

STORM WATER INFILTRATION SYSTEMS

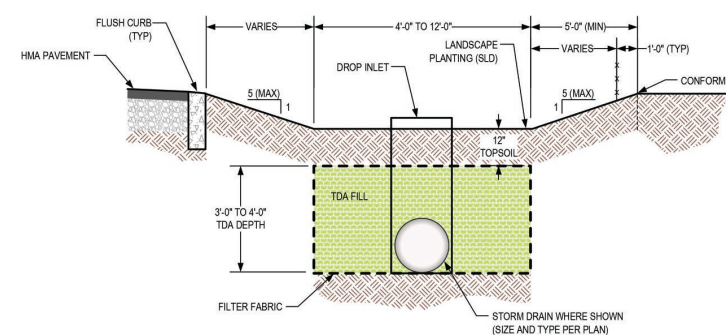
The State Water Resources Control Board has adopted sustainability as a core value for all its activities and programs.

Low Impact Development (LID) is a sustainable practice that benefits water supply and contributes to water quality protection. Traditional storm water management practices have been to collect and convey storm water runoff through storm drains, pipes, and other conveyances to a centralized storm water facility, or discharged into our waterways.

LID takes a different approach and uses sustainable storm water management practices in the site design to maintain the site's pre-development runoff rates and volumes. The goal of LID is to use design techniques that infiltrate, filter, store, evaporate, and detain runoff close to the source of rainfall, keeping the surface water runoff volume the same or lower than pre-development values.

Due to its engineering properties, Tire Derived Aggregate (TDA) is a good material to build LID infiltration galleries and subgrade storm water conveyance systems with.

- ☞ TDA has larger void ratio than gravel, typically twice as much, so infiltration galleries do not need to be as large as ones with gravel.
- ☞ TDA is much lighter than gravel, almost 2/3rds lighter!, which reduces transportation costs and increases construction productivity.
- ☞ And TDA is a recycled material, so you can feel good about using it in your projects!



Tire Derived Aggregate is so free draining that it offers a 1 cm per second permeability value for hydraulic connectivity, which is twice as permeable as typical gravel.



FACTS AT A GLANCE (ASTM D6270-17)

- 1 Ton = 1.4 cubic yards (in place)
- 1 Ton = 90-100 tires (PTE)
- In place density = 45-50 lbs/cubic foot
- Permeability > 1 cm/sec for most applications

- TYPE A (2-3 inch)**
- Infiltration galleries
 - Drainage applications
- TYPE B (6-12 inch)**
- Slope repair
 - Embankment fill

USEFUL TDA RESOURCES

Important Website Links

- <https://www.calrecycle.ca.gov/Tires/TDA/>
<https://www.calrecycle.ca.gov/Tires/TDA/Resources>
 TDA Program Grant Information
<https://www.calrecycle.ca.gov/Tires/Grants/TDA/>
 TDA Technology Center
<https://www.csuchico.edu/cp2c/ttc/index.shtml>

TDA Informational Videos

- TDA: A Cost-Saving and Sustainable Resource Material (overview of TDA civil engineering applications), YouTube (11 minutes)
 - TDA: Environmental Testing and Earthquake Safety, YouTube (11 minutes)
 - TDA: Low-Cost Vibration Mitigation, YouTube (6 minutes)
 - TDA: Long-Term Road Repair, YouTube (8 minutes)
- You can view these TDA Informational Videos at the TDA Resources Link.

TDA APPLICATION DEVELOPMENT

Many TDA applications were developed through CalRecycle's research efforts. CalRecycle is continuing to expand the understanding of TDA applications and material properties through university research and pilot projects. Current research topics include: Seismic testing of TDA with foundations and retaining walls, Mechanically Stabilized Tire Derived Aggregate (MSTDA), TDA in septic and storm water applications. These types of applications show great promise to eventually become future sustainable and beneficial uses of TDA.

CONTACTS

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TDA CIVIL ENGINEERING APPLICATIONS USING TIRE DERIVED AGGREGATE



WWW.CALRECYCLE.CA.GOV/TIRES/TDA



EVERY YEAR, California is faced with safely managing and diverting more than 40 million waste tires from landfills—that amounts to a tire for every man, woman and child in the state. One of CalRecycle's key innovations for removing tires from the waste stream is the use of Tire Derived Aggregate (TDA), a sustainable, lightweight, free-draining engineering material produced from shredded waste tires.

TDA not only helps California divert waste tires from landfills, it also solves a variety of engineering problems, often with safer and more cost effective results. In fact, TDA is often a cost effective alternative when used as: a lightweight solution in retaining walls, landslide stabilization and embankment fill projects; a vibration mitigation solution in light rail projects; and an alternative gravel solution in landfill projects.

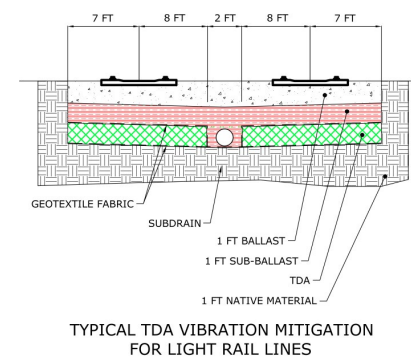
VIBRATION REDUCTION

Living next to active commuter rail lines can be annoying because of ground borne vibrations that transmit the noise of the passing train right into your home. The solution is to put a vibration absorbing material under the tracks.

CalRecycle developed a cost-effective alternative method of placing a 1-ft thick layer of TDA under the traditional stone ballast and gravel sub-ballast layers. Full scale tests have shown that the TDA layer is effective in controlling vibrations transmitted away from the tracks.

The relatively low cost of the TDA solution compared to past solutions is an added bonus. Transit agencies in both northern and southern California are currently using TDA for vibration mitigation when constructing new track extensions.

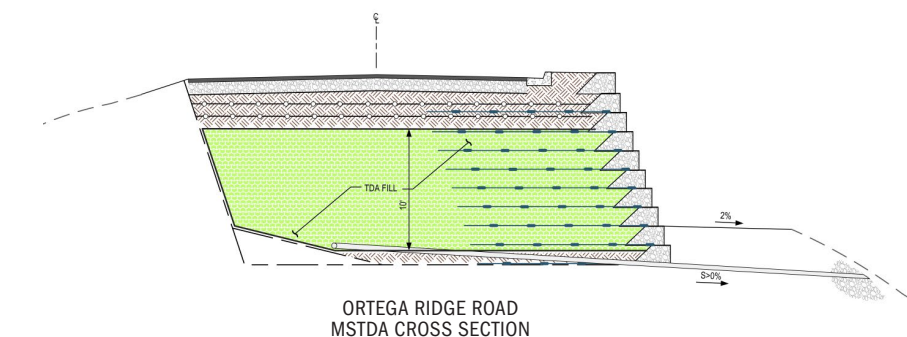
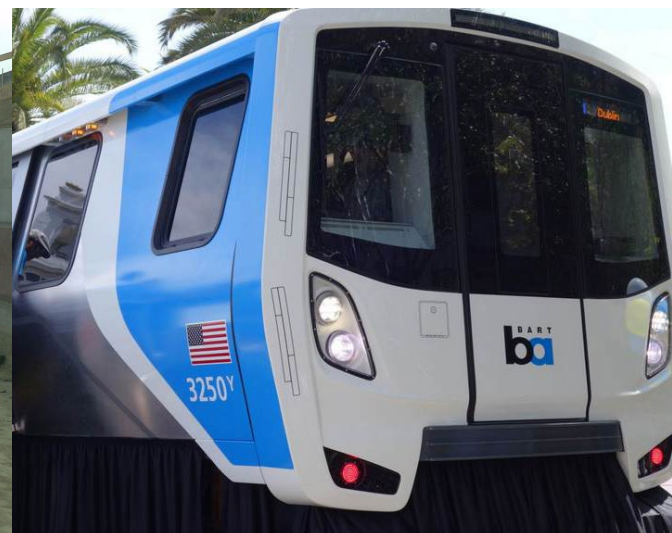
TDA vibration mitigation has saved BART, VTA, and L.A. Metro millions of dollars!



MECHANICALLY STABILIZED TIRE DERIVED AGGREGATE

CalRecycles TDA program has developed and supported construction of Mechanically Stabilized TDA (MSTDA) road repair projects across the state of California. MSTDA utilizes the current practice of stabilizing fill material with plastic geo-grid that is attached to rock filled gabion baskets. The TDA along with the geogrid reinforcing and rock filled gabion baskets are combined to create a long term, lightweight, free draining, and very cost effective road slide repair. This approach can be varied to work with a multitude of typical road repair scenarios and results in a technique that substantially lengthens the life of the repair by using the beneficial properties of TDA to help create a cost effective solution for community engineers and contractors.

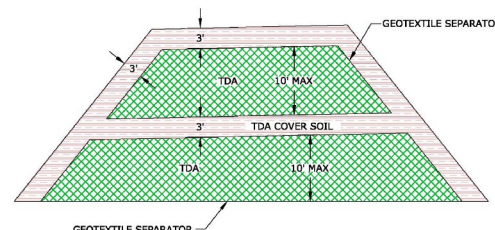
Dixon Landing Embankment Fill under construction



Before and after photos of MSTDA at Ortega Ridge.

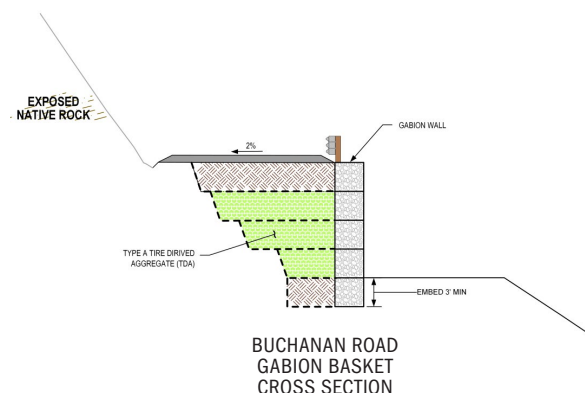
EMBANKMENT FILL

Constructing embankments on weak foundation soils can provide numerous challenges such as slope instability and excessive settlement. This is primarily due to the weak foundation soils not being able to support the weight of the overlying soil fill. The solution is to use the lightweight properties of TDA to limit settlement and increase stability.



DIXON LANDING - EMBANKMENT CROSS SECTION

Dixon Landing Embankment Completed

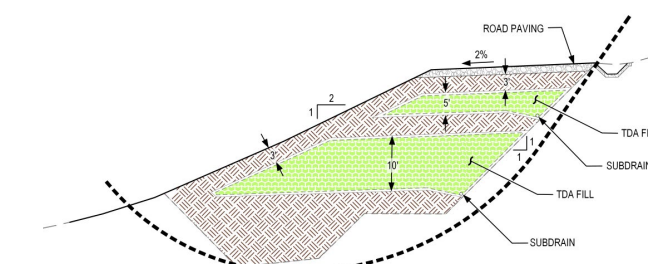


BUCHANAN ROAD GABION BASKET CROSS SECTION



ROAD REPAIR AND STABILIZATION

With in-place densities of less than 50 pounds per cubic foot, TDA is less than half the weight of conventional soil. This lightweight property makes TDA an ideal material for long term repair of roads that have been damaged by landslides.



GEYSERS ROAD TDA SLIDE REPAIR CROSS SECTION

TDA provides long term and cost effective repairs for road failure projects.

