**Study Overview**

ODOT and local public agencies perform routine repairs on roadways in Ohio to maintain comfortable and safe travel of the public. Roadways in Ohio with heavy Amish buggy traffic see more frequent partial depth repairs as it encounters more damage. This project was initiated by ODOT and the Ohio Research Initiative for Locals (ORIL) to improve the performance and service life of partial depth repairs performed on Amish buggy routes in Ohio and reduce their life cycle costs.

### Problem Identification

<table>
<thead>
<tr>
<th>Calks on the horseshoes of Amish buggies are the main cause of pavement damage.</th>
<th>The damage resulted in much higher repair costs on Amish route</th>
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<tbody>
<tr>
<td><img src="image1.png" alt="Horseshoe Image" /></td>
<td><img src="image2.png" alt="Graph Image" /></td>
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### Proposed Solution

#### Design of New Asphalt Mixes

New asphalt mixes that have much better resistance to damage were designed & evaluated.

- Design Asphalt Mixtures
- Conduct Laboratory Testing
- Durability
- Rutting
- AASHTO T282
- Flow Number

#### Field Evaluation

- ![Roadside Images](image3.png)

#### Design of Horshoes with Alternative Calks

Different safe, cost effective, and durable alternative horseshoes were designed & evaluated.

- Amish farriers helped in the design and evaluation of these alternative shoes.

- Lab tests indicated that the alternative shoes could significantly reduce pavement damage.

- ![Horseshoe Images](image4.png)

Experiments were performed at the Louisiana State University School of Veterinary Medicine to evaluate the effect of alternative shoes on horses.

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This research project was sponsored through the Ohio’s Research Initiative for Locals, Ohio Department of Transportation and Federal Highway Administration.
The use of the identified alternative horseshoes can reduce the vertical stresses imposed on the roads by at least 45%. However, it should be noted that the Amish farriers dress the horseshoes for worse case scenarios (typically township chip sealed roads).

The use of the identified alternative horseshoes can reduce the repair costs of Amish buggy routes by at least 40%.

The use of the identified alternative horseshoes can reduce the annual horse costs by at least 15% when considering the effects of those shoes on the horse service life.

Several horseshoes alternatives were identified. Horseshoes with new calk design are the most economical and easiest to be implemented at the current time. However, the Amish farriers dress the horseshoes for worse case scenarios (typically township chip sealed roads). Therefore, a task force led by the Amish and includes representatives from the townships, counties and ODOT has been established to address this issue and develop an implementation plan to ensure that the Amish community start using the alternative horseshoes identified in this study.

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