CIVIL ENGINEERING APPLICATION USING TIRE DERIVED AGGREGATE (TDA)

•PRESENTED BY:
•Stacey M. Patenaude

•Joaquin Wright - KENNEC Inc.

CalRecycle's Main Objective is to get TDA Accepted by the Civil Engineering Community

- Educate Local public works, CALTRANS, Private Consulting Civil Engineers and State and Local Environmental Agencies on the benefits of TDA
- Research – Develop Sustainable, Environmental Beneficial and Cost Effective Civil Engineering Reuses for Waste Tires
- Coordinate and Assist Waste Tire Processors to assure there is adequate TDA to meet future demand.

Services Available from CalRecycle to Promote TDA

TDA Technical Expertise –

- Provide TDA project design Assistance
- Provide education and training on the technical aspects and benefits of using TDA

TDA Project Management

- Provide construction management assistance
- Provide procurement and staging for TDA projects
- Provide performance and environmental monitoring for TDA projects

California TDA Projects

- 2001- First TDA Project, Dixon Landing Interchange Project
- 2003-2007 - Hwy 215 and Route 91 Retaining Wall research projects. Joint project with Caltrans
- 2004 - Valley Transit Authority - Vibration Mitigation Project
- 2007 – Marina Dr, Mendocino Co. Landslide Repair
- 2008 - Riverside County Landfill Gas Collection system, Pilot projects
- 2008 - Caltrans Confusion Hill, Lightweight fill Embankment
- 2008 - Sonoma Co. Geysers Rd. Landslide Repair Project
- 2009 - Sonoma Mtn. Road , Landslide Repair Project
- 2009 - Sacramento County Keifer Landfill, Landfill Leachate recirculation project
- 2010 - Santa Barbara County, Palomino Rd Slide Repair

CalRecycle

Future TDA Projects in California

- BART Extension, TDA for Vibration Mitigation 5300 ft .of track. Warm Springs - SanJose
- MTA Goldline Extension TDA for Vibration Mitigation 9900 ft. of track, Pasadena-Azusa,
- Construction of Type 1T Retaining Wall Pilot project, Caltrans
- Septic system leach field research
- TDA in MSE applications

CalRecycle

Beneficial Properties of Tire Derived Aggregate (TDA) in Civil Engineering Applications

Tire Derived Aggregate (TDA) has properties that civil engineers, public works directors & contractors need

- Lightweight
- Free Draining/High Permeability
- Low earth pressure
- Good thermal insulation
- Durable
- Compressible
- May be cheapest solution

  Help solve significant environmental problems

  Conserve natural aggregate resources

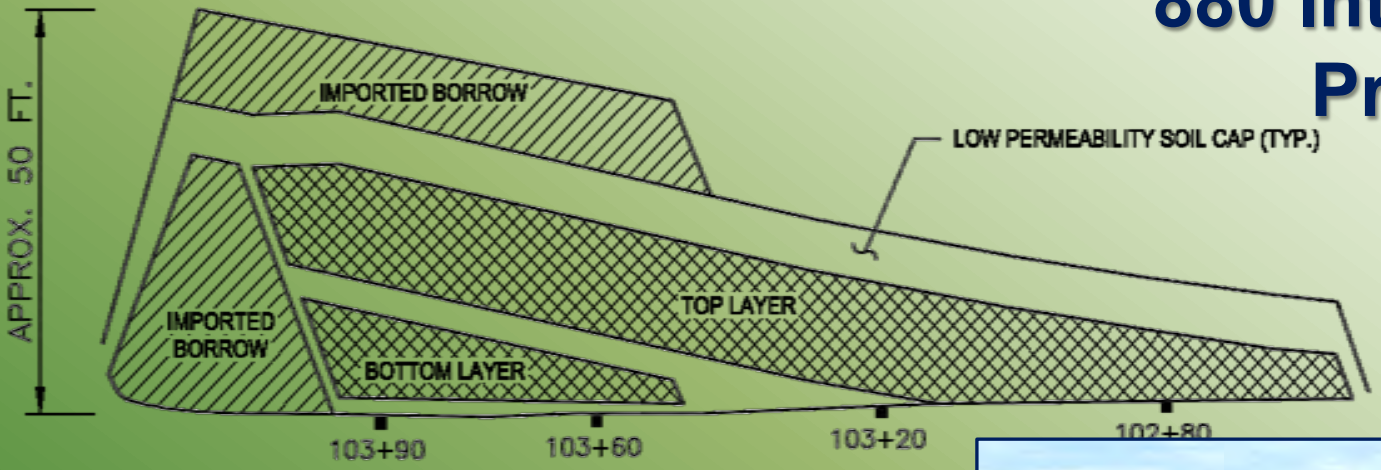
CalRecycle

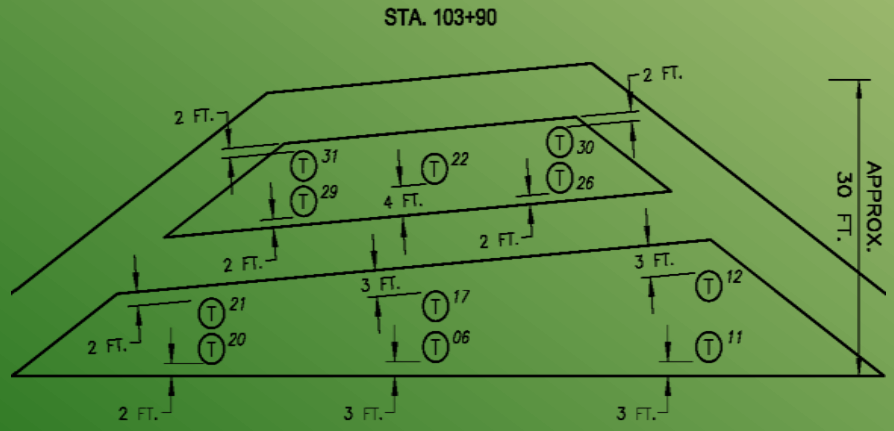

Type "B" TDA
Dixon Landing Road
7/10/2001

Uses for Tire Derived Aggregate

- Lightweight fill for Embankments
- Lightweight fill for slide Repair
- Lightweight backfill for Retaining Walls
- TDA in Landfill Applications, replacement for conventional aggregate
- TDA used in Vibration Mitigation Applications

Dixon Landing/HWY 880 Interchange Project





CalRecycle


Dixon Landing/HWY 880 Interchange
Project

Dixon Landing/HWY 880 Interchange Project

CalRecycle

660,000 Tires

CalRecycle


Savings to the State $240,000
Dixon Landing/HWY 880 Interchange
Project

Confusion Hill Embankment Project

Confusion Hill - Lightweight TDA Embankment Project 2008

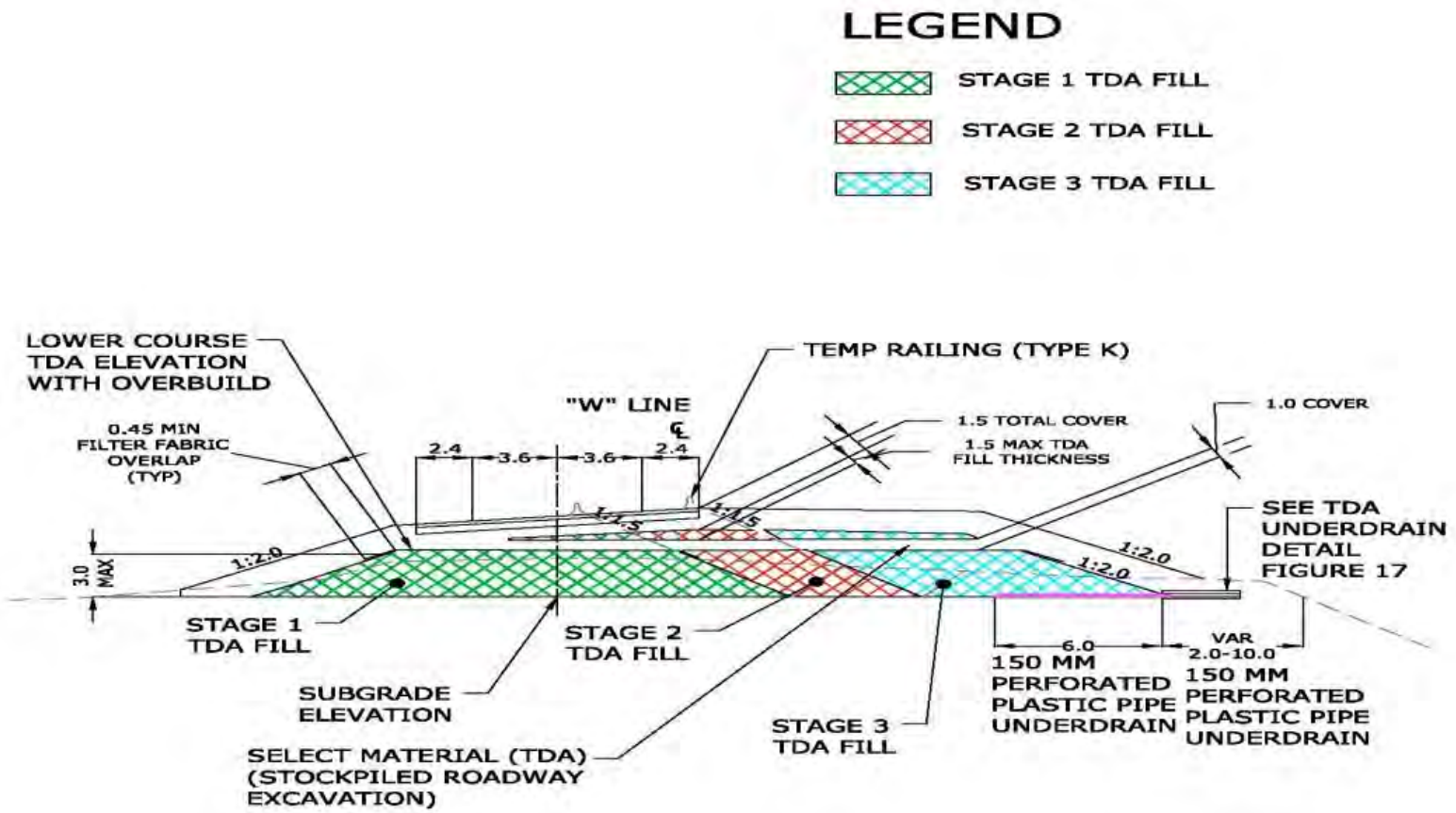
CalRecycle

Confusion Hill Lightweight Embankment Project

Confusion Hill - Lightweight Embankment

CalRecycle

Confusion Hill - Lightweight Embankment



CONFUSION HILL TDA EMBANKMENT
HIGHWAY 101 - TIRE DERIVED
AGGREGATE LIGHTWEIGHT FILL

CalRecycle

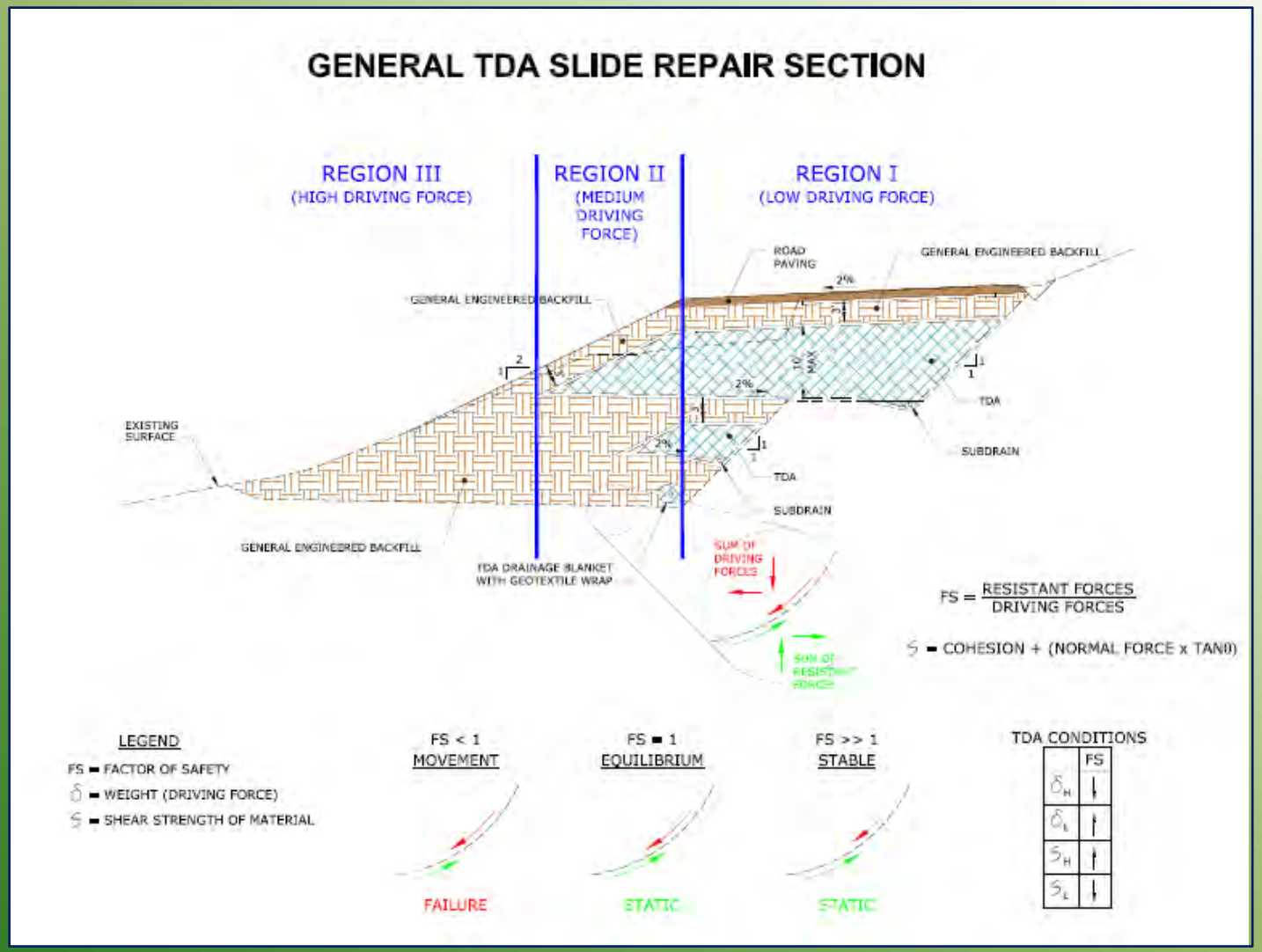
Confusion Hill Final Project

Light Weight TDA Fill for "Slip outs"

Lightweight Fill for "Slip Out"
Road Slide Repair
Mendocino and Sonoma
Counties

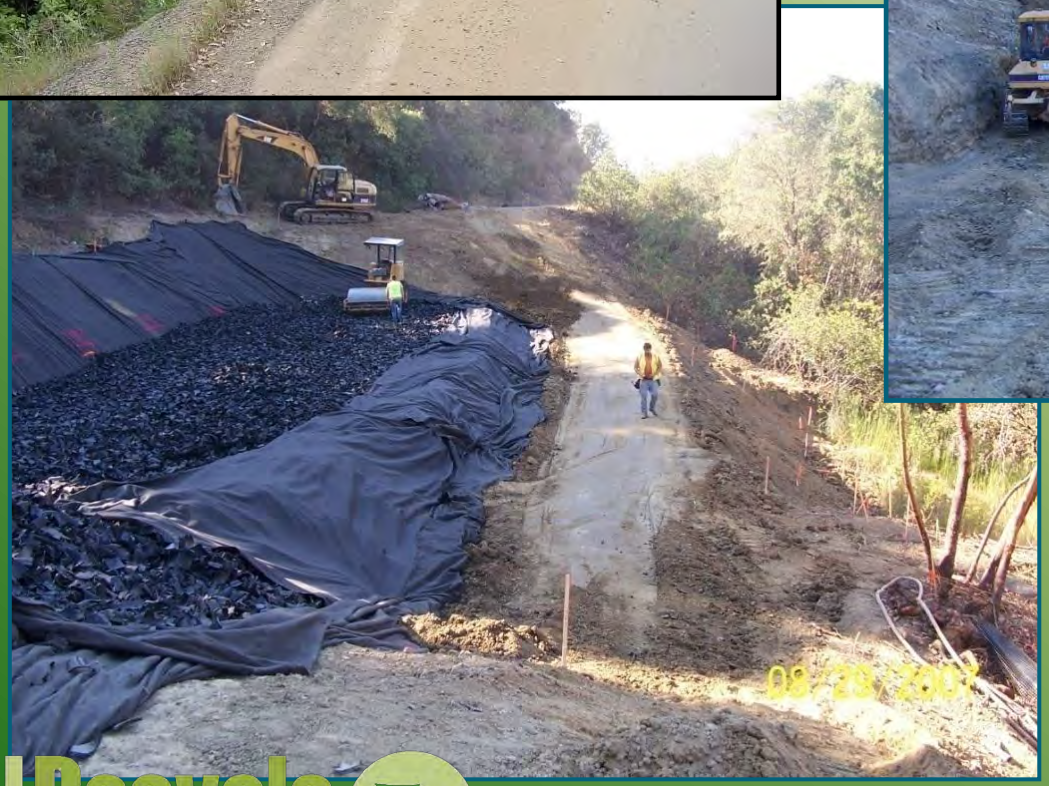
CalRecycle

General View of TDA Slide Repair



CalRecycle

Marina Drive Slide Repair



CalRecycle

Mendocino County, Marina Dr.

CalRecycle

Marina Drive Slide Repair

Geysers Road Slide

CalRecycle

Geysers Road Slide Repair

Geysers Road Slide Repair

CalRecycle

Geysers Road

Before

After

Saving to County

$128,000

Sonoma Mtn. Road, Sonoma County

Sonoma Mountain Road

Sonoma Mtn. Road, Sonoma County

Palomino Road, Santa Barbara County
Slide Repair

Palomino Road, Santa Barbara County

Slide Repair

Palomino Road, Slide Repair

Palomino Road, Slide Repair

Palomino Road, Slide Repair

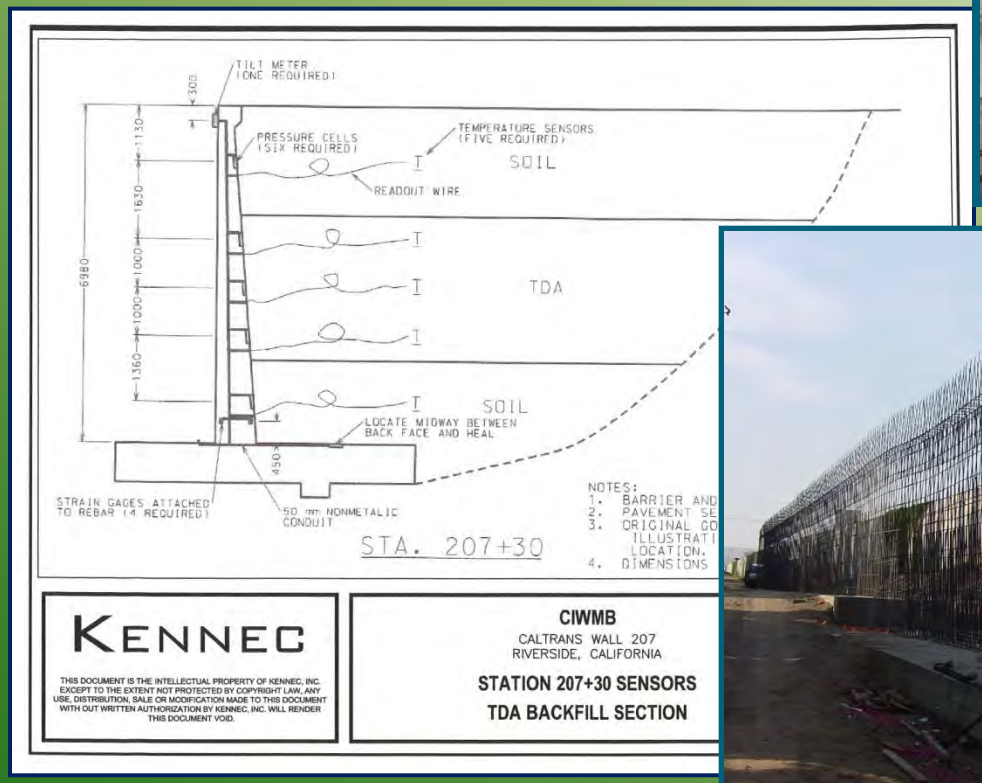
Palomino Road, Slide Repair

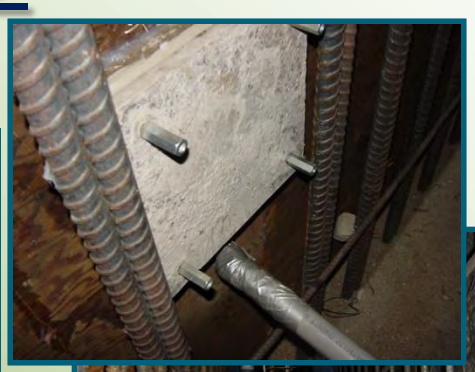
Light Weight Backfill Behind Retaining Walls

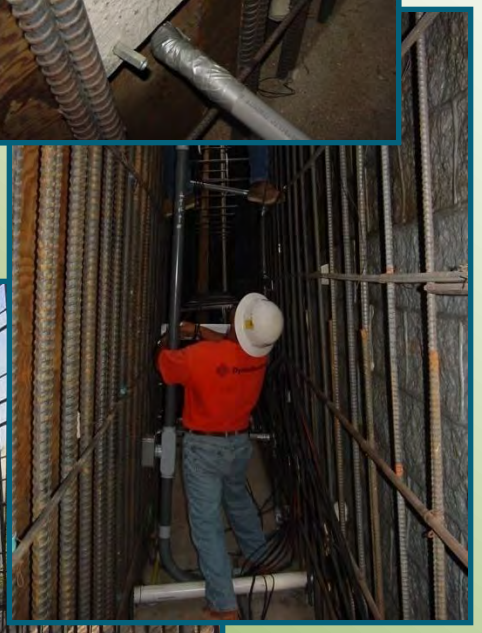
CalRecycle

Light Weight Application
Wall 119 and 207

Lightweight Backfill Behind Retaining Walls
Riverside, Ca
Wall 119 and 207







Wall 119 Riverside, CA

CalRecycle

Wall 119 Riverside, Ca

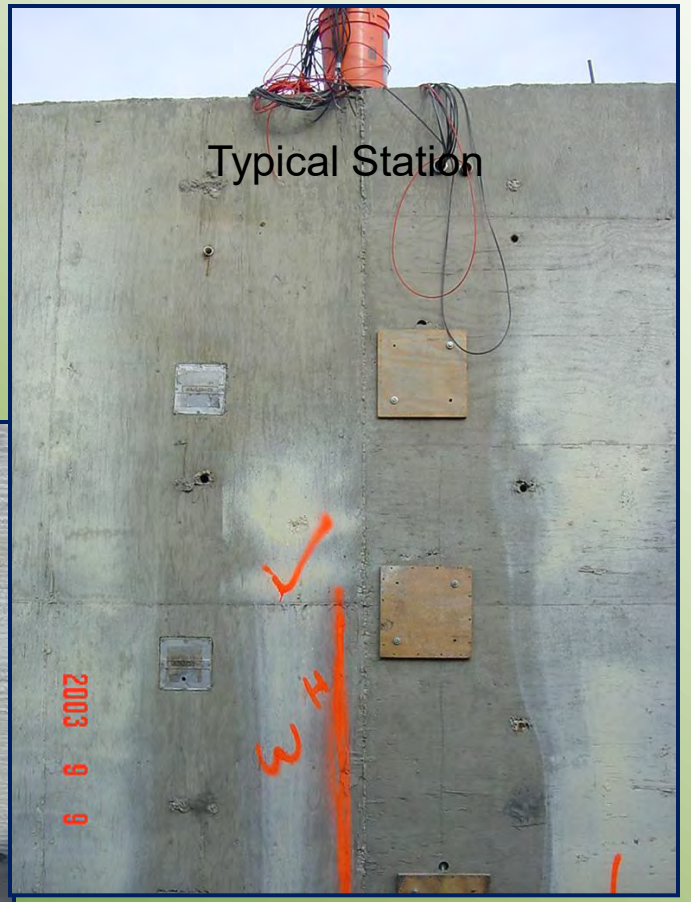
Placement of foundation soil

Compaction of foundation soil

Unloading TDA

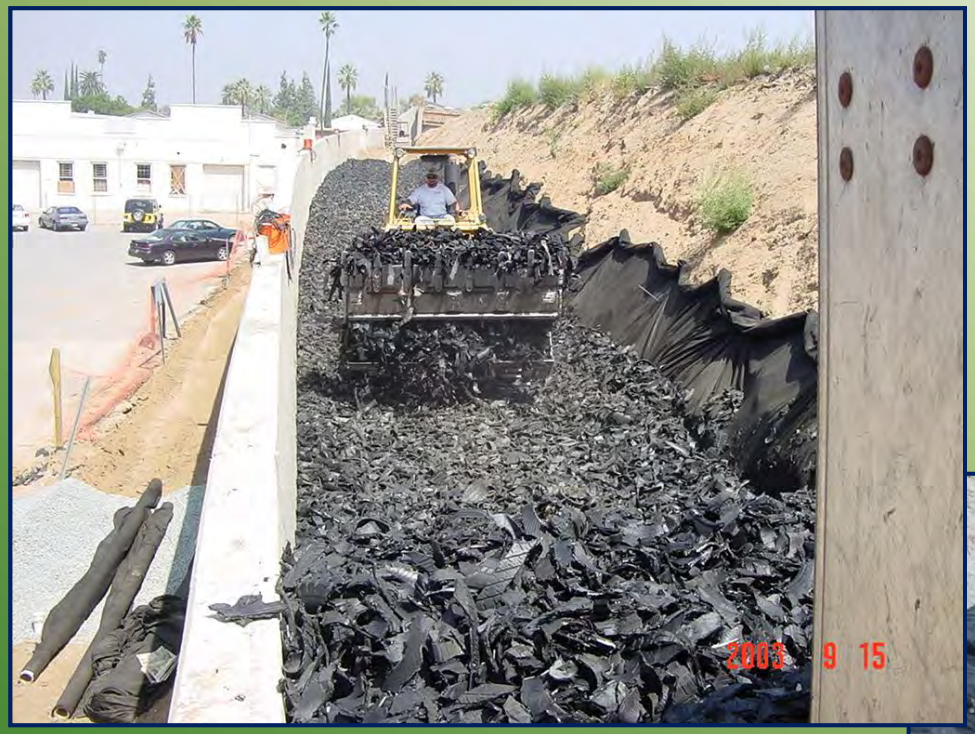
CalRecycle

Wall 119 Riverside, CA



CalRecycle

Wall 119 Riverside, CA



TDA placement

TDA placed and compacted

Wall 119 Riverside, CA

Final geo-textile wrap

CalRecycle

Wall 119 Riverside, CA

Cover soil delivery, placement, and compaction

CalRecycle

Wall 119 Riverside, Ca

Completed cover soil installation, 2 feet

Typical gravel/soil section

Road way backfill

CalRecycle

Wall 119 Riverside, Ca

Wall 207 Riverside, Ca

CalRecycle

Type 1 T Retaining Walls

Estimated Savings on Future Walls - $100/ lineal foot

CalRecycle

TDA In Light Rail Vibration Mitigation

CalRecycle

Vibration Mitigation

CalRecycle

Conventional Vibration Mitigation Technology $800+/ft


TDA Vibration
Mitigation $150/ft

VTA Vasona Line Light Rail

Saving to VTA $1,000,000

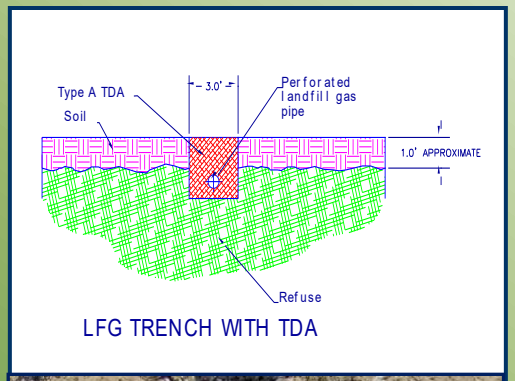
TDA in Landfills Applications

- Landfill Gas Pipe Protection
- Landfill Bio-Reactor System
- Drainage Layers in Landfill Covers
- Landfill Gas Extraction Trenches
- Daily and Intermediate Alternative Cover

Why use TDA in Landfill Systems

- High Permeability/Free Draining
- Compressible
- Lightweight
- Cost savings
- Recycling (100 Tires = 1.5 cy)

Landfill Gas Collection Trenches, Replace Gravel w/Type A TDA



- Type A for Gravel Replacement
- Oversize Auger for Vertical Wells
- Geo-textile separator between TDA and Soil or Fine Material

CalRecycle

LFG TDA Trenches Typical Construction

- Typical excavation & relocation of refuse
- Typical equipment, End Dump, Excavator, Skip loader, Air monitor

CalRecycle

LFG TDA Trenches

CalRecycle

LFG TDA Trenches
Typical Construction

- Geo-textile separator between TDA and Soil or Fine Material

CalRecycle

LFG TDA Trenches
Typical Construction

What is Type "A" TDA?

- ***Type "A" TDA*** – Typical, Three inch minus,
- 1 Ton = 1.4 cubic yards
- 1 Ton = 100 tires (PTE)
- In Place Density = 45-58 lb/ft³
- Permeability › 1 cm/sec for many applications

- **Uses** – Drainage material, septic leach fields, Vibrations dampening layers under light rail tracks. Gas collection media, Leachate collection material

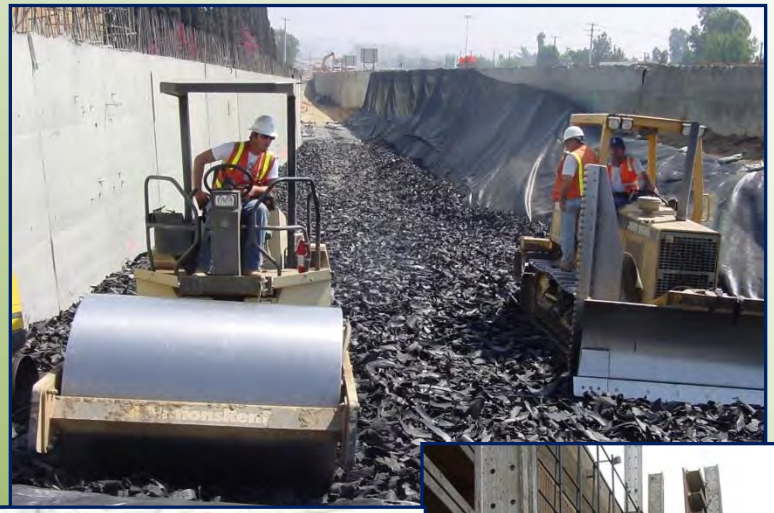
What is Type "B" TDA?

- ***Type "B" TDA*** – Typical, 12 inch minus,
- 1 Ton = 1.5 cubic yards
- 1 Ton = 100 tires (PTE)
- In Place Density = 45-50 lb/ft³
- Permeability › 1 cm/sec for many applications

- **Uses** – Lightweight fill for embankments, Slide repairs, Lightweight fill behind retaining walls, Gas collection and leachate recirculation media

CM Aspects for TDA Projects

- Pre–Construction
- Construction



CalRecycle

Pre - Construction Activities

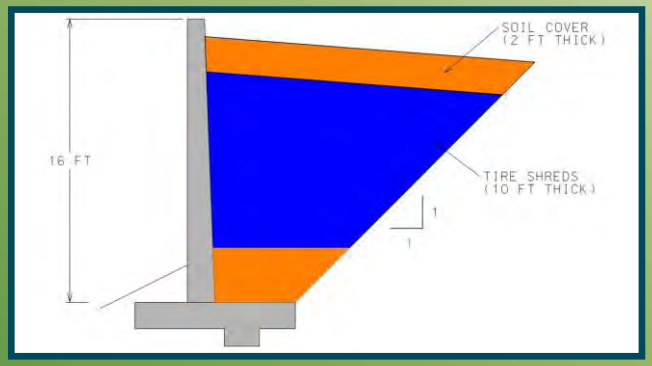
- Design and Overall Project Understanding
  - Develop Comprehensive Understanding
    - Communication with team for Design, Construction, and Construction Management expectations.
    - Delivery methods and rates
      - Material quality/verification
      - Stockpile location
- Regulatory Agency Outreach
  - Education and Communication
    - Local Water Board
    - Local Fire Department
    - Interagency Agreements

CalRecycle

Construction Activities

- Construction Understanding
  - Communication with team at kick off meeting, TDA Construction, when, where and team expectations.
  - Placement techniques
    - Rates of Delivery, number of suppliers
    - q/a of material
    - Advantageous changes in techniques
    - Documentation of work

- As-builts
  - Documentation of changes
    - Data retrieval methods and verification
    - Drawings of TDA location, sensors etc



CalRecycle

The Future of the CalRecycle's CEA Program

- Continue Assistance with Design and Construction Oversight Assistance
- Continue TDA – Research and Development of new Applications
- Continue TDA Education
- Continue TDA Project Construction Oversight and Material
- Procurement Assistance
- Develop and TDA Grants and Loans

Questions ?

CalRecycle

KENNEC, INC