the low spots. With a little practice and a lot of patience you will quickly become proficient at this. Move the strings over five to 10 feet and work your way across the field. Level the base paths with a 2 x 4, using it as a screen board. Loosen the soil with a nail drag, level and roll. Regularly scheduled maintenance to maintain the surface grade will prevent a big problem down the road.”

### The Use of Infield Conditioners

Even after an infield mix has been tested, amended, graded, and watered, there is still a high level of daily maintenance that goes into infield management. This is where the role of an infield conditioner is critical.

There is no industry standard for what constitutes a conditioner. There are a range of products on the market, including aggregates, limestone, brick dust, vitrified clays, expanded shales, and calcined clays.

A conditioner should be selected primarily for its ability to manage moisture and provide a barrier between an athlete's cleat and the clay below. For this reason, professional groundskeepers exclusively use vitrified clays and calcined clays for skinned infield management.



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Vitrified and calcined clays vary in the base mineral that is used for the amendment, along with the manufacturing process that heats the particle to give it stability or permanence (it is in this regard that calcined clay differs from a kitty litter, which is simply dried clay rather than a fired permanent 'ceramic' amendment).



Photo courtesy of Jeff Langner

Every field should incorporate some kind of conditioner on the surface of the skinned infield to prevent infield clay from sticking to cleats, equipment, and grooming tools. For this application, typically about a 1/8" layer of material is applied. (The amount of product needed will vary based on square footage of the infield along with the type of conditioner selected. For example, more vitrified clay would need to be applied to achieve a 1/8" depth versus calcined clay, which is a much lighter material). Conditioners will also act as a mulch to help hold moisture in the infield on hot sunny days.

Many field managers like to work conditioners deeper into the infield skin, using a rototiller or nail drag, as a way to help manage moisture deeper in the soil profile.

This is especially beneficial when using calcined clays, which nearly hold their weight in water, acting like tiny sponges to absorb water and release it back into the infield skin over time.

In contrast, vitrified clays and expanded shales have less water-holding capacity. These amendments can be appealing as a surface topdressing for their ability to let moisture work its way through the surface and down into the infield mix, especially in hotter, dryer climates. Vitrified clays and expanded shales offer a high level of durability and often have aesthetic benefits as well.

### Dragging Techniques

Dragging a skinned infield can easily be a daily task on many fields, but is often neglected by field managers who have to care for multiple fields with limited staff. However, the benefits of good dragging practices should not be ignored (similarly, it's important to keep in mind that poor dragging methods can cause low spots on the field, lip build-up at the edge of the skin, and can create a field that is too fluffy or shifty).



Photo courtesy of Jeff Langner

When done properly, nail and mat dragging a field can help to maintain the proper grade, promote drainage, and provide a safe, resilient playing surface. Nail dragging helps to loosen the soil and provides material that can be moved around to fill low spots. This practice is most effective when the infield mix is moist, but not oversaturated. For daily maintenance, the nail drag should be light enough to remove spike marks and bumps but not turn up too much loose material. Field managers should take care to always hand rake the last six to 12 inches from edges to avoid pushing infield mix and conditioner into the turf, which causes lips.

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Mat dragging is a good way to put a nice finish on the field and to smooth out imperfections. This is a good practice prior to each game on a field. However, if a field is wet, a cocoa mat is better than a metal drag since wet infield mix tends to clump and stick to metal equipment.

When dragging fields, the starting and stopping points should vary from day to day. Base paths should be raked by hand whenever possible and kept slightly firmer than the rest of the infield. Periodic rolling can help firm up the base paths.

### Lip Management

After proper grade is established on a skinned infield, it is important to manage the transition from the skin to the turfgrass. A good grade becomes irrelevant if a lip builds up at the transition since water will tend to pool in this spot. Infield soil should be level with the root-zone soil, not the top of the turf.

Lips can develop from a number of factors: erosion from wind and water, poor dragging techniques, and a tendency for players to push dirt toward edges. Improper or neglected maintenance will compound the problem. Regular, scheduled maintenance will prevent the need for a major renovation.

The most effective method for preventing lip build-up is to sweep out the edge on a daily basis. While this is ideal, it is not practical for most maintenance crews due to manpower and budget constraints. Using a backpack blower on a weekly basis and hosing on a monthly basis is probably more realistic. To correct major lips, you often have no choice but to remove the turf with a sod cutter, re-establish the grade and replace the turfgrass.

### Conclusion

Infield management is not without its challenges, and a staff with limited personnel, tools, and financial resources may struggle to stay on top of some of the daily maintenance requirements. Things like access to water and availability of mound and plate tarps make a huge difference toward being able to battle the elements – not just staving off rain, but maintaining a good moisture base when weather turns hot and dry as well.

Selecting a good base soil (or amending an existing infield mix) and choosing the right conditioners can go a long way to making the daily maintenance process a bit easier on a field manager. Taking the extra time to establish a proper grade, drag regularly, and manage lips will give a field the extra touch to look and play its best when the game is on the line.