

“Diamond – It’s Not just for Engagements anymore!”™

PEG your Sidewalks for Safety and for Savings.

Today, you can actually put diamond to work

..... Making your sidewalks safer and more accessible

..... with Pre-Emptive Grinding!

By: Sidewalk Savers, Ltd.

[Http://www.SidewalkSavers.com](http://www.SidewalkSavers.com)

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**Introduction: Pre-Emptive Grinding (PEG) of Sidewalks makes sense, increases safety,
..... and can be a significant cost savings!**

In the Olden Days, it was just an ounce of prevention to avoid the rare potential lawsuits for allowing a “Tripping Hazard” to exist on your property. More recently, however, the probability of being forced to part with hard earned money has greatly increased as cities around the country began coping with the requirements of the Americans with Disabilities Act (ADA).

During 2003 and 2004, many real world examples across the country demonstrated that Pre-emptive Grinding could have saved lots of money by removing the Hazard before the homeowner received a warning notice from the City. They could have easily used simple Pre-Emptive maintenance with low cost Diamond Tools to avoid much of the expensive Removal and Replacement of Sidewalks, Driveway Aprons, curbs, etc.

Repair estimates ranging from \$650.00 to \$3,500.00 accompanied notices of additional daily penalties for non compliance. Up to 70%, 80% or even 90% of these costs could have been easily prevented by doing preventative maintenance, Pre-Emptively Grinding the Sidewalks before they became a hazard. And now, this very real threat to home owners is coming soon to a neighborhood near you.

The purpose of this paper is to outline how to determine what is required to comply with reasonable standards, and how to safely and economically perform this routine maintenance.

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Contractors to Do the Work for you → Local Job Opportunities!

Recognizing that not everybody will want to grind their own sidewalks, the further purpose for this document is to recruit, train, and list Small Businesses or Contractors who are qualified and able to perform the work. This Business Opportunity will be especially important to our cities where job creation is critical since the cities are where the workpieces, i.e. Sidewalks, are located. Obviously, the sidewalks are not going to be relocated or exported to Mexico or China or anyplace else for the grinding operation, so these are good jobs which will continue to exist right here in the neighborhood, right where the sidewalks are located.

More details on this later, but we would invite any of our Small Business Package customers who become qualified as “Sidewalk Savers” (tm), to contact us at info@sidewalksaver.com to make sure that their company is appropriately qualified and listed on our:

<http://www.SidewalkSavers.com>

Sidewalk Saver Resources List.

Preliminary Check to Assess the Potential Danger

The first step is simply to go for a walk up the street in front of your house or around the block. Check the number of potential tripping hazards which you encounter. If you really want to notice the stumbling points and barriers, you can test your skills at in-line skating, or pushing a baby stroller, or perhaps the very daring could even ride a wheel chair. Even the 1/4" bumps will be instantly noticed and these 1/4" bumps are frequently encountered on even the newest sidewalks. I personally ride my Road Bike (23mm {7/8"} Tires) on the sidewalks as a “Test Vehicle” and sense every bump, even on the newest concrete sidewalks.

The frequency and amplitude of the bumps will tell you how soon your neighborhood will become the next A.D.A. (Americans with Disabilities Act) target zone. Then, go back and check your own sidewalks to determine if they are presenting an annoying or even dangerous bump to your neighbors. These bumps, especially the smaller ones, are the best candidates for preventative maintenance or Pre Emptive Grinding, before a problem even exists.

The steps for Pre-Emptive Grinding

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Pre-Emptive Grinding (PEG) is simple and low in cost, but, before going further than the initial measurement and calculations, be sure to contact your City Engineer to determine that Sidewalk Grinding or Sidewalk Planing is an acceptable procedure for improving the quality of any concrete that is on the Public Right of Way. Refer to the Appendix of this article for a list of typical Cities which include Sidewalk Grinding within their list of approved procedures.

1 - Measurements and Calculations.

Measure the Step height between the lower block and the raised block using a ruler or steel tape measure.

For more precision as you measure across a slightly sloped block, you can place a straight flat board of known thickness on the higher of the two sidewalk sections. Using a simple ruler or depth gage, measure the Step Difference between the higher pavement block and the lower block, being sure to subtract the thickness of the board which assisted in the measurement.

Note the differences in “Step” across the width of the sidewalk as it may not require as much grinding on one side as on the other side. Frequently, there is a tapered step so that the grinder will produce an angled ramp varying according to the actual job. A slight finish touch can produce a squared off grinding surface since very little sidewalk needs to be removed in order to produce a semi-finish to rough ground surface.

The City of Oregon, OH has an excellent Depiction of this at their web site, although the actual condition is somewhat exaggerated for purposes of illustration. Their web site is shown below and is at: <http://www.ci.oregon.oh.us/ctydpt/publicservice/publicservice.htm>

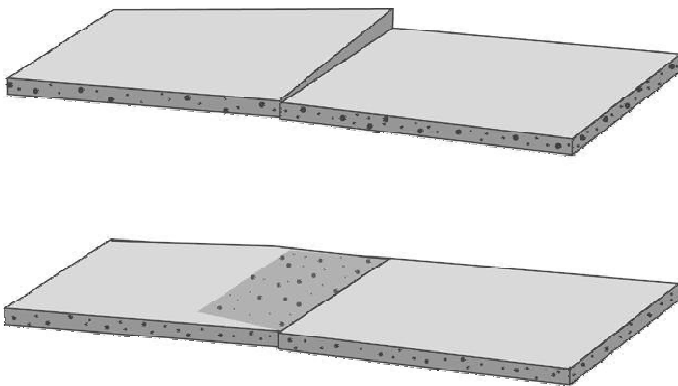


Figure 1: Oregon, OH depiction of compound angle grinding.

1) How bad are the bumps and what are the cures?

- **0-1/4" Step** is generally ignored but can be easily beveled at the same time as other joints are being ground, so why not?
- **1/4" - 1" Steps** are within the range where grinding alone is the recommended procedure in an ever increasing number of cities and towns across the USA and Canada. Some cities refer to this grinding process as Sidewalk Planing.
- **Larger than 1" steps** typically will require a combination of raising the lower block and grinding the higher block, or a full replacement could be required.

2) Measure the Hazard and determine what is required to correct it.

- **0-1/4" Step** is generally ignored but can be easily beveled at the same angle as the 1/4"-1/2" steps.
- **1/4" - 1/2" Steps** are ground with a 1:2 Ratio so that a gradual transition from 1/2" to 1" in length is ground on the surface depending on the actual measurements.
- **1/2" - 1" Steps** are treated as a “Ramp” in accordance with the recommended standards of the Access board in Washington, D.C. This requires that they be ground with a 1:12 Ratio so that a gradual transition from 6" to 12" in length is ground on the surface of the sidewalk block.

HINT: The City of Portland, Oregon has a “*Citizen Sidewalk Repair Manual*” available in which they recommend a 1:12 ratio for all grinding in the 1/4” – 1” range. In addition to making the job look better, it also makes the calculations quick and easy:

<u>STEP</u>		<u>Ramp Length</u>
1 / 4”	➔	3” long ramp
1 / 2”	➔	6” long ramp
3 / 4”	➔	9” long ramp
1”	➔	12” long ramp

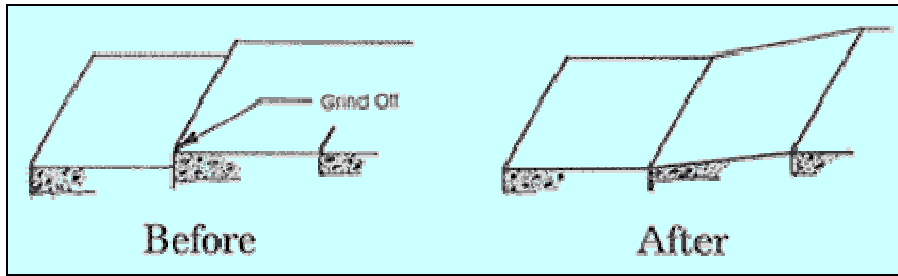


Figure 2: Portland, OR's Sidewalk Repair Manual shows “before” and “after”.

3) **Tools and methods for measurement. Calculations and marking.**

- General method: A simple board can be placed on top of the higher sidewalk block so that the distance from the bottom of the board down to the lower sidewalk block can be measured and recorded. *If the measurement is taken from the top of the board to the top of the lower sidewalk block, it is necessary to subtract the thickness of the board.*
- By using the Step Height, calculate the Ramp Length of slope as mentioned above.
- Mark the Ramp Length on the higher block with a permanent marker.
- Repeat this process at increments across the width of the sidewalk. Typically, measurements at 3 - 4 points across the Sidewalk Block will be sufficient to indicate if a straight Ramp or a combination Slope ramp needs to be ground.
- Connect the Dots to show the length of Ramp which will be ground.

4) **Tools and Equipment to minimize the need for grinding.**

- BLOCK Re-Alignment: Some of the first applications you will “encounter”, or perhaps the best way to say it is that you will “Stumble across”, will be a block which is 2”, 3” or more as these are typically caused by tree roots. These will generally not be candidates for Grinding, but there will be some cases where the individual blocks are in perfect condition with the dislocation being the only problem.
- For large driveway sections, the lower block is frequently raised by a process referred to as “mud jacking”. This process involves the use of a diamond Core Drills to drill strategically placed holes so that a slurry can be pumped under the

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block to hydraulically lift it to be level with the adjoining block. This procedure requires additional equipment and procedures which are beyond the scope of this “Sidewalk Savers” system so we would recommend qualified Contractors to perform the “Mud-Jacking” service.

- For SIDEWALKS or Garden walks, on the other hand, the blocks would be inspected for cracks or other signs of damage. No cracks? Block Intact? then you are ready to consider the next step.
- The sidewalk is then checked to see that the blocks are separated at the joints. If not, then a diamond saw blade can easily separate the blocks so that one can be lifted at a time.
- The sidewalk blocks are now ready to be brought into alignment by using one or two of the 5 foot pry bars for lifting the lower of the two blocks to be nearly the level of the adjoining block. For this operation, the area beneath the block can be back-filled to support the block in its new position by using a wooden dowel rod. The more completely the cavity beneath the raised block is filled, the better. BUT, it is important to avoid raising the block more than 1/4” above the adjoining block or you will have created a new step hazard. **It is also critical that you avoid placing fingers or other body parts under the raised block.**
- The nearly level joint is now ready for grinding as mentioned in the following section to finish the repair.
- **One Caveat with this procedure:** If the Sidewalk Block cracks, then Replacement may be the only option, so this process must be approved by the Property owner and the Inspector before implementing it on the sidewalk. It is most frequently applied to garden walks.

5) Grinding Methods:

Bevel Edges.

- A simple 1:2 Bevel, for repairing the 1 / 4” – 1 / 2” step, can be ground by using the Single row diamond Cup on the Jepson 4.5” angle Grinder. This process can be sped up significantly by using the 7” Single row diamond Cup on the much heavier Jepson 7” angle Grinder, but this is typically not necessary for the DIY home-owner where tool cost is more important than is the time required for completing the task.

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Grinding a Slope.

- A 1:12 Ramp , for repairing the 1/2” – 1” step, can be ground by using the Single row diamond Cup on the Jepson 7” angle Grinder. For those who are preferring to produce a 1:12 ramp on the 1/4” – 1/2” steps, they will still be operating within the capabilities of the smaller 4.5” diamond Cup and grinder which was used for the bevel edge.
- Squaring the Grind: The final step in grinding a “Site” is to square up the Ramp by making the ground surface end in a line which is perpendicular to the edge of the sidewalk. The Color of the overall concrete walk can be enhanced by Power Washing at the end of the Grind, but this is usually considered as an Extra Cost option.



Crack Sealing

- A simple crack in a garden walk, a sidewalk, a driveway, or even a Basement or Garage floor where dislocation is not yet evident, can sometimes be repaired by patching with a suitable Portland cement or epoxy based patching material. The key to successful patching is the Crack preparation which can frequently be accomplished with a 4.5” Crack Sealer Wheel on a 4-5” Angle Grinder. This Crack Sealer Wheel

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or the more aggressive Crack Sealer Segment Blade carves a Vee Groove where previously there was a crack. The ½” width Vee Groove is typically ½” to ¾” deep so that the patch material has a better opportunity to grip and produce a long lived smooth patch. The added benefit of this type of timely patch is that it prevents water seepage and can prevent the shifting or separation which would occur with an un-patched surface.

Driveway Apron with qualifying Crack where there is no dislocation of either section. →



Crack Sealer Blade with Dust Muzzle. →



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6) Safety and Dust Control

The Dust Muzzle and Fine Particle Vacuum System to capture over 95% of the dust at the source!



NOTE: It is still necessary to wear a Respirator, Safety Glasses, Hearing Protection, Gloves and Knee Pads in order to perform these grinding and cutting applications.

7) Estimating the Job - Multiple approaches to home in on cost.

Replacement Cost -- Estimating Method:					
	Width	Length	Number	\$ /ft²	Cost
Sidewalk Block 1	5	4	1	\$8.00	\$160.00
Sidewalk Block 2	5	5	3	\$8.00	\$600.00
Sidewalk Block 3	5	6	1	\$8.00	\$240.00
TOTAL COST:					\$1,000.00

This Replacement Cost Method acts as a cross check on the following two methods which should produce costs which are lower by 50-60%.

Length of Grind Site -- Estimating Method:				
	Width	Number •	\$ /ft	Cost
Grind Site	5	7	\$9.75	\$341.25
Set-up Time Costs:				\$60.00
TOTAL COST:				\$401.25

- Number of Joints or Sites between Blocks which need to be ground.

Time & Materials -- Estimating Method:			
	# Hours	\$ /hour	Cost
Labor Costs	4	\$75.00	\$300.00
Tool & Materials Cost			\$100.00
TOTAL COST:			\$400.00

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Based on the estimated costs for this “Typical” Reference Job, it would be \$400.00 to purchase or less than \$100.00 for the D-I-Y homeowner who merely needed a Diamond Cup and safety equipment. The costs for a D-I-Y homeowner will primarily be tool costs depending on what tools and equipment he has on hand. Even if buying all the required equipment for the job, the D-I-Y savings would still be in the 50%-60% range.

8) Business Opportunity for Single Entrepreneur or small company.

The Cost effectiveness of Grinding vs. Replacement creates opportunities for the qualified entrepreneur to provide this *Sidewalk Saver Service™* as a service to his neighborhood and beyond. The fact of the matter is that even newly poured sidewalks frequently need “fine tuning” to make it meet the surface smoothness requirements of the A.D.A. or of my Road Bicycle with the 7/8” tires.

Getting started as a small business is especially attractive since the City Sidewalk inspectors frequently provide the “Marketing Services” as they perform their annual survey of the sidewalks. The converse is equally true as the City Inspector is frequently asked for a list of people to do the work.

The representative of the City of Portland, Oregon recently commented that the contractors follow the Inspectors around and submit their cost estimates for grinding repairs at the same time as Replacement Cost estimates are being provided. Portland even goes the extra step to allow the home owner to replace a partial block when the home-owner does the work himself. This is not available as an option if the City does the work. The current shortage of concrete has made the comparisons even more favorable for grinding and for Portland’s partial block replacement.

9) Advanced Topics

Surface Quality: One of the concerns about Grinding Concrete has been the quality of the surface which is produced by grinding as compared to newly poured Concrete. A set of photographs of Curb Cuts in our Spring Grove sub-division in central Ohio clearly depicts the spalling of the concrete which was poured improperly 4 years ago as opposed to the curb cut which was made with Diamond Saw Blades.

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← Photo on the Left shows the Curb Cut at the intersection of East College Avenue and Nicole Ave. in Westerville, OH on 26-MAR-2006.

The Photo on the Right and below show the Curb Cut via Diamond Saw Blades on North Hempstead at the intersection of the Towers Park Bicycle Trail on 26-MAR-2006. →

Diamond Grinding and Diamond Sawing have the same effect on the Concrete surface, exposing the aggregate as clearly seen in the following photograph,



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Additional studies have been performed by State Highway Departments over the past 30 years as Diamond Sawing and Grinding has been increasingly utilized for Highways, Airport Runways, concrete construction and renovation. For lists of these references, we would invite the reader to contact us at: info@sidewalksaver.com specifying the targeted applications.

“Free Cutting” Ability: Another concern is the “Free-Cutting” ability of the Diamond Cup since it is most important to incorporate a Diamond/Bond/Tool Design combination that will cut the concrete with normal forces that are within the capabilities of the operator. *A grinding cup needs to define the geometry of the cut* rather than tending to follow the existing topography as the area of grinding contact increases. This is achieved by combining the Diamond type, the diamond size, and the diamond concentration with the Metal Bond Technology plus using relatively small area of grinding segments.

The Temptation to use a Longer Life Diamond Cup is frequently quite attractive, but should be avoided for operational reasons. A Double Row Diamond Cup would seem like a good buy since there would obviously be more diamond and the life would logically be increased. Unfortunately, this increased Surface area or harder Bond would increase the likelihood of the tool following the topography instead of creating and defining the geometry of the surface being ground. If you see a web site that derides grinding and shows pictures of unsatisfactory grinding, it is most likely that the tools were designed for long life rather than for the Free-Cutting action that is so critical to success with this type of grinding application.



Double Row 4.5” Diamond Cup



Single Row 4.5” Diamond Cup

10) Promotional Materials

In addition to the Sidewalk Savers Web Site, we would also refer prospective Sidewalk Savers to the long list of reference materials at our Web Site. These materials and instruction sheets are typically available in PDF Format so that they can easily be downloaded as used as prospecting tools.

- A) Papers
- B) Case Histories
- C) Prospecting and Advertising Fliers
- D) Cost Estimating sheets