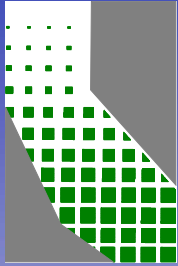


Civil Engineering Applications Using Tire-Derived Aggregate (TDA) Selected California Projects





Civil Engineering Applications
Using Tire-Derived Aggregate (TDA)
Selected California Projects
Presented for The California State
University, Chico, California
Pavement Preservation Center

Presented By:



Joaquin Wright, Principal



TDA Presentation Summary

Pavement Preservation Center,

January 5th 2009

- Beneficial properties of TDA
- Construction management aspects of building with TDA
- Embankment projects
- Slide repair projects
- Retaining wall backfill projects
- Vibration Attenuation projects
- Retaining wall backfill projects
- Landfill Applications

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



Uses for Tire Derived Aggregate (TDA)

☐ Lightweight Embankment Fill



☐ Lightweight TDA for slide repair

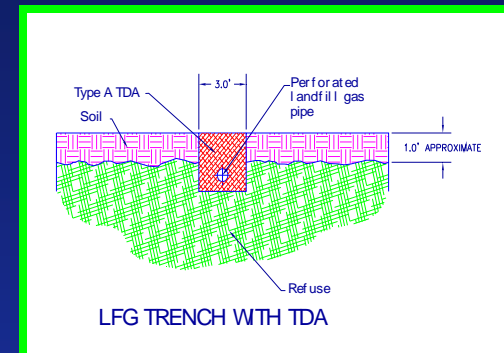


Uses for Tire Derived Aggregate (TDA)

- Lightweight TDA for Retaining Walls



- TDA in Landfill Applications



- TDA for vibration attenuation



CM Aspects for TDA Projects

- Pre-Construction
- Construction



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 CalTrans/CIWMB



Construction Activities

- Construction Understanding

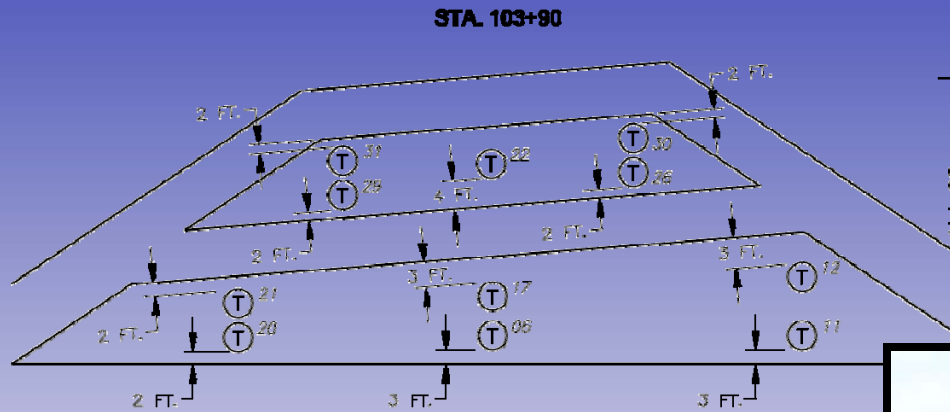
- Communication with team at kick off meeting, TDA Construction, when, where and team expectations.
- Placement techniques
 - Rates of Delivery, number of suppliers
 - q/a of material
 - Advantageous changes in techniques
 - Documentation of work

- As-builts

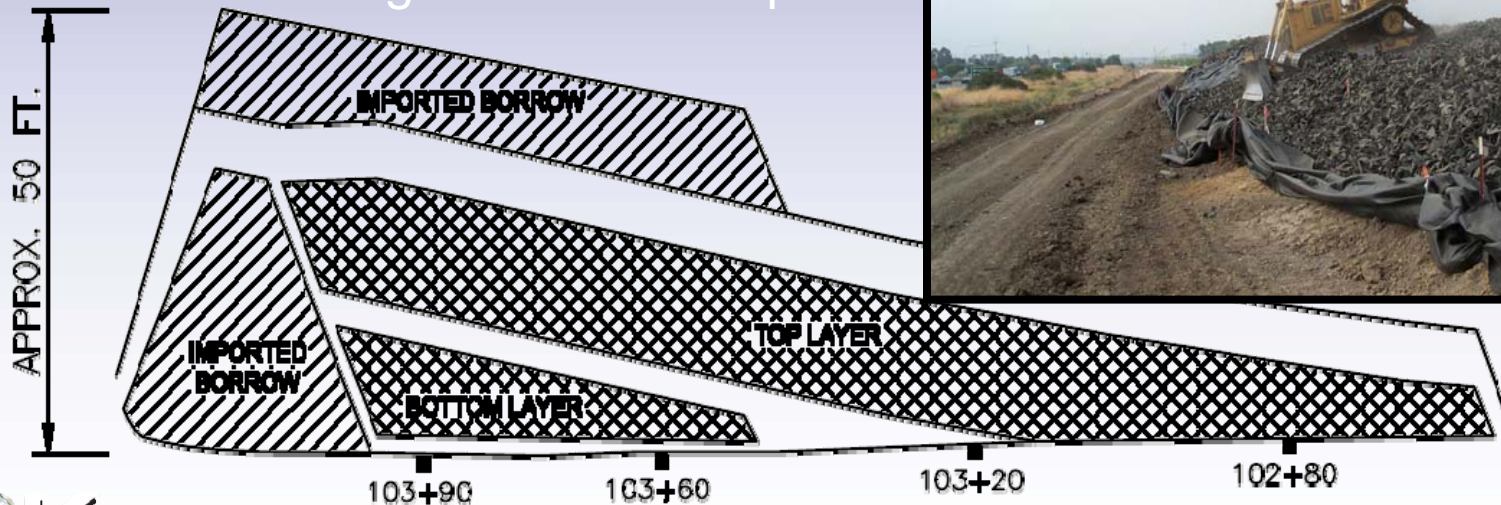
- Documentation of changes
 - Data retrieval methods and verification
 - Drawings of TDA location, sensors etc., future work



Embankment Fill Application DIXON LANDING



Lightweight Embankment Fill
Dixon Landing S880 On Ramp



Dixon Landing Embankment Fill





Dixon Landing Road

7/11/2001



Dixon Landing Road

7/27/2001



Dixon Landing Road

7/27/2001





Dixon Landing Road

7/13/2001



Dixon Landing Road

7/12/2001



660,000 Tires



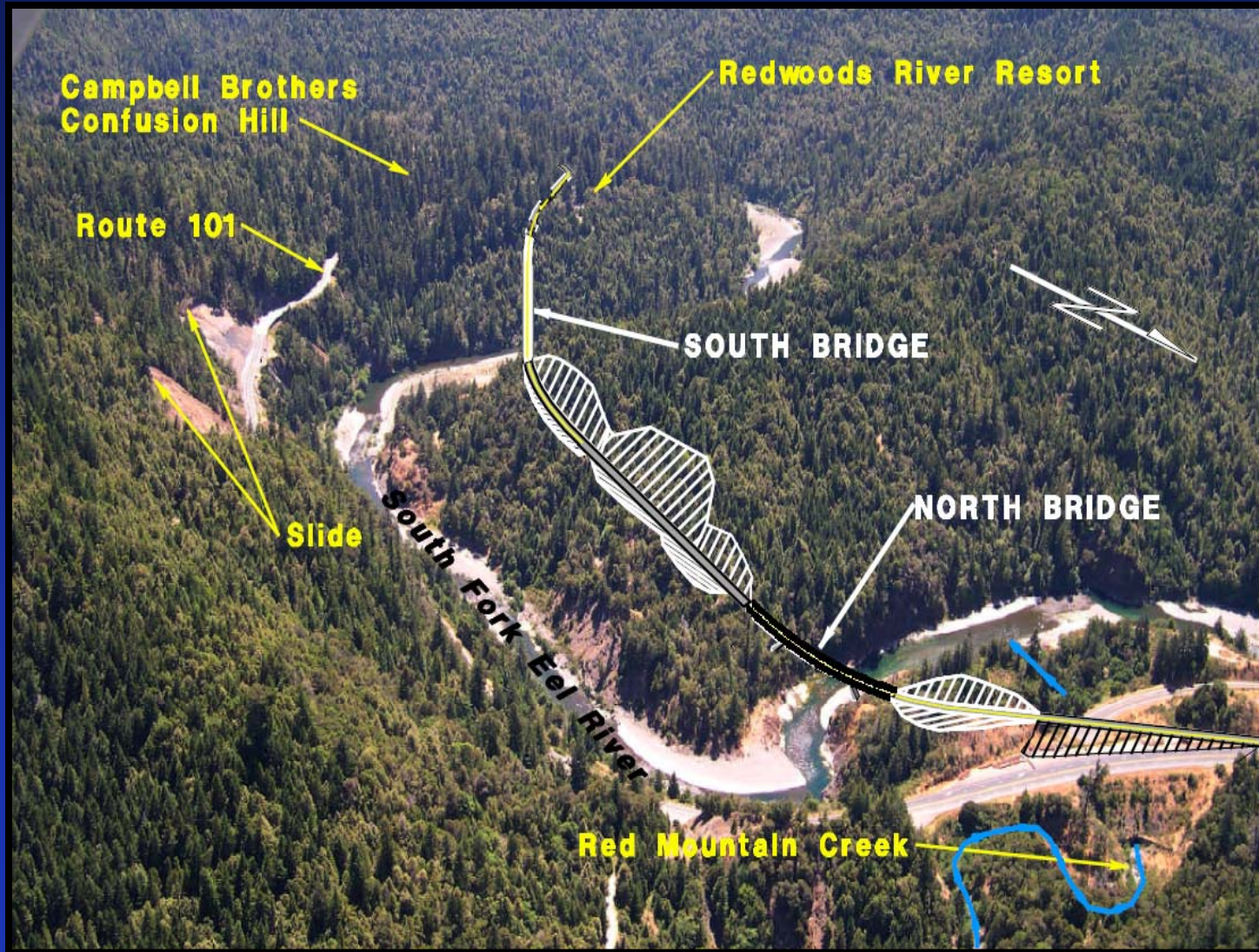
Savings to the State **\$240,000**



Confusion Hill Embankment Project



Confusion Hill Backfill Project



Confusion Hill Existing alignment



Confusion Hill bridges



CONFUSION HILL



NORTH BRIDGE

01- MEN-101

PREPARED BY DES, BRIDGE ARCHITECTURE & AESTHETICS



CONFUSION HILL



SOUTH BRIDGE

01- MEN-101

PREPARED BY DES, BRIDGE ARCHITECTURE & AESTHETICS

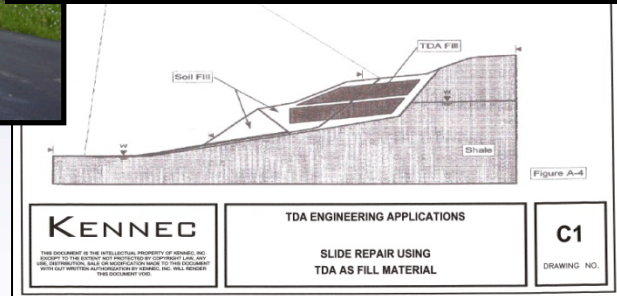


Confusion Hill TDA Embankment fill

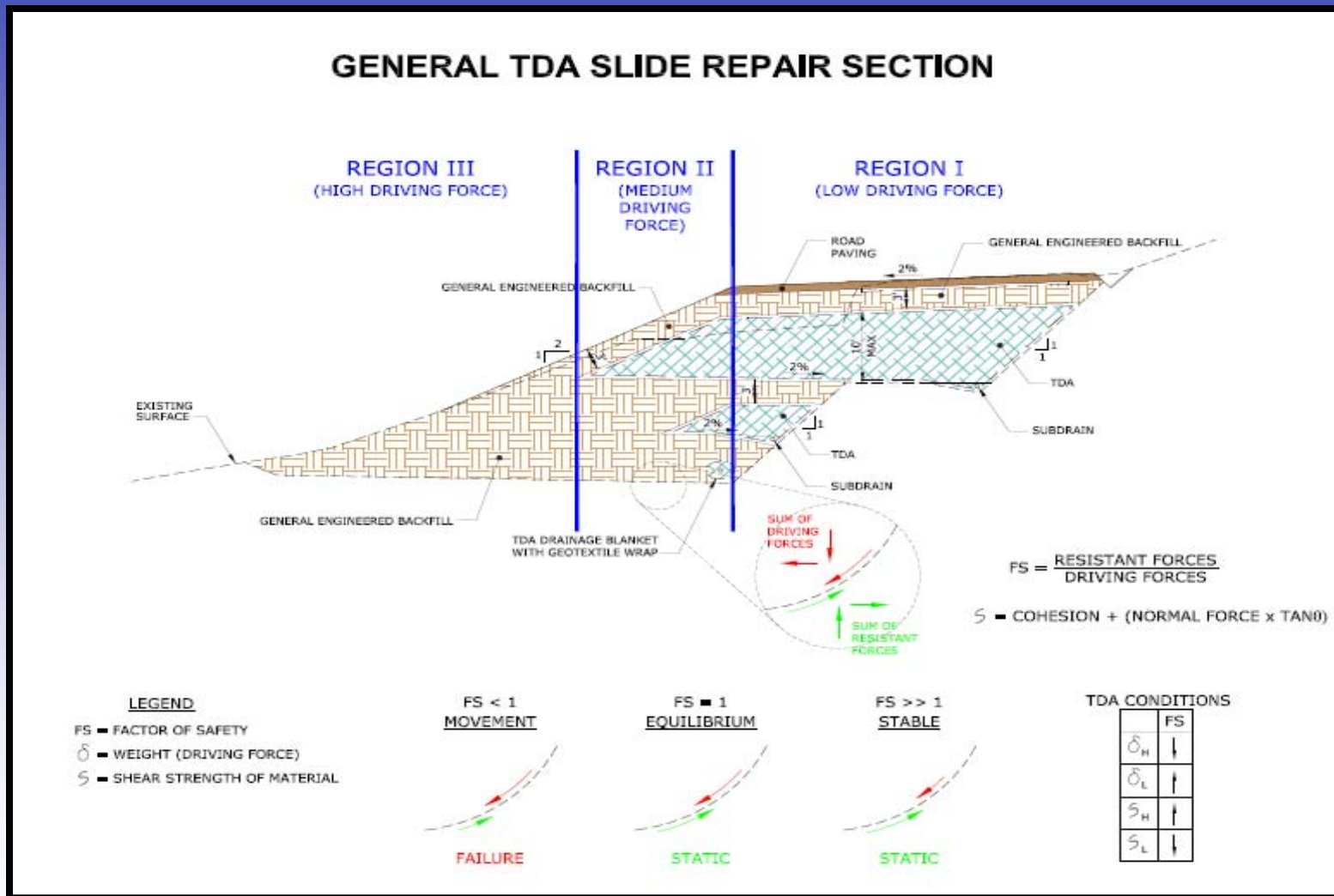


Light Weight TDA Fill for “Slip outs”

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



General view of tda slide repair



Marina Drive slide repair



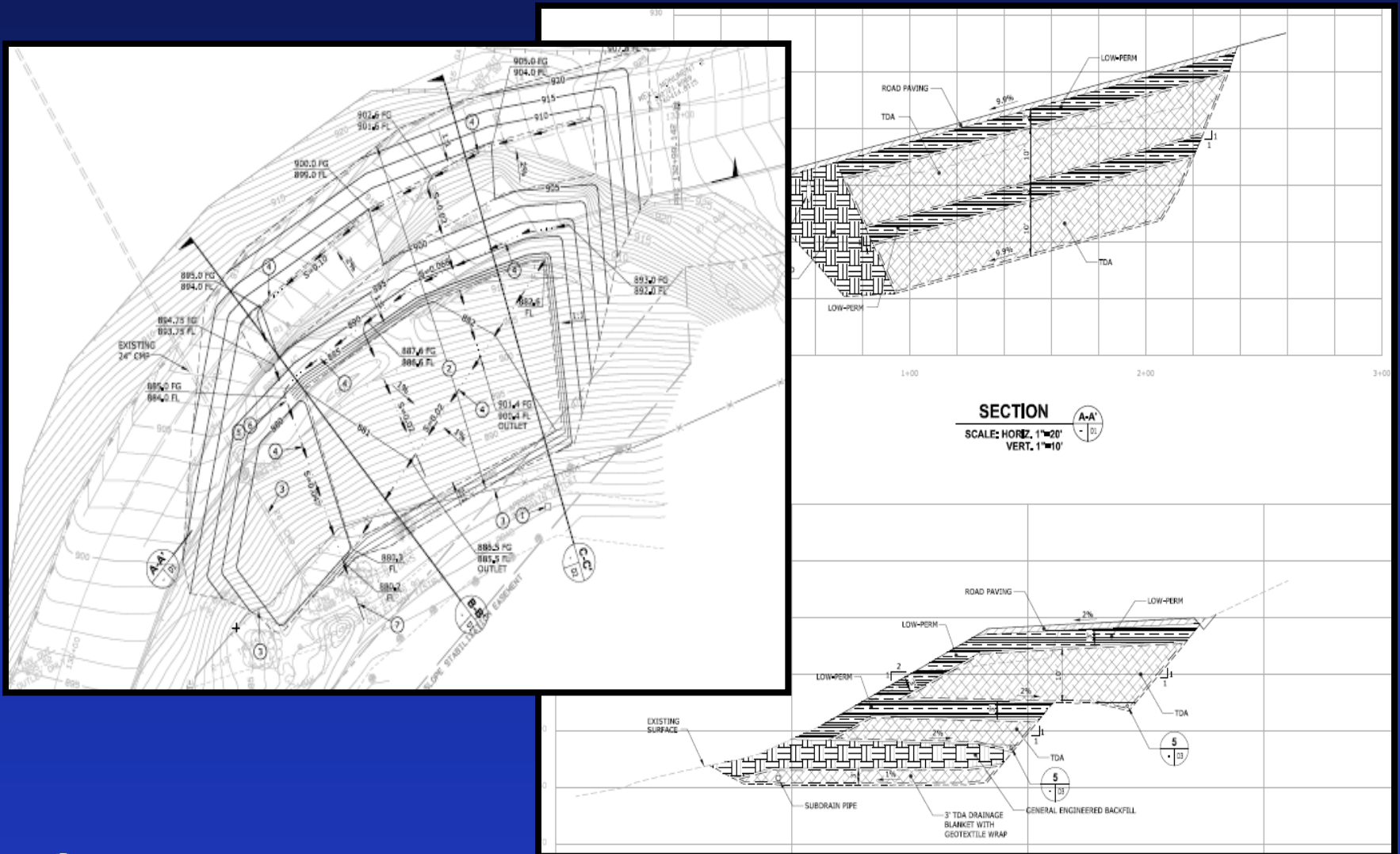
Marina Drive slide repair



Geysers road slide repair



Geysers road slide repair



Geysers road slide repair



Geysers road slide repair

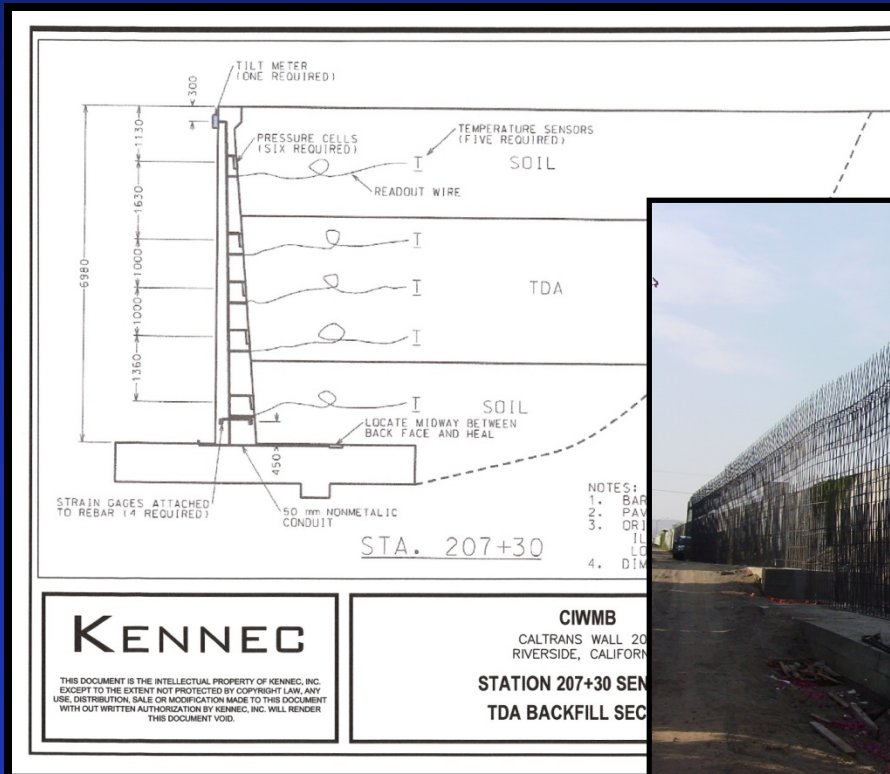


Light Weight Backfill behind retaining walls



Light Weight Application Wall 119 and 207

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



Wall 119 Riverside, Ca



Back-cut of slope prior to retaining wall foundation installation

Wall 119 Riverside, Ca



Wall foundation installed –
rebar cage under construction



Strain Gauge Installation

Wall 119 Riverside, Ca



Grinding rebar – Preparation for strain Gauge Installation



Spot welding strain gauge to rebar

Wall 119 Riverside, Ca



Spot welding strain gauge



Installed strain gauges (typical)

Wall 119 Riverside, Ca



Installation of strain gauge cover



Covers installed and sealed

Wall 119 Riverside, Ca

Installed strain gauge (typical)



Double rebar install (typical)

Wall 119 Riverside, Ca

Placement of foundation soil



Compaction of foundation soil



Unloading TDA

Wall 119 Riverside, Ca

Installed TDA



Typical Station



Pressure cell installed

Wall 119 Riverside, Ca



TDA placement



TDA placed and compacted



Data collection during construction

Wall 119 Riverside, Ca

Final lifts of TDA, notice Geotextile wrap on both sides of TDA



TDA compaction

Wall 119 Riverside, Ca

Final geo-textile wrap



Wall 119 Riverside, Ca

Cover soil delivery, placement, and compaction



Wall 119 Riverside, Ca

Completed cover soil installation, 2 feet



Typical gravel/soil section



Wall 119 Riverside, Ca



86,000 TIRES

2003 9 19

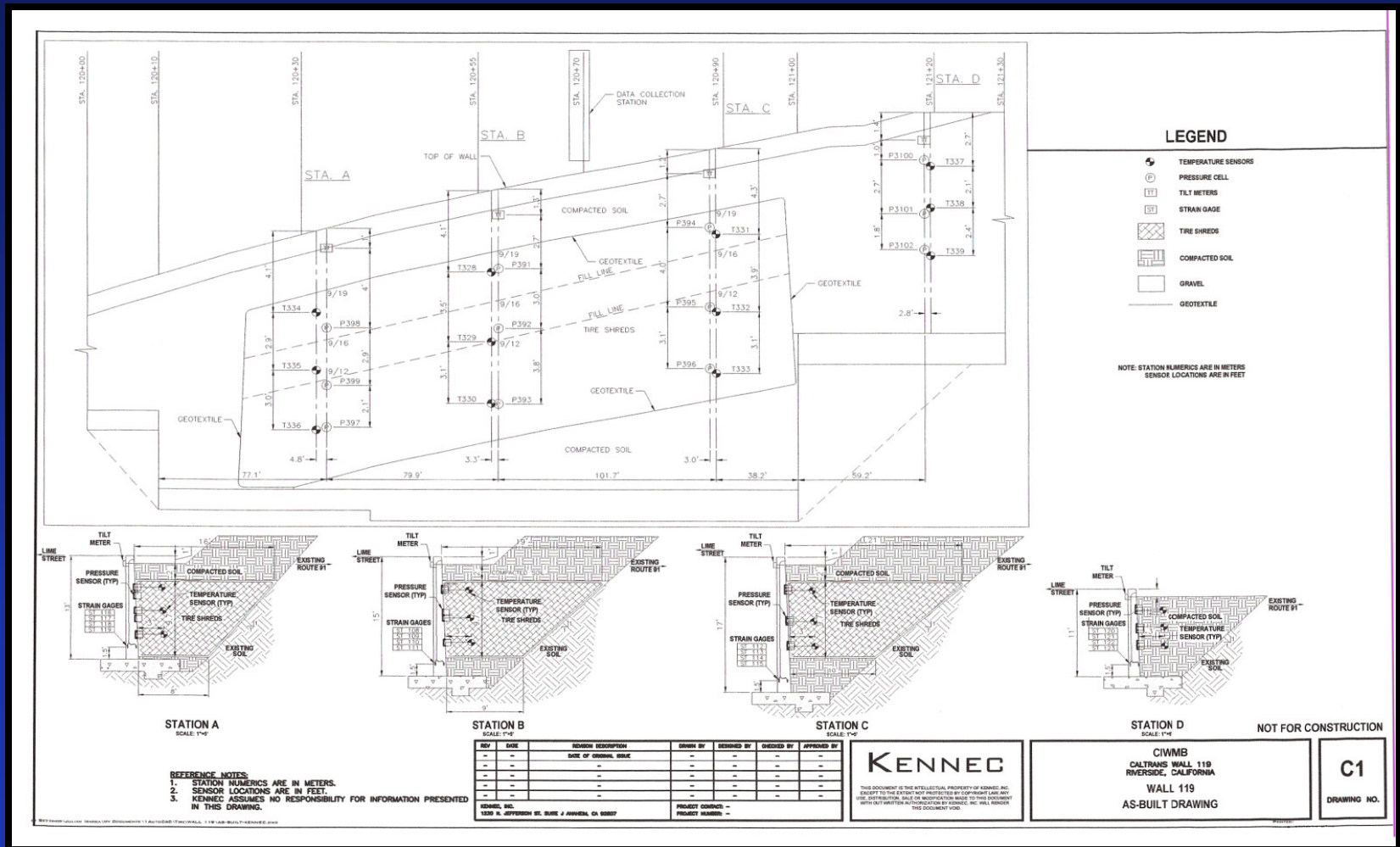
Wall 207 Riverside, Ca



150,000 Tires

Wall 119 & 207 Riverside, Ca

As-Builts!



Vibration Attenuation



Conventional Vibration Mitigation Technology \$800+/ft



TDA Vibration
Mitigation \$150/ft



VTA-Vasona Line
Extension 2001

100,000 TIRES



 **KENNEC, INC**

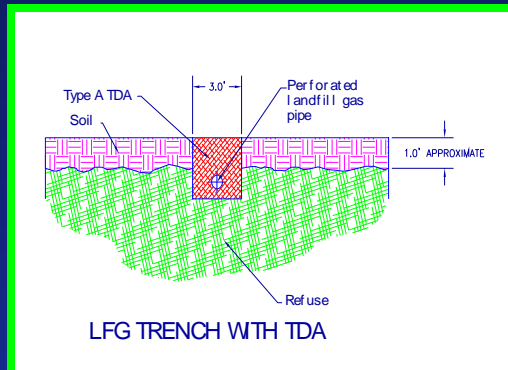
Use of TDA in Landfills

- 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)

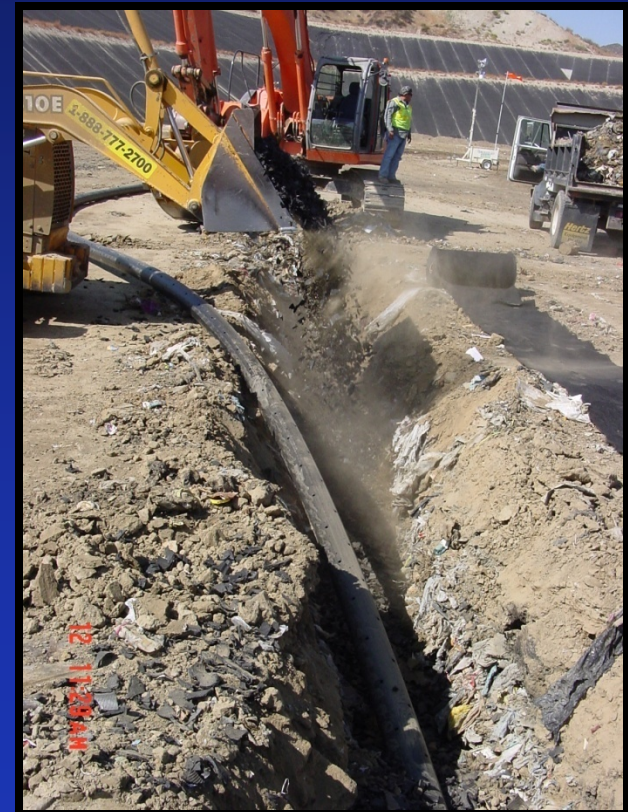
Landfill Gas Collection Trenches, Replace Gravel w/Type A TDA



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

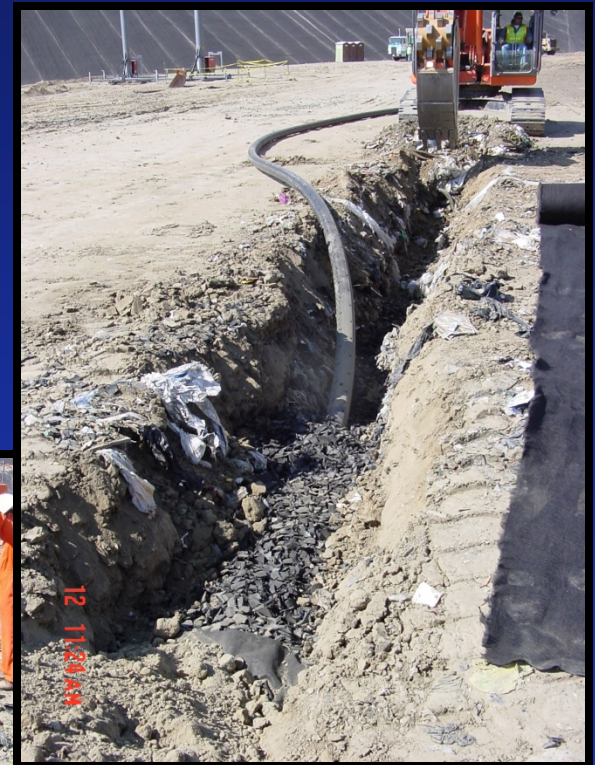
LFG TDA Trenches Typical Construction

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



LFG TDA Trenches Typical Construction

- Remove refuse/soil place pipe bedding, place pipe, cover with TDA
- Geo-textile separator between TDA and Soil or Fine Material



LFG TDA Trenches Typical Construction

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



LFG TDA Trenches Typical Construction

- Geo-textile separator between TDA and Soil or Fine Material
- Replace cover material, fill operations as usual, draw from system when appropriate



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

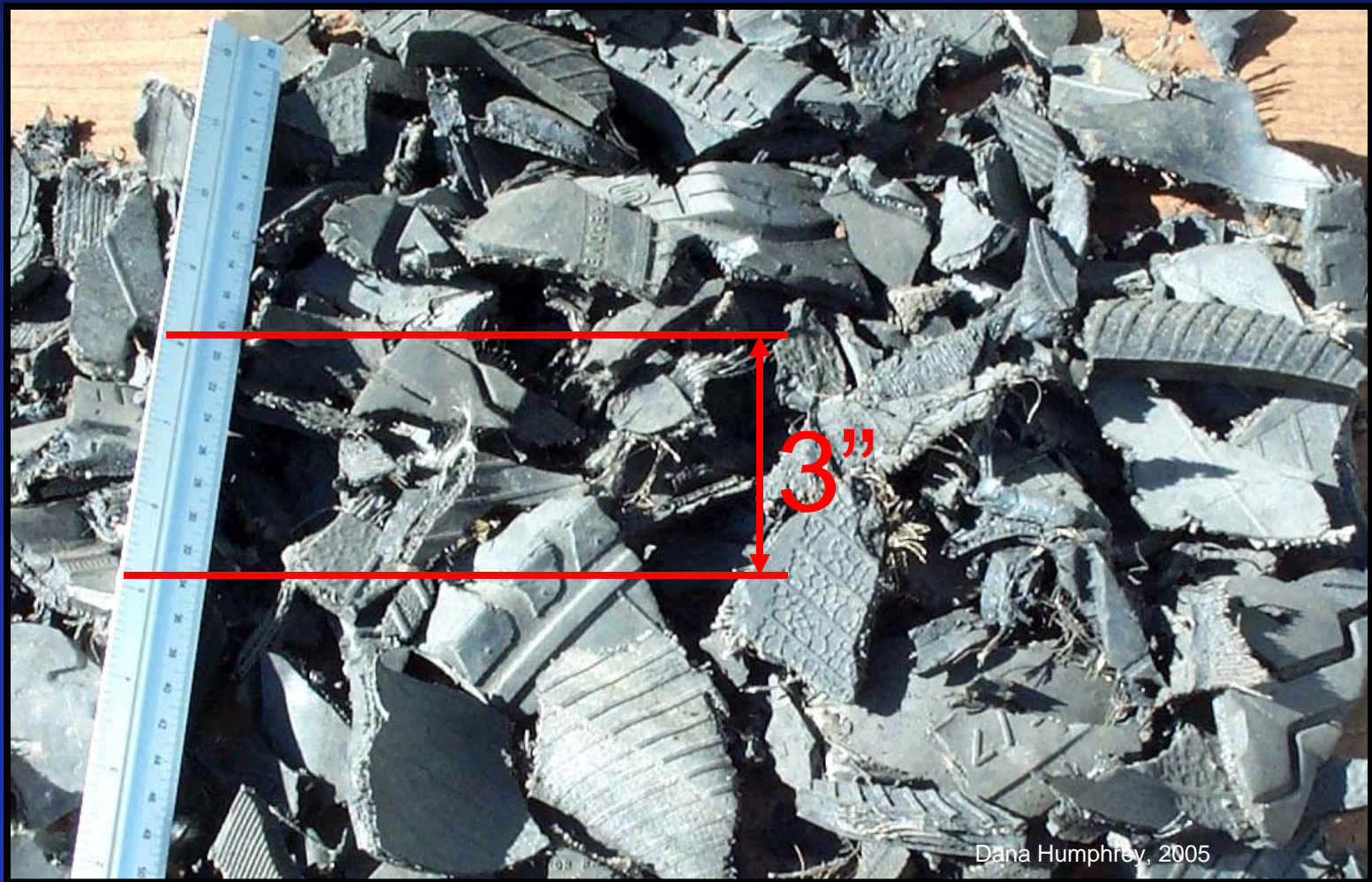
What is Type B TDA?

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, Lightweight fill behind retaining walls, Gas collection media, Leachate collection material

Size of TDA



Dana Humphrey, 2005

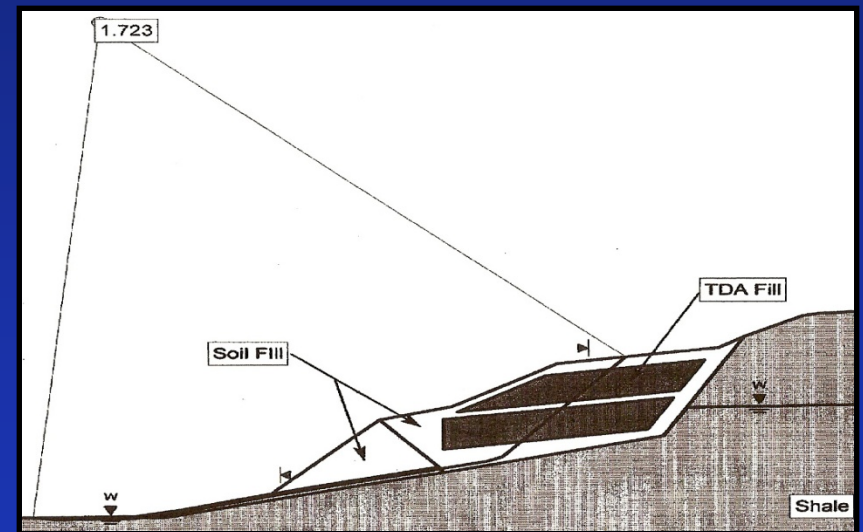
TDA Civil Applications

- Lightweight Embankment Fill



- Lightweight Backfill Behind Retaining Walls
- Lightweight fill for road slide repairs

- Vibration Attenuation
- Landfill Applications



Questions ?