TDA as Road Embankment

Fill

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Outline

- Origins and goals of the tire shred incentive program
- Background
- Implementation
- Design issues
- Construction issues
- Performance
- Status of the program
Goal
To help solve the waste tire problem by using tire shreds (TDA) in the most efficient manner, in appropriate locations.

It was *not* the goal to conduct research to further the state of the practice.

Pursue the application that uses the largest amount of tires with the least effort.
Overview

- NYSDOT Policy: “DOT will use tire shreds in appropriate applications and locations as the lightweight fill of first choice, or as a replacement for natural fill.”

- Partners included DEC, OGS, ESDC, Thruway
Early Work

- Hosted a training session by Dr. Dana “Shred” Humphrey in 1996
- Reviewed several draft legislation bills
- First pilot project in 1999
  - Intended to establish the engineering requirements should TDA usage be mandated
Pilot Project

- Rt 17: Five Mile Point to Occanum, Broome Co.
- Off ramp, Rt 17 to North Road
- 267,000 tires placed in a 10’ layer
Placing Shreds on Geotextile
Compaction lines up the shreds and takes out many of the voids that would lead to compression.
New Legislation

- Waste Tire Management & Recycling Act of 2003 (Bill A2106)
- $2.50 collected for each tire sold. $2 into fund.
- Money to be used for identifying and cleaning up stockpiles, and using tires in civil engineering applications.
- DOT, DEC, NYSTA and ESD are all named in the legislation.
- Sunsets December 31, 2010. All sites were required to be remediated by then!
DOT identified projects to use shreds as a substitute for ordinary fill

DOT set material requirements

DEC (through OGS) provided shreds for DOT to use

Open to other applications, although quantity used will be smaller and implementation will take more effort/time. (Better to keep separate from the initiative efforts).
DOT’s Process (project level)

- Identify and Select candidate projects
- Identify the needed quantity, PS&E, placement schedule
- Provide design details
- Show TDA source locations in contract documents
- Provide specs for placement and trucking in our contract
On the supply end...

DOT trained Inspectors of the shredding operation (OGS), shredding contractors, Construction personnel (for placement)
New Developments

- Special specs for Material, Placement and Trucking
- QA/QC procedures for sampling and testing—GCP-19
- Inspector training and certification course
- Site selection and design guidelines—GEM-20
- MOU between DEC and DOT: includes reimbursement for trucking
DOT’s published guidelines

- GCP-19: Sampling and Testing of Tire Shreds
- GEM-20: Guidelines for the Selection, Design and Construction of Tire Shreds in Embankments

Completed in April, 2004, and subsequently revised. See: www.dot.state.ny.us/tech_serv/geo/manuals.html
Project Selection

- Geotechnical Engineers discuss projects with designers
- Look for jobs with >2.1 m fill, above water table, away from wells, water sources, NYC watershed
- Select staging areas
- Coordinate schedule with DEC, OGS
Quality Assurance Program

- Inspector training course for OGS
- GCP-19 set requirements, procedures
- Inspectors sample and test every “cone”
- Stockpiles are tracked
The Course

- Consists of:
  - Classroom lecture
  - Written test
  - Demonstrate proficiency in sampling and field testing procedures.

- Earning certification depends on attendance and successful completion of all three elements.
Purpose of the course

- To train and certify inspectors. At the end of the course, inspectors will be able to:
  - Determine sampling intervals
  - Provide guidance to tire shredder
  - Conduct and interpret tests
  - Document test results

- Inspectors have the responsibility of assuring that the shred stockpiles they accept meet DOT specification requirements.
What Makes a Good Shred?

- Proper size (meets gradation requirements)
- Clean cut edges (minimizes exposed steel)
- Minimal exposed and free steel
- No contaminants (gas, oil, hydraulic fluid, etc.)
- At least one sidewall cut (to minimize cupping)
- Relatively clean (no clinging dirt or mud)

While they don’t have to be perfect, this is a construction material.
## Size Requirements

<table>
<thead>
<tr>
<th>Size</th>
<th>Percent Smaller Than, By Weight</th>
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<tbody>
<tr>
<td>16 inches</td>
<td>100</td>
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<tr>
<td>12 inches</td>
<td>90 – 100</td>
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<tr>
<td>8 inches</td>
<td>75 – 100</td>
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<tr>
<td>1-1/2 inches</td>
<td>0 – 25</td>
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<tr>
<td>3/16 inches (No. 4)</td>
<td>0 - 1</td>
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Measurement of Shred

- Measured shred lengths from 1-1/2 inch to 16 inches using a "sizing board"
- Used it for protruding steel
- Also used a No. 4 sieve
Why do we measure length rather than width, like an aggregate?
**Other Requirements**

- **Visual**
  - All shreds shall:
    - have at least one sidewall severed from each shred.
    - have less than 1% by weight of free steel.

- **Protruding Steel**
  - Tire shreds shall conform to the following requirements for protruding steel:
    - Metal wires protruding more than 2 inches from the edge of any tire shred: 0%.
    - Metal wires protruding between 1 inch and 2 inches from the edge of any tire shred: 0 – 25% of the shreds by weight.
    - All shreds with metal wires protruding less than 1 inch from the edge of any tire are acceptable.
A nice pile of chips, with free steel visible
Processing
Construction Details and Requirements
Embankments

Tire shred layers are 1 m max

1 m cover on the side slopes

Each layer is wrapped in geotextile

Multiple layers are allowed, with 0.6 m compacted earth in between

No shreds within 1.5 m of the top of finished grade
Shred Embankment Construction
Projects
I-87 Grade Crossing Elimination – 1.1 M tires
Route 240X/Cattaraugus Creek: 300 K tires
Route 219 Section V: 1.8 M tires
I-87 Bridge Replacement: 1 M tires
I-84-I-87 Interchange: 380 K tires (140 K used by DOT)
Performance

- All projects were required to have a 30 day waiting period under a 2’ surcharge (all projects “wintered over”).
- Post-paving settlements were negligible.
- No problems to date
Program Summary

- 5.6 M PTE’s used
- 81 inspectors trained and certified
- 6 projects in 5 Regions
- Reviewed well over 1,000 inspection forms
- Duration of effort was 2003 to 2008
Other Applications for Recycled Tires....
Tire Chips as Subgrade

- Delaware County
Tire Bales

- Chautauqua Co
Thank You!

- Feel free to contact Don Dwyer of the Geotechnical Engineering Bureau

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