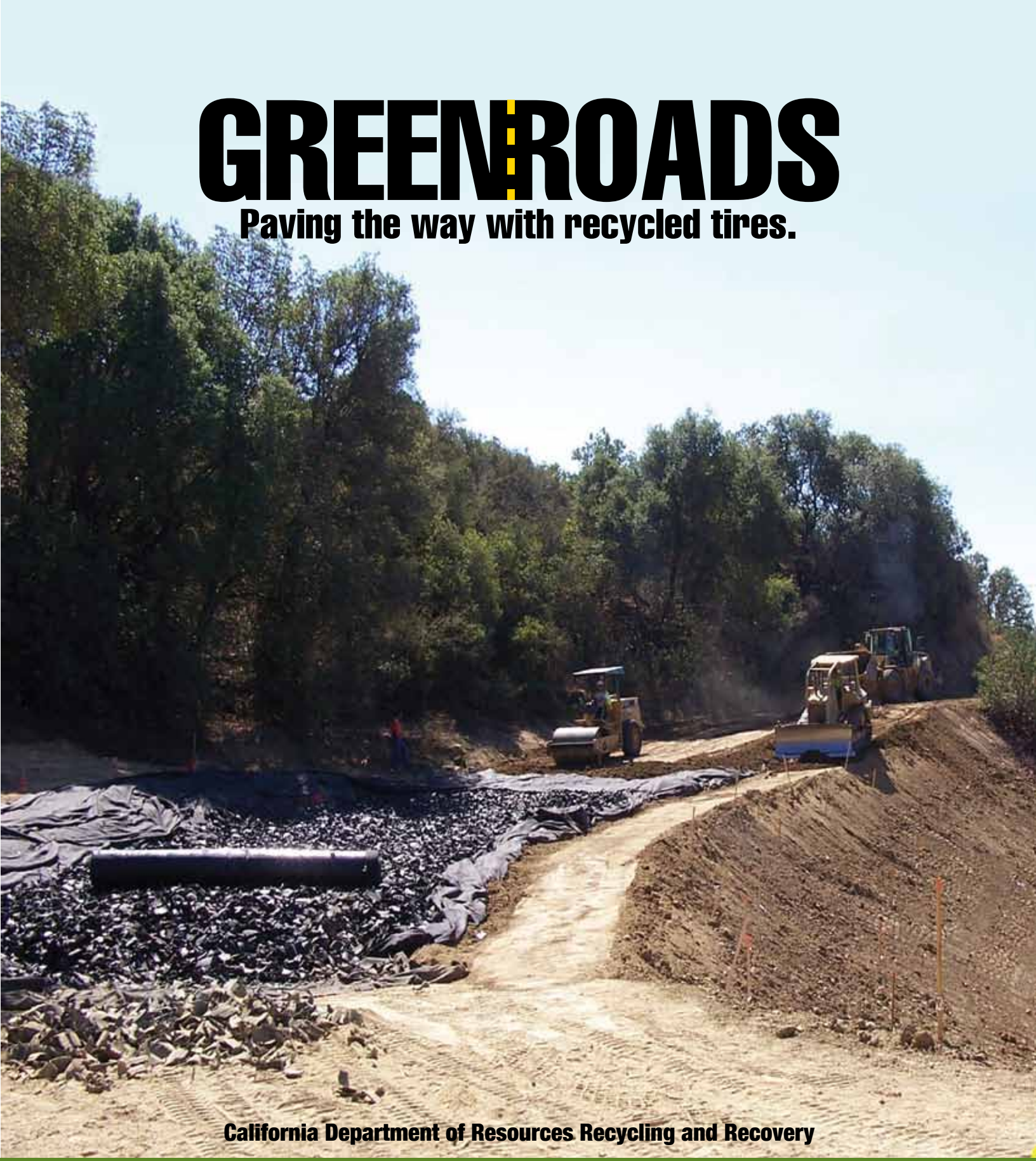
GREEN ROADS

Paving the way with recycled tires.



California Department of Resources Recycling and Recovery

Tire-Derived Aggregate

TIRE-DERIVED AGGREGATE

California is faced with the significant challenge of diverting and safely managing more than 40 million waste tires generated each year. The California Department of Resources Recycling and Recovery, also known as CalRecycle, plays an important role in the stewardship of California's waste tires by promoting innovative reuses to reduce tire disposal.

Tire-derived aggregate, or TDA, not only helps California divert waste tires from landfills, it also helps civil engineers solve a variety of engineering problems. TDA, which is produced from shredded waste tires, is lightweight, free-draining and a less expensive alternative to conventional lightweight aggregates.

PROJECT APPLICATIONS:

Road Slide Repair

TDA is an excellent alternative in roadslide repair because it decreases the overburden forces on existing sub-surface materials. When using TDA in place of soil fills, less excavation is needed to reach the stability factor of safety, which results in a more stable repair design. TDA is also less expensive than other lightweight fills such as geo-foam. Additionally, TDA has a permeability of approximately 1 centimeter per second and does not absorb substantial water. These free-draining characteristics result in a road section repair fill that minimizes the opportunity for the backfill to become saturated. Used properly, TDA can significantly reduce the potential for future failure due to saturated conditions.

Embankments

Constructing highway embankments on weak soils can result in slope instability and excessive settlement. Because TDA weighs less than half of conventional soil fill, it solves the stability and settlement problems that occur if foundation soils are weak.

- Embankments on the Interstate 880 interchange at Dixon Landing used 660,000 tires and saved an estimated $240,000. (2000)

- The Confusion Hill TDA Project along U.S. 101 near Garberville used 270,000 waste tires and saved the state $320,000. (2009)

COMPOSITION:
TDA is made up entirely of shredded scrap tires, and comes in two size types.

Type A
Typically about 3 inch minus
1 Ton=1.4 cubic yards
1 Ton=90-100 tires (PTE)
In place density=45-58 lb/ft^3
Permeability>1 cm/sec for most applications

Uses for Type A are:
- Drainage material, septic leach fluids
- Vibration dampening layers under light rail tracks
- Gas collection media
- Landfill leachate collection system

Retaining Wall Backfill

Using TDA as backfill behind retaining walls can reduce lateral forces that impact the inside of the retaining wall. The ability to design a retaining wall with smaller lateral forces allows engineers to reduce the amount of steel or concrete that goes into a standard retaining wall, therefore resulting in a cost-effective design solution.

Vibration Attenuation

TDA is an excellent product for reducing ground borne vibrations that transmit the noise of passing trains into homes. TDA acts as an energy absorbing layer below the tracks.

Traditionally, rubber mats, special track fasteners, or floating slabs have been used to reduce vibration. However these solutions can be quite expensive and in some applications their effectiveness is limited. In contrast, CalRecycle developed a TDA application that works in a similar way and is more cost-effective. By using a 1-ft thick layer of TDA below the traditional stone ballast and gravel sub-ballast layers, full-scale tests have proven this as an effective method to control vibration transmitted away from the tracks. The lower cost of this technology, in comparison to conventional vibration mitigation techniques, is an added bonus.

- Four sections of track with TDA underlayment were completed in 2005 for the Santa Clara Valley Transportation Authority (VTA) in San Jose, Calif. Those track sections were again analyzed in 2009 to determine if they were still performing the same after four years of operation. The results show the sections of track with TDA underlayment were still mitigating vibration effectively. This project saved $1 million.

Landfill Applications

TDA is an excellent substitute for the drain rock or gravel that historically has been used in landfill leachate and gas recovery design features. TDA can be used in landfills in many applications, from operations layers, to the porous material surrounding the collection and disbursement pipes in the vertical and horizontal gas extraction, to liquid recirculation trenches. The relatively large amount of interstitial space and the convoluted pathway for liquid flow within TDA are useful properties for this civil engineering application. Also, the use of TDA instead of a naturally mined resource such as gravel reduces the greenhouse gases released due to landfill systems and operations.

Type B
Typically about 6-12 inches
1 Ton=1.5 cubic yards
1 Ton=90-100 tires (PTE)
In place density=45-50 lb/ft^3
Permeability>1 cm/sec for most applications

Uses for Type B are:
- Lightweight fill for embankments
- Lightweight fill behind retaining walls
- Lightweight fill for road section slide repair

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