

## **Rubber sidewalks...sustainable or hype?**

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Like any new idea or concept, as the concept of sustainability becomes increasingly popular among mainstream consumers, there is a real concern of a marketing backlash. This backlash often manifests itself as “green washing,” the exaggeration of sustainability of a product or a company. As educated consumers, it is important for people to be aware of this issue in order to make accurate purchases.

There are two important aspects to consider when assessing a product’s sustainability: 1) the product’s necessity and purpose weighed against its social, economic, and environmental costs and 2) the product’s life cycle: where the materials come from, how it is manufactured, and where it ends up at the end of its life.

This essay will examine a new and innovative “green” product created to replace cracking, uneven, concrete sidewalks with a system of recycled rubber pavers or tiles: “Rubbersidewalks.” Rubbersidewalks are designed to be a viable option for municipalities and citizens alike who are tired of the reoccurring and expensive problem of damaged sidewalks from mature street trees. This product allows sidewalks and trees to happily coexist by working *with* trees as opposed to against them. Upon analyzing the sustainability of Rubbersidewalks, I believe it successful passes the test.

### **History of Rubbersidewalks, Inc.**

The idea for rubber sidewalks was dreamt (literally) by Richard Valeriano. As a senior sidewalk inspector for the City of Santa Monica, Valeriano had spent the past twenty years checking for sidewalk damage from the spreading roots of street trees. He had seen the expensive cost of repairing damaged sidewalks as well as the unfortunate removal of numerous established street trees due to their unruly roots. After one particular day of inspection back in 1998, Valeriano actually *dreamt* of elastic-like sidewalks that would bend over tree roots to resolve this conflict between sidewalks and roots. He did not know what to make of the dream, until one day the light bulb went off in Valeriano’s head when he noticed his own health club installing rubber tiles as

flooring. He thought perhaps sidewalks should be made of rubber, as opposed to concrete, to allow flexibility for growing tree roots.

The idea came to fruition when he found a rubber mat manufacturing firm, U.S. Rubber Recycling Inc., to develop the prototypes for the rubber sidewalks using recycled auto tires.<sup>1</sup> Valeriano and the City of Santa Monica tested the tiles with bicyclists, roller-bladers, and women in stiletto heels and eventually, after two years of experimenting, created a test sidewalk replacing a badly cracked section of a public sidewalk near the city's library branch. The rubber sidewalk was built under a ficus tree, a tree species known for its sidewalk destroying roots, and was highly successful. Upon the success of the library sidewalk, the city began installing rubber pavers under ficus trees at several more locations throughout the city.

The product eventually took off in 2001 when a screenwriter and producer, Lindsay Smith, began researching alternatives to tree removal for her home city of Los Angeles, which was also removing problematic trees from sidewalks. When she discovered what Santa Monica was doing with rubber sidewalks, she was able to arrange demonstrations of the Santa Monica rubber sidewalks for public officials from Los Angeles and several other adjoining cities. The demonstration garnered interest in the officials and led many to pledge to have their own sidewalk tests for their cities. In L.A., Smith managed to save 12 ficus trees slated for removal due to her demonstrations.

The entire process led Smith to start a company based on Valeriano's idea of rubber sidewalks. She named her company Rubbersidewalks, Inc. Since 2001, Smith has been selling Rubbersidewalks to municipalities and citizens throughout the country. As of July 2006, approximately 130,000 square feet of rubber sidewalks can be found in sixty cities in fifteen states<sup>2</sup>.

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<sup>1</sup> Bob Pool, "With Rubbersidewalks, Trees are on the Rebound," Los Angeles Times, July 17, 2001.

<sup>2</sup> Matt Bradley, "Is Rubber The Future Of Sidewalks? Eco-Friendly Rubber Sidewalks Made From Recycled Tires Are Alternative To Concrete," The Christian Science Monitor, July 12, 2006.

## Product Specifications



Photo Source: [www.rubbersidewalks.com](http://www.rubbersidewalks.com)

The Rubbersidewalks pavers are interlocking and modular. They are joined by self-gripping dowels and locked into an “EdgePro” restraint chassis. This forms a solid unibody that will not shift or pop-up, not even in heavy rain or flooding. Additionally, if any major geological shifts occur, such as an earthquake, the pavers will not be destroyed and can be reset, unlike concrete<sup>3</sup>.

Rubbersidewalks are manufactured with recycled California tire crumbed rubber combined with polyurethane binder and colorant and are molded with steam-generated heat (to reduce energy demands) and heavy pressure<sup>4</sup>. This process creates a strong and durable tile that meets the requirements of a standard sidewalk, including stable grade, non-vibration in compliance with American with Disabilities Act (ADA) requirements, and wet/dry skid resistance<sup>5</sup>.

Rubbersidewalks are hard enough for skateboarders, rollerblades and spikes, yet resilient enough to provide safe passage for all pedestrian and wheeled traffic<sup>6</sup>. The pavers are non-toxic and contain no volatile organic compounds (VOCs). They do not leach, off-gas, or produce rubber dust particles<sup>7</sup>.

Rubbersidewalks pavers are available in various sizes and colors, depending on the use, and are approximately two inches thick. They are reversible and each face has a minimum expected life of seven years. The entire tile is expected to last between fifteen

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<sup>3</sup> Rubbersidewalks, Inc. Website. [www.rubbersidewalks.com](http://www.rubbersidewalks.com)

<sup>4</sup> Interview, Dan Joyce, Principal, November 10, 2006.

<sup>5</sup> Rubbersidewalks, Inc. Website. [www.rubbersidewalks.com](http://www.rubbersidewalks.com)

<sup>6</sup> Rubbersidewalks, Inc. Website. [www.rubbersidewalks.com](http://www.rubbersidewalks.com)

<sup>7</sup> Rubbersidewalks, Inc. Flyer. Can be accessed from website. [www.rubbersidewalks.com](http://www.rubbersidewalks.com)

to twenty years<sup>8</sup>. Additional specification information about Rubbersidewalks can be found in Appendix A.

The upfront cost of Rubbersidewalks is inevitable higher than concrete and is estimated to be approximately 30% more<sup>9</sup>. However, the long-term life of the pavers can save significant amounts of money. Rubbersidewalks have been found to last twice as long as concrete near tree roots and therefore will not need replacement and repair. According to some estimates, Rubbersidewalks can cost \$8.70 a square foot, about \$2 more a square foot to install than a regular concrete or asphalt sidewalk. However, the labor costs of replacing tiles can cost about \$1.50 square foot, instead of the \$8 to \$12 it costs to break up and replace concrete<sup>10</sup>.

### **Advantages of Rubbersidewalks**

The development of Rubbersidewalks was intended to resolve the conflict between safe sidewalk and attractive street trees. With growing tree roots cracking and breaking sidewalks and creating a public safety hazard, cities have been left with no alternative but to remove the problem-causing trees and spend funds to repave the sidewalks. This costly process has resulted in 1) the loss of urban forest and 2) money due to high construction and labor costs and expensive trip-and-fall liability cases. The District of Columbia has spent \$7 million to repair concrete sidewalks in 2005 alone, got hit with 2,600 complaints about



Photo Source: [www.rubbersidewalks.com](http://www.rubbersidewalks.com)

<sup>8</sup> Rubbersidewalks, Inc. Flyer. Can be accessed from website. [www.rubbersidewalks.com](http://www.rubbersidewalks.com)

<sup>9</sup> Interview, Dan Joyce, Principal, November 10, 2006.

<sup>10</sup> Kery Murakami, "Rubber sidewalks add bounce to city foot traffic," Seattle Post-Intelligencer Reporter, October 5, 2006.

broken concrete, and is currently fighting three trip-and-fall lawsuits related to sidewalks<sup>11</sup>. Rubbersidewalks provide an alternative to this expensive process and provide an environmental, social, and economic benefit.

Rubbersidewalks have two main functions that provide environmental, social, and economic benefits: 1) flexibility and 2) modularity. The rubber's flexibility allows the sidewalk to bend as the tree roots grow below, keeping the sidewalk intact, while due to its modularity crews can perform routine root management by simply lifting the pavers and trimming the root offshoots every two to three years (which has not been shown to damage the health or stability of the tree)<sup>12</sup>. The pavers can also be cut and molded to fit around trunks and roots as necessary. Because the modular pavers are not poured, like cement, they do not suffocate roots. The Rubbersidewalks pavers have quarter-inch spaces between them that let water and air get through to roots, so roots grow downward as they should and not upward<sup>13</sup>.



Photo Source: [www.rubbersidewalks.com](http://www.rubbersidewalks.com)

Additionally, Rubbersidewalks, Inc. has found that growth rate of roots is actually slower under the rubber pavers than concrete, perhaps due to the sufficient water and oxygen reaching the roots through the seams of the pavers<sup>14</sup>.

### **Lifecycle Assessment**

The most important aspect in assessing a product's lifecycle is to look at the source of its materials; which for Rubbersidewalks is recycled tire rubber. All Rubbersidewalks are

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<sup>11</sup> Bradley, 2006.

<sup>12</sup> Rubbersidewalks, Inc. Website. [www.rubbersidewalks.com](http://www.rubbersidewalks.com)

<sup>13</sup> Rubbersidewalks, Inc. Website. [www.rubbersidewalks.com](http://www.rubbersidewalks.com)

<sup>14</sup> Rubbersidewalks, Inc. Website. [www.rubbersidewalks.com](http://www.rubbersidewalks.com)

made of 100% California tire rubber and utilize one entire tire for each square foot of paver, which is about eleven pounds of tire rubber. So 400 square feet of Rubbersidewalks keeps over two tons of waste tire rubber from going into landfill<sup>15</sup>. Finding alternative uses for items that are slated for waste is an important aspect of Rubbersidewalks sustainability.

In a state with the most registered vehicles in the country, dealing with waste tires is an extremely important waste issue<sup>16</sup>. According to California's Integrated Waste



Management Board (CIWMB), approximately 40 million waste tires are generated each year, of which approximately 30 million are successfully diverted to alternative uses, including reuse, retreading, and combustion<sup>17</sup>. Through research, education, and grants, CIWMB supports tire recycling efforts and the use of recycled tire rubber products. As a local California tire-reuse business, Rubbersidewalks, Inc. has been awarded two Tire Commercialization Grants by the CIWMB which has helped the company grow.

Another aspect of assessing a product's lifecycle is to analyze the length of a product's life. Rubbersidewalks are developed to last from sixteen to twenty years, approximately two to three times longer than the life of concrete or asphalt near tree roots, and the company is actively researching and developing ways to extend the life further<sup>18</sup>. By providing a longer life than concrete, materials and energy from production are not used and money from construction and labor is not spent, creating a sustainable product. Additionally, once pavers are no longer usable, they are recycled to make either new pavers or other rubber products—a cradle to cradle approach.

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<sup>15</sup> Rubbersidewalks, Inc. Website. [www.rubbersidewalks.com](http://www.rubbersidewalks.com)

<sup>16</sup> California Integrated Waste Management Board Website. [www.ciwmb.ca.gov/Tires/](http://www.ciwmb.ca.gov/Tires/)

<sup>17</sup> California Integrated Waste Management Board Website. [www.ciwmb.ca.gov/Tires/](http://www.ciwmb.ca.gov/Tires/)

<sup>18</sup> Interview, Dan Joyce, Principal, November 10, 2006.

Lastly, Rubbersidewalks promote the sidewalk's walkability—which is by far the most sustainable mode of transportation around! Thus, Rubbersidewalks is inherently a product that promotes a sustainable lifestyle.

The sustainability of this product has reached an important group of people in the country that are concerned with sustainable development: the United States Green Building Council (USGBC). Developers interested in building “green” or “high performance” buildings using USGBC's Leadership in Energy and Environmental Design (LEED) standards can obtain potential credits in four different categories by using Rubbersidewalks: 1) recycled content use, 2) regional material use, 3) heat island effect reduction, and 4) stormwater management.

### **Room for Improvement**

As with all products on the market, there is always room for improvement. At the moment, Rubbersidewalks are only manufactured in California, yet are supplied to municipalities as far away as Washington D.C.—2,700 miles away! Thus the “unsustainable” shipment of the pavers is not only costly, but also environmentally unfriendly because it contributes to greenhouse gases. Rubbersidewalks, Inc. is concerned about issue and hopes to open a new manufacturing facility on the East coast by 2007<sup>19</sup>.

In order to address two of the biggest problems facing the use of Rubbersidewalks, the life of the product and the fading color, Rubbersidewalks, Inc. created its patented “Safety-All” coating. Although it improves the quality of the product, there is question about the sustainability of the polyurethane and other chemicals involved with the top coat. Polyurethane is a component of the Rubbersidewalks pavers, as well. Further research and cost-benefit analysis would help determine if these chemicals are indeed

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<sup>19</sup> Elizabeth Williamson, “City Has a New Bounce in Its Step: D.C. Tests Tree-Friendly Sidewalks Made of Recycled Tires,” Washington Post, July 2, 2006.

necessary. My assumption is that the benefit of Rubbersidewalks would outweigh the human and environmental implications of the chemicals used.

## **Conclusion**

In determining the sustainability of a product, it is important to consider the product's purpose and the lifecycle. Rubbersidewalks clearly have an important environmental, social, and economic purpose because they save trees, save money, and provide safety. The cradle-to cradle lifecycle of Rubbersidewalks is also conducive to sustainability because it reuses waste tires, a highly important issue for the country, and reuses waste pavers.

Cities across the nation are becoming aware of this innovative and creative technique of dealing with an annoying and costly problem. Currently, over 130,000 square feet of Rubbersidewalks can be found in nearly sixty American cities. However, as with all new and sustainable products, changing municipal and public impressions and choices, through education, is the biggest challenge facing the future of Rubbersidewalks. Helping people understand the initial upfront cost as an important investment is the first step in changing opinions. Secondly, addressing the negative image of rubber sidewalks (for some people) is another concern<sup>20</sup>. Most of these concerns lie around the misconception that Rubbersidewalks are bouncy, are easily destroyable, and will resemble playgrounds. These concerns can be resolved simply through education and public awareness. And lastly, changing street infrastructure code to permit or require Rubbersidewalks will help bring this product to more cities around the country.

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<sup>20</sup> Nell Boyce, "New Rubber Sidewalks Tested in 60 Cities," National Public Radio (NPR), All Things Considered, August 4, 2006.

## Appendix A

<b>Material:</b>	100% recycled California crumb rubber, Urethane resin binder & colorant
<b>Sizes:</b>	2' x 2.5' x 1.875"      5 sq ft (for 4 or 5 foot wide sidewalks) 2.5' x 5' x 1.875"      12.5 sq ft 2' x 2' x 1.875"      4 sq ft
<b>Weight:</b>	10.8 lbs per square foot (54 lbs; 135 lbs; 44 lbs)
<b>Surface:</b>	Crumb rubber molded texture; all edges 1/8" radius [Both sides identical]
<b>Colors:</b>	Gray, terra cotta, green, blue, black, black with white spec (other colors available upon request)  Paver expected to darken slightly in the first two months then remain stable. UV lab tests show no change after two years. Surface appearance may vary due to inconsistency in granulated waste tire rubber.
<b>Maintenance</b>	Sweep, hose down or mop
<b>Pressure &amp; weight tolerance:</b>	3000 pounds per square inch
<b>Coefficient of Friction ASTM C 1028:</b>	0.90 dry; 0.65 wet (OSHA guidelines require that all walking surfaces satisfy a 0.5 Static Coefficient of Friction rating. In new construction and alterations, ADA specifies that a 0.6 Coefficient of Friction is recommended on all path of travel surfaces. Rubbersidewalks is 0.9.)
<b>Taber-Abrasion ASTM C 501:</b>	270 (indicates high resistance to wear)
<b>Shock Attenuation:</b>	Under 200 g at 5'. Fall significantly less likely than on concrete to cause injury or broken bones.
<b>Salt/Chloride ASTM B117:</b>	No change in surface; no stain or residue
<b>Magnesium Chloride soak:</b>	No change in surface; no stain or residue
<b>Xenon Arc Weathering:</b>	No change after exposure to sunlight two-year equivalent
<b>Flame Spread ASTM E162:</b>	Index 131.18 at average temperature of 157.7 C (Surface flammability ANSI Z124.1 and Z124.1 allows Index of 450 or less)
<b>Flammability ASTM D1929-96:</b>	Lit cigarettes, cigars or matches will burn on paver until they self extinguished (Ignition at minimum 9 minutes sustained exposure to 722 degrees Fahrenheit.)
<b>Porosity:</b>	Permeable at module seams; immediate drainage of water into ground; minimal run off into storm drain.
<b>Freeze-Thaw ASTM C 1026:</b>	Product exposed to 15 cycles of freeze-thaw at 0 Degrees for 90 days. No change. No facial defects. No signs of crazing, chipping, spalling or cracking. Product frozen at 0 degrees was subjected to impact with no change.
<b>ADA compliance:</b>	ADA compliant, low vibration.
<b>Modularity:</b>	Rubbersidewalks is a modular sidewalk system. Pavers are interconnected and can be periodically opened for tree root maintenance.
<b>Other:</b>	-100% California recycled tire rubber, with polyurethane binder-Non-toxic. All components inert solids. No volatile organic compounds. -Rubbersidewalks reduce sound of pedestrian or wheeled traffic. -Maintenance: Sweep, hose down or mop

Source: Rubbersidewalks, Inc. [www.rubbersidewalks.com](http://www.rubbersidewalks.com)

## References

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### Websites:

California Integrated Waste Management Board. <http://www.ciwmb.ca.gov/Tires/>  
Rubbersidewalks, Inc. [www.rubbersidewalks.com](http://www.rubbersidewalks.com)

### Personal interview:

Dan Joyce, Principal, Rubbersidewalks, Inc., November 9, 2006

### Other Rubber Products Websites:

US Rubber: <http://www.usrubber.com/>

ECO-BLOK: <http://www.eco-blok.com/>

Grubble: <http://www.grubblellc.com/>

Integrated Waste Management Board: <http://www.ciwmb.ca.gov/>

RubberStuff: [www.americanrubber.com](http://www.americanrubber.com)

Tire Turf: [www.continentalturf.com](http://www.continentalturf.com)

Perma-Turf Playground Safety Surface: [www.perma-turf.com](http://www.perma-turf.com)

Asphalt Rubber System: [www.asphaltrubber.com](http://www.asphaltrubber.com)

Rubber Pavements Association: <http://www.rubberpavements.org/>

Surfacing: [www.northwestrubber.com](http://www.northwestrubber.com)

Road Oyl Resin Modified Emulsion: [www.sspco.com](http://www.sspco.com)