John Mascaro's Photo Quiz

John Mascaro is President of Turf-Tec International

Answers from page 17

The dark green and light green lines on this college baseball infield are the result of an off-course crop duster applying liquid fertilizer. April fools! It's the result of a tarp. However, the reason for the lines is almost as unique as the crop duster joke. I am sure some of you guessed that the tarp caused heat injury, however what actually happened was the sports turf manager put down the tarp and then had a couple days of rain. The rain only paused during times that he did not have anyone to help pull the tarp off to allow the turf to get sunlight and air. When they were able to finally pull the tarp off, these lines were on the infield. Since the tarp is older, they speculated that yellow areas, where the turf became a little chlorotic, are where the turf simply elongated to find light. However, the greener areas are probably where the tarp has worn and more light was penetrating the tarp and getting to the grass plants. This event took place before the field was overseeded so it all occurred on actively growing bermudagrass. After a couple of days of sunshine and a fertilizer application, the field was all back to normal.

Photo submitted by Andrew Siegel, sports turf manager for baseball and softball fields at the University of Texas at Arlington. ■

If you would like to submit a photograph for John Mascaro's Photo Quiz please send it to John Mascaro, 1471 Capital Circle NW, Ste # 13, Tallahassee, FL 32303 call (850) 580-4026 or email to john@turf-tec.com. If your photograph is selected, you will receive full credit. All photos submitted will become property of SportsTurf magazine and the Sports Turf Managers Association.

THE IMPORTANCE OF MOWING

Mowing is one of the most important cultural practices for maintenance of a healthy turf. Proper mowing height increases turfgrass density and promotes deep root growth, both of which lead to a stronger turf that is more competitive against weeds and better able to persist under environmental stresses.

Two important components of mowing are cutting height and frequency. Both of these factors depend on the turfgrass species, utility of the grass, cultivar, and the level of lawn quality desired. Other important considerations are clipping disposal, mowing equipment and mowing safety.

▲ **Figure 1.** St. Augustinegrass (on the left) has coarse leaf blades and requires a higher height of cut. Bermudagrass (on the right) has much finer leaf blades and can be mowed at much lower heights.

MOWING HEIGHT

The optimum cutting height is determined by the growth habit and leaf width of the turfgrass species. Grass species that have fine textured (narrow) leaf blades and that grow horizontally can usually be mowed shorter than an upright-growing grass with coarser (wider) leaf blades. For example, bermudagrass and creeping bentgrass are mowed at low heights because of their numerous narrow leaf blades and low growth habit (**Figure 1**). In contrast, St. Augustinegrass is mowed at higher heights because it has coarse-textured leaf blades.

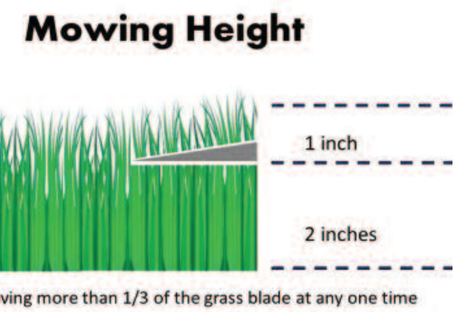
Turfgrass undergoes physiological stress with each mowing event, particularly if too much leaf tissue is removed (**Figure 2**). Scalping, or removal of too much shoot tissue at one time, can produce long-term damage to the turf. This can leave turf susceptible to other stresses such as insects, disease, drought, and sunscald. Mowing also influences rooting depth, with development of a deeper root system in response to higher mowing heights. Advantages of the deeper root system are greater tolerance to drought, insects, disease, nematodes, temperature stress, poor soil conditions, nutrient deficiencies and traffic. Repeated mowing below the recommended heights for each species is a primary cause of turf injury and should be avoided. It is also important to not mow at higher than the recommended heights, as this may result in increased thatch.

MOWING FREQUENCY

Mowing frequency is determined by the growth rate and the utility of the grass. The growth rate is influenced by grass species, time of year, weather conditions, and level of management. In the south, grass may need year-round mowing, while many parts of the country only mow in spring, summer and fall. Grass that receives repeated athletic use will need more frequent mowing to reduce potential injuries and to improve the playing surface, while low maintenance lawn areas would need less frequent mowing. Some species, such as bahiagrass, often require mowing for seedhead removal rather than for leaf blade reduction.

Grass should be mowed often enough so that no more than 1/3 of the blade height is removed per mowing (**Figure 3**). For example, if recommendations call for a 2” mowing height, the grass should be mowed when it gets to 3” in height. It is important to always leave as much leaf surface as possible so that photosynthesis can occur, particularly in a grass that is subject to environmental or site stresses.

Figure 3
Credit:
Claire Lewis



CLIPPING DISPOSAL

The function that the grass serves will often determine whether clippings are left on the ground or removed. Grass clippings contain nutrients and organic matter that is broken down by soil microbes. The nutrients can be taken up by the turf and reused and the organic matter will contribute to the soil. Because they are readily decomposed by microbes, clippings do not generally contribute to thatch. On some surfaces, such as athletic fields and golf greens, clippings are generally not desirable and are usually bagged. In these cases, the clippings can be composted.

To avoid pollution of water bodies, it is extremely important to blow any grass clippings left on sidewalks, driveways, or other hard surfaces back onto the grass. These clippings contain nutrients that could contribute to water pollution if they go down a storm drain or blow into a water body, so be sure to not leave them on these surfaces.

MOWING EQUIPMENT

Mowers are available in a wide variety of sizes and styles with many features. The two basic types are reel and rotary mowers, with variations of these available for specialized or utility uses. Reel mowers use a scissors-like action to cut the leaf blades and are used on grasses that require a low height of cut. They are suited for use on high maintenance, fine-bladed grasses such as those found on golf courses and athletic fields where a precise clean cut is desirable. Reel mowers require higher maintenance than other mowers.

▲ **Figure 4.** Reel mower

▲ **Figure 5.** Rotary mower

Lawns can be mowed with either reel or rotary mowers, depending on grass species and recommended height of cut **(Figure 4)**. Rotary mowers can be obtained as push or self-propelled models. Front, side, and rear-clipping discharge models are also available. A gasoline or electric engine is used to turn the horizontally-mounted mower blade. The grass blade is cut on impact with the mower blade. Most rotary mowers cannot mow lower than 1 inch and are best used for mowing heights above 2 inches.

Mulching mowers are modifications of rotary mowers **(Figure 5)**. These are designed to cut leaf blades into very small pieces that decompose more quickly than leaf blades cut by conventional mowers, providing nutrition and organic matter to the soil environment. The mower blades are designed to create a mild vacuum under the mower deck until the leaf blades are cut into small pieces. Mulching mowers do not have the traditional discharge chute like most rotary mowers.

Electric mowers are another option that some prefer for reduction of noise and CO_2 losses. Improvements in recent years in these mowers have increased their power and durability. They come in cordless and with cord models.

Regardless of what type mower is used, keeping blades sharp is very important for the health of the turf. Ragged, torn leaf blades are not only unsightly but also contribute to poor growth and further injury.

GOOD MOWING PRACTICES

Follow these best practices for safe mowing:

• Pick up all stones, sticks and other debris before mowing to avoid damaging the mower or injuring someone with flying objects.

• Never mow wet turf with a rotary mower because clippings can clog the machine. Mow only when the turf is dry.

Sharpen the mower blade frequently enough to prevent tearing of leaf blades.

• Mow in a different direction every time the lawn is cut. This helps prevent wear patterns, reduces the grain (grass lying over in the same direction), and reduces the possibility of scalping.

• Leave clippings on the ground. If clumping occurs, rake or use a leaf blower to distribute them.

• Check your mower every time it is used. Follow manufacturer's recommendations for service and adjustments.

• Adjust cutting height by setting the mower on a driveway or sidewalk and using a ruler to measure the distance between the ground and the blade.

• Never fill a mower engine with gasoline when the mower is hot.

• Always wear durable closed shoes when mowing the lawn – no sandals or flip flops.

• Sweep up any clippings left on paved surfaces to avoid potential water pollution. ■

Table 1. Suggested mowing heights for warm and cool season grass species.

Turfgrass Species	Optimal Mowing Height (inches)
Warm Season Grasses	
Bahiagrass	3.0 - 4.0
Bermudagrass (Use Dependent)	0.5 - 1.5
Centipedegrass	1.5 - 2.0
St. Augustinegrass	2.5 - 4.0
Zoysiagrass (Coarse types)	2.0-2.5
Cool Season Grasses	
Creeping Bentgrass	0.2-0.5
Kentucky Bluegrass	
(Cultivar Dependent)	0.75-2.5
Perennial Ryegrass	1.5-2.0
Tall Fescue	1.5-3.5

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Membership Application

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*Not been an STMA national member since 2000. New student and affiliate memberships do not qualify for the free conference registration. However, all members are eligible to receive the $100 voucher for referring a new qulaifying member.

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*There must already be a national sports turf member from your facility or commercial member from your company before you may sign up in the Associate category.

Phone: 800-323-3875 **www.STMA.org**

BACKPACK AND HAND-HELD SPRAYER CALIBRATION

Photo courtesy of Michael Goatley, Jr., Ph.D.

Backpack and hand-held sprayers consist of a tank to hold the spray mix, a pump to provide pressure, and a spray wand with one or more nozzles to deliver the spray solution in the desired spray pattern. Most backpack sprayers hold 4-6 gallons of spray mix, and hand-held sprayers usually hold 1-3 gallons. The small size, transportability, and ease of use make the sprayer a versatile tool. Backpack and hand-held sprayers are good for small acreages, spot spraying, and hard to reach locations.

Proper application of pesticides is only possible with an accurately calibrated sprayer. Calibration is the process of measuring and adjusting output of application equipment in order to apply the correct amount of active ingredient per unit area. Failure to care for and correctly calibrate spray equipment can result in misapplication of pesticides, repeat applications, damaged plants, excess cost, and environmental contamination.

PRE-CALIBRATION CHECKLIST

Proper maintenance and preparation of spray equipment will minimize application mistakes and prolong the life of your sprayer. Follow the guidelines below before making a pesticide application.

- Fill the sprayer tank ½ full of clean water. Use only clean water. Do not add pesticides until the sprayer has been checked for leaks, is in good operating condition, and has been calibrated.
- Inspect the sprayer to be sure all components are in good working order and are undamaged. Pay special attention to the pump, spray wand, strainers, and hoses. Check that there are no obstructions or leaks in the sprayer. Fix any leaks before calibration or making a pesticide application. If the sprayer has a pressure gauge, check it for accuracy. If the sprayer has a pressure regulator, follow manufacturer recommendations for periodic cleaning and inspection.
- Be sure your spray tips are the correct type and size for the spray application you want to make. The spray tip is perhaps the most important, yet most neglected, component of the sprayer. It is critical to use the appropriate nozzle tip for the intended pest target and turfgrass conditions. The spray tip determines the spray pattern and droplet size. For single nozzle band applications, it is recommended to use even-flat-fan or flood-jet types. For spot applications, hollow or solid-cone nozzles, even-flat-fan, or flood-jet types will work well.
- Remove, clean, and replace (if necessary) the screen behind the spray tip. Clean the spray tip and screen in soapy water with a soft brush. Remove any deposits from the nozzle opening with a toothpick or compressed air. Never use a knife or metallic object to clean tips as it will ruin them. Never try to unclog a tip by blowing through it with your mouth.
- With the spray tip removed, and in a place away from wells and water supplies, pressurize the sprayer and flush the system with plenty of water to remove any particles or debris.
- Reassemble the nozzle and pressurize the sprayer to check the tip for a uniform spray pattern. This can be done by spraying water on a paved or bare surface and watching for streaks as the spray dries. Wet streaks that occur directly under the nozzle may result from damaged or worn spray tips, low operating pressure, or holding the wand too close to the ground. Clogged tips may produce streaks anywhere in the spray pattern of the affected nozzle. If a spray tip has an improper spray pattern, re-

place it with a new tip that is the same style and output volume.

• Consistency with this calibration technique is dependent on how evenly the operator can spray an 18.5 feet by 18.5 feet area. This can be performed on a concrete or asphalt driveway/parking lot to observe how evenly the surface dries. The angle of a nozzle's spray pattern and the height at which it is held from the ground determine the width of the spray pattern. Try different spray heights and observe the drying rate. A uniform drying rate indicates uniform coverage. Nozzle height can be adjusted to control excess streaking. Once your application techniques are consistent, then you can begin calibrating your backpack or hand-held sprayer.

Photo courtesy of Michael Goatley, Jr., Ph.D.

• Constant pressure must be maintained for consistent application rates. High pressure equals more product being applied per unit area as well as higher drift potential, while lower pressure equals less product per unit area. Few hand-held and backpack sprayers contain pressure regulators. Pressure fluctuations can be prevented by installation of a pressure gauge or spray management valve (SMV) or constant flow valve (CFV) on the spray handle or boom. Spray rates and patterns will be more consistent, drift potential can be reduced, and calibration is easier. If a pressure regulator is not an option, fairly even pressure can be maintained if the hand pump is operated by a constant number of pumps per minute. It is not necessary to know the exact pressure output to calibrate a sprayer, but the pressure must be kept constant throughout calibration and application. Keep in mind that each operator will have a different walking speed and will regulate pressure differently. Therefore, it is important to calibrate a sprayer for each operator.

CALIBRATION PROCESS

The amount of spray applied to an area will depend on walking speed, pressure, spray swath width, and the spray tip selected. If you change any one of these, the amount of spray applied changes and the sprayer must be calibrated from the beginning.

There are several different ways to accurately calibrate a sprayer. The process being outlined in this bulletin is based on the 128th Acre Calibration Method. The spray collected from a single nozzle measured in fluid ounces directly converts to gallons per acre regardless of the number of nozzles. Because there are 128 fluid ounces in a gallon, the fluid ounces collected from 1/128th of an acre will equal gallons of solution per acre.

Remember:

1 acre = 43,560 square feet
1/128th of an acre = 340.31 square feet
1/128th of an acre = 18.5 feet by 18.5 feet
1 gallon = 128 fluid ounces

Collect materials needed to calibrate the sprayer:

- Sprayer
- Correct spray tips (if using more than one, the tips are identical)
- Measuring tape
- Water
- Flags or turf paint
- Measuring container (measurement in fluid ounces)
- Stopwatch

Step 1: Determine application pressure and timing.

Mark off an area 18.5 feet by 18.5 feet. Turf paint or flags can be used to establish boundaries.

Fill the sprayer tank ½ full of clean water. Use only clean water during calibration. Never add pesticides to a sprayer until it is properly calibrated and ready for use. Pump to the normal operating pressure to simulate the average spray situation.

Walk at a comfortable, steady speed while spraying to achieve uniform coverage. Maintain consistent pressure while spraying. Measure the time in seconds it takes to uniformly spray the 18.5 feet by 18.5 feet area. Record the time.

Example: It took 46 seconds to spray the 18.5 feet by 18.5 feet area.

Step 2: Measure nozzle output

Nozzle flow rate is the amount of liquid sprayed from the nozzle in a given amount of time. Operate the sprayer with water in the tank at the desired pressure. Using a stopwatch and measuring cup marked in fluid ounces, collect water from the nozzle for the time (in seconds) it took to spray the predetermined area. Record the amount collected. Repeat this process 2-3 times to get the average nozzle output.

Note: Application rates can be highly variable with backpack or hand-held sprayers. Simple adjustments can be made to ensure a consistent application rate. To increase application rates, the operator can increase pressure and to decrease application rates, the operator can decrease pressure.

Example: The first amount collected after 46 seconds is 44 fluid ounces. The second amount collected after 46 seconds is 45 fluid

Backpack and hand-held sprayer calibration worksheet

Color-coded squares are meant to help in entering repeated numbers.

- (green) - amount of time in seconds it takes to spray the 18.5 feet by 18.5 feet area
- (red) - sum of fluid ounces collected from the nozzle
- (black) - average nozzle output measured in fluid ounces
- (yellow) - number used to determine acceptable range for nozzle output
- (blue) - minimum number of fluid ounces that is acceptable from each nozzle
- (brown) - maximum number of fluid ounces that is acceptable from each nozzle

Remember:

1 acre = 43,560 square feet
1/128th of an acre = 340.31 square feet
1/128th of an acre = 18.5 feet by 18.5 feet
1 gallon = 128 fluid ounces

Step 1: Determine application pressure and timing.

Mark off an area 18.5 feet by 18.5 feet. Turf paint or flags can be used to establish boundaries.

Measure the time in seconds it takes to uniformly spray the 18.5 feet by 18.5 feet area. Remember to walk at a comfortable, steady speed and maintain consistent pressure while spraying.

Total: ______ seconds to spray the 18.5 feet by 18.5 feet area.

Step 2: Measure nozzle output.

Operate the sprayer with water in the tank at the desired pressure. Using a stopwatch and measuring cup marked in fluid ounces, collect water from the nozzle for the time (in seconds) it took to spray the predetermined area.

Collect water output for ______ seconds.
Amount collected:
1) ______ fluid ounces
2) ______ fluid ounces
3) ______ fluid ounces
Total output from the nozzle (sum of the 3 collections): ______ fluid ounces
Determine average output:

______ fluid ounces / 3 nozzles = ______ fluid ounces for average nozzle output

Average nozzle output: ______ fluid ounces is equal to ______ GPA
The sprayer is calibrated to deliver ______ gallons per acre.

Multiple Nozzles
If there are multiple nozzles, check that all nozzles are within 7 percent of the average nozzle output by determining the range.

0.07 x ______ fluid ounces = ______ (range)

Minimum acceptable fluid ounces that can be collected from each nozzle:
______ fluid ounces - ______ = ______ fluid ounces

Maximum acceptable fluid ounces that can be collected from each nozzle:

The acceptable range for individual nozzle output is between ______ fluid ounces to ______ fluid ounces.

If a nozzle does not fall within the acceptable range, clean or replace the nozzle and repeat this step. Once nozzle output falls within the acceptable range, the sprayer is calibrated.

Remember, the concept of the 128th method is based on the time it takes to spray 128th of an acre with a single nozzle. That time requirement is then used to collect fluid ounces from a single nozzle. Since there are 128 fluid ounces in a gallon, the simple conversion or result is in gallons per acre (GPA).

Average nozzle output: ______ fluid ounces is equal to ______ GPA
The sprayer is calibrated to deliver ______ gallons per acre.

ounces. The third amount collected after 46 seconds is 44 fluid ounces. The average output of the nozzle is 44 fluid ounces.

Example:

44 fluid ounces is the average nozzle output. Therefore, the sprayer is calibrated to deliver 44 gallons per acre. Remember: The concept of the 128th method is based on the time it takes to spray 128th of an acre with a single nozzle. That time requirement is then used to collect fluid ounces from a single nozzle. Since there are 128 fluid ounces in a gallon, the simple conversion or result is in gallons per acre (GPA).

MULTIPLE NOZZLES

If there is more than one nozzle being used, check the uniformity of all nozzles on the boom. Collect the water sprayed from each nozzle individually for the time (in seconds) it took to spray the predetermined area. After catching the spray from each nozzle individually, add the amounts collected and divide by the number of nozzles to get the average output per nozzle. If the flow rate of any spray tip is 7% greater or less than the average nozzle output, clean or replace the nozzle tip. If any of the nozzles need to be cleaned or replaced, recheck the output from all nozzles and recalculate the average.

Example:
Nozzle Test
Output collected from each nozzle after 46 seconds:
Nozzle 1 – 44 fluid ounces
Nozzle 2 – 45 fluid ounces
Nozzle 3 – 44 fluid ounces
Total output from all nozzles: 133 fluid ounces
Determine average output for each nozzle:

$$\frac{\text{133 fluid ounces}}{\text{3 nozzles}} = \text{44.3 or 44 fluid ounces average nozzle output}$$

Remember:

$$\frac{\text{Sum of total fluid ounces}}{\text{Number of nozzles}} = \text{average nozzle output in fluid ounces}$$

Check that all nozzles are within 7 percent of the average nozzle output.

0.07 x 44 fluid ounces = 3.08

The acceptable range for nozzle output is between 40.9 to 47.1 fluid ounces. All of the nozzles in the example fall within the acceptable range. If they do not, clean or replace the spray tips and repeat this step.

> The sprayer is now correctly calibrated. The average amount of water collected in fluid ounces equals the gallons applied per acre (GPA).

Example:
44 fluid ounces was the average nozzle output. Therefore, the sprayer is calibrated to deliver 44 gallons per acre.

TIPS FOR PRODUCT APPLICATION

Correct and accurate application of any pesticide product to a turfgrass area is essential to prevent damage to the turfgrass and prevent pollution of water sources. Use the following tips for accurate and safe applications with your sprayer:

• Read all product labels to ensure safe handling, proper application, and correct use rates. In addition, be sure to comply with all state and federal environmental regulations.

• Make sure the sprayer is in good operating condition. Review the Pre-Calibration Checklist before each pesticide application.

• Calibrate the sprayer every fourth application (if using the same applicator) or every application (if a new applicator) to ensure the sprayer and nozzles are still delivering the correct volume of product.

• Always stay a safe distance from water sources to prevent any possible pollution.

• Don't apply pesticides on windy days (less than 7 mph or less than 5 mph near sensitive crops).

• Maintain a consistent walking speed and pressure during calibration and match it during application to deliver an accurate amount of product.

• Use different sprayers for insecticide and herbicide applications.

• Be sure to clean the sprayer thoroughly after applying pesticide products to prevent build up and corrosion on sprayer parts.

This material was originally produced by the 2013 STMA Information Outreach Committee. Members included: Darian Daily; Alec Kowalewski; Brad Fresenburg; Bryan Myers; David Kimel; Doug Linde; Jason Bowers; Jason Kopp; Jason Kruse; Jeff Langner; Jim Plasteras; Mike Goatley; Neil Cathey; Ryan McGillivray; Steven Phillips; TJ Brewer; Tony Strickland; Vickie Wallace; Wayne Horman; and Weston Floyd. ■

References:

STMA Information Outreach Committee

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Virginia Tech – Calibrating Hand-held and Backpack Sprayers for Applying Pesticides - http://pubs.ext.vt.edu/456/456-502/456-502.html

North Carolina State University – Calibrating a Backpack Sprayer - https://www.bae.ncsu.edu/topic/agmachine/turf/pubs/ag-576-callibrating_back-

INFINITY PARK,

Glendale, Colorado

WHY STMA SHOULD CONSIDER YOUR FIELD A WINNER?

The season opened this year on March 3, 2013. We had a fair amount of snow in February and one corner of our field remained frozen through January and February. We were hoping that the corner would thaw out enough to have a safe playing surface, however with 2 weeks until the season opener we were forced to come up with a different plan. We had to rent a heating system that they use to thaw the ground before they pour concrete. The system was very labor intensive and also expensive to rent. The thawing process took about a week to complete but we were able to get in the scheduled game and made sure the field was safe for play.

March and April ended up being our biggest snow months and the snow always seemed to come the day before our matches. We were forced to plow the field multiple times in order to make sure the games were played.

The field was rented to Magpul on June 29. They hosted a farewell to Colorado and had approximately 4,500 people on the field. The event went well and there was very limited damage from tents vendor booths and concessions.

Another challenge that we had was Colorado State University asked to host a spring scrimmage at Infinity Park to try and rally the Denver alumni. The field was already scheduled for rugby tournaments the following day so we had to figure out how to effectively and efficiently flip the field from football to rugby. We spoke directly with the CSU coaching staff and convinced them that since it was only a practice to leave the goal post where they were. This made the field 10 yards shorter than a normal field but no one knew because we did not paint numbers on the yardage markers. The evening after the practice we painted the football lines green (big thanks to Bret Baird of Dick's Sporting Good Park on green paint selection) and then restriped the field for the next day.

The biggest challenge of the year came after the Serevii and Glendale invitational sevens tournament. On the playing surface we had 42 games in a 2-day span. The field held up to all the play very well but did need a lot of divots filled throughout the following week.

- **Level of Submission:** Schools/Parks
- **Category of Submission:** Sporting Grounds
- **Sports Turf Manager:** Noel Harryman
- **Title:** Manager Turf Operations
- **Education:** Bachelor's Degree in Business Management
- **Experience:** 2002-2003 Landscape Supervisor (Fresh Aire Enterprises); 2002-2007 Material Supplier Manager/Designer (Landscape Solutions); 2007-2009 Project Manager (Graff's Turf Farms); fields worked on include Coors, Invesco, Dicks, Folsom, Wrigley, Infinity Park, Haymarket; 2009-2011 Assistant Turf Manager, City of Glendale; 2011-Current Manager Turf Operations 2012 City of Glendale
- **Staff:** Josh Bertrand, Gene Hazlett, Vickie Allen, Kevin Brown, Matt McCord, Jody Yonke, Joe Fererra, Christi Clay, Corey Williams, and Chris Roozing.
- **Original construction:** 2007
- **Renovation:** Irrigation replacement on the playing surface. The laterals had to be lowered because they were not installed according to the specs. The lines were punctured do to deep tine aeration. The sod was stripped out along the laterals running east to west on the field and then new sod was installed. We were forced to use thick cut sod in order to be able to play on the surface shortly after the renovation. The renovation was done because of the punctured irrigation lines and because the original installation did not follow the irrigation specifications. The lines were anywhere from 4-8" depths. By lowering the laterals we are able to deep tine aerate up to 12" depth and still be safe. The city has also thought about putting in the Desso system in the grass and would not have been able to entertain this system without lowering the lines. The renovation went very well in 2011 and not at all noticeable at this point. In hindsight I would probably push to have the entire field pulled out and laser leveled and a complete resod. Pulling out a 4 foot wide area is difficult to get a perfect grade. We still notice a few imperfections.
- **Turfgrass variety:** Midnight, Awesome, Impact, Nu-Destiny-Kentucky Bluegrass (70%) Caddieshack, Accent, Top-Gun-Perennial Ryegrass (30%)
- **Overseeding:** Overseeding is done with Kentucky bluegrass. The pitch is overseeded four times a year (last week of March, first week of May, mid-June, and the last week of August). The first three overseedings were done with 10#/1000sq.ft. and the last overseeding in August was done with 15#/1000sq.ft. The seed mix is Midnight, Awesome, Impact, and NuDestiny Kentucky Bluegrass. For divot repair we use a 1:3:1 ratio of pregerminated seed, USGA Sand, and fertilizer.
- **Rootzone composition:** 92% Sand; 8% other (4% silt, 2% Clay, 2% organic matter)
- **Drainage:** GraviTURF designed by Dan Almond of Millennium Sports. Using 4-inch ADS drain pipe, located on 15-foot centers, set in pea gravel, 10 inches below surface.