

# A Step-by-Step Approach to Reducing Lead Hazards in Urban Soils

If you want to address the lead in your soil, here are some step-by-step instructions to help you. A few things to note:

There is no safe level of lead. This process is NOT a cure – the process described below is designed to reduce the risk of lead poisoning. It will not prevent lead poisoning in all cases. We always recommend following safe and healthy habits when working in urban soils including wearing gloves, keeping bare soil covered, washing hands often, and washing crops carefully before eating. [Additional tips are available here.](#)

**Here we go!**

For more tips, visit:

[www.ecoworksdetroit.org/soilleadproject](http://www.ecoworksdetroit.org/soilleadproject)



## Step 1. Know Your Soil



Begin by having your soil tested in a scientific lab. Put on a pair of clean gardening or disposable gloves. With a clean shovel, dig into your soil to about 4" below the surface. Drop that soil into a clean freezer bag and mix it up with your gloved hands. We recommend you take 1 sample from every 1,000 square feet of space.

Contact a reputable lab and request the following tests: total lead, phosphorus content, pH, and organic matter content. Mail your soil sample to the lab (we recommend Dairyland Labs) and wait for your results!

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## Step 2. Aerate Your Soil



While you wait for your soil results, it's ok to move on to this step. Aeration is the process of poking small holes into your soil to bring needed oxygen to plant roots and healthy soil organisms, reduce soil compaction, and reduce phosphorus runoff. A variety of aeration devices can be purchased or rented from your local hardware store. One recommendation is to use a spading fork, push it into the ground as deep as you can and give it a wiggle. If you have a larger space, you can hire a contractor or rent a power aerator.

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### Step 3. Check out your results! We'll take these in order:



Dairyland Labs, Inc.  
4900 W. Dickman Road  
Battle Creek, MI 49037  
269-753-0048  
michigan@dairylandlabs.com  
www.dairylandlabs.com

Sample #:  
Report Date:

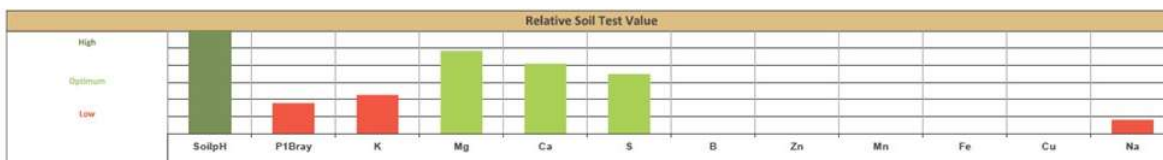
Submitted By:

Grower:

Field ID:  
Sample ID:  
Acres:  
Sample Depth:  
Previous Crop:

Account #:

Soil Test Results	Soil pH	Buffer pH	lbs/A P <sub>1</sub> Bray	lbs/A K	lbs/A Mg	lbs/A Ca	lbs/A S	ppm B	ppm Zn	ppm Mn	ppm Fe	ppm Cu	ppm Na	Organic Matter %
Available Nutrients % Base Saturation	7.5		40	136 1.0%	783 18.1%	5529 76.6%	35						4.8 0.1% you <15 0.4%	5.9%
Optimum Level % Base Saturation	6.5		90	240 1.7%	650 15.0%	5413 75.0%	40	2	8	50	50	3		18.0
No Crop Specified	lbs/A N Credit	lbs/A N	lbs/A P <sub>2</sub> O <sub>5</sub>	lbs/A K <sub>2</sub> O	lbs/A Mg	lbs/A Ca	lbs/A S	lbs/A B	lbs/A Zn	lbs/A Mn	lbs/A Fe	lbs/A Cu	lbs/A Gypsum	lbs/A Lime
Crop Uptake	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0	0	0
Crop Removal		0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0		
Recommendations		0	0	0	0	0	0	0.0						



- a. **Total Lead:** your total lead level should be below 400ppm for gardens, farms, and children's play areas.

If your total lead level is **above 400ppm**, we recommend a more serious intervention in addition to the approach described here. Check out the resources available through your local health departments. Here are links to the Michigan Lead Safe Program:

[https://www.michigan.gov/mileadsafe/0,9490,7-392-84216\\_104606---,00.html](https://www.michigan.gov/mileadsafe/0,9490,7-392-84216_104606---,00.html) , the Wayne County Health Department

<https://www.waynecounty.com/departments/hhvs/wellness/leadsafe-wayne-county.aspx> , and the City of Detroit Health Department

<https://detroitmi.gov/departments/water-and-sewerage-department/dwsd-projects/making-detroit-lead-safe>

If your total lead level is **below 400**, that's good news! You still want to be safe in handling soils but this is a good start.

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- b. **Organic Matter:** an optimal organic matter content is about 5%. Your soil's organic matter content is likely lower than this. Increase your overall organic matter by adding compost, mulching, planting cover crops, and/or planting deep rooted perennials such as tall grasses, wildflowers, and trees. (Bonus: this is also great advice for mitigating climate change!)
- c. **pH:** An optimal pH is around 7.0. In urban areas, the pH is often much higher. You may be able to prevent further pH increases by removing unnecessary concrete from your property. You may also be able to reduce the pH in soils by adding modest amounts of sulfur to your soil. Sulfur is readily available at gardening stores.
- d. **Phosphorus:** The amount of phosphorus in soil is important for healthy plants but also plays a key role in binding lead into an insoluble form.
  - i. **If your phosphorus levels are high:** Too much phosphorus can damage plants and also run off into lakes and rivers during rain or snow melt. If your phosphorus level is higher than 90 lbs/acre or 45 ppm, do not add any bone meal or fertilizer for several growing seasons. Adding nitrogen fixing plants may help correct excessive phosphorus levels.
  - ii. **If your phosphorus levels are low:** bringing your phosphorus levels up to an optimum level may help bind lead in soil. You can download our online excel-based calculator below to estimate how much bone meal to add.

#### Calculator:

Download our calculator. You will be asked for the following information:

#### Inputs:

- Total area to be treated in square feet
- Baseline phosphorus level in ppm or lbs/acre
- % of phosphorus in bonemeal (this can be found on the packaging label. If nutrients are listed as N-P-K, then use the 2<sup>nd</sup> number.)
- Is the % phosphorus in bonemeal calculated as P or as P<sub>2</sub>O<sub>5</sub>?

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#### Step 4. Apply bone meal

If your soil is low in phosphorus, use the online calculator to estimate how many pounds of bone meal to apply to your soil. Our research is based on bone meal as a source of phosphorus both for its ability to slowly release phosphorus over time and for its low environmental impact in production.

Bone meal may be purchased in powder, granular, or liquid form from any gardening store. We found granular bone meal to be the easiest to measure and least messy to apply. Parboiled bone meal eliminates the threat of any disease spread but disease spread is an extremely low risk with all bone meal products.

The following protective equipment is recommended before working with any fertilizers – even natural ones like bone meal:

1. Clean gardening gloves or disposable gloves
2. N95 mask
3. Safety goggles or safety glasses
4. Work clothes that can be washed separately from any children's clothing

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Using a scale and a clean bucket, weigh out the bone meal to be applied. Distribute the bone meal as evenly as you can on the soil. We recommend a drop spreader for the most even distribution but careful broadcasting by hand or a rotating spreader will also work. We'll note that bone meal has a distinctive odor, but it won't smell once it's applied to the soil.

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Caution: Do not overapply bone meal. There is too much of a good thing. Excessive bone meal can run off and pollute water systems. Do not apply any fertilizers just before a heavy rainfall is predicted.

### Step 5. Reapply every few years

Our studies showed an average reduction in bioavailable lead between 9% and 10%. Repeating the procedure outlined in Steps 1-4 every 3-4 growing seasons may improve your results.

Individual results may vary. The authors are not responsible for the outcomes on any particular property.

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