2024 STUDY GUIDE Maintenance Cost Estimating

Fertilizer Calculations

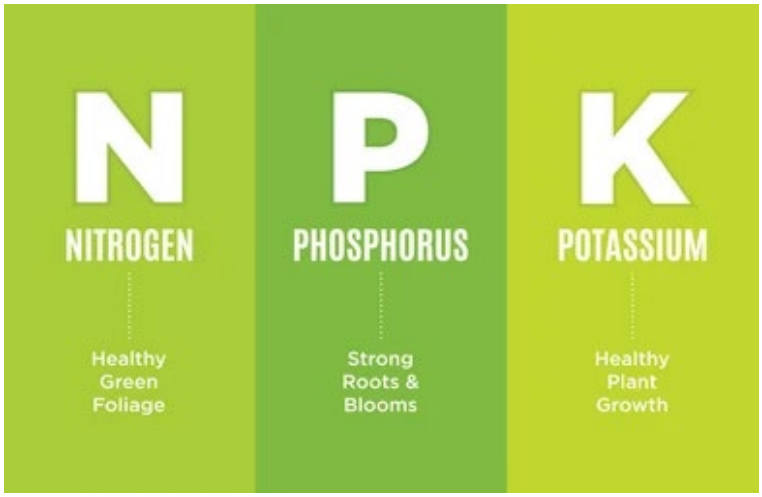
Landscape professionals must be able to quickly calculate the quantity of fertilizer needed for a property. This is often reduced to how many 50 lb. bags are required.

The starting place is to know how many lbs. of nitrogen per 1000 square feet.

To determine how many 50 lb. bags of fertilizer are required, you first must understand how much Nitrogen is in a bag. This depends on the type of fertilizer mix.

All fertilizer bags will have three numbers on them. The first number is always the percentage of Nitrogen in the bag. For example, a lawn fertilizer might look something like the following.

30 – 0 – 12



This example mix contains 30% nitrogen. If the bag weighs 50 lbs. in total, how many lbs. of nitrogen (N) would be in the bag?

It would be 30% of 50 lbs. or……15 lbs. (50 x .30 = 15)

Ok, let's look at it in another way. If you want 1 lb. of nitrogen (N), how many lbs. of this 30-0-12 mix would you need? Remember, only 30% of it is Nitrogen.

EASY! Divide the lbs. of nitrogen needed (1 lb. in this case) by the percentage of nitrogen (N) in the mix.

1 lb. of N / .30 (% N)= 3.33 lbs. If we poured 3.33 lbs. of this bag of fertilizer into a spreader, one lb. of it would be Nitrogen. The other 2.33 lbs. would be Potassium, Phosphorus, and other micronutrients and coatings.

STORY PROBLEM:

A commercial property has 50,000 sq. ft. of lawn that needs to be fertilized. You determine you want to apply 1 lb. of Nitrogen per 1000 sq. ft. Your fertilizer mix is 30 – 0 – 8.

How much fertilizer must you apply over this property's 50,000 sq. ft. of grass?

Step 1. Determine how many units of 1000 sq. ft. you have by dividing your total lawn area by 1000.
Step 2. Multiply these units from Step 1 by the recommended lbs. of nitrogen per thousand sq. ft.
Step 3. Divide those total lbs. of nitrogen by the percentage of nitrogen in the mix.
Step 4. Determine how many 50 lb. bags you need. Round up to the nearest whole bag.

Let's do this together.

Step 1. 50,000/1000 = 50 (You have 50 units of 1000 sq. ft on this property)
Step 2. 50 x 1 = 50 (You want 1 lb. of nitrogen per 1000 sq. ft., so you need 50 lbs. of nitrogen. Pretty easy so far, right?
Step 3. 50 / .30 = 166.67 (Because only 30% of the mix is nitrogen, you need 166.67 lbs. of total fertilizer to get 50 lbs. of Nitrogen.
Step 4. 166.67/50 = 3.33 or 4 Bags. (you require 3.33 50 lb. bags to get 166.67 lbs. of fertilizer, but you can't buy .33 bags, so you determine you need 4 bags.

Now buy 4 bags, apply the fertilizer, and delight the customer with green, healthy grass!

YOUR TURN

How many bags of fertilizer do you need for the following scenarios? Use the same steps as the previous page.

1. Billy Bob's Burger Headquarters:
    a. Lawn Area = 230,000 sq. ft.
    b. The recommended application rate is 1.5 lbs. of nitrogen per 1000 sq. ft.
    c. Fertilizer mix is 32-0-8

2. Sally's Serendipitous Sweets Candy Shoppe
    a. Lawn Area = 8000 sq. ft.
    b. Recommended application rate is 0.5 lbs. per nitrogen per 1000 sq. ft.
    c. Fertilizer mix is 25-5-10

The math is the same if you are fertilizing shrubs or ground cover. We use different fertilizer blends in these cases.

3. Warren's Wonderful Wingtip's
    a. Shrub area – 12,500 sq. ft.
    b. The recommended application rate is 1 lb. of nitrogen per 1000 sq. ft.
    c. Fertilizer mix is 14-14-14

Mulch Calculations

Another essential calculation landscapers need to understand is how much mulch is required to cover planting beds. Although we can easily measure the ***area*** of a bed that needs to be covered (length x width), mulch is purchased in a ***volume*** (cubic yards). This is because a certain *depth* of mulch is also a factor. Therefore, you must determine how many cubic yards of mulch are needed to cover a specific bed area at a specified thickness.

Two factors must be determined before calculating the volume of mulch in cubic yards.

1. The total bed area needed to be covered with mulch
2. How thick the mulch needs to be

Most often, mulch thickness is described in inches. Perhaps you must apply the 2-inch thick mulch over the whole bed area. This creates a problem because our area is in *sq. f*t., and the depth is in *inches*. To calculate, the units must be the same.

Let's walk through the steps together.

Step 1. Find the area of the beds. (Measure the length x width to get sq. ft.)
Step 2. Determine the depth in inches and **CONVERT** this depth from inches to feet. Divide how many inches in depth you need by 12 because there are 12 inches in a foot.
Step 3. Multiply the area by depth (remember they both need to be in feet)
This gives us a VOLUME in cubit feet. We are not quite there yet. Remember, mulch is purchased in cubic YARDS, not cubic feet.
Step 4. Divided the volume by 27 to convert cubic feet to cubic yards. DON'T forget this last step.
There are 3 ft. in a yard. 3 ft. x 3ft. x 3 ft.is a cubic yard. ***3x3x3 = 27****. (27 Cubic feet in 1 cubic yard)*

STORY PROBLEM:

You have determined that 2" of fresh bark mulch needs to be installed over all beds and tree rings of a new property you just won. You measured a total bed and tree ring area of 25,200 sq. ft. How many cubic yards of mulch are needed for this project?

Step 1. 25,200 area
Step 2. 2"/12" = .167 (2 inches is .167 feet)
Step 3. 25,200 x .167 = 4208.4 (Covering all 25,200 sq. ft of bed area with .167 feet (2 inches) of mulch would require 4208.4 cubic feet. **Wait! We need cubic yards, not just cubic feet.**
Step 4. 4208.4/27 = 155.87 cubic yards. (Round ***up*** to the nearest yard. So, you need 156 cubic yards of mulch).

YOUR TURN
How many cubic yards of mulch are needed for the following scenarios?

1. Billy Bob's Burger Headquarters:
    a. Total bed and tree ring area = 50,300 sq. ft.
    b. 2 inches of mulch needed.

2. Sally's Serendipitous Sweets Candy Shoppe
    a. Total bed and tree ring area = 1550 sq. ft.
    b. 1 inch of mulch needed

Seed Calculations

Lawn overseeding is another common service landscape maintenance companies provide. Calculating how many pounds of seed is needed can also be done in a few easy steps.

Like fertilizer, we determine how many pounds of seed are needed per 1000 sq. ft. Here are the steps:

Step 1. Determine how many units of 1000 sq. ft you have on the property by dividing the total sq. ft of lawn area that will be overseeded by 1000.
Step 2. Determine how many lbs. of seed are needed per 1000 sq. ft.
Step 3. Multiply the lbs. from Step 2 with the number of 1000 sq. ft. units from Step 1.

STORY PROBLEM:

Fall is coming, and the Bermuda grass is going dormant. Therefore, you will overseed the Bermuda with Rye grass to keep things green over the winter. You have determined you need to overseed at a rate of 4 lbs. of seed per 1000 sq. ft. The property has 75,300 sq. ft. of lawn.

Step 1. 75,300/1000 = 75.3 (You have 75.3 units of 1000 sq. ft on this property)
Step 2. 4 lbs. per 1000 sq. ft.
Step 3. 75.3 x 4 = 301.2 lbs. (301.2 lbs. of seed is needed to cover all 75,300 sq. ft at a rate of 4 lbs. of seed per 1000 sq. ft.

YOUR TURN

How many lbs. of seed are needed for the following two properties?

1. Billy Bob's Burger Headquarters:
    a. Total lawn area = 50,300 sq. ft.
    b. Recommended overseeding rate is 4 lbs. per N 1000 sq. ft.

2. Sally's Serendipitous Sweets Candy Shoppe
    a. Total lawn area = 8000 sq. ft.
    b. Recommended overseeding rate is 3 lbs. per N 1000 sq. ft.

Labor & Equipment Cost Estimating

The cost associated with employee time is the most significant cost for landscaping companies. To charge the customer the correct amount, how many hours each task will take and how much those hours will cost must be calculated.

Successful companies understand the production rates for each task they need to do and then strive to achieve those rates. Production Rates/Factors are the time it takes to accomplish a task.

A few examples of items where production rates are used Include:

- Hours it takes to fertilize grass per 1 sq. ft or possibly per 1000 sq. ft.
- Hours it takes to install 1 cubic yard of mulch
- Hours it takes to mow per 1 sq. ft. of grass or per 1000 sq. ft. of grass
- Hours to hard edge per lineal foot

Can you list some other types of work where knowing production rates is essential? What might the production factor be in your examples? (per yard, per tree, per flat.)

NCLC Maintenance Cost Estimating Competition TIP #1:

We give you the production rates to use. You don't need to know the exact rates for the competition. Just use the ones we provide you on the worksheet!

You **DO** need to calculate the total hours required to complete a task. For example, you will need to calculate how long it will take to mow 100,000 sq. ft of lawn or install 10 yards of mulch based on the rates we provide you. These rates will change based on the size of your mower. For the competition, you will use one production rate; it will be on the worksheet.

You also need to calculate how much money those hours will cost.

We give you labor cost per hour to use as well.

Lastly, if a piece of equipment is to be used, we need to know how much the piece of equipment will cost per hour.

You probably guessed it; we also give you the equipment cost per hour for the competition.

Let's Practice!

Square footage of grass = 100,000 sq. ft.
Production Rate = .00013 hours (it takes .00013 hours to mow 1 sq. ft.)
Labor Costs per hour = $32.00
Equipment Cost per hour = $7.50

How many hours will it take to mow 100,000 sq. ft?

100,000 x .00013 = **13 Hours**

How much will these 13 labor hours cost?

13 hours x $32.00 = **$416.00**

How much will the equipment cost to mow that 100,000 sq. ft.?

13 hours x $7.50 = **$97.50**

In landscape maintenance, we ultimately want to calculate a cost per season. We need to know the number of occurrences for the season or year to calculate this.

If a standard landscape maintenance contract includes 26 mows a year, then the cost per season is calculated by multiplying the costs above by 26.

Mow hours per season:

13 hours x 26 occurrences = **338 hours per season**

Cost of labor per season:

338 hours x $32.00 = **$10,816.00 per season**

Cost of equipment per season:

338 hours x $7.50 = **$2,535.00 per season**

Add the labor cost and equipment cost together to get the total cost of mowing this 100,000 sq. ft. for the season:

$10,816.0 + $2,535.00 = $13,351.00

Material Cost Estimating

Landscape maintenance companies provide services that also include material costs in addition to labor and equipment costs. For example, a company that will perform overseeding work needs to calculate the costs for the material (seed costs) as well as the labor and equipment required to install that seed.

Mulch installation requires labor costs to move and rake the mulch, possible equipment costs such as a skid steer to move larger piles or stage the mulch, and the material costs of the mulch itself.

NCLC Maintenance Cost Estimating Competition TIP #2:

In the competition worksheet, we provide materials costs for you to use as a *per unit cost*, such as cost per *lb*. of seed, per *bag* of fertilizer, or per cubic *yard* of mulch.

You will need to calculate the quantity of materials required under the scenarios given during the competition.

NCLC Maintenance Cost Estimating Competition TIP #3:

You must also calculate the materials, labor, and equipment costs **per season**.

You will be provided with the number of occurrences during the competition. NOTE: You must do two sets of estimates—one for a ***standard service*** and one for a ***premium service*** option. The only difference is the number of occurrences for specific tasks, but this will require you to recalculate the costs for the season.

If you are going to overseed 2 times a year, you will calculate the material and labor costs for 2 occurrences, not just 1.

Here are the steps to calculate material costs per occurrence and per season.

Step 1. Calculate the quantity of product needed, such as lbs. of seed, bags of fertilizer, or cubic yards of mulch
Step 2. Determine the costs per unit of material (In the competition, we will provide this)
Step 3. Multiply the quantity needed by the cost per unit to get the cost per occurrence
Step 4. Multiply the cost per occurrence by the number of occurrences to obtain the price per season

Let's Practice!

Calculate the material cost to overseed a property with the following scenario.

Pounds of seed needed = 302 lbs. (see the steps in the Seed Calculation section above to review how to get this number)
Seed Cost per pound = $1.25 (We will give the cost to you)
Occurrences per season = 2

Step 1. 302 lbs.
Step 2. $1.25
Step 3. 302 x $1.25 = **$377.50** *(per occurrence)*
Step 4. $377.50 x 2 = **$755.00** *(per season)*

YOUR TURN

How much will it cost to over-seed the lawn on the following two properties?

1. Billy Bob's Burger Headquarters:
    a. Total lawn area = 50,300 sq. ft.
    b. Recommended overseeding rate is 4 lbs. nitrogen per 1000 sq. ft.
    c. Seed Cost = $1.25 per pound
    d. Occurrences 2

2. Sally's Serendipitous Sweets Candy Shoppe
    a. Total lawn area = 8000 sq. ft.
    b. Recommended overseeding rate is 3 lbs. nitrogen per 1000 sq. ft
    c. Seed Cost = $1.75 per pound
    d. Occurrences 1

After studying this material, you now know how to calculate the following:

- Quantity of materials needed based on sq. ft.
- Labor hours required per occurrence
- Labor hours needed for a season.
- Equipment cost per occurrence
- Equipment cost per season
- Material cost per occurrence
- Material cost per season

Now, practice putting it all together using the following spreadsheet. Notice that some examples have been provided at the top in *italics*. Calculate the numbers for each peach-colored cell on the sheet.

STANDARD Landscape Services to be Performed	Square Footage or Unit of Measure	Hours per Unit of Measure	Hours per Occurrence	Number of Occurrences	Total Hours per Season	Labor Cost per Hour	Total Labor Cost per Season	Equipment Cost per Hour	Total Equipment Cost per Season	Quantity of Actual Product Needed	Material Cost per Unit of Measure	Total Material Cost Per Season	Total Cost per Service
EXAMPLES	*25000.00*	*0.0001*	*3.25*	*26*	*84.50*	*$32.00*	*$ 2,704.00*	*$7.50*	*$ 633.75*				
Mowing													*$ 3,337.75*
Overseed Lawn (not including tree rings (900 sq. ft.)	*24100.00*	*4E-05*	*0.96*	*1*	*0.96*	*$45.00*	*$ 43.20*	*$10.00*	*$ 9.60*	*511.00*	*$1.25*	*$ 638.75*	*$ 691.55*
Fertilize Turf (including tree rings)	*25000.00*	*0.0001*	*2.50*	*3*	*7.50*	*$45.00*	*$ 337.50*	*$2.25*	*$ 16.88*	*10.00*	*$25.00*	*$ 750.00*	*$ 1,104.38*
Mowing	251360.00	0.00013		26		$32.00		$7.50					
Overseed Lawn (not including tree rings)	243060.00	0.00004		1		$45.00		$10.00		973.00	$1.25		
Fertilize Turf (including tree rings)	251360.00	0.0001		3		$45.00		$2.25		18.00	$25.00		
Practice these ones as well. NOTE: For QUANTITIES & OCCURANCES, you will need to find or calculate these during the competition													
Weed All Beds and Tree Rings	56000.00	0.0002		13		$32.00							
Fertilize All Beds (≠ Rings)	47700.00	0.0003		1		$45.00				9.00	$35.00		
Prune Beds	28000.00	0.0025		3		$32.00							
Stick Edging Hard Edge	15800.00	0.0003		13		$32.00							
Line Trimming Soft Edge	12539.00	0.002		13		$32.00							
Mulch All Beds & Rings (≠ annuals)	56000.00	0.006		1		$32.00				102.00	$20.00		
Prune Trees (ea.)	232.00	0.33		1		$32.00							
Install Annual Flowers (sf)	350.00	0.02		2		$45.00				504.00	$1.00		
Install Tulip Bulbs (sf)	175.00	0.02		2		$45.00				525.00	$0.50		
Maintain Annual Flower Beds	350.00	0.003		26		$32.00							
Total Costs All Services													

Snow & Ice Estimating

Landscape companies must calculate the costs of providing this work and product for markets that offer snow plowing and ice melt services.

Snow and Ice service require labor, materials, and equipment. Equipment may include plow trucks, skid steers, snow blowers, and ice melt spreaders.

Snow and Ice Truck & EQUIPMENT Costs

Step 1. Determine the area to be covered
Step 2. Calculate how many hours will be needed to clean that area
Step 3. Determine the per-hour cost for that equipment (We will provide these rates to you in the competition).
Step 4. Calculate the cost per service
Step 5. Calculate the price per season based on the number of occurrences

Snow and Ice LABOR

Step 1. Determine the area to be covered
Step 2. Calculate how many labor hours will be needed to clean that area
Step 3. Determine the per-hour labor cost for snow and ice service (We will provide these rates to you in the competition).
Step 4. Calculate the per-service labor cost by multiplying the hours needed by the cost per hour.
Step 5. Calculate the per-season cost based on the number of occurrences**.**

NCLC Maintenance Cost Estimating Competition TIP #4:

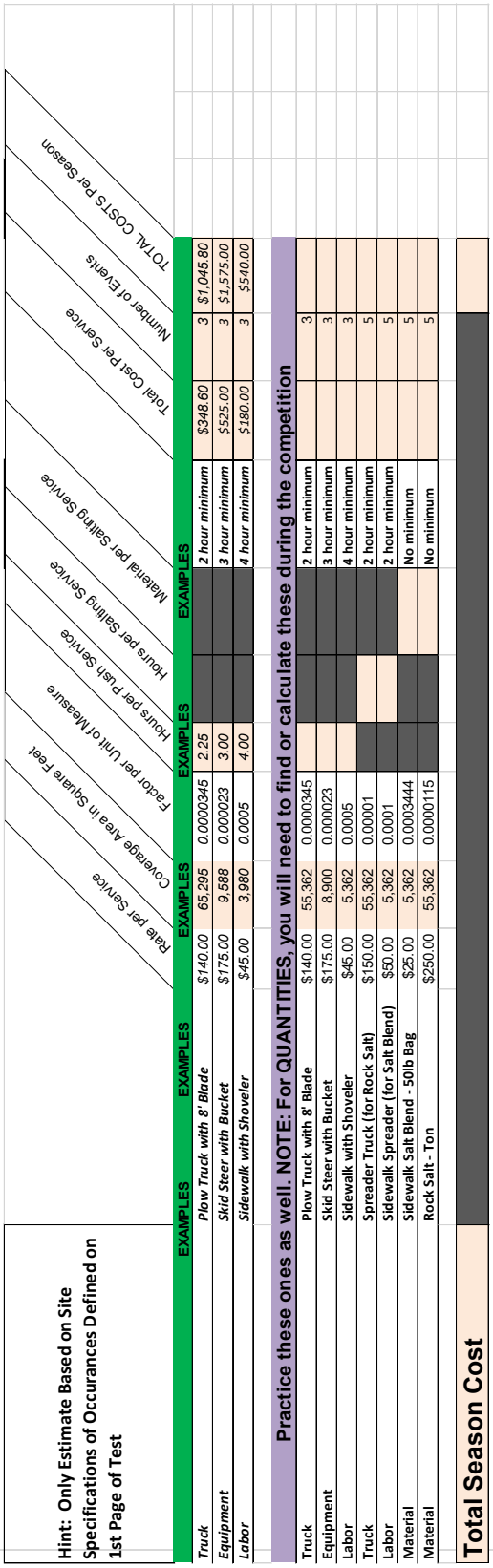
Watch for the minimum hours stipulation. For example, if there is a 2-hour minimum, that is the least number of hours a customer will be charged, even if it does not take that long.

For example, you estimated that only 1.5 hours are needed to put down ice melt, but there is a 2-hour minimum. **USE 2 HOURS in your calculation**. For anything over 2 hours, use the number you calculated. For example, if you estimated that it would take 2.5 hours, then use the 2.5 hours, not the 2.

Snow and Ice MATERIAL

Step 1. Determine the area to be covered
Step 2. Calculate the quantity of material needed by multiplying the total coverage area by a factor that indicates how much ice melt is required per sq. ft. (We will provide this factor to you in the competition).
Step 3. Determine the material cost (We will provide this cost to you in the competition).
Step 4. Calculate the material cost per service by multiplying the cost of material by the quantity of material needed.
Step 5. Calculate the cost per season based on the number of occurrences.

Use what you have learned in the landscape maintenance part of this study guide, your practice filling out a maintenance worksheet, and the snow and ice estimating notes above to practice snow and ice estimates. Notice that a few example calculations are in *italics* on the top.



Hint: Only Estimate Based on Site Specifications of Occurances Defined on 1st Page of Test		Rate per Service	Coverage Area in Square Feet	Factor per Unit of Measure	Hours per Push Service	Hours per Salting Service	Material per Salting Service	Total Cost Per Service	Number of Events	TOTAL COSTS Per Season
Truck	EXAMPLES	*$140.00*	*65,295*	*0.0000345*	*2.25*			*$348.60*	*3*	*$1,045.80*
Equipment	EXAMPLES	*$175.00*	*9,588*	*0.000023*	*3.00*			*$525.00*	*3*	*$1,575.00*
Labor	EXAMPLES	*$45.00*	*3,980*	*0.0005*	*4.00*			*$180.00*	*3*	*$540.00*
Practice these ones as well. NOTE: For QUANTITIES, you will need to find or calculate these during the competition										
Truck	Plow Truck with 8' Blade	$140.00	55,362	0.0000345				2 hour minimum	3	
Equipment	Skid Steer with Bucket	$175.00	8,900	0.000023				3 hour minimum	3	
Labor	Sidewalk with Shoveler	$45.00	5,362	0.0005				4 hour minimum	3	
Truck	Spreader Truck (for Rock Salt)	$150.00	55,362	0.00001				2 hour minimum	5	
Labor	Sidewalk Spreader (for Salt Blend)	$50.00	5,362	0.0001				2 hour minimum	5	
Material	Sidewalk Salt Blend - 50lb Bag	$25.00	5,362	0.0003444				No minimum	5	
Material	Rock Salt - Ton	$250.00	55,362	0.0000115				No minimum	5	
Total Season Cost										