



Performance Benefits & Cost Savings of Tire-Derived Trails



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Topics

- **CalRecycle Purpose**
- **Health & Safety Research Findings**
- **LEED & CalGreen Resources**
- **Funding Assistance**
- **Tire Derived Products & Benefits**
- **Feedback/Discussion**



CalRecycle Purpose

Working to protect public health and the environment by effectively and efficiently managing California's waste disposal and recycling efforts.

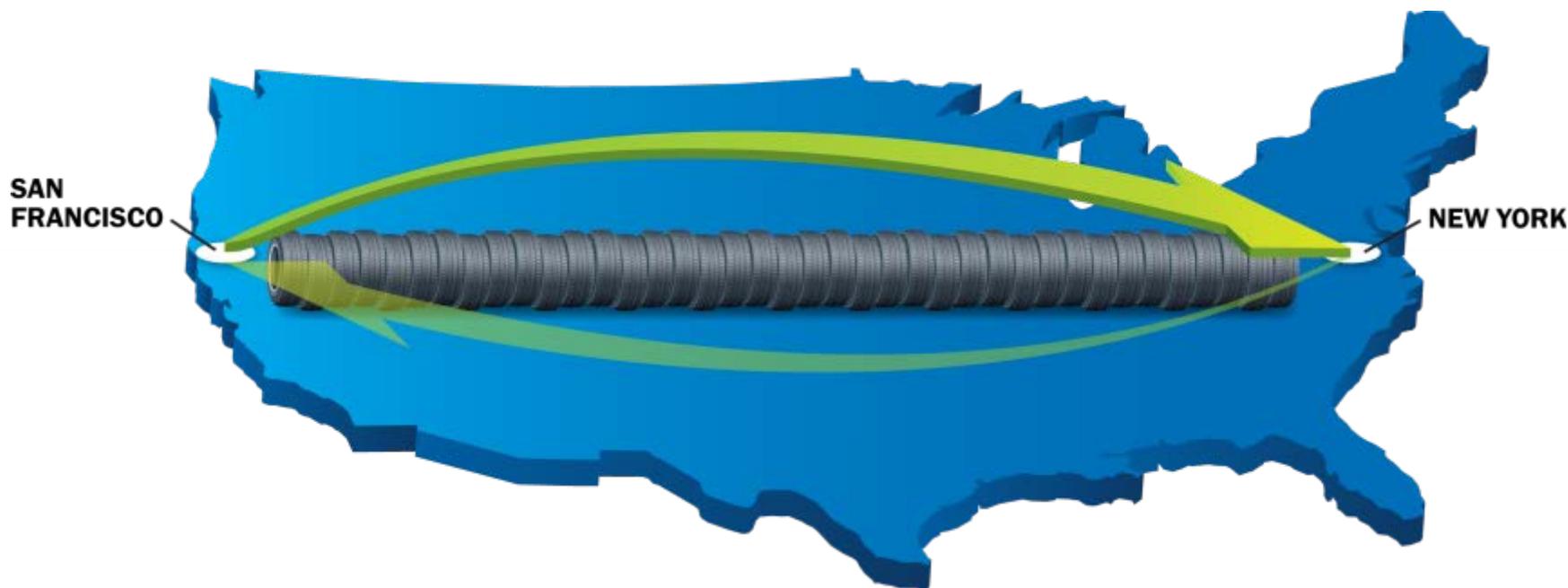
Divisions:

- **Administration, Finance & Information Technology Services**
 - **Materials Management and Local Assistance**
 - **Recycling**
 - **Waste Permitting, Compliance and Mitigation**

California generates ~40 Million Waste Tires Annually

40 Million Tires = 5,681 Miles

Distance from San Francisco to New York City..... AND BACK!

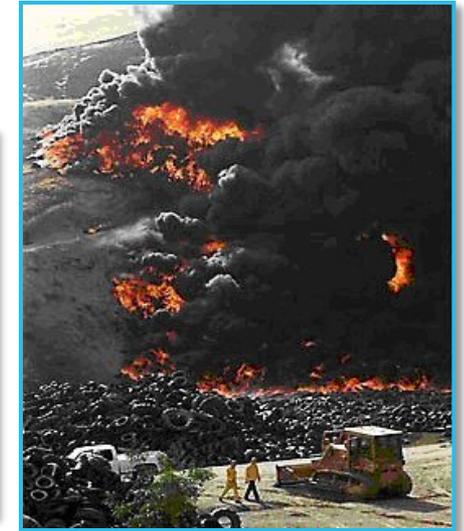


Waste Tires

2 Major Threats: Pests and Fire

Negative Impacts

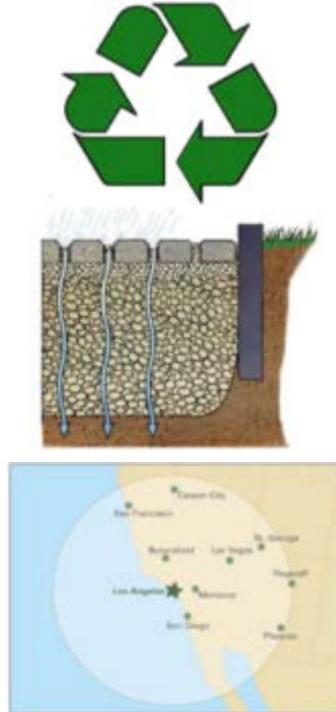
- Hazardous
 - Potential for fire and toxic chemicals from smoke
- Public Health
 - Tires are a breeding ground for mosquitoes
- Environmental
 - Air, water and land pollution with potential public health effects
- Aesthetic
 - Ugly piles of tires stockpiled on a parcel of land



TDPs Contribute to LEED Credits & CalGreen Standards

LEED v4 Credits

- ✓ Rainwater management
- ✓ Heat island effect
- ✓ Outdoor Water Use
- ✓ Building life-cycle impact
- ✓ Green purchasing
- ✓ Local Sourcing of raw materials
- ✓ Low-emitting materials
- ✓ Acoustical performance
- ✓ Exterior noise control
- ✓ Design innovation



CalGreen Standards

- ✓ Regional materials
- ✓ Recycled content
- ✓ Enhanced durability and reduced maintenance
- ✓ Weather resistance and moisture management
- ✓ Heat island effect
 - ✓ Cool roof
 - ✓ Hardscape alternatives
- ✓ Potable water reduction



Health & Safety Research

- 2003 [Building Materials Emissions Study \(BMES\)](#)
- 2011 [Tire-Derived Rubber Flooring Chemical Emissions Indoor Reference Exposure Limits \(IREL\) Study](#)

More research Findings are posted at:

www.calrecycle.ca.gov/greenbuilding/Materials/Research/TireStudy.htm

Health and Environmental Impacts of Tire-Derived Products: Tire-Derived Product Business Assistance - Windows Internet Explorer

http://www.calrecycle.ca.gov/Tires/Products/BizAssist/Health/default.htm

File Edit View Favorites Tools Help

★ Favorites | TBAP 2 Sectorwide | CPCFA Financing Program... | Web Slice Gallery | LoGIC -EAR | TBAP-Tire markets

Health and Environmental Impacts of ...

CA.GOV CalRecycle

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California CalRecycle

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Reduce Reuse Producer Responsibility Schools/Districts Businesses

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→ Facilities/Permitting

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Tire-Derived Product Business Assistance

Health and Environmental Impacts of Tire-Derived Products

The following links provide access to recent articles, research, studies, and fact sheets that specifically examine the potential health and environmental risks associated with various tire-derived product types. These references are also included in the literature review mentioned directly below.

[Tire-Derived Product Performance Literature Review](#) (MS Excel, 97 KB)--Results of an extensive literature review undertaken by R.W. Beck in 2009 to identify publications relevant to tire-derived product performance and research addressing health and environmental concerns, and life cycle costs for marketing purposes. The spreadsheet indicates the name of identified articles, source/author, applicable product types, and where the article can be found online, if available.

[Artificial Turf](#) | [Crumb Rubber](#) | [Pour-In-Place Products](#) | [Rubber Mulch](#) | [Tire-Derived Aggregate](#)

Artificial Turf

→ [OEHHA Artificial Turf Study](#)--The Office of Environmental Health Hazards Assessment (OEHHA) has been contracted to study the health effects of the new generation of artificial turf playing fields.

→ [Synthetic Turf Council Position Paper Regarding Health and Environmental Impacts](#) (Adobe PDF, 29 KB)

→ [New York State Department of Health Fact Sheet on Crumb Rubber Used as Infill Material in Athletic Fields in Synthetic Turf Fields \(August 2008\)](#)

→ [Connecticut Department of Public Health Fact Sheet on Artificial Turf Fields \(October 2007\)](#) (Adobe PDF, 63 KB)

→ [New York City Department of Health and Mental Hygiene Questions and Answers Regarding Artificial Turf](#)

→ [An Assessment of Chemical Leaching, Releases to Air and Temperature at Crumb-Rubber Infilled Synthetic Turf Fields \(May 2008\)](#) (Adobe PDF, 966 KB)

→ [Air Quality Survey of Synthetic Turf Fields Containing Crumb Rubber Infill \(March 2009\)](#) (Adobe PDF, 670 KB)

→ [A Review of the Potential Health and Safety Risks from Synthetic Turf Fields Containing Crumb Rubber Infill \(May 2008\)](#) (Prepared for New York City Department of Health and Mental Hygiene by TRC) (Adobe PDF, 958 KB)

→ [Review of the Human Health and Ecological Safety of Exposure to Recycled Tire Rubber Found at Playgrounds and Synthetic Turf Fields \(July 2008\)](#) (Prepared for the Rubber Manufacturers Association by Chem Risk, Inc.)

→ [San Francisco Recreation and Park Department Synthetic Playfields Task Force Findings and Department Recommendations \(August 2008\)](#)

http://www.calrecycle.ca.gov/Tires/Products/BizAssist/Health/default.htm#Mulch

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www.calrecycle.ca.gov/Tires/Products/Health/default.htm



HAZARDS IDENTIFICATION

Primary Route(s) of Exposure: Inhalation, skin contact, eye contact, ingestion.

effects of overexposure:

Inhalation: Irritation of respiratory tract. Prolonged inhalation may lead to mucus membrane irritation, dizziness and / or light headedness, headache, nausea, coughing, central nervous system depression.

Skin Contact: Irritation of skin

Eye Contact: Irritation of eyes. Prolonged or repeated can cause conjunctivitis, tearing of eyes, and redness of eyes.

Ingestion: May cause fatigue, drowsiness, dizziness and / or light headedness.

Medical conditions Aggravated by exposure: eye, skin, respiratory disorders.

FIRST-AID MEASURES

Inhalation: Remove to fresh air. Restore and support continued breathing. Get emergency medical attention. Have trained person give oxygen if necessary. Get medical help for any breathing difficulty. Remove to fresh air if inhalation causes eye watering, headaches, dizziness, or other discomfort.

Skin Contact: Wash thoroughly with soap and water. If any product remains, gently rub petroleum jelly, vegetable or mineral/ baby oil on to skin. Repeated applications may be needed. Remove contaminated clothing. Wash contaminated clothing before re-use. If irritation occurs, consult a physician.

Eye Contact: Flush immediately with large amounts of water, especially under lids for at least 15 minutes. If irritation or other effects persist, obtain medical treatment.

Ingestion: Do not give liquid if unconscious or drowsy. Give no more than 2 glasses of water. Obtain medical attention.

ACCIDENTAL RELEASE MEASURES

Steps to be taken in case material is released or spilled: Comply with all applicable health and environmental regulations. Ventilate area. Clean up with towels, boom, or other absorbents. Large spills – Use a respirator if not in a ventilated area. Shut-off leak. Surround and contain spill. Pump to storage or salvage vessel. Use absorbent to pick up excess residue. Keep salvageable material and rinse water out of sewers and water courses. Small spills – use absorbent to pick up residue and dispose of properly. Clean up with soap and water.

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, expressed or implied, with respect to such information, as we assume no liability resulting from its misuse. Users should take their own investigations to determine the suitability of the information for their own particular purposes. In no event shall reRubber LLC be liable for any claims, losses, or damages, howsoever arising, even if reRubber LLC has been advised of the possibility of such damages.

HANDLING AND STORAGE

Handling and Storage: Keep out of surface waters, sewers, and waterways entering or leading to surface waters. Keep containers tightly sealed when not in use. Store in temperatures between 40°F - 100°F. DO NOT FREEZE.

TOXICOLOGICAL INFORMATION:

Routes of Entry: Irritation caused through all routes of Entry. Hazard through repeated or prolonged inhalation and ingestion.

Toxicity to Animals: Not established.

Ecotoxicity: This product has not been tested to determine environmental effects.

CARCINOGENIC EFFECTS: None of the ingredients in this product are listed with OSHA, IARC, or NTP as carcinogenic.

DISPOSAL CONSIDERATIONS

Waste disposal: Dispose in accordance with all applicable regulations. Avoid discharge to natural waters. Under EPA-RCRA (40 CFR 261). This material is not a hazardous waste.

REGULATORY INFORMATION:

As of the date of this MSDS, all of the components in this product are listed (or are otherwise exempt from listing) on the TSCA inventory. This product has been classified in accordance with the hazard criteria of the CPR (controlled products regulations) and the MSDS contains all the information required by the CPR.

Toxic Substances Control Act: This product is in compliance with the U.S. Toxic Substances Control Act (TSCA) inventory requirements.

FOR EMERGENCY CALL: 1-800-424-9300 (CHEMTREC)

HIMIS (U.S.A.):

Health Hazard: 1

Fire Hazard: 0

Reactivity Hazard: 0

Personal Protection: B

Tire Derived Product Categories

- Accessibility Ramps, Paths & Sidewalks
- Animal Care Products
- Synthetic Turf
- Flooring & Mats
- Sports Surfacing
- Landscaping & Rubber Mulch
- Outdoor Surfacing, Pavers & Tiles
- Playground Surfacing
- Traffic Related Products





TDP Pricing

- Some TDPs typically have higher initial costs than competing products
- But these TDPs usually have lower life-cycle costs because they
 - Are more durable
 - Reduce replacement and maintenance costs
- Plus, TDPs often provide other performance or safety benefits



Funding Assistance

Tire-Derived Product Grant Program

- Eligible: Public schools, CA cities, counties and state agencies
- Reimbursement Grant
- Max \$150K/applicant, based on \$5 for passenger tire equivalent diverted

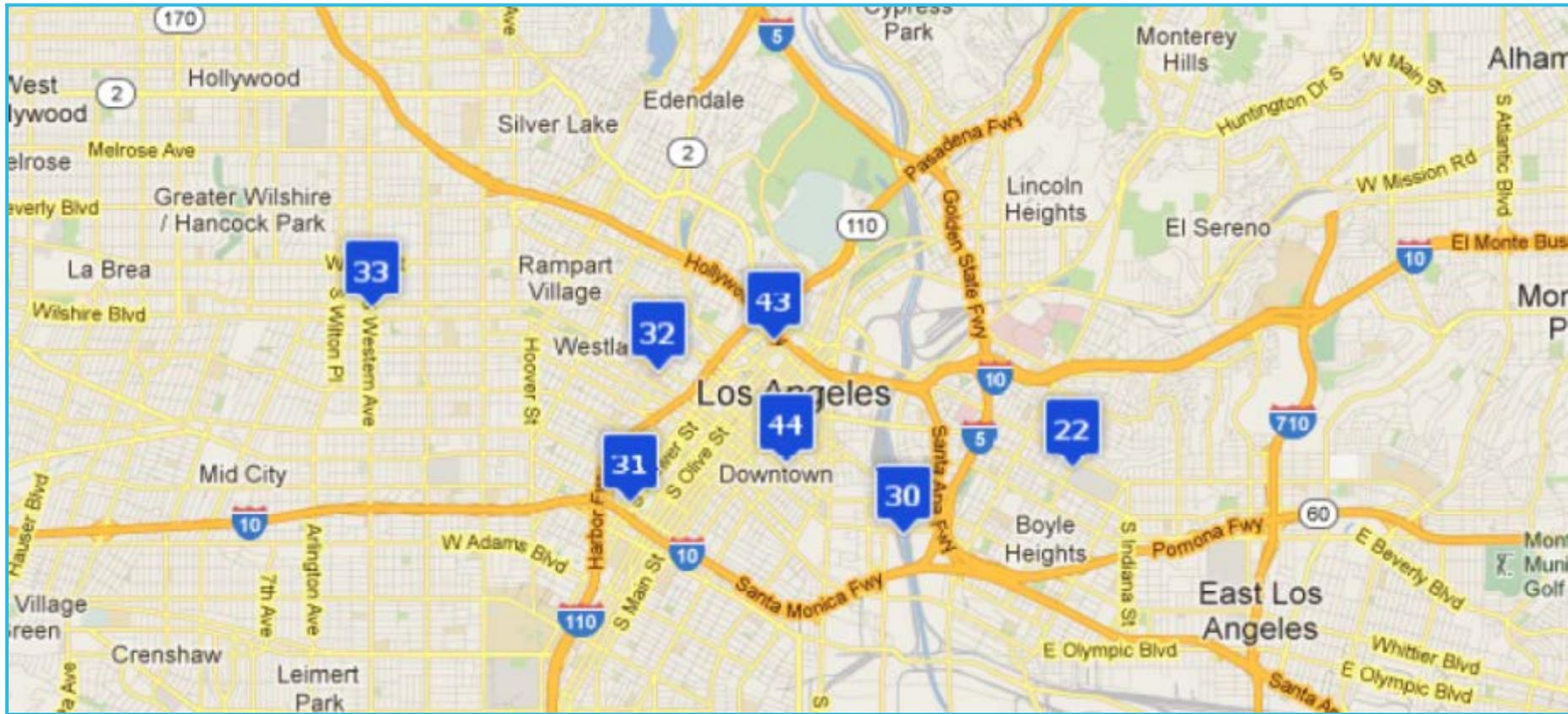
More information call: 916/341-5062

Or email: Grants@calrecycle.ca.gov

Receive automatic grant notification emails:

www.calrecycle.ca.gov/Listservs/Subscribe.aspx?ListID=90

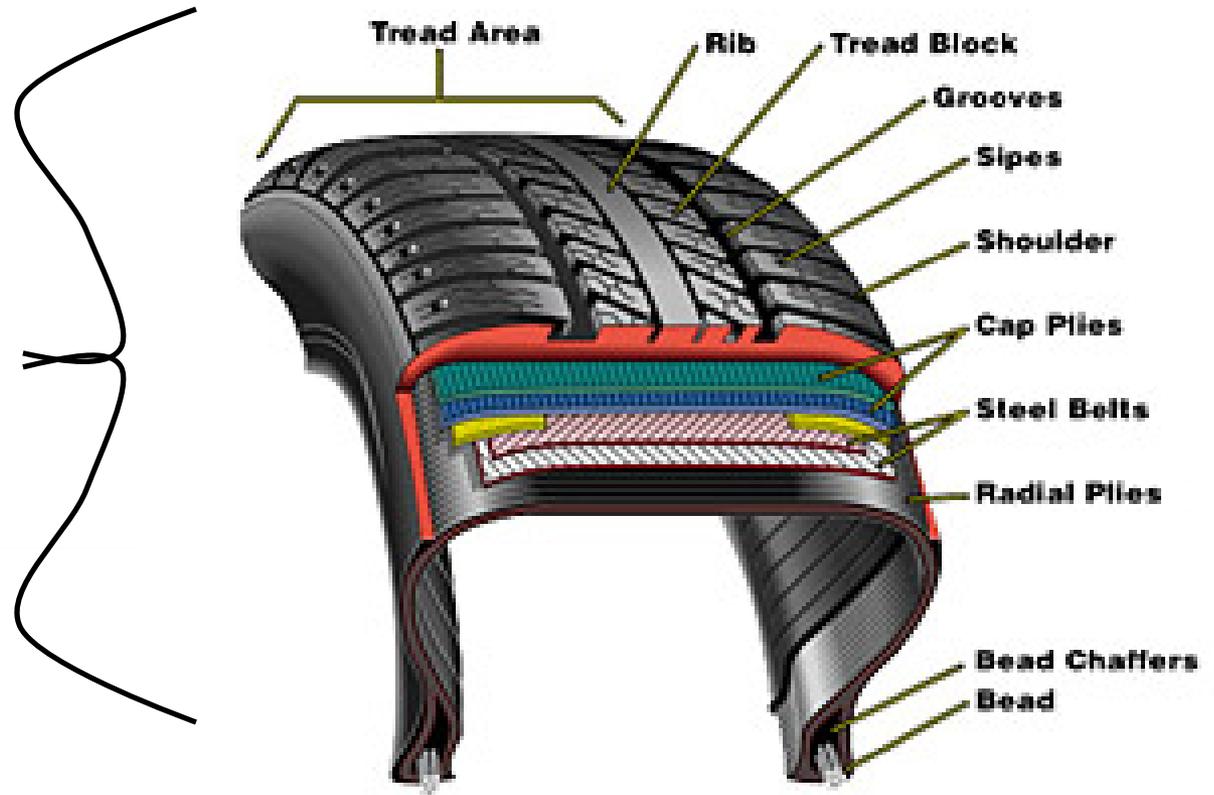
Locations of Installed Tire-Derived Products Statewide



Locations statewide are listed at: <http://goo.gl/maps/VoPu>

Anatomy of a Passenger Car Tire

- Synthetic Rubber
- Steel Radials
- Nylon Mesh



Deconstruction of a Passenger Car Tire

The screenshot shows a digital catalog interface. On the left is a 'Table of Contents' sidebar with the following items: CALIFORNIA TIRE-DERIVED PRODUCT CATALOG, TABLE OF CONTENTS, ABOUT THIS CATALOG, TIRE-DERIVED PRODUCTS BY CATEGORY (expanded), and APPENDICES. The main content area displays a page from the 'TDP Catalog' at page 390 of 627. The page features the Tri-C Tire Recycling Division logo, the text 'Tri-C Tire Recycling Division Leader in Recycling Technology', and a headline: 'Tri-C Manufacturing Equipment Produces Quality Synthetic Turf Crumb Infill'. Below the headline is a video player showing industrial machinery. Underneath the video is a large pile of dark synthetic turf crumb infill. At the bottom of the page, contact information is provided: 512 Harbor Boulevard, West Sacramento, CA 95691, phone 916.371.1700, fax 916.371.8181, and website www.tricire.com. The page is branded with 'Tire-Derived Product Catalog' and 'CalRecycle' logos. The interface includes a search bar at the top right and a navigation bar at the bottom with various icons.

<https://vimeo.com/68341681>

Deconstruction of a Passenger Car Tire

The screenshot shows a digital catalog interface. On the left is a 'Table of Contents' sidebar with the following items: CALIFORNIA TIRE-DERIVED PRODUCT CATALOG, TABLE OF CONTENTS, ABOUT THIS CATALOG, TIRE-DERIVED PRODUCTS BY CATEGORY, APPENDICES (with sub-items: Appendix A - Company Directories, Appendix B - Certification Programs, Appendix C - Case Studies), Accessibility Ramps - SafePath Products, Ballistic Backstop - Paragon Tactical, Board Walk Extensions - Millennium Molding, and Bumper Guards & Curb Ramps. The main content area is titled 'TDP Catalog' and shows 'pages: 270 / 627'. It features a video player with a play button. The video content includes the text 'Smarter Materials for Next Generation Infrastructure™', the 'KBI FLEXI-Pave' logo, a 'From Michelin Press Release' header, a video thumbnail of a road surface, and a caption: 'K.B. Industries partners with Michelin to use Flexi-Pave for Yellowstone National Park trails'. Below the video is contact information for 'K.B. Industries, Inc.' (7300 Bryan Dairy Road, Suite 400, Largo, FL 33777; 1234 'O' Street, Fresno, CA 93721; phone: (727) 722-8309; website: www.kbius.com; email: kbif@kbius.com) and a photo of a road at 'Arlington National Cemetery'. A 'Cal Recycle' logo is in the bottom right corner of the video player. The bottom of the page has a navigation bar with icons for home, search, print, and other functions.

Yellowstone Video

Outdoor Surfacing: Bound Mulch, Pour-in-Place, Pavers, & Tiles

Potential LEED® v4 Credits:

- Rainwater Management
- Heat Island Reduction
- Environmental Product Declaration
- Sourcing of Raw Materials

Applications

- Park Trails
- Ski Resorts
- Walkways
- Courtyards
- Sports Arenas
- Disc Golf
- Water Parks



Case Study: Pour-in-Place Walkway

Vanguard Learning Center, Los Angeles, CA

Benefits:

- California Tires diverted from landfills: **2,508 tires**
- Reduced stormwater runoff
- Permeable surfacing
- Shock-absorbing
- Flexible
- Reduced trips and falls



Outdoor Surfacing: Accessibility Ramps, Sidewalks, & Treewells

Product benefits may include:

- Enhanced durability & resilience
- Easy maintenance & installation
- Enhanced safety & reduced liability
- Enhanced comfort
- Absorbs and retains less heat than concrete
- Reduced storm water run-off depending on product permeability

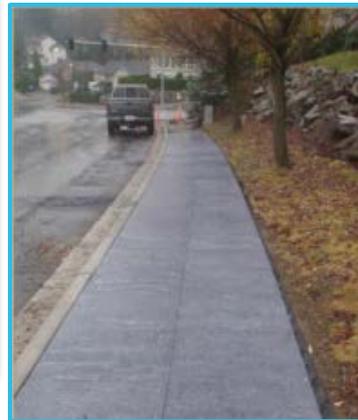
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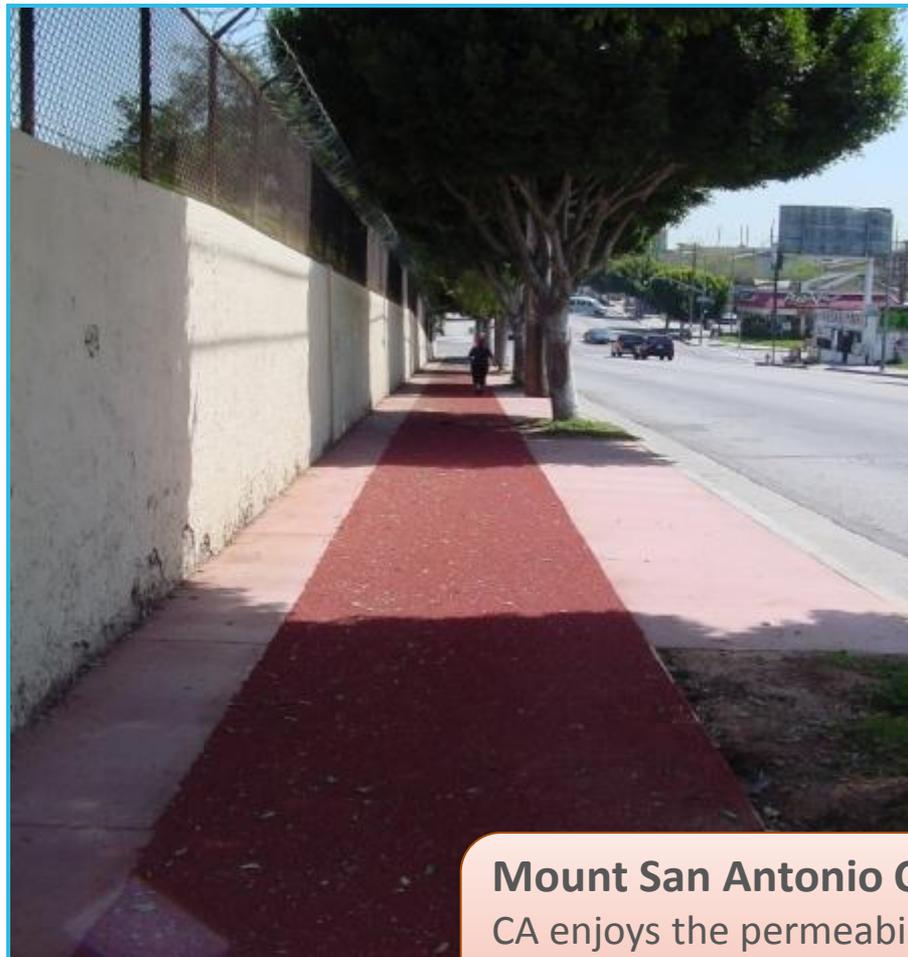
Environmental Product Declaration

Sourcing of Raw Materials





Safer Sidewalks for City Blocks



Mount San Antonio College in Walnut, CA enjoys the permeability of rubber sidewalks, allowing rain water to drain. The flexibility accommodates growing tree roots.

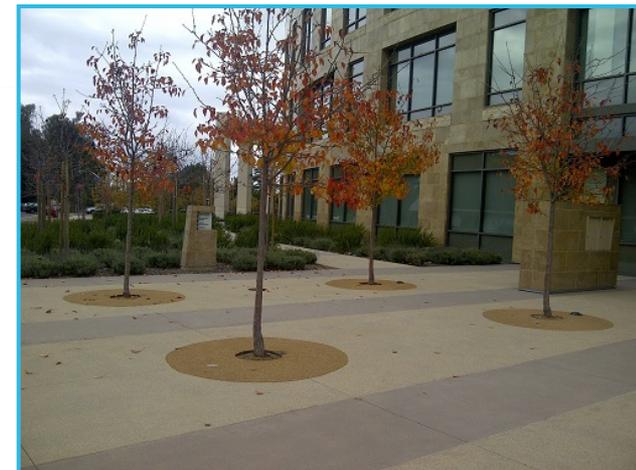


100% Recycled Rubber for Pigmented Pervious Pavement for walkways



Pour in Place & Tree Wells

Monrovia High School

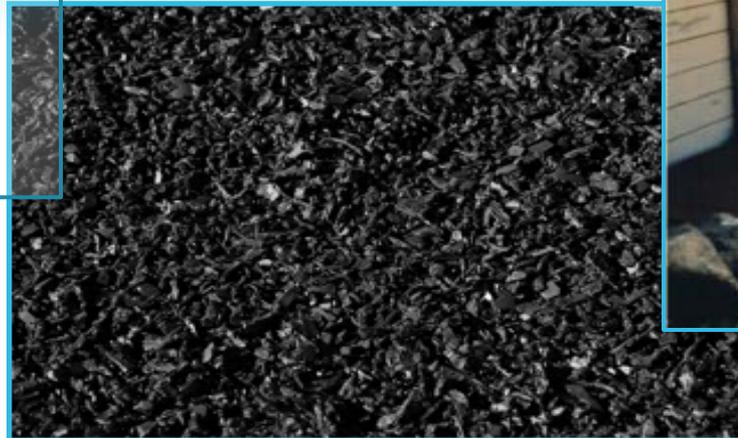
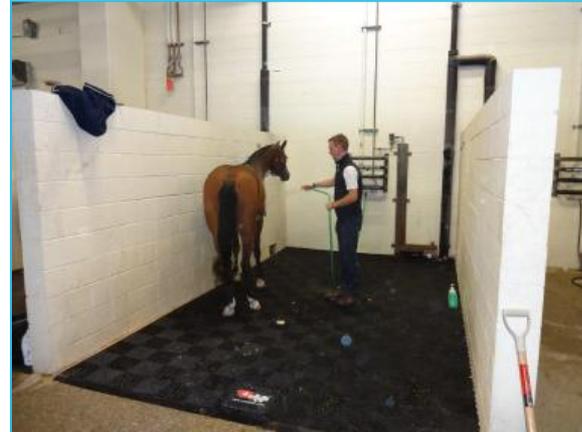


Equestrian Flooring & Footing: Loose Fill Footing, Stall & Flooring Mats

UC Davis was awarded a \$150K CalRecycle reimbursement grant to utilize animal mats formulated from recycled tires. Rubber stall mats naturally cushion the animal's feet and legs, requiring less bedding and less maintenance.

Applications

- Flooring Tiles
- Stall Mats
- Arena Cover
- Bedding Options

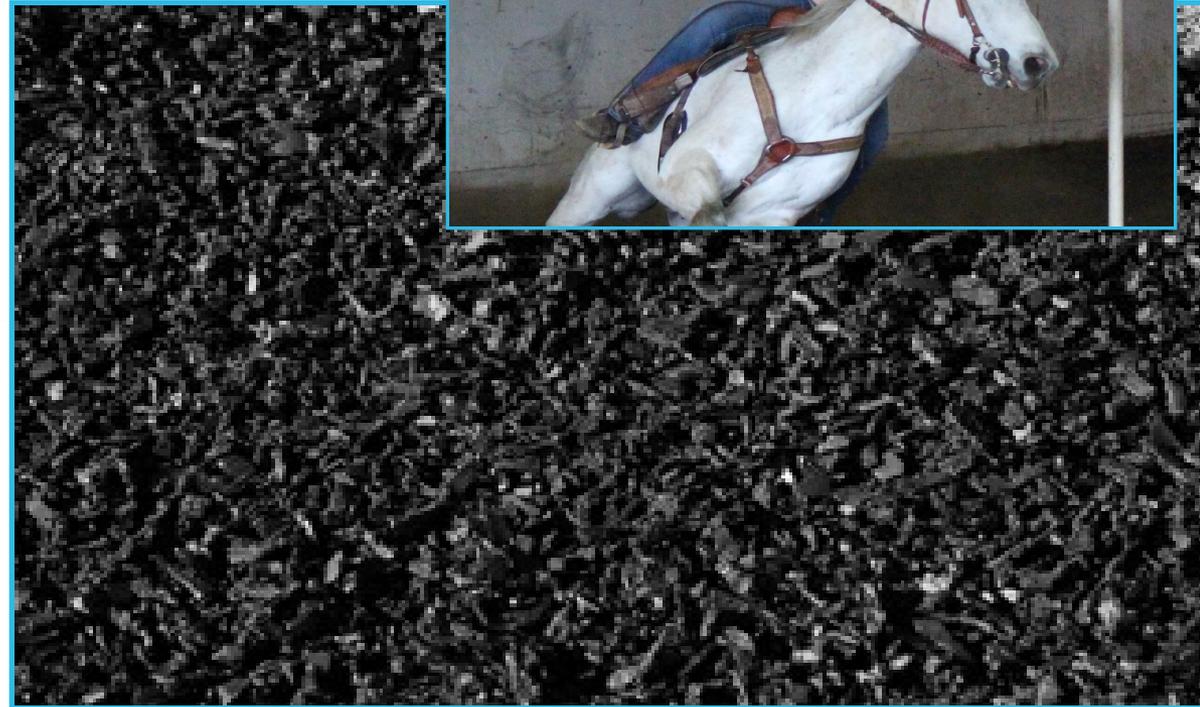


Case Study: Equestrian Footing

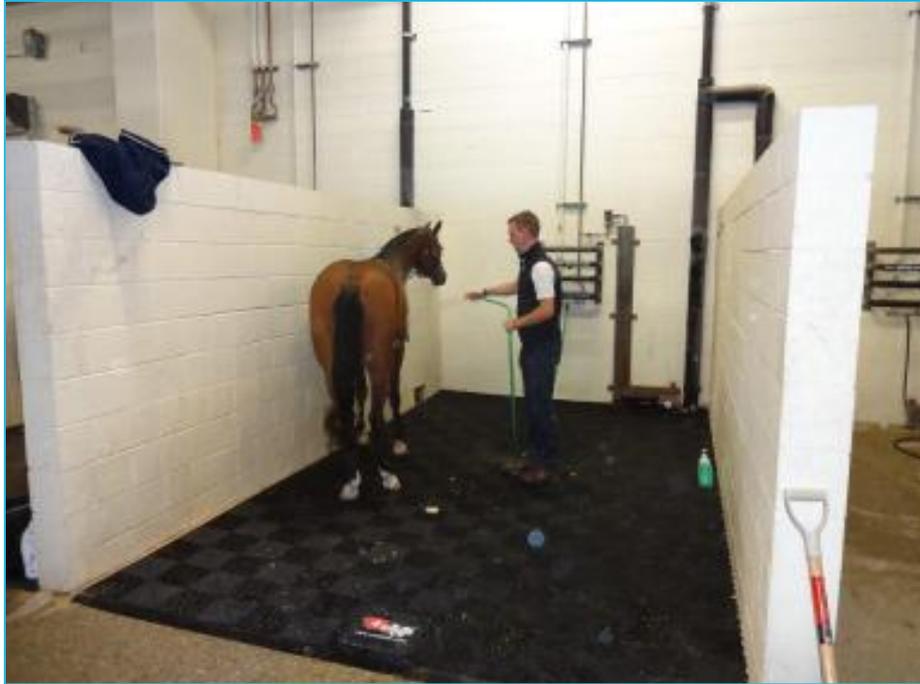
Humboldt County Fairgrounds, Ferndale, CA

Benefits:

- California Tires diverted from landfills: **8,331 tires**
- Reduced maintenance
- Reduced mud and dust
- Improved drainage
- Shock-absorbing surface
- Reduced injuries



Recycled Rubber Tiles



- Designed to be long lasting.
- Easy to install with no tools required.
- Provides great footing for horses while allowing drainage.
- Lightweight, unlike conventional rubber mats.
- Easy to clean and maintain.

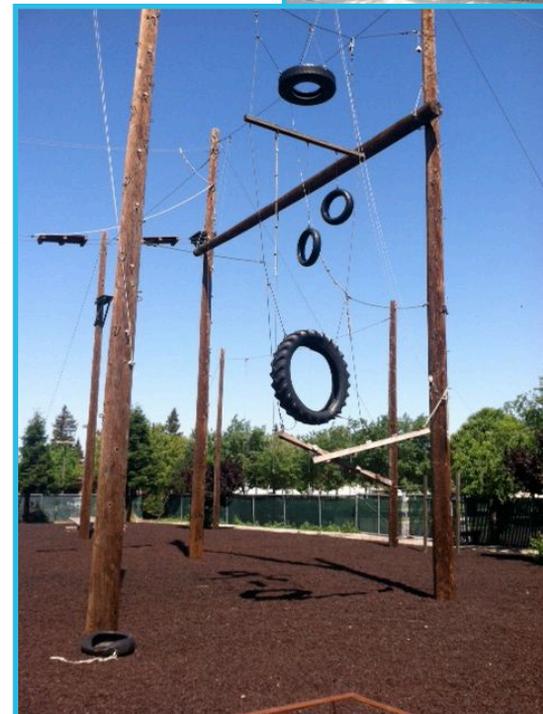
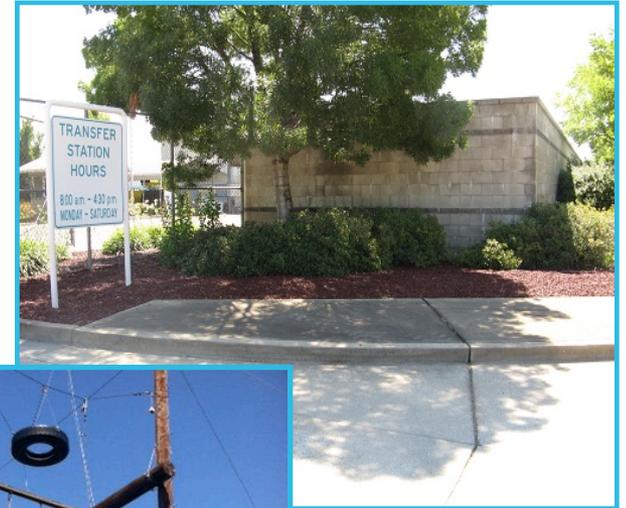
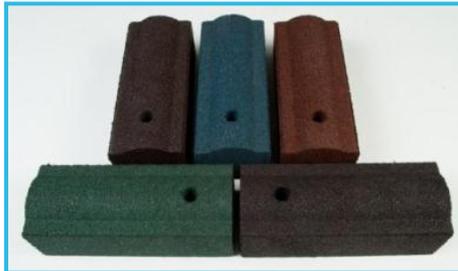
Landscape: Loose Mulch & Edgings

Potential LEED® v4 Credits:

Rainwater Management

Environmental Product Declaration

Sourcing of Raw Materials



Case Study: Rubber Mulch



Santa Clara County Sheriff's Office, Training Academy

- California tires diverted from landfills: **10,500**
- Prevents weeds
- Reduced mulch erosion
- Discourages animals

“We are located right against the foothills near a county park, and the landscape generates weeds very quickly. This mulch prevents weeds from growing and provides cushioning for falls.” - Deputy Sheriff Devin Fontana

Case Study: Landscaping Bark

Redding Recycling and Transfer Station

- California tires diverted from landfills: **6,183 tires**

Savings

- Reduced labor, maintenance and replacement of wood chips every few years
- The bark controls weed growth, reduces dust, provides excellent drainage and is long lasting

Benefits:

- Durable
- Aesthetically pleasing
- Diverts tires from landfills



Outdoor Surfacing: Pavers & Tiles

Product benefits may include:

- Durable and resilient to various climates and exposure to elements
- Resistant to fading and cracking
- Low installation and maintenance costs
- Reduced injuries and enhanced comfort
- Non-skid surface & slip resistance in both wet /dry conditions
- Permeable surface, depending on product

Potential LEED® v4 Credits:

Rainwater Management

Heat Island Reduction

Environmental Product Declaration

Sourcing of Raw Materials



Case Study: Outdoor Pavers

Contra Costa County Fairgrounds, Antioch, CA

Benefits:

- California Tires diverted from landfills: **6,469 tires**
- Shock-absorbing
- Anti-skid surface
- Water Permeable
- Durable in hot and cold climates
- Reduced tripping hazard compared to concrete pad



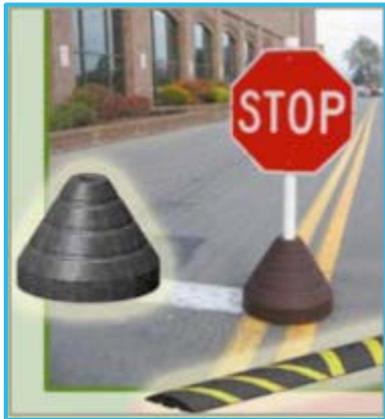
Traffic Related Products

Product benefits may include:

- Durable & resilient to various climates and exposure to elements
- Low installation & maintenance
- Weighs less than many non-recycled product substitutes
- Reduced cost
- Variety of product options

Potential LEED ® v4 Credits:

Environmental Product Declaration
Sourcing of Raw Materials



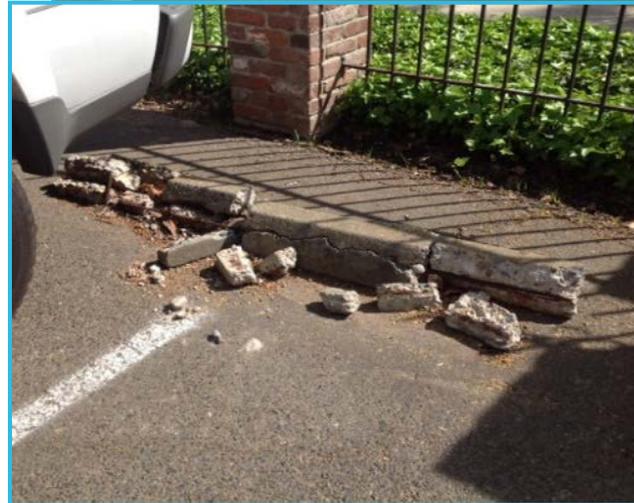
Case Study: Tire Stops

Dow Chemical

- Installed 400 three ft. tire stops in their parking lot
- California tires diverted from landfills: **800 tires**

Benefits

- Lasts longer compared to conventional concrete
- Maintenance free
- Easy to install
- Lightweight
- Reduced risk of vehicle damage





Discussion/Questions?

NEW 2016 TDPs Catalog on-line at:

www.calrecycle.ca.gov/Tires/Products/Catalog

Contains product specification sheets, etc.

[Vendor List!](#)

**We hope this presentation
has been informative.**

Let us know how we might improve.