

ARTS Quarterly

Paving Has Begun

ARTS 2001 projects are underway. Pickens County School District was the first to begin paving at various schools and applications included bus ramps, parking areas and activity areas. Paving of rubberized asphalt was completed at Hagood Elementary, Central Elementary, Daniel High, Liberty High and Clemson Elementary Schools. In total, the various projects amounted to approximately 2600 tons of rubberized asphalt for Pickens County.

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From Pickens County, the contractor moved on to the Anderson County project.



Michelin Boulevard in Anderson County

Anderson County paved Michelin Boulevard near the new Michelin Tire Facility and Anderson County Airport. This project is being completed in two phases and involves resurfacing of approximately 17,095 lane feet with asphalt-rubber. The total tonnage for this phase

of the project was approximately 10,500 tons.

The next project will be resurfacing at the SC Botanical Garden located in Clemson, SC. The roads and parking areas within the Garden accommodate over 100,000 guests each year.



Asphalt pours from the dump truck into the paver and is laid at temperatures exceeding 300°F

ARTS

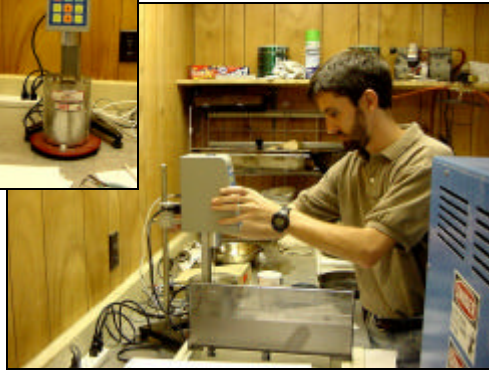
Our mission is to promote the practical utilization of waste tire rubber in hot mix asphalt as well as other civil engineering applications through research, training, education, and information services.

(Continued on page 2)

Grant Project Progress Report



(Continued from page 1)



Kevin Vaughan, Program Administrator, tests the mix viscosity at the asphalt plant in Anderson, SC.

ARTS conducts the asphalt mix design for each project individually. During the construction, testing will include the analysis of properties such as bulk specific gravity and unit weight. Once pavement is completed, analysis will include visual inspection and core sampling. All values will be compared to the control section.

Another project that was accepted involves using crumb rubber in various applications in the construction of the building that will house our new research facility. Applications include: septic tank and tile field, retaining wall, mulch in planting beds, and of course, asphalt-rubber pavement for the parking lot and driveways.

The final project that is underway involves research to determine the potential opportunities and economic feasibility of using post-consumer scrap tires and derivatives in new tires. This project is in conjunction with the Michelin Tire Company.

ARTS has been busy managing all of these projects and is actively pursuing others. If you have a project you would like to submit to ARTS, please contact the ARTS office at 864-656-6799.



Do You Have a Project For Us?

ARTS will consider a variety of projects including the use of scrap tires in civil engineering applications. We are not limited to rubberized asphalt. Retaining walls and embankments are prime candidates because they require a large number of waste tires. On the other hand, rubberized running tracks have been funded by DHEC in the past, so ARTS will not be able to consider similar proposals.



Sloan Construction begins the paving at Central Elementary School. Asphalt can be laid with little or no changes to typical paving methods. Asphalt mix is poured into the paver pictured above-left where it is fed out the back (as pictured on page 1) to create the pavement. This surface must be compacted using a roller as pictured in opposite photo.

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4 Million and Counting: ARTS Seminars Discuss What Can Be Done With All These Waste Tires

ARTS seminars target civil engineering uses for waste tires. A series of seminars is being offered this year to introduce the basics of using waste tires in civil engineering applications. Each of the seminars is a one-day event and is offered across South Carolina, in Charleston, Columbia and Greenville, on consecutive days. Two seminars were offered last spring and those who attended found them highly informative.

The first seminar, **The Basics of Rubberized Asphalt**, focused on how tires are broken down into crumb rubber and the various methods of blending the material with

asphalt to create pavement. The speakers introduced the ARTS program and the various uses of recycled tires. The shredding and production of crumb rubber and various blending processes were also discussed. In addition, Florida's experience with rubberized asphalt was presented by a guest speaker from Florida who is a member of the advisory board for the Rubber Pavements Association.

The second seminar, **Crumb Rubber's Civil Engineering Applications**, focused on the many other uses of tire shreds besides rubberized asphalt. Dana Humphrey, Ph.D. from the University of Maine was the guest speaker. His research in using tire shreds as lightweight fill, retaining wall backfill, and thermal insulation has received national recognition. Participants enjoyed his humor and the vast knowledge he shared throughout the day's presentation.

An additional set of seminars will be held **October 24-26**. These seminars will be held in Greenville, Columbia and Charleston, SC, respectively, and will feature the Arizona Process of rubberized asphalt and case studies of Arizona pavements. Jeff Smith of LandStar

Polymer Recovery, Inc. will be a featured speaker.

The final set of seminars will be **Rubberized Asphalt: Project Overviews**.

They will be held in Charleston on November 27, Columbia on November 28, and Greenville on November 29. The seminars will summarize the

completed 2000/2001 grant projects as well as any that are still under way at that time. Overviews will include successes and any lessons learned along the way.

These workshops are best suited for local government personnel; recycling coordinators, SCDOT personnel, city and county engineers; as well as contractors and other members of the engineering design community who are interested in learning about ways to reuse waste tires.

The cost of the workshops is \$45 and includes lunch, break refreshments, and materials provided by the speakers. If you are interested in receiving more information about ARTS, grants that are available, or the upcoming seminars, contact Wendy Franzese, 864-656-6799, or email: arts@ces.clemson.edu.

Directions to the host sites are available on our web site.



Serji Amirkhanian presents ARTS to Fluor-Daniel Company in Greenville, SC



Register Today

Registration information for **both** upcoming seminars is on the next page. Simply fill out the form and fax it in.

Please note the specific dates and host site locations as they are not identical for each seminar.

ARTS Registration

Rubberized Asphalt: The Basics of the AZ Process

- | | |
|--|--------|
| <input type="checkbox"/> Greenville—October 24, 2001 | Price* |
| <input type="checkbox"/> Columbia—October 25, 2001 | \$45 |
| <input type="checkbox"/> Charleston—October 26, 2001 | |

Rubberized Asphalt: Project Overviews

- | | |
|---|--------|
| <input type="checkbox"/> Charleston—November 27, 2001 | Price* |
| <input type="checkbox"/> Columbia—November 28, 2001 | \$45 |
| <input type="checkbox"/> Greenville—November 29, 2001 | |

*The price includes the seminar and lunch only. Hotel reservations must be made directly by attendees if an overnight stay is necessary.

Please attach a separate list of attendees and their phone numbers if more than one from your organization plans to attend.

Please Print

Name _____

Organization _____

Title _____

Street Address _____

City _____ State _____ Zip/Postal Code _____

Phone _____ Fax _____

Name for ID Tag _____

E-mail _____

Please note any special dietary or physical requirements

Method of Payment

- Check— Payable to **Clemson University/ARTS**
- Bill Me Invoice Required
- Visa MasterCard

Credit Card # _____

Cardholder name _____ Exp. date _____

Signature _____

Fax completed forms to **864-656-2670**
Mail to: ARTS, Lowry Hall, Box 340911
 Clemson University, Clemson, SC 29634-0911

Rubberized Asphalt: The Basics of the Arizona Process October 24-26

Seminars will be held in *Greenville, Columbia and Charleston*, featuring the Arizona Process of rubberized asphalt and case studies of Arizona pavements. Jeff Smith of LandStar Polymer Recovery, Inc. will be a featured speaker. Benefits of rubberized asphalt will also be discussed.

Locations:

- 10/24 Greenville** Holiday Inn I-85
4295 Augusta Road, 864-277-8921
- 10/25 Columbia** Ramada Plaza Hotel
8105 Two Notch Road, 803-736-5600
- 10/26 Charleston** Holiday Inn Mt Pleasant
250 Johnnie Dodds Rd., 843-884-6000



Last Seminar of 2001 Rubberized Asphalt: Project Overview

Join us **November 27th, 28th, or 29th** to review the successes and any lessons learned during our inaugural year of grant projects. At press date, projects to be reviewed include: Pickens County School District, Anderson County, the SC Botanical Garden, Michelin Tire Company and Greenville County. ARTS staff will be key presenters and guest speakers will include representatives of various projects.

Locations:

- 11/27 Charleston** Radisson Inn Charleston Airport
5991 Rivers Avenue, 843-744-2501
- 11/28 Columbia** Ramada Plaza Hotel
8105 Two Notch Road, 803-736-5600
- 11/29 Greenville** Holiday Inn I-85
4295 Augusta Road, 864-277-8921

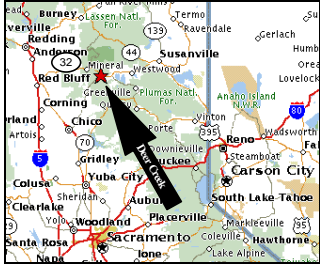


Cancellation Policy

The registration fee is fully refundable 10 week-days prior to the workshop. Substitution of another associate from your organization is encouraged if you are unable to attend. Advance notification of the substitution is appreciated.

Whole Tire Retaining Walls

It is estimated that more than 40 million truck tires are discarded annually. The California Department of Transportation (Caltrans) and the North Carolina Department of Transportation (NCDOT) have utilized some of these truck tires to stabilize slopes in emergency situations. The high cost of new construction materials, used to provide temporary protection for erosion can delay construction on projects. The availability of these discarded tires makes it extremely attractive as an alternative material for erosion control.

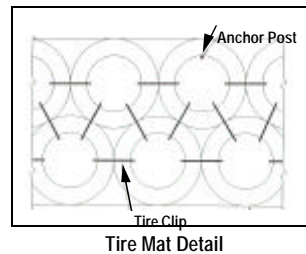
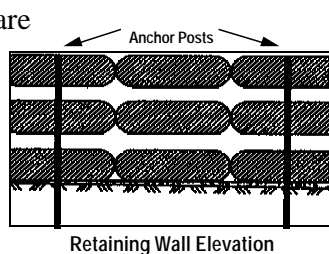
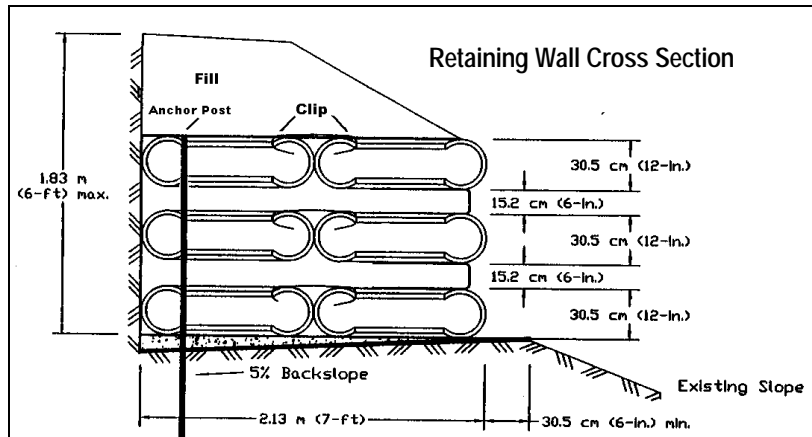


Northern CA, near the Nevada border

There have been several successful projects using whole truck tires to mechanically stabilize slopes. Caltrans' first project was a shoulder stabilization project using recycled tires and was located on Route 32 in Tehama County, near Dear Creek in the northern part of the state. Route 32 is a narrow, winding mountain roadway whose shoulders were being eroded away by both rainfall and snowmelt. The erosion was so severe in some locations that the embankments had eroded back to the pavement edge.

The project used whole truck tires to mechanically stabilize the shoulders. Engineering fabric was used in one of the sections to control erosion. Clips made of 1.27 cm (1/2 in.) steel reinforcing bars were used to hold the tires in point contact, thereby forming a continuous mat, and salvaged anchor poles were used to secure the tire assembly to the embankment.

Caltrans made several observations, conclusions and recommendations. First, construction of shoulder reinforcement and slope protection by maintenance personnel are simple and economical projects, mainly because of the availability of discarded tires. These projects also provide designers with immediate solutions. The availability, combined with the low cost of acquiring and installing discarded tires, makes them the ideal solution for many emergency problems which occur on highways. Caltrans concluded that with the exception of some minor erosion, the tires remained stable and maintained their integrity including the clips and steel posts that retained the tires in the mats. The project provided an economical solution to an increasing problem occurring on many low volume, narrow highways throughout California.



Resources Utilized

Personnel

- 1 Foreman
- 3 Maintenance Workers

Equipment

- 1 Dump Truck
- 1 Pickup
- 1 Backhoe & Loader

Materials

- 40 tires
- 180 clips
- 66.9m² (80 sq yds) Engineering Fabric
- 13.8m³ (18cy) Backfill Material
- 10 Recycled Anchor Posts

Completed in
16 Hours

Asphalt Rubber
Technology Service

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Great News!! ARTS Offers Incentives on New Grants



ARTS will *pay you* to take advantage of our grant program. For a limited time, ARTS will be offering incentives to agencies receiving

ARTS grants. In addition to paying the "difference" cost for using asphalt rubber or rubber in a civil engineering application, ARTS will also pay the agency a percentage of the base cost of the project as follows:

<u>EXAMPLES</u>	
Project Cost w/o Rubber	\$90,000
Project Cost w/ Rubber	\$108,000
ARTS Grant	\$18,000
Incentive	$90,000 \times 15\% = \$13,500$
New ARTS Grant	$\\$18,000 + 13,500 = \\$31,500$
<hr/>	
Project cost w/o Rubber	\$250,000
Project cost w/Rubber	\$300,000
ARTS Grant for Difference	\$50,000
Incentive	$100,000 \times 15\% = 15,000$
	$100,000 \times 10\% = 10,000$
	$50,000 \times 5\% = 2,500$
	Total Incentive = \$27,500
New ARTS Grant Amount	$50,000 + 27,500 = \\$77,500$

Project costs up to \$100,000 will receive an incentive of up to 15% or \$15,000. Project costs that exceed \$100,000 will receive the 15% incentive, plus an additional incentive of up to 10% of the amount over the first \$100,000. Projects with costs exceeding \$200,000 will receive an additional incentive of 5% of the amount that exceeds \$200,000, up to \$300,000.

All incentives are subject to approval by ARTS and the South Carolina Waste Tire Committee. The total incentive amount shall not exceed

\$30,000. This incentive offer is valid on all grant applications received and approved between August 14, 2001 and August 14, 2002.