CalRecycle

To Whom It May Concern:

Each year in California, more than 10 million waste tires end up in landfills instead of being recycled.

Through its "Green Roads" program, the Department of Resources Recycling and Recovery, also known as CalRecycle, promotes the use of waste tires in important projects undertaken by California communities. Recycling tires into rubberized asphalt concrete (RAC) and tire-derived aggregate (TDA) not only reduces the tire component of the waste stream, it offers cost-effective alternatives to traditional construction materials.

For years, RAC and TDA have been used successfully in paving and civil engineering projects across California. Roads paved with RAC use more than 2,000 waste tires per lane mile and are safer, quieter, and more durable than roads paved with traditional asphalt. TDA, made of 100-percent recycled waste tires, provides a cost-effective, environmentally-sound alternative to conventional aggregate for use in retaining wall, embankment fill, landslide stabilization, vibration mitigation, and various landfill construction projects. Both tire-derived products can help bring true environmental integrity to future infrastructure projects throughout the state.

Please find a briefing packet enclosed that contains several items that further explain the benefits of RAC and TDA, including:

- RAC and TDA technical brochures explaining the applications of each product;
- A fact sheet listing general information about RAC and TDA;
- Case study highlights as well as recent news related to the use of RAC and TDA and;
- A workshop registration form to attend an in-depth presentation on RAC and TDA.

A series of free informational workshops will be taking place throughout the state offering an opportunity to learn more about these products and how they may be of use to your jurisdiction. By promoting the use of RAC and TDA in communities across California, together we move closer to CalRecycle's goal of reusing 90 percent of waste tires generated each year. And by choosing RAC and TDA for your jurisdiction, you support green construction alternatives that also save taxpayer dollars.

Please email greenroads@calrecycle.ca.gov for more information about RAC and TDA. To reserve a place at an upcoming workshop, please call Jillianne Luong at (916) 239-4617.

Sincerely,

Robert E. Fuji
Senior Waste Management Engineer, Technical and Analytical Resources Division
Department of Resources Recycling and Recovery

GREEN ROADS

Paving the way with recycled tires.

California generates more than 40 million scrap tires every year. While nearly 75 percent of used tires are recycled, the rest still end up in landfills or illegal stockpiles. If not managed properly, scrap tires are a potential threat to both California's environment and public health and safety. Illegally stockpiled tires also pose a fire risk and are attractive habitats for rodents and insects.

The California Department of Resources Recycling and Recovery, known as CalRecycle, is dedicated to advancing California's waste tire reduction efforts by promoting the use of tire-derived products. Through the department's Green Roads program CalRecycle is reducing the amount of tires disposed in California's landfills by putting waste tires to new use as RAC and TDA.

What is RAC?

Rubberized asphalt concrete (RAC) is a proven product that has been used for road rehabilitation projects for more than 30 years. RAC contains ground tire rubber, asphalt binder and other aggregate materials.

Why is RAC Beneficial?

Cost-effective:

- A longer lasting, more durable pavement that resists cracking, rutting and shoving
- Requires no special paving equipment
- Can be used at reduced thickness compared to conventional asphalt

Safe:

- Provides a skid-resistant surface and prolonged color contrast with striping and markings

Environmentally friendly:

- Reduces noise pollution with noticeably lower tire noise
- Uses thousands of waste tires per lane mile

What is TDA?

Tire-derived aggregate (TDA) is made from shredded scrap tires and is used in a wide range of construction projects. These uses include retaining wall backfill, lightweight embankment fill, landslide stabilization, vibration mitigation, and various landfill applications.

Why is TDA Beneficial?

Cost-effective:

- Less expensive than other lightweight fill materials
- Requires less excavation than soil fill when used for landslide repair

High-performing:

- Lightweight, free-draining characteristics help solve engineering problems

Environmentally friendly:

- Reduces need for mined resources like pumice and gravel
- Keeps thousands of tires out of landfills with every application

California Department of Resources Recycling and Recovery

www.PavingGreenRoads.com

CalRecycle

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Santa Barbara Independent
WHO. WHAT. NOW.

CalRecycle, Santa Barbara County, Team Up to Fix Palamino Road

Pilot Project for Fire-Damaged Road Keeps Thousands of Scrap Tires Out of Landfills

Wednesday, August 11, 2010

California already recycles more than 30 million used tires a year, turning them into playground mats, artificial turf and other products. CalRecycle is promoting the use of recycled tires as a green construction alternative with materials like the tire-derived aggregate being used in the Palomino Road project, as well as rubberized asphalt concrete for paving quiet, long-lasting road surfaces.

Background

Palomino Road, in unincorporated Santa Barbara County, was originally constructed by cutting the hillside soil away and then building the road base back up again. The soil contained highly expansive clay materials, and settlement and roadway cracking have been ongoing problems for 25 years.

Twelve houses along Palomino Road were lost to fire in May 2009. Emergency equipment used during the firefight, and increased traffic from heavy trucks following the event, stressed existing poor road conditions. Road failure including landslides and excessive vertical cracking accelerated beyond routine maintenance, and an outside lane was closed.

Repair

Tire derived aggregate (TDA) is made from shredded, used tires. It is one-third the weight, exerts half the earth pressure, and provides 10 times better drainage than traditional soil materials. TDA is less expensive, and it provides a more stable embankment for the new road surface.

The TDA fill will be spread over a section of the damaged roadway measuring 400 feet long, 9 to 12

feet wide, and 6 feet deep. Two feet of cover soil will be compacted on top of the TDA, and the road will be finished with pavement. This project will keep approximately 35,000 waste tires out of landfills or stockpiles.

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CASE STUDY | Landslide Repair
Ukiah, CA

As part of an effort to reduce county spending and make a positive impact on the environment, Mendocino County Department of Transportation (MENDOT) used tire-derived aggregate (TDA), a product made from shredded scrap tires, as a replacement for mined construction aggregate in a landslide repair project in 2007.

PROJECT DETAILS

- CalRecycle partnered with MENDOT to repair 160 feet of roadway of Marina Drive near the city of Ukiah
- The project required the removal of the original backfill material used to construct the road in order to replace it with the lighter, more environmentally friendly TDA
- TDA was chosen in this project to repair the landslide to decrease the overburdened forces on existing subsurface materials. TDA was used in place of traditional soil fills, so that less excavation was needed to reach the stability factor of safety, resulting in a more stable repair design
- The free-draining characteristics of TDA allowed for a permeability of approximately one centimeter per second
- This project used approximately 133,000 tires (1,300 tons) of TDA and resulted in an overall cost savings to the county of $740,000

Looking for a more sustainable product to use in your current civil works construction project? TDA is a sustainable, cost-effective engineering product with proven benefits. California generates 44 million scrap tires a year and seventy-five percent are recycled, while another 10 million end up in landfills or are dumped illegally. Using TDA puts waste tires to use that might otherwise end up in landfills.

"Decision-makers in local government and the civil engineering community can incorporate sustainable practices into roadway projects by reducing the natural resources they use. The purpose of this project was to establish an alternative method for landslide repairs using TDA and this was accomplished by utilizing around 1,300 tons of the material," Marina Drive project spokesperson.

For more information visit www.PavingGreenRoads.com

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CASE STUDY | Lightweight Embankment Fill
Dixon Landing, CA

As part of a continuing effort to help develop and promote cost-effective solutions to construction projects, tire-derived aggregate (TDA) is being used in civil engineering projects, reducing the need for mined resources like pumice and gravel. CalRecycle entered into an interagency agreement with the California Department of Transportation to help build the Highway 880/Dixon Landing interchange using TDA, a product made from shredded scrap tires.

PROJECT DETAILS

- TDA was used to construct a freeway on-ramp embankment in 2001 as part of the Highway 880/Dixon Landing interchange project
- TDA was placed with conventional construction equipment in two layers up to 10 feet thick. The layers were separated by three feet of low-permeability soil. The embankment applied a vertical stress of 2,250 pounds per square foot (psf) to the foundation soil, compared to 3,750 psf for an embankment constructed with conventional earth fills, resulting in a 40 percent reduction in vertical stress
- TDA was chosen for this project because it had a lower unit weight (in-place unit weight of 50 pounds per cubic foot) than the alternative lightweight aggregate (unit weight of about 60 pounds per cubic foot) and because it was less expensive
- This Highway 880/Dixon Landing project used around 660,000 tires (6,627 tons) of TDA and resulted in nearly a $250,000 savings for California

Looking for a more sustainable product to use in your current civil works construction project? TDA is a sustainable, cost-effective engineering product with proven benefits. California generates 44 million scrap tires a year and seventy-five percent are recycled, while another 10 million end up in landfills or are dumped illegally. Using TDA puts waste tires to use that might otherwise end up in landfills.

"On the Dixon Landing interchange project, Caltrans needed lightweight embankment fill because of weak bay mud. TDA saved Caltrans nearly $250,000 over the next cheapest alternative. Moreover, the project used over 600,000 tires—a win for everyone," Dana N. Humphrey, Ph.D., P.E., Professor of Civil Engineering, University of Maine, Engineering Consultant to the Dixon Landing Project.

For more information visit www.PavingGreenRoads.com

GREENROADS
Paving the way with recycled tires.

CalRecycle

CASE STUDY | Vibration Mitigation
Santa Clara County, CA

In 1999, CalRecycle commissioned the first field test of tire-derived aggregate (TDA), a product made from shredded waste tires, as a vibration dampening material. The result of that test led to the recommendation that the Valley Transit Authority (VTA) use TDA for its Vasona Line light rail extension in Santa Clara County.

PROJECT DETAILS

- Vibration from passing trains transmits as noise in nearby homes. The close proximity of homes on the Vasona Line extension helped establish the need for TDA
- Before proceeding with using TDA, the VTA built a test section of the TDA vibration track in its San Jose rail yard. CalRecycle supplied the TDA and monitored construction and testing of this 2001 pilot project
- Tests confirmed that the use of a one-foot thick layer of tire shreds located beneath the sub-ballast, ballast layers and ties of the light rail track section was an effective vibration mitigation measure. Based on these findings, the VTA in San Jose chose to construct four sections of track, nearly 3,000 feet, with the new TDA vibration mitigation underlayment, during its Vasona Line extension project
- Four sections of the track with TDA underlayment were completed in 2005 for VTA and after being analyzed in 2009 the results showed the sections of track with TDA were still mitigating vibration effectively after four years of operation
- TDA was proven to act as an energy absorbing layer below the tracks and assist in the reduction of ground borne vibrations in the Vasona Line extension project
- Use of TDA as part of the Vasona Line extension kept 100,000 waste tires out of the state's landfill and resulted in a savings of $1 million

Looking for a more sustainable product to use in your current civil works construction project? TDA is a sustainable, cost-effective engineering product with proven benefits. California generates 44 million scrap tires a year and seventy-five percent are recycled, while another 10 million end up in landfills or are dumped illegally. Using TDA puts waste tires to use that might otherwise end up in landfills.

"(Tire-derived aggregate) has exceeded our expectations for long-term performance," Bernice Alaniz, a VTA spokeswoman.

For more information visit www.PavingGreenRoads.com

GREENROADS
Paving the way with recycled tires.

CalRecycle

CASE STUDY | Rubberized Asphalt Concrete
Thousand Oaks, CA

The city of Thousand Oaks experienced firsthand that the benefits of using rubberized asphalt concrete (RAC) include cost savings, a long lasting and durable product, noise reduction and reduction of landfill disposal. The city has used the ground tire rubber and asphalt binder mixture since 1992.

PROJECT DETAILS

- The city found that the improvements of increased skid resistance, reduced road noise, improved riding qualities and imperviousness to water made the use of RAC cost-effective on a life cycle basis and more desirable than traditional asphalt concrete for the city of Thousand Oaks
- A two-inch thick resurfacing layer used nearly 2,000 scrap tires per lane mile, meaning for a four-lane highway the city used up to 8,000 waste tires in a one-mile section
- The city had reported they expect the paving to last 20 to 25 years compared with 10 to 15 years for the traditional pavement they used in the past
- RAC costs somewhat more — $47 per ton, as opposed to $30 per ton for normal asphalt, the product was used at a reduced thickness compared to conventional asphalt overlay— ultimately resulting in significant material reduction and cost savings for the city of Thousand Oaks
- By the end of 2010, the city of Thousand Oaks had used rubber from 1.55 million discarded tires in its pavement rehabilitation projects

Looking for a more sustainable product to use in your current civil works construction project? Why not use a product that has proven benefits and is cost-effective? California generates 44 million scrap tires a year and seventy-five percent are recycled, while another 10 million end up in landfills or are dumped illegally. Help CalRecycle reach its goal in reducing the number of waste tires discarded by using RAC as a solution to civil engineering projects that involve resurfacing or chip sealing.

"The city of Thousand Oaks is quite pleased with its experience with RAC. We've been using RAC for over a decade and encourage the use of this product in other California cities. If we can see the benefits of RAC so can you," Tom Pizza, P.E., Engineering Division Manager, City of Thousand Oaks, Construction and Right of Way Management.

For more information visit www.PavingGreenRoads.com

GREENROADS
Paving the way with recycled tires.

Did You **Know?**

- California generates 44 million scrap tires a year
- Seventy-five percent are recycled, another 10 million end up in landfills or are dumped illegally
- Illegally dumped tires pose fire and health risks and pollute roads, open spaces and waterways

Benefits of Recycling Your Tires:

- Scrap tires can be ground down and mixed with asphalt to pave roads, or shredded for use in landslide repair and embankments
- Roads paved with asphalt mixed with recycled tire rubber last longer, are quieter and need fewer repairs
- Projects that use recycled tires are good for the community and the environment

Visit **www.PavingGreenRoads.com** to learn more about the wide variety of products and projects that use recycled tires.

California Department of Resources Recycling and Recovery

Printed on paper containing a minimum 30 percent postconsumer fibers.

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Paving the way with recycled tires.

¿Sabías que?

- California genera más de 44 millones de llantas desechadas al año
- 75 por ciento son recicladas, otras 10 millones terminan en basureros o vaciadas ilegalmente
- Llantas vaciadas ilegalmente plantean riesgos de incendios y de salud, contaminan las carreteras, espacios abiertos, y a los cursos de agua

Beneficios de Reciclar Sus Llantas:

- Llantas desechadas pueden ser molidas y mezcladas con asfalto para pavimentar caminos, o despedazadas para construir barreras sólidas
- Carreteras pavimentadas con asfalto mezclado y llantas recicladas duran más, son más silenciosas y necesitan menos reparaciones
- Los proyectos que usan llantas recicladas son buenos para la comunidad y el medio ambiente

Visite **www.PavingGreenRoads.com** para aprender más de las variedades de productos y proyectos que usan llantas recicladas.

California Department of Resources Recycling and Recovery

GREEN ROADS

Paving the way with recycled tires.

Green Roads Workshop:
Using recycled waste tires as RAC and TDA

CalRecycle invites you to this "must attend," half-day workshop that will provide the latest information on Rubberized Asphalt Concrete (RAC) and Tire-Derived Aggregate (TDA). Meet leading experts and learn the best practices in manufacturing and placement of RAC, an introduction to using TDA in civil engineering applications, and CalRecycle incentives.

Discussion topics include:

Rubberized Asphalt Concrete (RAC)

- What is RAC?
- Reduced Thickness Studies
- Life Cycle Analysis and Cost Factors
- Noise Reduction with RAC
- Specifications
- Inspection and Testing at the Site
- Mix Design Forensics and Case Studies
- Best Practices During Manufacturing and Placement
- RAC Cooperative Purchase Program

Tire-Derived Aggregate (TDA)

- History of TDA
- Overview of TDA Applications
  - Lightweight Embankment Fill
  - Lightweight Fills behind Retaining Walls
  - Vibration Mitigation Layers below Light Rail Tracks
  - Landslide Repair
  - Landfill Gas and Leachate Collection Systems
- Projects and Case Studies

Incentives

- Technical Assistance
- Funding Opportunities

Scheduled presenters include:

Stacey Patenaude - Materials Recycling Engineer, CalRecycle
Joaquin Wright - Principal Engineer, Kennec Inc
Theron Roschen, P.E. - Program Manager, Jacobs Engineering
Michael Robinson, P.E. - Principal Materials Engineer, Kleinfelder

Free Registration

Please reserve your attendance NOW!
Space is limited and sessions are first come, first served. Please see the opposite side of this form for registration and instructions.



California Department of Resources Recycling and Recovery

www.PavingGreenRoads.com

CalRecycle

Green Roads Workshop:
Using recycled waste tires as RAC and TDA

Please select the session you would like to attend and submit your form via **fax (916) 492-0927** or **email** to **jluong@katzandassociates.com**.

For more information call **(916) 492-0923**.

Please Check	Date	Time	County Location	
☐	April 5, 2011	8:30am -12:30pm	**Santa Barbara**	Holiday Inn 5650 Calle Real Goleta, CA 93117
☐	April 26, 2011	8:30am -12:30pm	**Alameda**	Crowne Plaza 32083 Alvarado-Niles Road Union City, CA 94587
☐	May 3, 2011	8:30am -12:30pm	**Marin**	Inn Marin Hotel 250 Entrada Drive Novato, CA 94949
☐	May 9, 2011	8:30am -12:30pm	**Los Angeles**	Embassy Suites 8425 East Firestone Blvd. Downey, CA 90241
☐	May 10, 2011	8:30am -12:30pm	**San Diego**	Handlery Hotel 950 Hotel Circle North San Diego, CA 92108

Please RSVP two weeks prior to event date.

ATTENDEE #1 CONTACT INFORMATION

FULL NAME: _____
LAST FIRST MI

AGENCY/COMPANY NAME:

JOB TITLE:

ADDRESS _____
STREET ADDRESS SUITE #

_____
CITY STATE ZIP CODE

PHONE: ( ) E-mail:

ATTENDEE #2 CONTACT INFORMATION

FULL NAME: _____

JOB TITLE:

PHONE: ( ) E-mail:

How did you hear about us? _____

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California Department of Resources Recycling and Recovery

Rubberized Asphalt Concrete

RUBBERIZED ASPHALT CONCRETE

The California Department of Resources Recycling and Recovery, also known as CalRecycle, is dedicated to advancing California's tire waste reduction efforts by promoting the use of tire-derived products.

Rubberized asphalt concrete (RAC) is a road paving material made by blending ground tire rubber with asphalt binder that is then mixed with conventional aggregate materials. This mix can be placed using conventional paving equipment. Road paving projects that use RAC keep thousands of tires per paved mile out of landfills.

Benefits of RAC

1. Cost-Effective

RAC can be used at reduced thickness, which may offset its initial cost increase versus conventional asphalt concrete. In addition, RAC typically has a lower lifecycle cost because of its increased longevity and durability.

2. Long-Lasting and Durable

RAC resists cracking and case studies have demonstrated time and again that RAC lasts much longer than conventional materials—often 50 percent longer. This not only saves on maintenance costs but also cuts down on construction-induced traffic.

3. Noise Reduction

There is a significant reduction in the road noise produced from the tire/pavement interface when using RAC versus conventional pavement overlays. In most cases, RAC is twice as effective at reducing road noise.

4. Reduces Landfill Disposal

A two-inch thick resurfacing project uses up to 2,000 scrap tires per lane mile. This means that for a one-mile section of a four-lane highway, up to 8,000 waste tires are used in creating longer-lasting roads, instead of ending up in landfills and illegal stockpiles. Thousand Oaks was one of the first California cities to take advantage of RAC, and since 1992 has used more than 1.55 million waste tires in road paving projects.

Project Applications

Crumb rubber from waste tires can be used in various ways in roadway rehabilitation. The most common applications are:

1. Rubberized hot-mix asphalt resurfacing over existing asphalt or concrete pavement (overlay)

2. Rubberized stress absorbing membrane

Resurfacing

RAC can be used in a cost-effective manner as an overlay. Caltrans design guidelines are generally used to determine the thickness of conventional asphalt concrete overlays based on deflection testing. These guidelines indicate a reduction in overlay thickness of up to one-half may be used if RAC is selected, while still providing the same degree of protection against reflective cracking. Studies have indicated RAC also provides a degree of structural strength increase versus conventional asphalt concrete. The minimum recommended thickness for RAC overlays is 1.25 inches.

Stress Absorbing Membrane (Chip Seal)

A rubberized chip seal can be used effectively in cases where the existing roadway is basically sound and all that is needed is a new surface course. The crumb rubber in the asphalt binder provides increased flexibility of the surface which increases resistance to reflective cracking and helps keep the surface water from entering the roadway subgrade.

A chip seal can also be used as stress absorbing membrane interlayer in conjunction with an overlay of conventional asphalt concrete or RAC. The interlayer is best used where the existing roadway section is basically sound but oxidation of the surface asphalt has resulted in mild to severe alligator cracking and additional resistance to reflective cracking is needed.

Manufacturing Process

Currently RAC is specified by the Greenbook, 2009 Edition, Standard Specifications for Public Works Construction and by Caltrans. RAC can be manufactured and placed satisfactorily using either specification.

There are two processes used to add crumb rubber to liquid asphalt cement.

Asphalt-Rubber Process

The asphalt-rubber process is any method that mixes and reacts the rubber particles with the asphalt cement prior to adding the resulting binder to the aggregate. This process has the longest history of use and is the basis for the Caltrans reduced thickness design. Asphalt-rubber is field blended and requires special equipment at the hot-mix plant to react the crumb rubber with the asphalt cement.

Terminal Blend Process

The terminal blend process digests the crumb rubber into the asphalt cement at the refinery (or asphalt terminal). This process has been used in Texas since 1989 and in California since the mid-1990s. The terminal blend process does not require special equipment at the hot-mix plant.

- Typical crumb rubber modifier content for asphalt-rubber ranges from 18-22 percent. The crumb rubber modifier used in asphalt-rubber is in the 10-16 mesh range.

- Terminal blend binders contain 10 percent or less crumb rubber modifier. However, in recent years the crumb rubber modifier content has been increased to 15-20 percent in some projects.

Cost comparison

In most applications, RAC can be used at a reduced thickness compared to conventional asphalt overlays—in some cases at half the thickness of conventional material—which may result in significant material reduction and cost savings. In addition there may be lifecycle cost savings from the reduction in maintenance costs and longevity of RAC.

- For example, when soil/deflectometer testing indicates that a 4-inch overlay of conventional asphalt concrete is required, RAC saves up to $75,000 per lane mile over conventional asphalt concrete.

Visit **www.PavingGreenRoads.com** and the Rubberized Asphalt Concrete link for more technical information and cost comparisons.

Testimonials

"The City of Thousand Oaks is quite pleased with its experience with RAC. We've been using RAC for (nearly two) decades and encourage the use of this product in other California cities. If we can see the benefits of RAC, so can you."

Tom Pizza, P.E., Engineering Division Manager, City of Thousand Oaks Construction and Right of Way Management

"The Sacramento County Department of Transportation has had routine use of asphalt rubber since 1990. Since that time, we have placed over a half million tons of asphalt rubber, recycling more than 1.5 million waste tires. We now choose the product from a lifecycle savings and environmental mitigation perspective. We feel that with asphalt rubber's performance in rut and reflective crack resistance, coupled with the longevity, traffic noise reduction and use of a recycled product it's the right choice."

Michael Penrose, Director, County of Sacramento, Department of Transportation

CalRecycle

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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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