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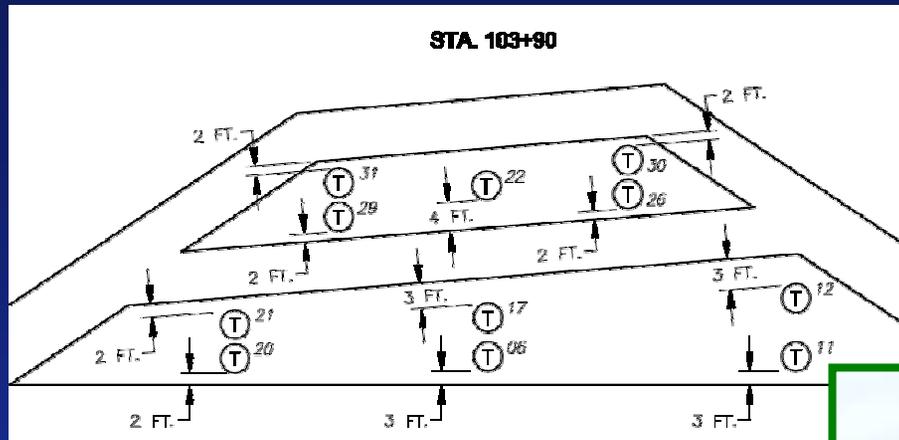
TDA IN LANDFILL GAS COLLECTION SYSTEMS



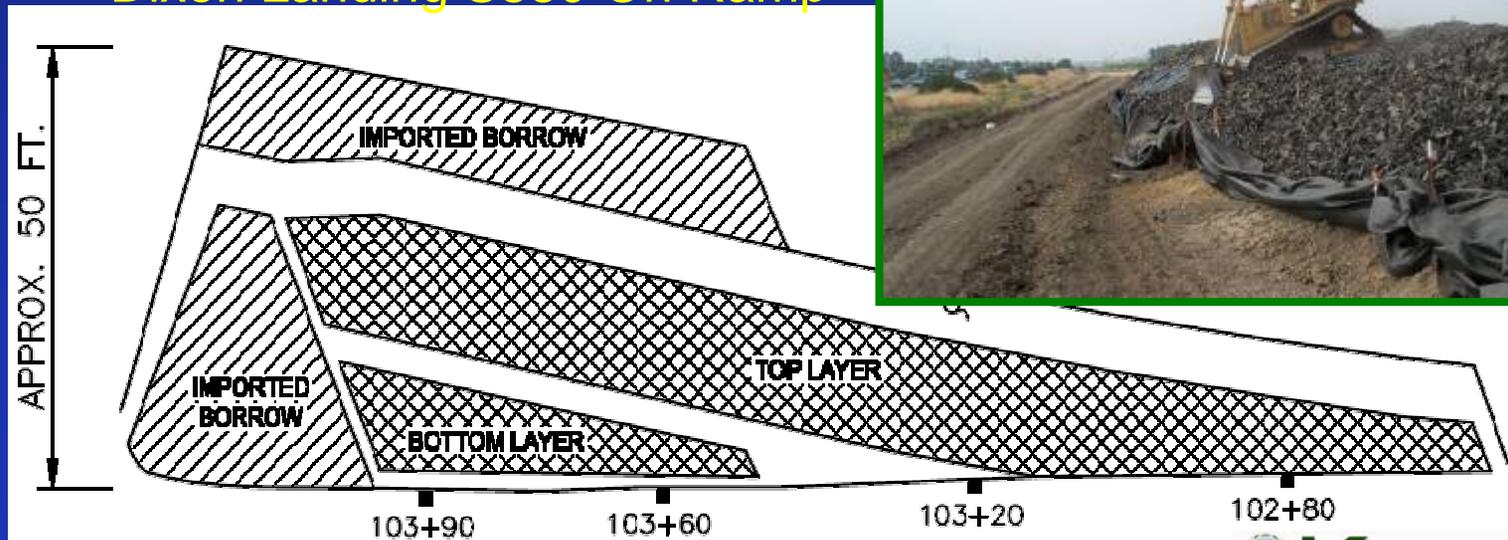
Why use Tire Derived Aggregate (TDA)?

- 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 problem
- Conserve natural aggregate resources

TDA Applications



Lightweight Embankment Fill
Dixon Landing S880 On Ramp



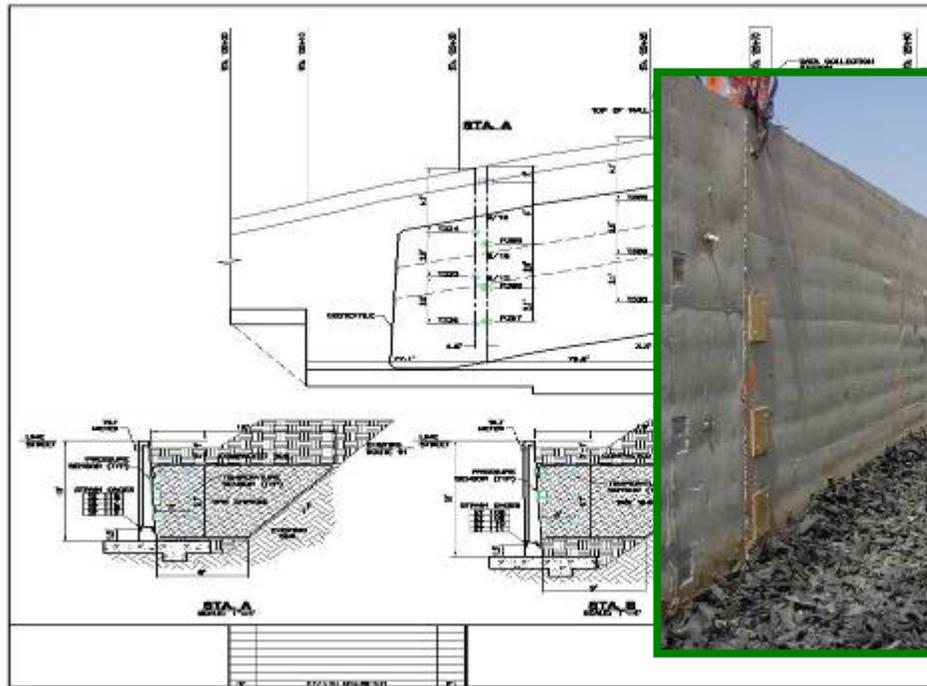
TDA Applications

Vibration Attenuation for
Vasona Light Rail Line
San Jose, Ca



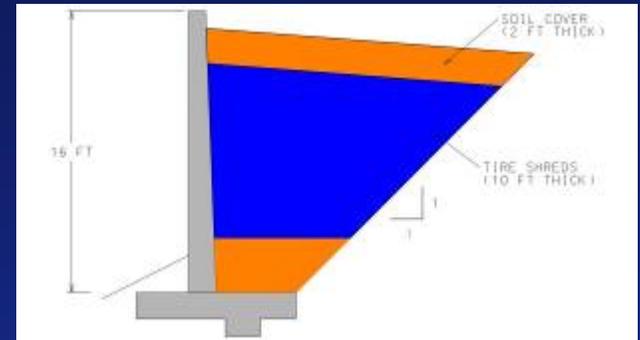
TDA Applications

Lightweight Backfill Behind Retaining Walls
Riverside, Ca



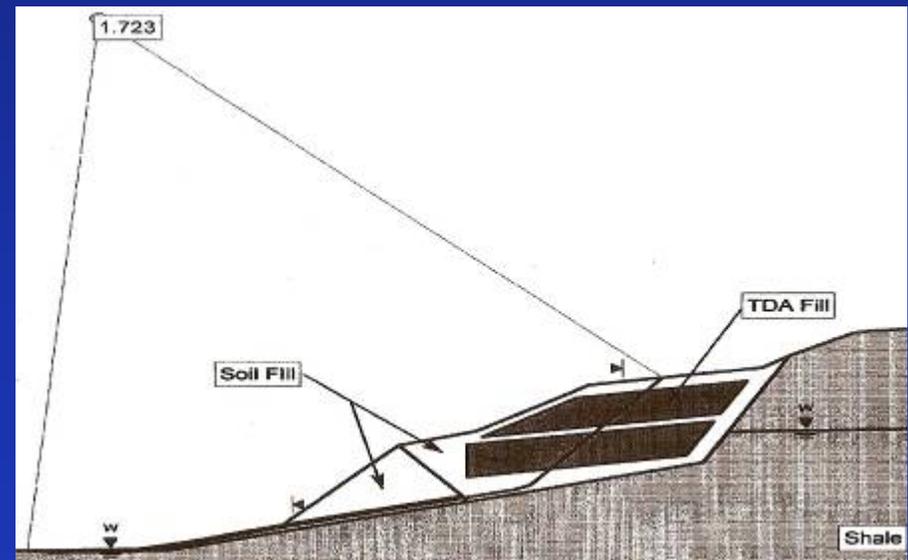
Civil Applications

- Lightweight Embankment Fill



- Lightweight Backfill Behind Retaining Walls

- Lightweight Fill for Slide Repair
- Vibration Attenuation
- Landfill Applications
- Landfill Gas System



Use of TDA in Landfills

- Leachate Collection and Removal System (LCRS)
- 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 for Landfill Gas Systems?

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

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

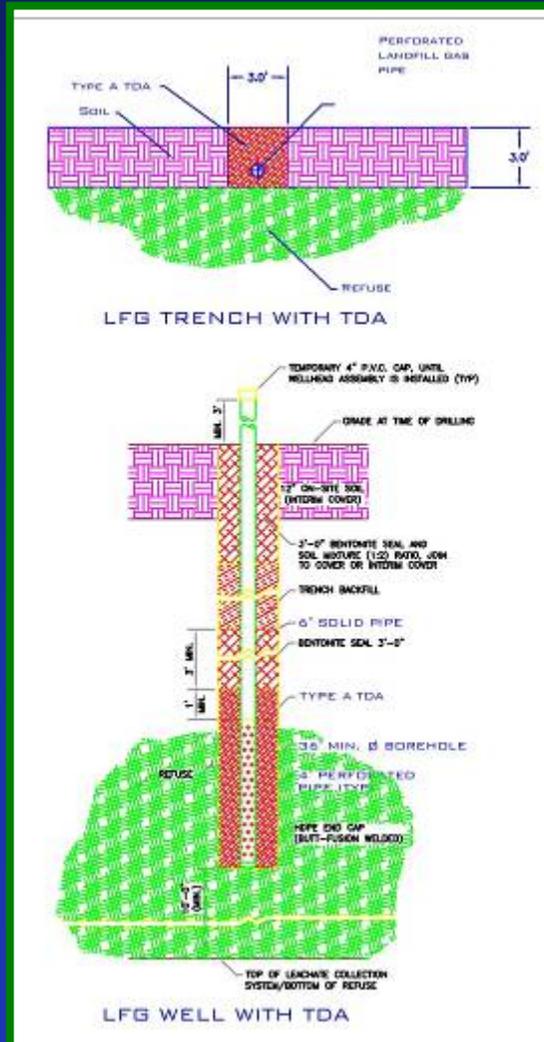


Dana Humphrey, 2005

Where can you use TDA in a Landfill Gas System?

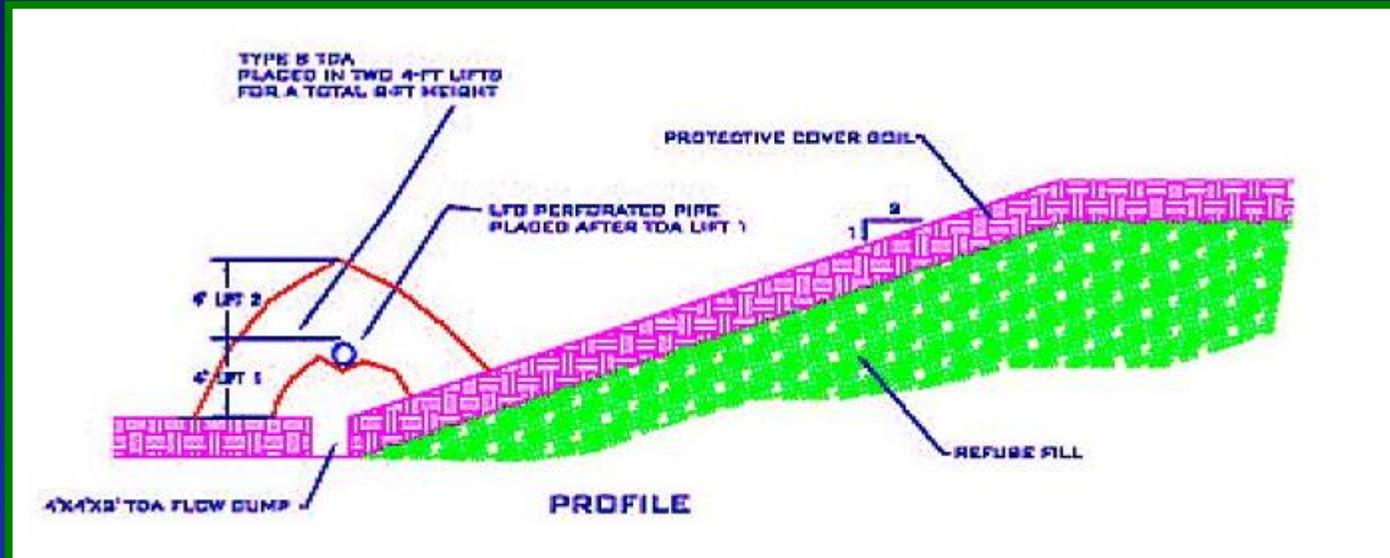
- Landfill Gas Collection Trenches, Replace Gravel Type A TDA
- Gas Collection System, Trench-less Type B TDA
- Gas Collection System, Pipe Protection, Type B TDA
- Gas Collection System, Gas Sump, Type B TDA

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



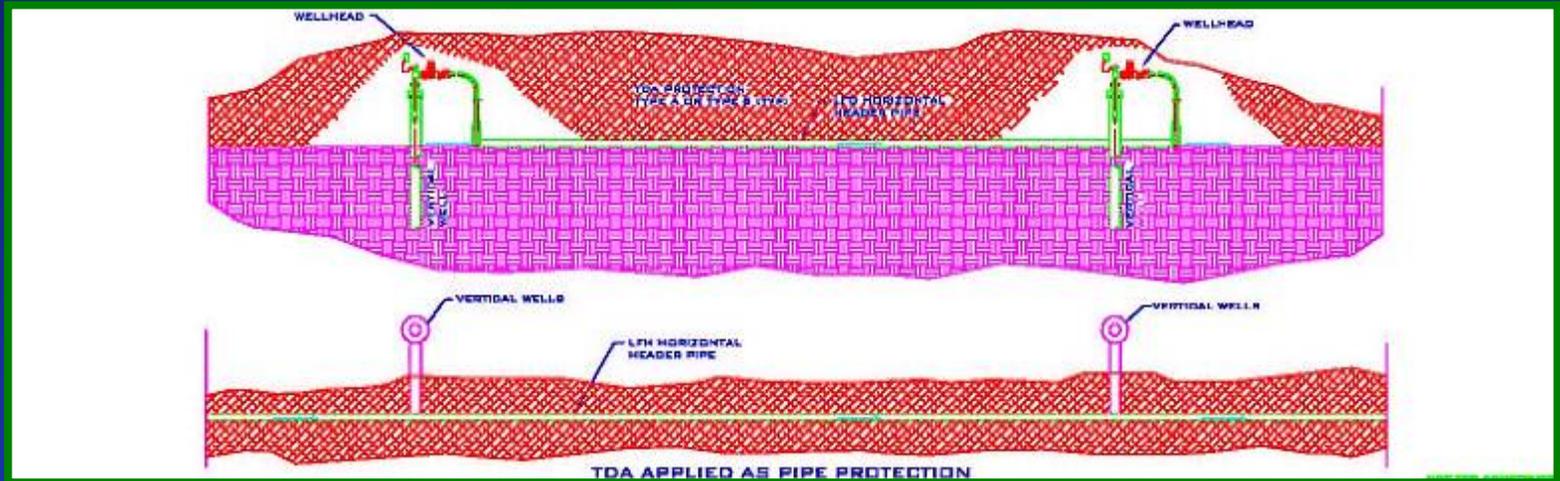
- Type A for Gravel Replacement
- Oversize Auger for Vertical Wells
- Geo-textile separator between TDA and Soil or Fine Material

Gas Collection System, Trench-less, Type B TDA



- High Permeability
- Cost savings
- Recycling (100 Tires = 1.5 cy)

Gas Collection System, Pipe Protection, Type B TDA



- Header Pipe Protection
- Cost savings
- Recycling (100 Tires = 1.5 cy)

Gas Collection System, Pipe Protection, Type B TDA



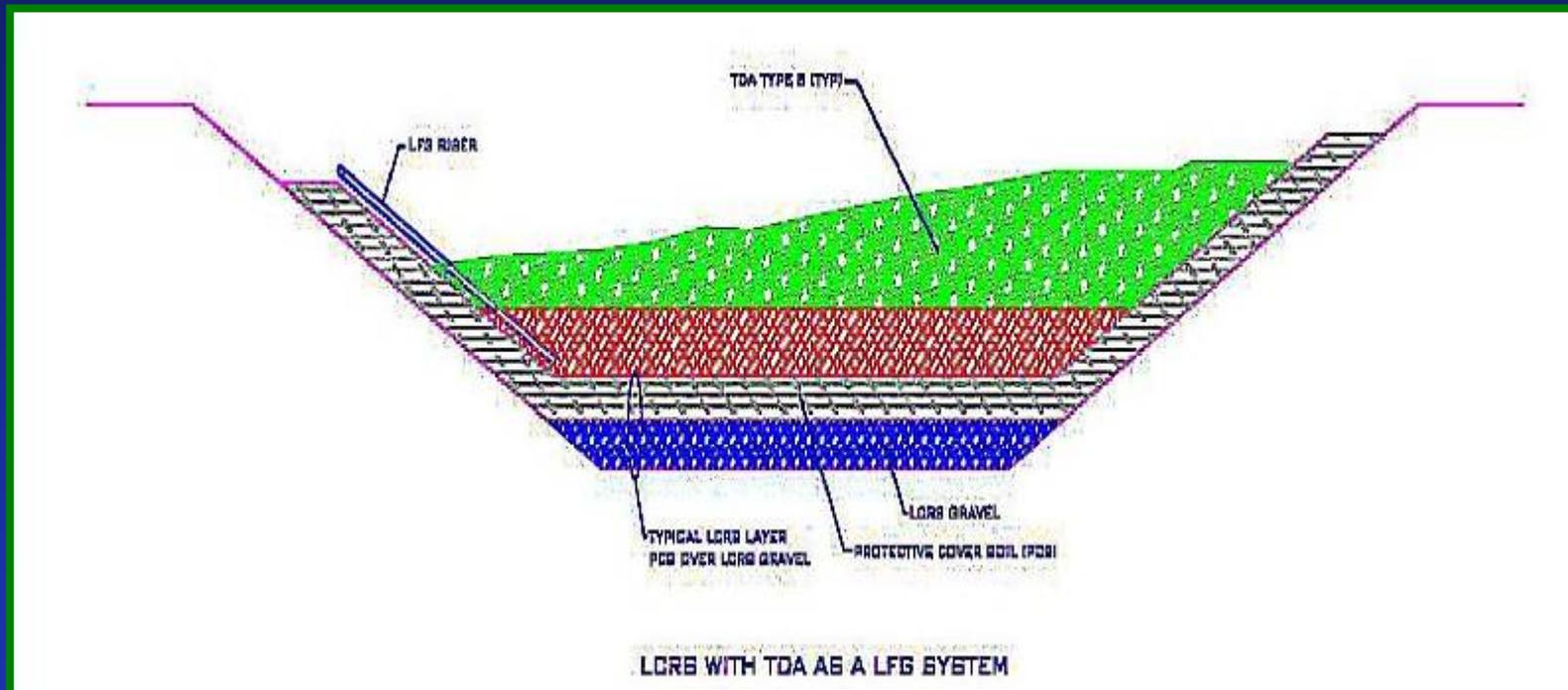
Gas Collection System, Pipe Protection, Type B TDA



Gas Collection System, Gas Sump, Type B TDA



Gas Collection System, Gas Sump, Type B TDA

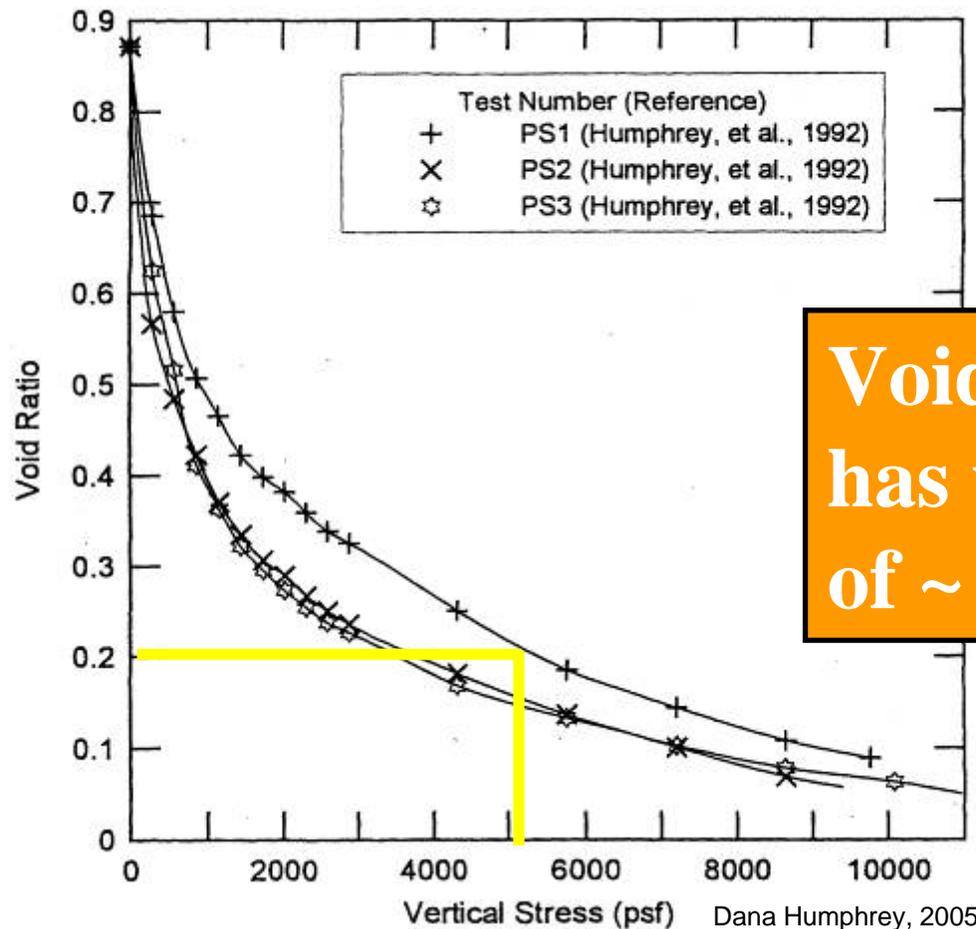


Why use TDA for landfill gas systems?

- High permeability
- Cost savings
- Recycling

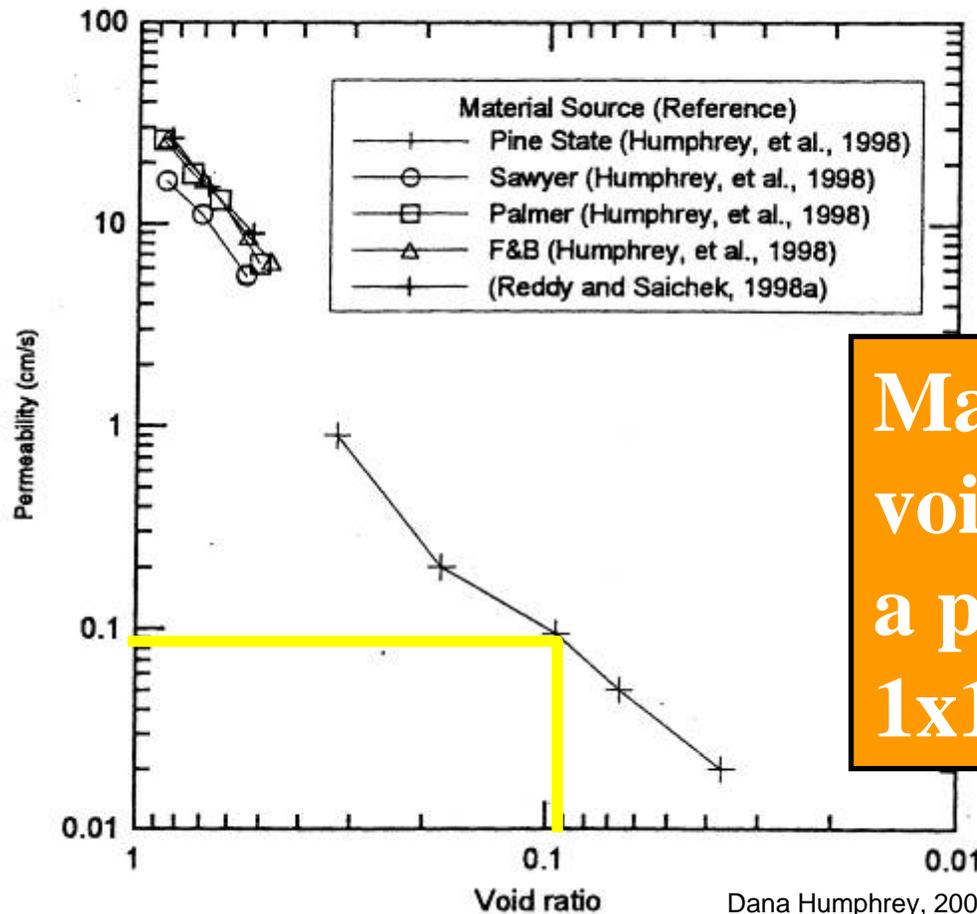
1 TON TDA = 100 TIRES = 1.5 CUBIC YARDS of Aggregate Material not removed from existing natural resource pool

Effect of Vertical Stress on Void Ratio



Void ratio of 0.2
has vertical stress
of ~ 5,000 psf

Relationship Between Permeability and Void Ratio



Material with a void ratio of 0.2 has a permeability of 1×10^{-1} cm/sec

General Guidelines

TDA LFG Applications

10 Feet thick Maximum

No free wire <1% by weight

No Fines, No Crumb Rubber

Average exposed steel on pieces < 2"

More Information:

<http://useit.umeciv.maine.edu/factsheet/fsts.htm>

<http://www.ciwmb.ca.gov/Tires/>

[https://www.rma.org/publications/scrap%5Ftires/index.cfm?
CategoryID=565](https://www.rma.org/publications/scrap%5Ftires/index.cfm?CategoryID=565)

<http://www.kennec.com/>



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