

mar·ket·ability

The Future of Scrap Tires in Oklahoma

Colorado Waste Tire Market
Development Conference
Greenwood Village, CO
June 23, 2016



“The only way to discover the limits of the possible is to go beyond them into the impossible.”

Arthur C. Clarke

Credit:

http://www.brainyquote.com/quotes/quotes/a/arthurccl124660.html?src=t_impossible

Objectives

- **Oklahoma's market development efforts**
 - Authority
 - Current OK Market Distribution
 - Purpose
- **Approach**
 - Literature Review
 - Demonstration Project
- **Future market development in Oklahoma**

Market Development Efforts

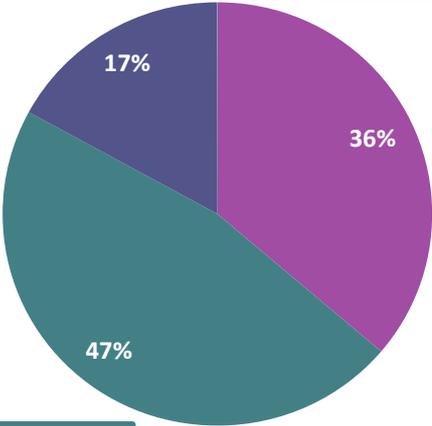
Authority 27A O.S. § 2-11-401.5

- ❑ Accrued funds can be used for remediation of tire dumps and projects to increase market demand for products made from Oklahoma used tires.
- ❑ Prioritization for projects with the greatest potential to benefit schools, communities and local governments.

OK-Market Distribution

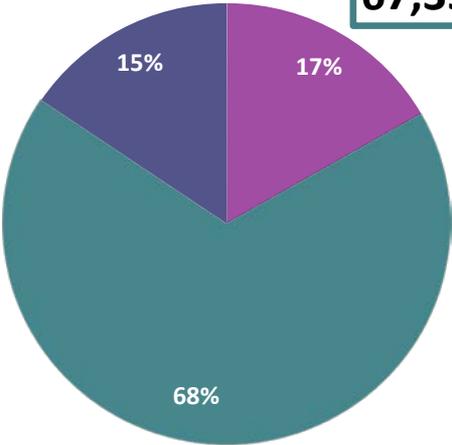
(FY 2014-FY 2016)

OK FY 15
67,674.87 tons



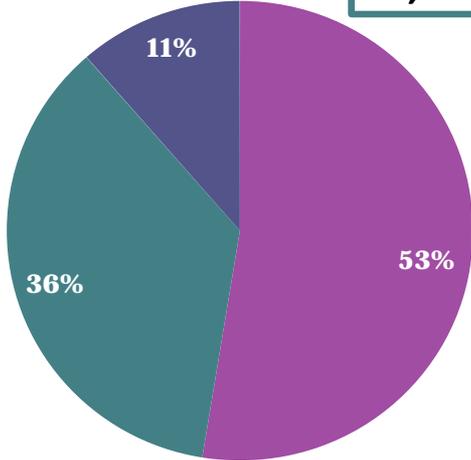
■ Crumb rubber
■ Shreds
■ TDF

OK FY 14
67,353.91 tons



■ Crumb rubber
■ Shreds
■ TDF

OK FY 16
70,891.82 tons



■ Crumb rubber
■ Shreds
■ TDF

Market Development Efforts

Purpose

- Promote market diversification in OK
- Create a demand for viable markets in Oklahoma
- Create a partnership



Photo credit: DEQ staff



Photo credit: DEQ staff



Photo credit: <http://www.cio.com/article/2993154/business-alignment/how-to-maximize-stakeholder-involvement-when-acquiring-new-enterprise-software.html>

Approach

- ❑ Literature review (OU)
- ❑ Demonstration Project (Wagoner County)
- ❑ Testing and Evaluation (OU)

Research Proposal

**USE OF GROUND TIRE RUBBER (GTR) IN ASPHALT PAVEMENTS:
LITERATURE REVIEW AND DOT SURVEY**

Submitted to:

Oklahoma Department of Environmental Quality
707 N Robinson
Oklahoma City, OK 73102

Prepared by:

Rouzbeh Ghabchi, Ph.D.
And
Musharraf Zaman, Ph.D., P.E., Fellow ASCE

School of Civil Engineering and Environmental Science
The University of Oklahoma
202 W. Boyd Street, Rm. 334
Norman, Oklahoma 73019

Submitted by:

Office of Research Services
The University of Oklahoma
201 Stephenson Parkway, Suite
Norman, Oklahoma 73019

October 12, 2015



Photo credit: DEQ Staff



Figure 2: SCB Test in Progress

Photo credit: University of OK School of Civil Eng. and Env. Science

Approach

Literature Review

- University of Oklahoma (School of Engineering and Environmental Science)
- Use of ground tire rubber (GTR) in asphalt
- Characterization of hot mix asphalt (HMA) containing GTR
- Associated performance when combined with virgin materials

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Approach

Literature Review

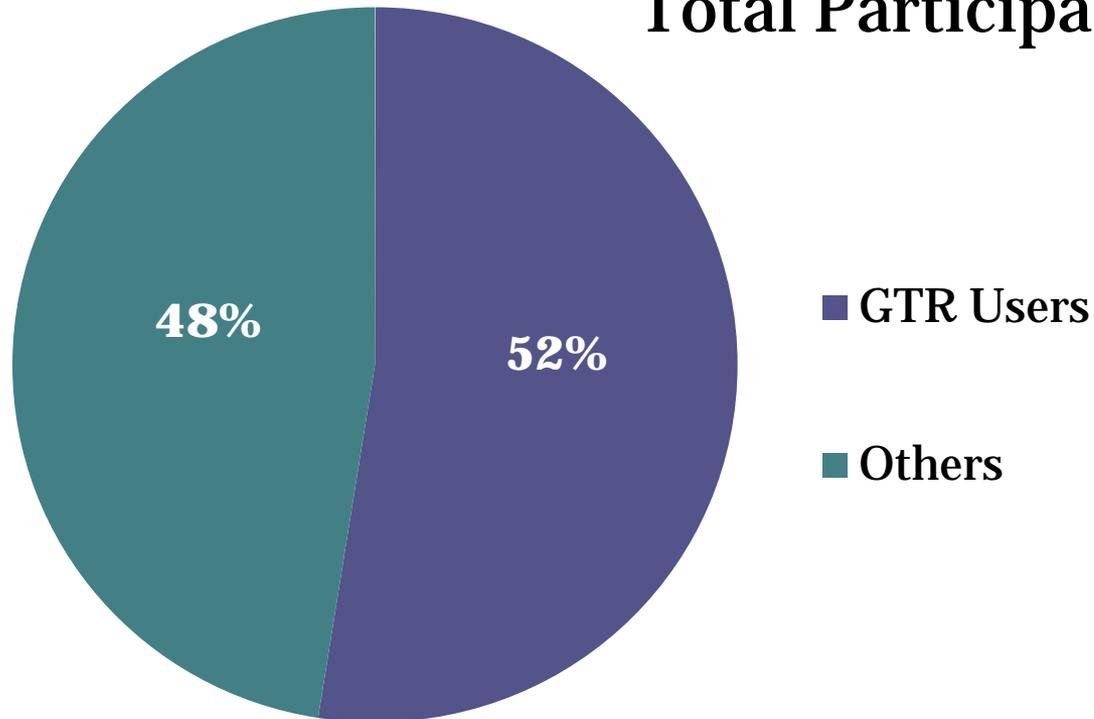
- **Summary of significant findings consisting of lab test results, field observations, and common practice**
- **DOT survey and summary of results**
- **Referenced over 90 citations**



Approach

Literature Review-DOT Survey

Total Participants = 40



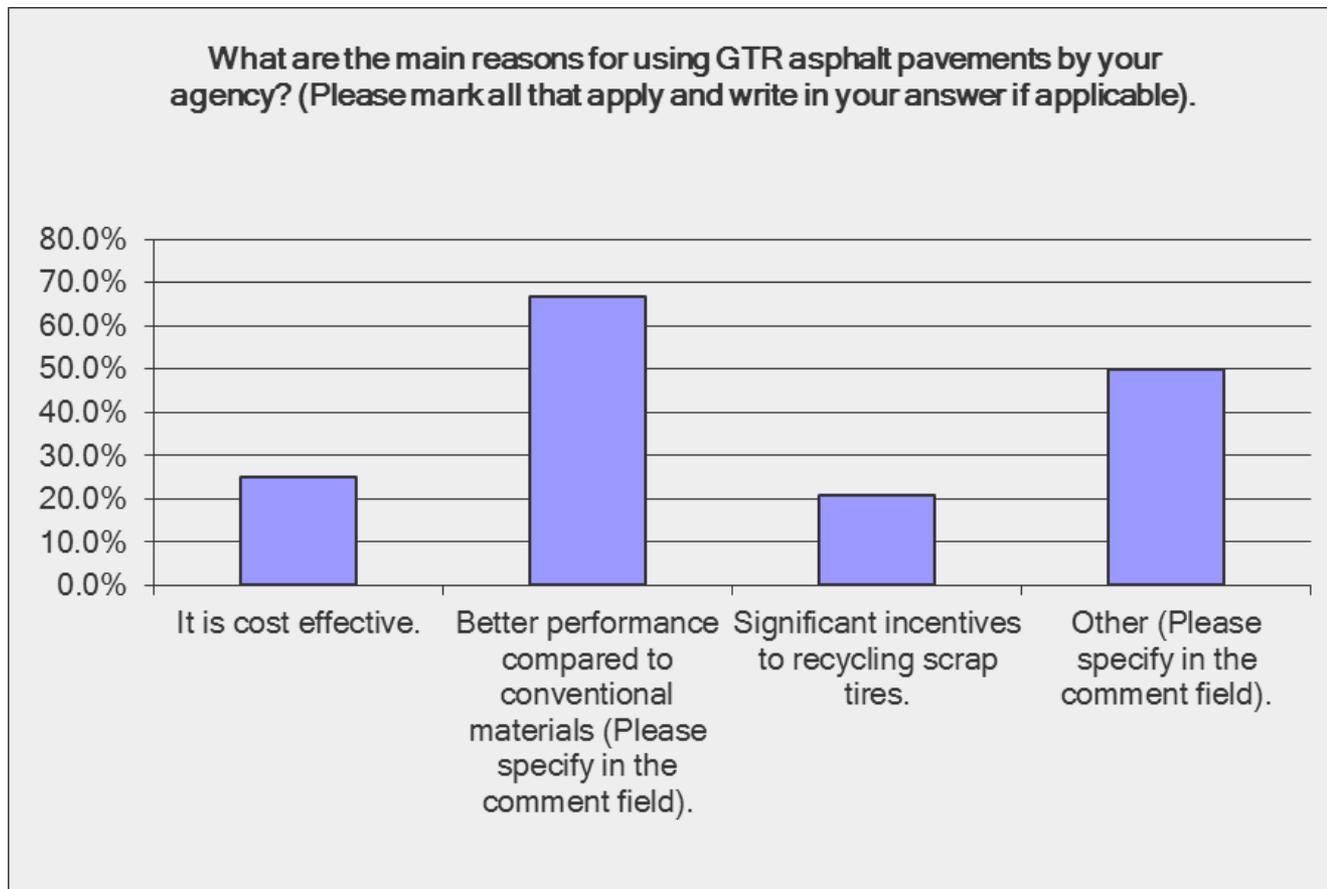
Approach

Literature Review-DOT Survey

Please specify the reason(s) for not incorporating GTR in asphalt mixes (please mark all that apply and write in your answer if applicable).		
Answer Options	Response Percent	Response Count
Unsuccessful experience of using GTR in asphalt mixes in the past (please specify in the comment field).	38.9%	7
Concern over the performance of asphalt mixes containing GTR (please specify in the comment field).	44.4%	8
Lack of performance data of asphalt mixes containing GTR.	27.8%	5
Using GTR in asphalt is not cost effective.	61.1%	11
There is not sufficient incentive to recycling scrap tires in pavement applications.	33.3%	6
There is not a crumb rubber producer in the state.	22.2%	4
Detailed Answer or Comment		16
	answered question	18
	skipped question	22

Approach

Literature Review-DOT Survey



Approach

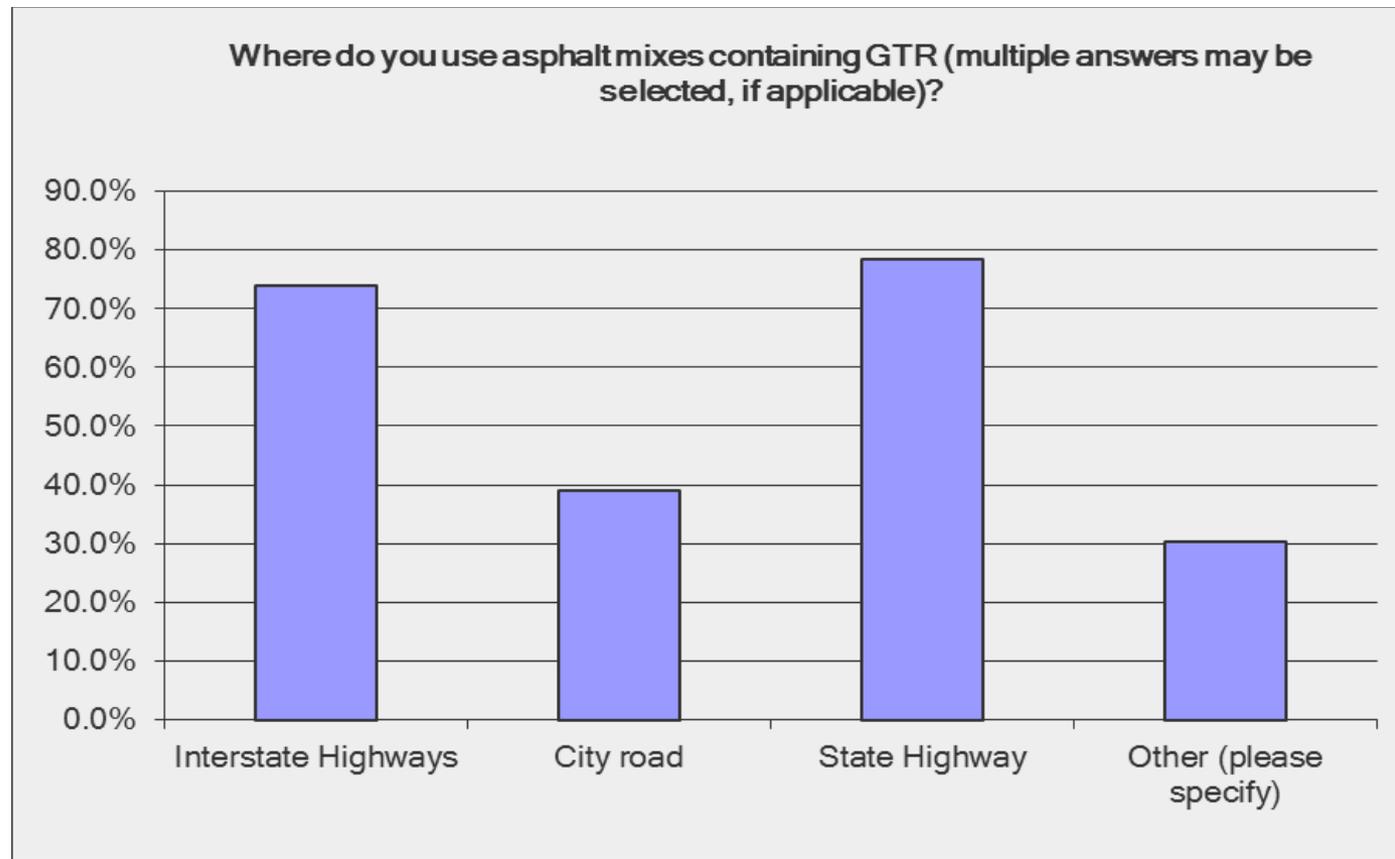
Literature Review-DOT Survey

Please specify in what type(s) of mixes the GTR is used by your agency (please mark all that apply and write in your answer if applicable)?

Answer Options	Response Percent	Response Count
Hot Mix Asphalt (HMA)	87.0%	20
Warm Mix Asphalt (WMA)	56.5%	13
Non-Structural Thin-Lift Overlay (<1.5 in.)	52.2%	12
Structural Overlays (> 1.5 in.)	56.5%	13
Mill-and-Fill Operation	47.8%	11
Chip Seal	30.4%	7
Fog Seal	21.7%	5
Other (please specify)	26.1%	6
answered question		23
skipped question		17

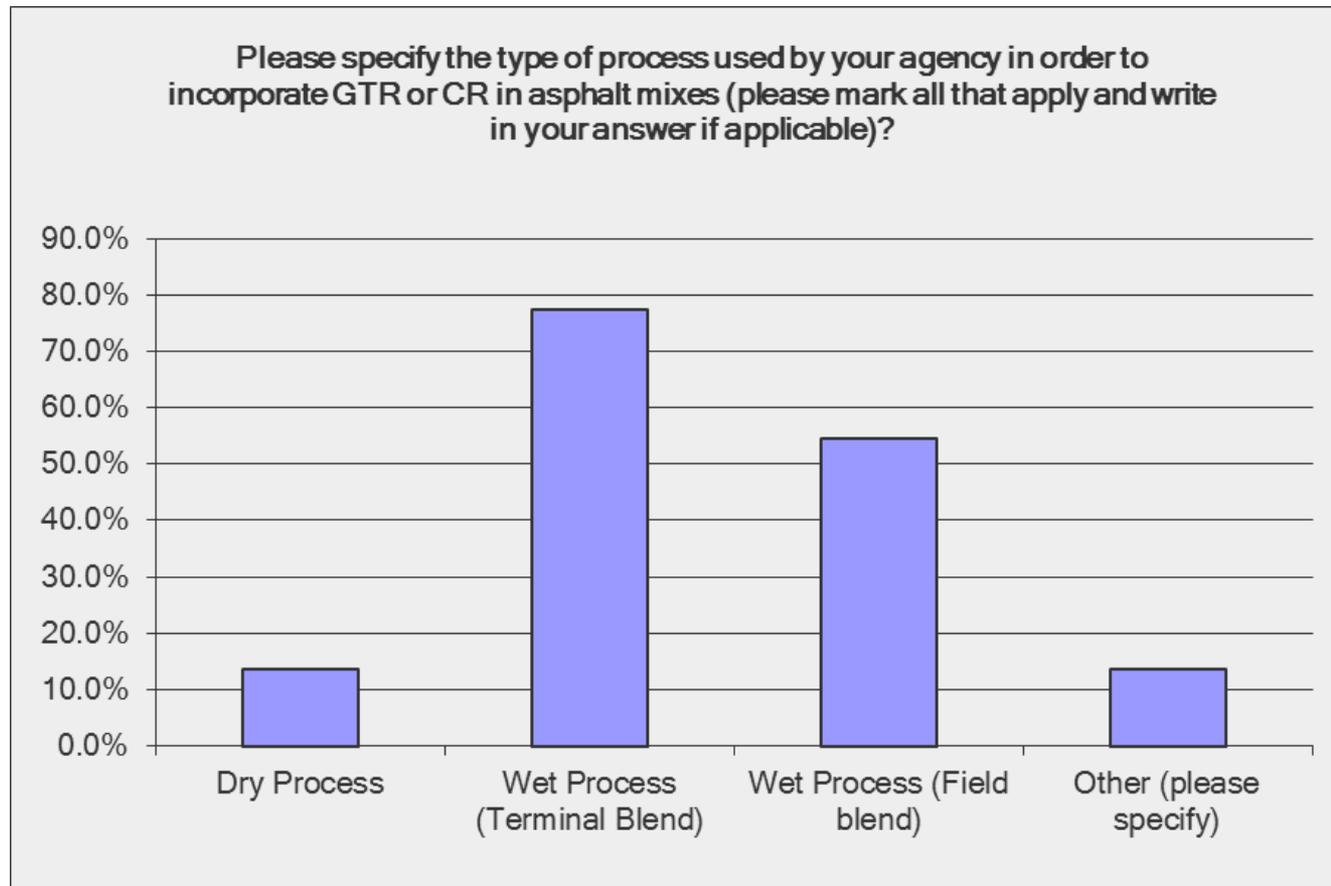
Approach

Literature Review-DOT Survey



Approach

Literature Review-DOT Survey



Approach

Demonstration Project

- ❑ Literature review (OU)
- ❑ Demonstration Project (Wagoner County)
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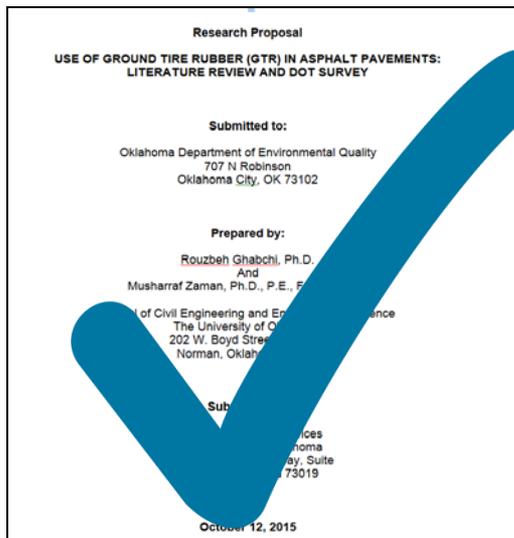


Photo credit: DEQ Staff



Figure 2: SCB Test in Progress

Photo credit: University of OK School of Civil Eng. and Env. Science

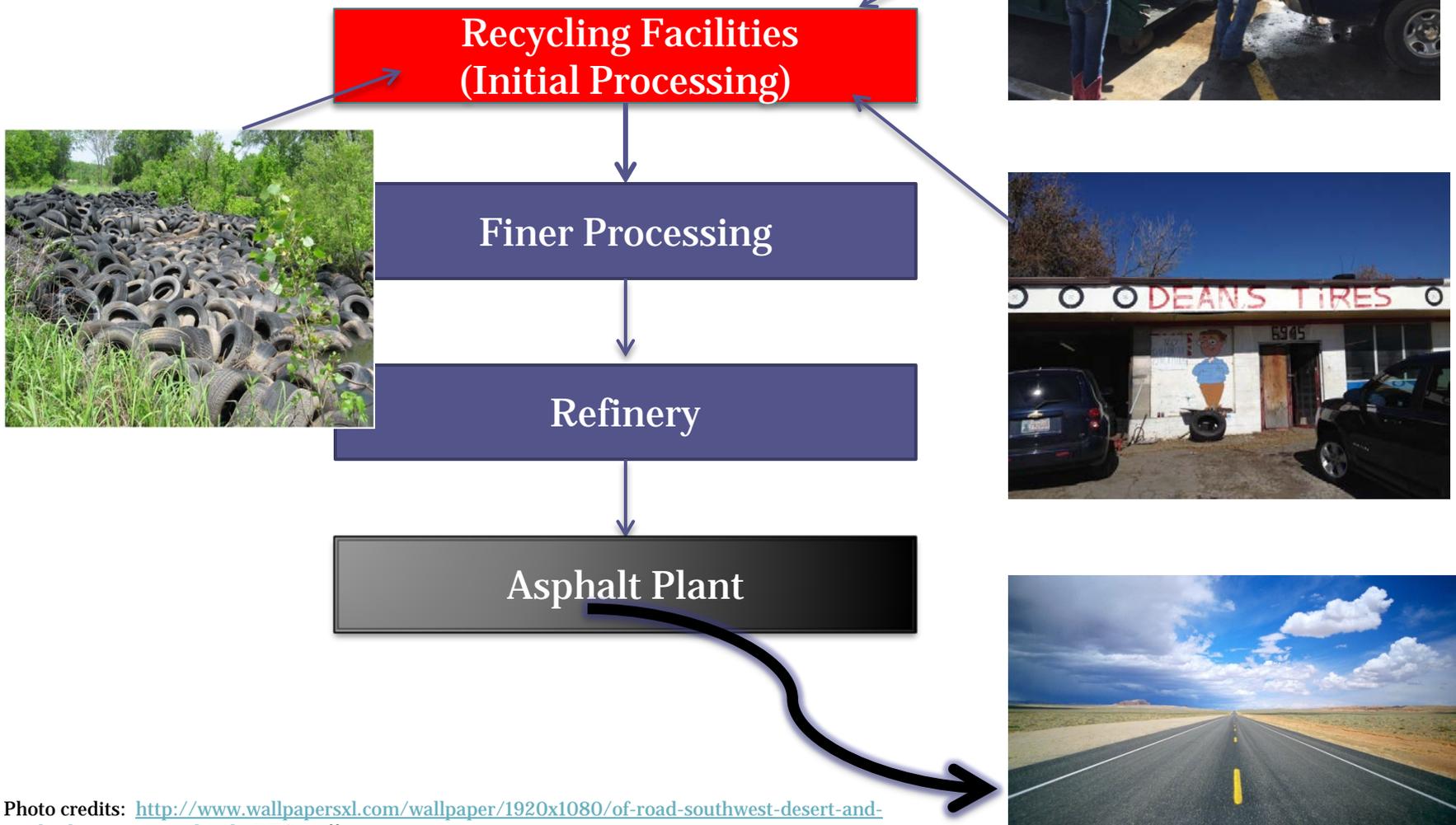
Approach

Demonstration Project-Benefits

- Create a demand for the use of Oklahoma tires in asphalt;
- Determine cost and performance of using GTR in asphalt on OK roads;
- Obtain metrics and data related to design method most appropriate for Oklahoma;
- Determine feasibility of using rubberized asphalt in future projects;
- Encourage the use of GTR in asphalt and eliminate scrap tire stockpiles.

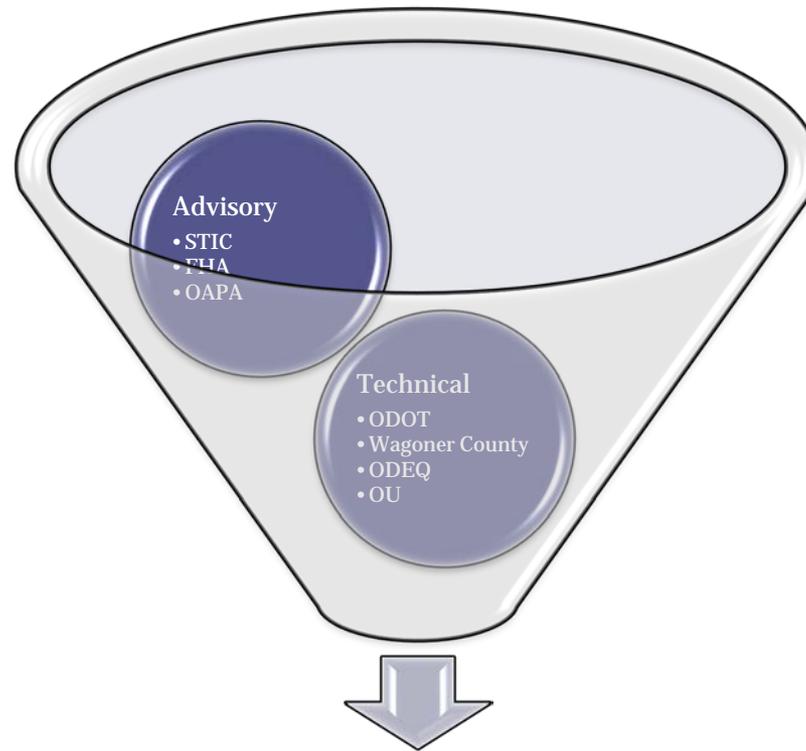
Approach

Demonstration Project



Approach

Demonstration Project



PARTNERSHIPS

Approach

Demonstration Project-Challenges

- **Creating buy in with partners**
 - “Who is going to fund the project?”
 - “Who is going to take the lead?”
 - “What are the risks?”
- **County**
 - “Why should we try something new?”
 - “What incentive can you provide that will mitigate the risk?”
- **Project Design**
 - “What is the most beneficial performance grade for Oklahoma using GTR?”

Approach

Demonstration Project

“How do we maximize our tanker loads?”

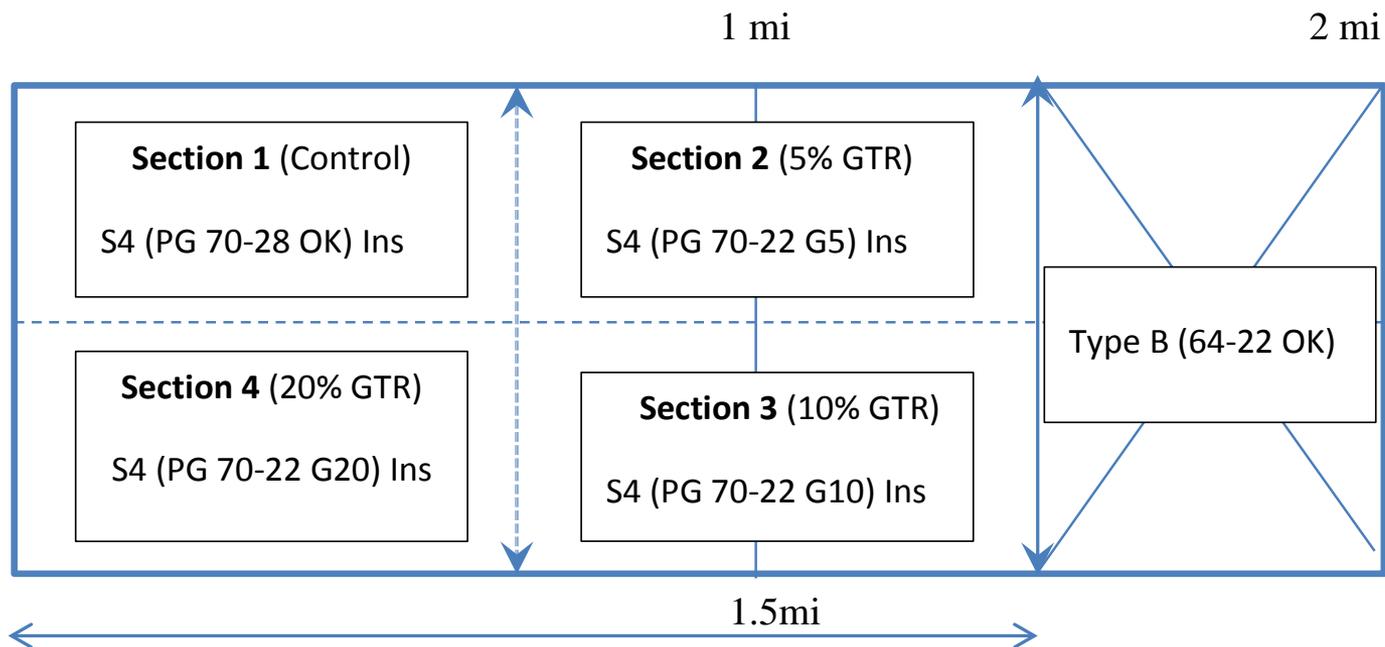


Diagram 1

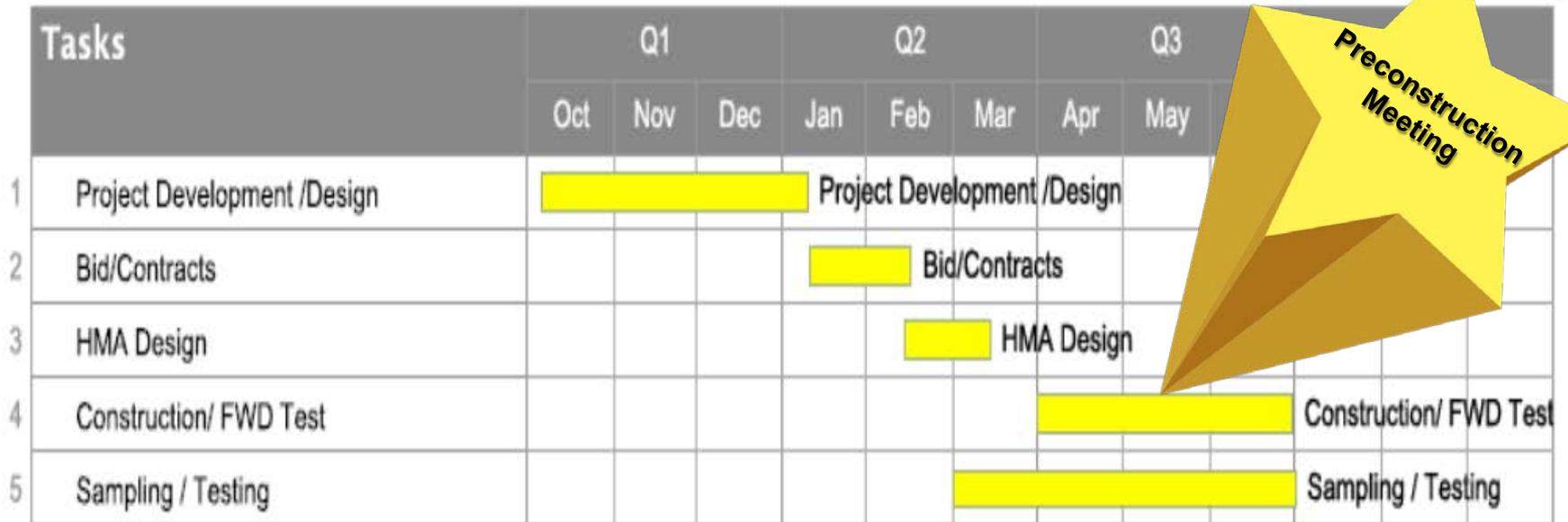
Approach

Demonstration Project

- **Contractors**
 - “This is going to be a logistical nightmare!”
- **Suppliers/Producers**
 - “We’re in.”
- **Oklahoma Processors**
 - “We are good with our current markets.”
 - “How will new markets affect our revenue stream?”
 - “Until there is a demand, we cannot justify purchasing additional equipment.”

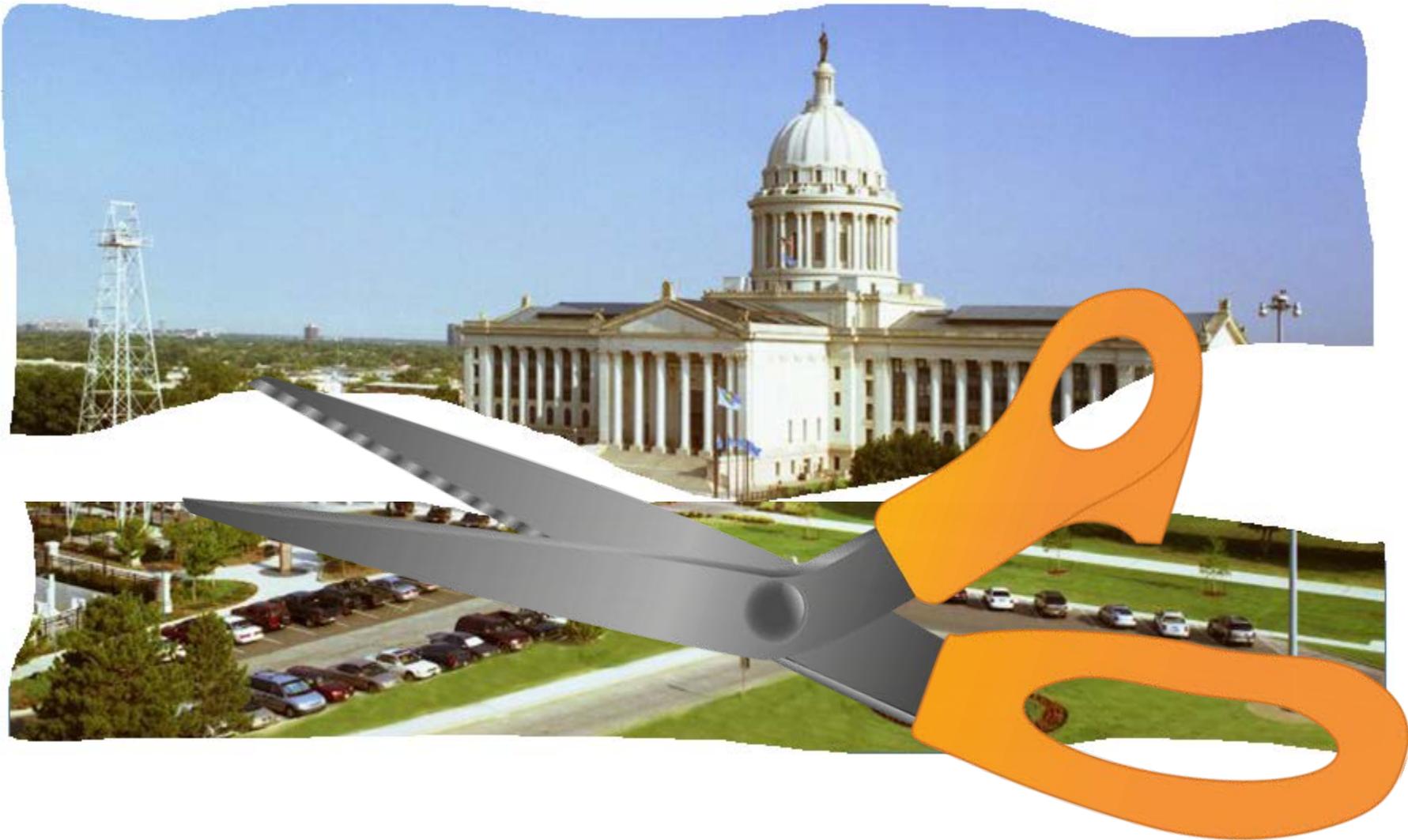
Approach

Demonstration Project



Approach

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Demonstration Project

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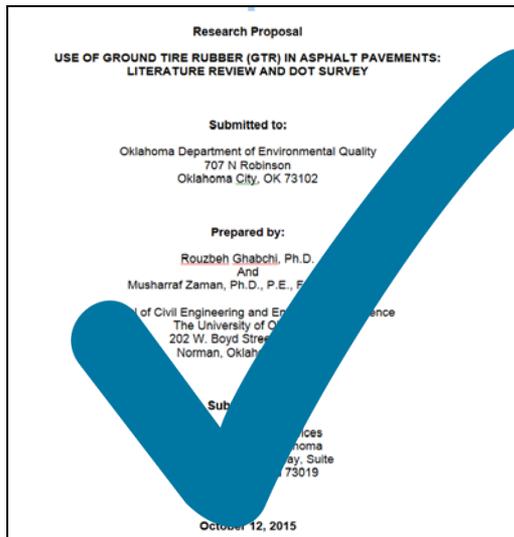


Photo credit: DEQ Staff



Figure 2: SCB Test in Progress

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Future Markets

- Other applications of GTR
 - Trails, tracks, molded rubber products, etc;
- Tire Derived Aggregate (TDA)
 - pipeline infrastructure bedding, lightweight embankment fill, etc.;
- Develop a demand for other available markets in Oklahoma

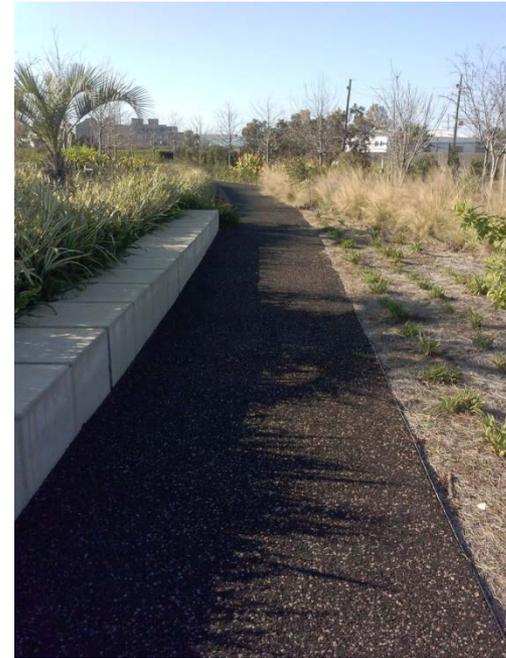


Photo credit: Crescent Park, New Orleans, LA photo taken by Ferrella March ; KBI Flexi®-Pave



Photo credit:
https://www.google.com/search?q=TDA+civil+engineering&biw=1920&bih=898&source=lnms&tbn=isch&sa=X&ved=0ahUKEwiehNur7KXNAhUo4IMKHVXVAYcQ_AUIBigB#imgrc=Jbm6ajjOBZmzhM%3A

Questions?

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Photo credit:

<http://www.bing.com/images/search?q=holding+up+hands+images&view=detailv2&adlt=strict&qpv=holding+up+hands+images&id=FBAB31079AD954A0B027EEE8A8A7E58E546928E5&selectedIndex=0&ccid=3TyBSXtM&simid=608041995760959620&thid=OIP.Mdd3c81497b4c359b3ff8bab86956e864o0&ajaxhist=0>

