Fundamentals of Laser Grading

By Sean Connell

Laser grading is a term in the athletic field construction industry used to describe the process of moving soil with a grading mechanism equipped with an automated control. Laser guided controls can be mounted on any machinery including track hoes, trenchers, motor graders, bulldozers, tractors and infield groomers. In fact, anything with a motor and hydraulic supply can be mounted with an automated laser control system. The fundamental reason to use laser guided equipment is that it creates the most accurate and consistent grade and ultimately improves the drainage, usability, safety, and overall appearance of a sports field.

One of the biggest myths about laser grading is that some fields cannot be laser graded because of the elevations of land or fences that directly encase the field. This is usually untrue. A field can often be laser graded without moving the surrounding topography. In order to do this, you must do the following procedure.

First, grid the field on 40' or 50' centers, then shoot all grades and record on a scale drawing. (Note: most fields have some type of original blueprint so that scale drawings can be made very easily by tracing). After you have a drawing with grades shot, you can evaluate which way the water is going. After determining where the water can drain the most efficiently, you will then determine how much slope you will laser grade. One tenth of an inch in 10 linear feet is 1% of slope, so 1' of fall in 100 linear feet equals 1% slope.

After compiling your information, you need to measure the length of slope to determine your slope %. For example, if you have 4' feet of fall over 200 linear feet, you automatically know that is 2% of slope (4/200=0.02). Now you can determine if there are any problems between the points such as a big mound of soil which is holding the water back from draining or a big dip that is holding water. This process identifies problems and helps you determine how much to cut or fill. The automated laser guarantees the 2 points (from high to low) will have continual slope with no holes or high spots to get through. The lowest point is your bench mark so you know you will get positive drainage.

Now that you have a plan, you need to make sure have the right type of equipment to complete the job. For instance, laser grading variances are 1" to 2"; that means 1" to 2" is all the soil you will be able to move with a laser box in a reasonable amount of time. So, given that information, you know you have to make other arrangements to move larger quantities of soil. A farm tractor equipped with a box blade with ripper teeth can loosen the soil from 4" to 6" depths at a reasonable rate. Using larger equipment such as a bulldozer is good, but keep in mind that any equipment you use needs to complement the laser grading.

The sloped laser that is used to control the laser box blade is set in a central location on the field. You point the axis in the direction that you want to laser grade. It is accurate to the thousandths of a percent. After setting the height of the instrument, you will set the receiver to the relative grade of the soil you're going to grade. The most frequently used type of equipment to laser grade athletic fields is a tow-type box blade. It has a hitch receiver to the draw bar of a tractor and an axle of wheels behind the box blade. It makes it independent of the tractor and provides the most consistent grade. There is also a mast that holds the laser receiver which receives the signal from the sloped laser and sends it in to a control box. The control box sends the signal back into an electric hydraulic valve that controls the box blade that is grading. The signal is instant and in real time. As the tractor moves across the field, the box is making cuts and fills leveling soil giving you the safest playing surface and best drainage. In addition to the tow-type box blade, there are also 3-point hitch versions of the laser guided systems available. Unfortunately, they are more sensitive to the tractor movement. For instance, the front wheel goes into a hole and moves the box blade faster than the system can respond requiring the operator to have more responsibility on the finished surface.

The field is laser graded. All the soil is in-place and you balanced the soil so you do not have to export or import any fill to complete your job. As completion of the field is near, you are going to install your irrigation (always tamp ditches and make contractor fix settling for up to a year, this is a safety issue and is a standard for professional contractors). After irrigation and soil amendments, you will need to prepare the soil for grassing by loosening the top 2" to 3" of soil. To remove all stones, trash, sticks etc. for a clean surface, use a harrow or soil pulverizer to loosen the soil; then smooth with a box blade, preferably with the laser box. After completion, you are ready to seed or sod your field; remember, the biggest chance of damage or slow drainage is when a field is being grassed.

In summary, automated laser grading guarantees safety and improved drainage which are the biggest issues on any field. Understanding the method and how it directly impacts the finished result on any playing field should make it a mandatory trade to be included on any field renovation or construction. You do not let plumbers do electrical work, so why would you let a site contractor grade a field when there are sports turf specific contractors with properly sized equipment and specialize in field construction? Site contractors move soil and install the utilities more efficiently and cost effectively. The same logic should go to the Architect / Engineers by specifying laser grading as a trade and including them on all field construction projects. When renovating and constructing fields, properly sized equipment and trained operators make the difference.

Sean Connell is Owner and Primary Project Manager, Georgia Golf Construction, Woodbine, NJ; and a member of the SFMANJ Board of Directors.

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MY TURF WENT TO THE DOGS - Here's the *Scoop* on Dog Parks

By Jeff Cramer, CPWM

As grounds managers, we often receive requests for special projects. When our township governing body requested we plan, construct and maintain a "dog park" (off-leash area for dogs) I realized there were many new challenges – not the least was care of the turf.

When I announced the project to my staff, most, if not all, were concerned with the impact of pet waste on staff and equipment. Shortly after the opening of the park we realized that the pet waste was the least of our maintenance problems. Long-term care of the park's turf was our major battle.

Here are some suggestions you may want to consider before installing a dog park:

FACILITY DESIGN AND CONSTRUCTION

1. Visit other existing sites to determine impact on your maintenance program. Don't reinvent the wheel if you don't need to. You can see what is best for you by reviewing what works and doesn't work for other dog parks. Our facility was a one-acre site.
2. Choose better quality fencing materials to provide a safe environment for dogs and to reduce maintenance. Use largest wire core and thickest fabric coating, install a bottom tension wire and use heavier grade posts and rails.
3. Install a double-gated user entrance where owners can unleash their pets.
4. Plan an equipment service gate of sufficient size for your turf equipment.
5. If a water source is available, install a freeze-proof hydrant convenient to the facility.
6. Do not plant trees or shrubs – they won't survive!
7. Other things to consider: sitting benches, bulletin board, shade canopy, port-a-johns.

PET WASTE CONTROL

8. Post user rules and pet waste regulations at several locations.
9. Install several self-serve pet waste clean-up mitten dispensers with covered and lined waste cans along the inner perimeter.
10. Solicit park users to help enforce self clean-up by owners. This provided excellent results for our facility. Additional enforcement by park rangers if available. This includes pet license enforcement, control of aggressive animals, etc.

TURF MAINTENANCE

11. Locate the facility in a well-drained area.
12. Our facility consisted of primarily K-31 fescue – the tall fescues provide the best wear tolerance.
13. Soil compaction, both the four-legged and two-legged kind, was the biggest problem, not pet waste. Aerate several times per season to help maintain a viable turf.
14. Raise cutting height to 3" – 3 ½".
15. Conduct soil tests to determine soil phosphorous (P), potassium (K), magnesium (Mg), calcium (Ca) and liming needs. Apply slow-release nitrogen (N) sources to provide 3-5 lbs Nitrogen per year.
16. Remove all sod at the entrance gate and replace with #10 cinders compacted over ¾" clean gravel – the turf will never survive here.
17. Use a nonselective herbicide containing glyphosate (e.g., Roundup) beneath the fence line. Keep the park closed during application until herbicide has dried.

For more information go to www.dogpark.com.

Jeff Cramer is a Certified Public Works Manager; Director of Public Works, Howell Township, NJ; and a member of the SFMANJ Board of Directors.

DID YOU KNOW?

***Hydraulic conductivity* is defined as a trait of soil relating to the ease of water movement in that soil.**

SFMANJ Field of the Year Contest 2007

Sports Field Managers Association of New Jersey is announcing its annual Field of the Year (FOY) contest.

ELIGIBILITY:

- Must be a current member of SFMANJ
- Only school and parks/recreation fields are eligible
- Must be a natural grass field/fields

CRITERIA:

Award will be presented basis:

- Playability and appearance of the playing surfaces
- Five 6x7 photos & one before photo if possible
- Describe your maintenance program and what you did to improve your field
- Describe yearly budget used for this field
- Feel free to have sports groups in your photo

Edward Grekoski Park - Field of the Year 2006
South River, NJ

SUBMITTING YOUR ENTRY:

Entries are to be submitted by mail and must be received by September 30, 2007. Entries are limited to 10 color photos. Please include the name, location and owner of the facility, along with your name, position, and contact number.

Mail to:
SFMANJ 2007 FOY Contest
PO Box 370
Annandale, NJ 08801

AWARDS:

Winners will be honored with a plaque at New Jersey Turfgrass and Landscape Conference & Expo in December 2007 and will be featured in an article in SFMANJ *Update* newsletter. The winner will also receive a two-night stay at the Trump Taj Mahal, Atlantic City and three days of education and trade show admission at Expo 2007.

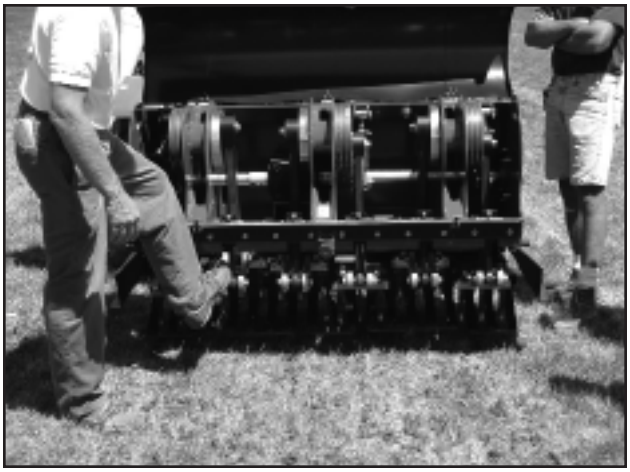
NOTE:
Photos will not be returned and may be used on SFMANJ website and promotional settings.

SFMANJ members are encouraged to attend the Rutgers Lawn, Landscape, and Sports Turf Research Field Day on Wednesday, August 1, 2007 at the Rutgers Adelphia Research Farm in Adelphia, NJ. SFMANJ will be sponsoring equipment demonstrations.

Calibration and operation of backpack sprayers is a common tour stop during Rutgers' Summer Field Days.

Deep tine cultivation equipment has been demonstrated at past SFMANJ-sponsored equipment field days.

Killin' weeds and takin' names. Dr. Steve Hart, Rutgers University, explains his latest herbicide efficacy work at a past Rutgers Lawn, Landscape, and Sports Turf Research Field Day at Adelphia.



Kickin' the tires … or tines? SFMANJ-sponsored Field Days are a great opportunity to examine the latest equipment offerings from local distributors prior to making a purchasing decision.

Dr. Jim Murphy (holding soil plug), Rutgers University and SFMANJ Advisor, annually participates in Rutgers Turfgrass Research Field Days by delivering practical turfgrass education.

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