



# Mixture Design and Performance-Based Specifications for Cold Patching Mixtures

Vanessa I. Rosales-Herrera  
Jolanda Prozzi  
Jorge A. Prozzi

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Project Title:	Material Design and Testing Methods for Home Made and Containerized Cold Mix
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Performing Agency:	Center for Transportation Research at The University of Texas at Austin

Project performed in cooperation with the Texas Department of Transportation and the Federal Highway Administration.

# **Laboratory and Field Tests were used to Evaluate the Performance of Containerized and Homemade Cold Patching Mixtures.**

## **Cold Patching mixtures evaluated included:**

- \*Asphalt Patch**

- \*PermaPatch**

- \*Proline**

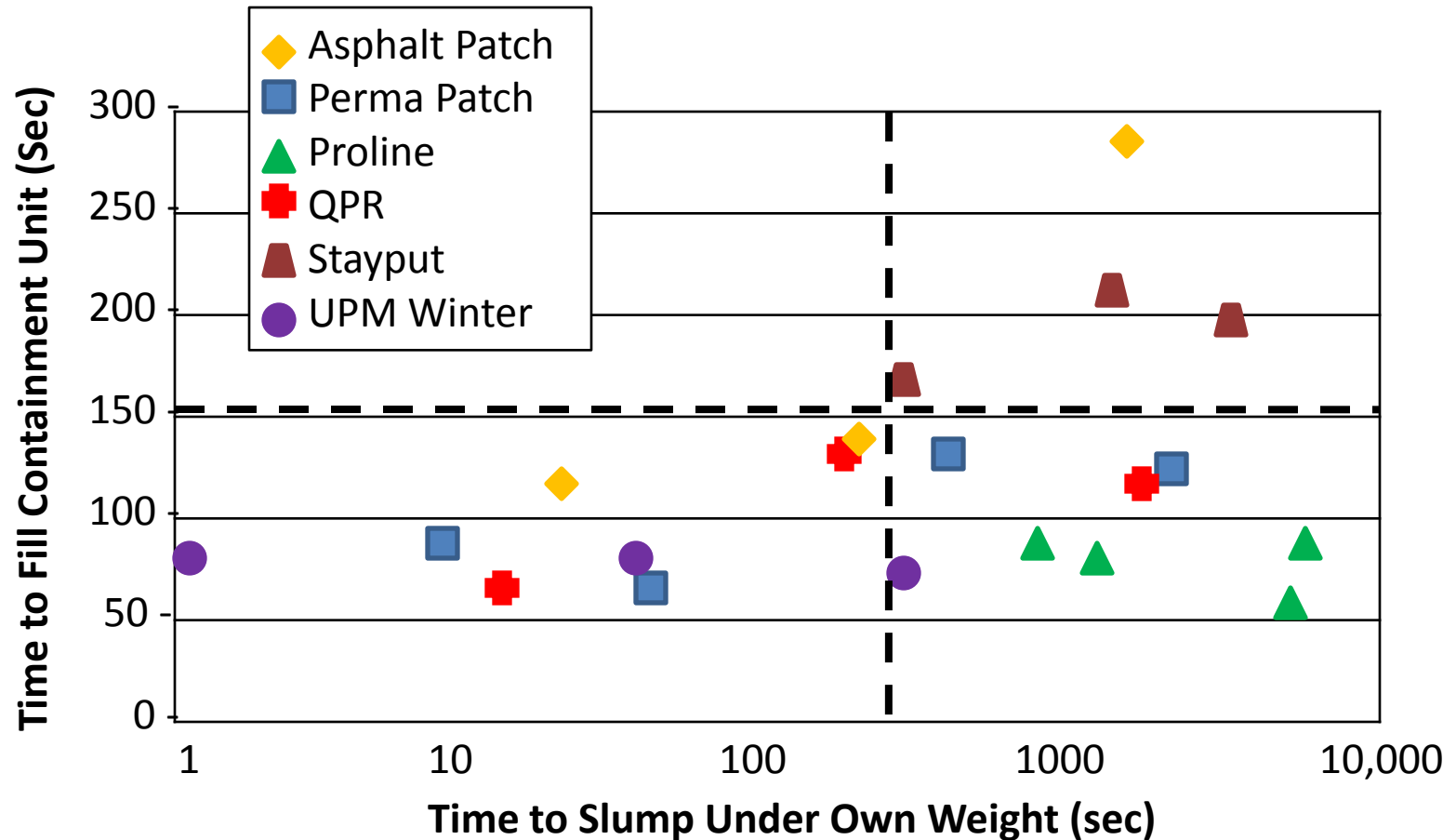
- \*QPR**

- \*Stayput**

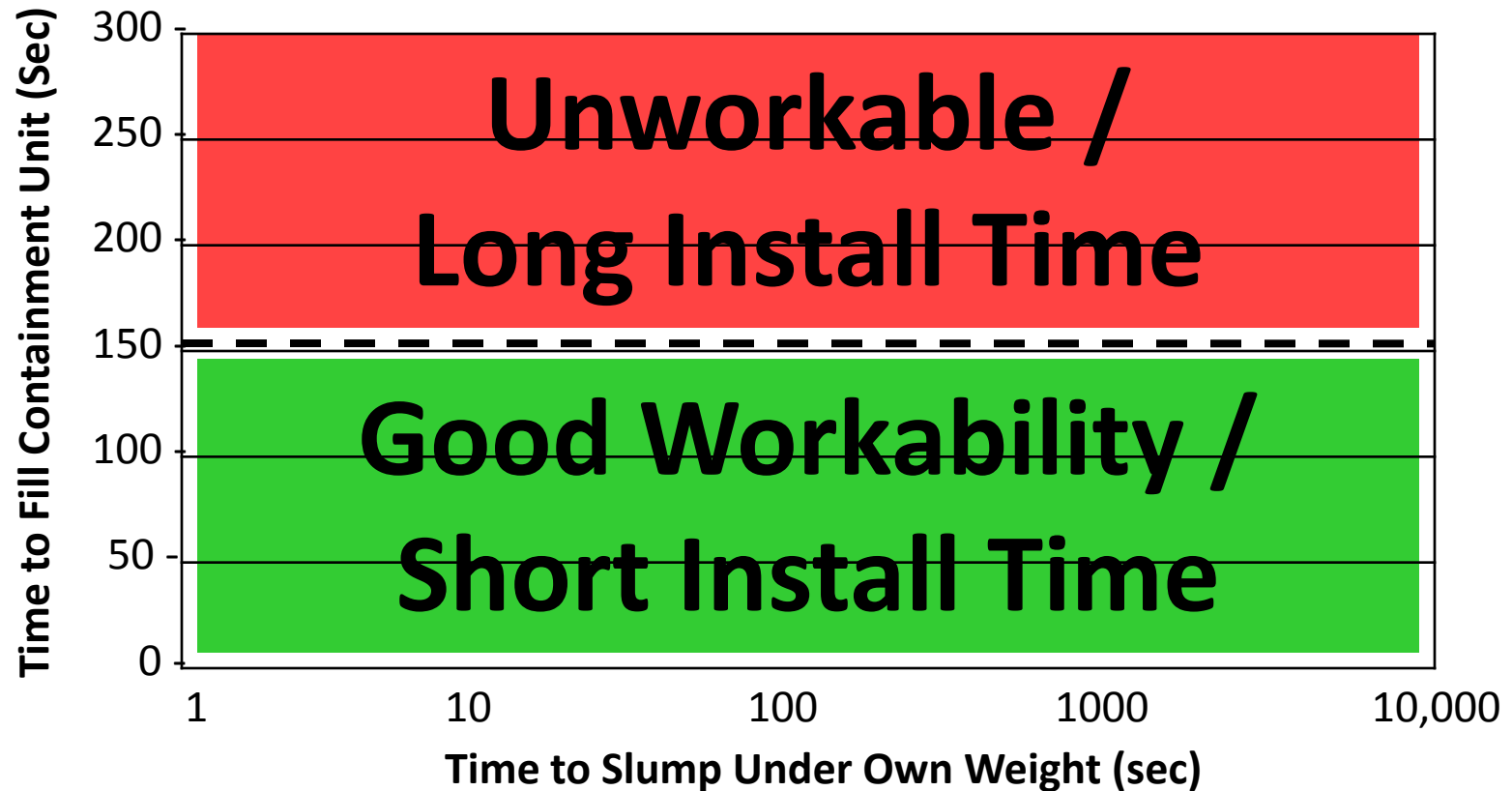
- \*UPM**

# Laboratory Slump Test

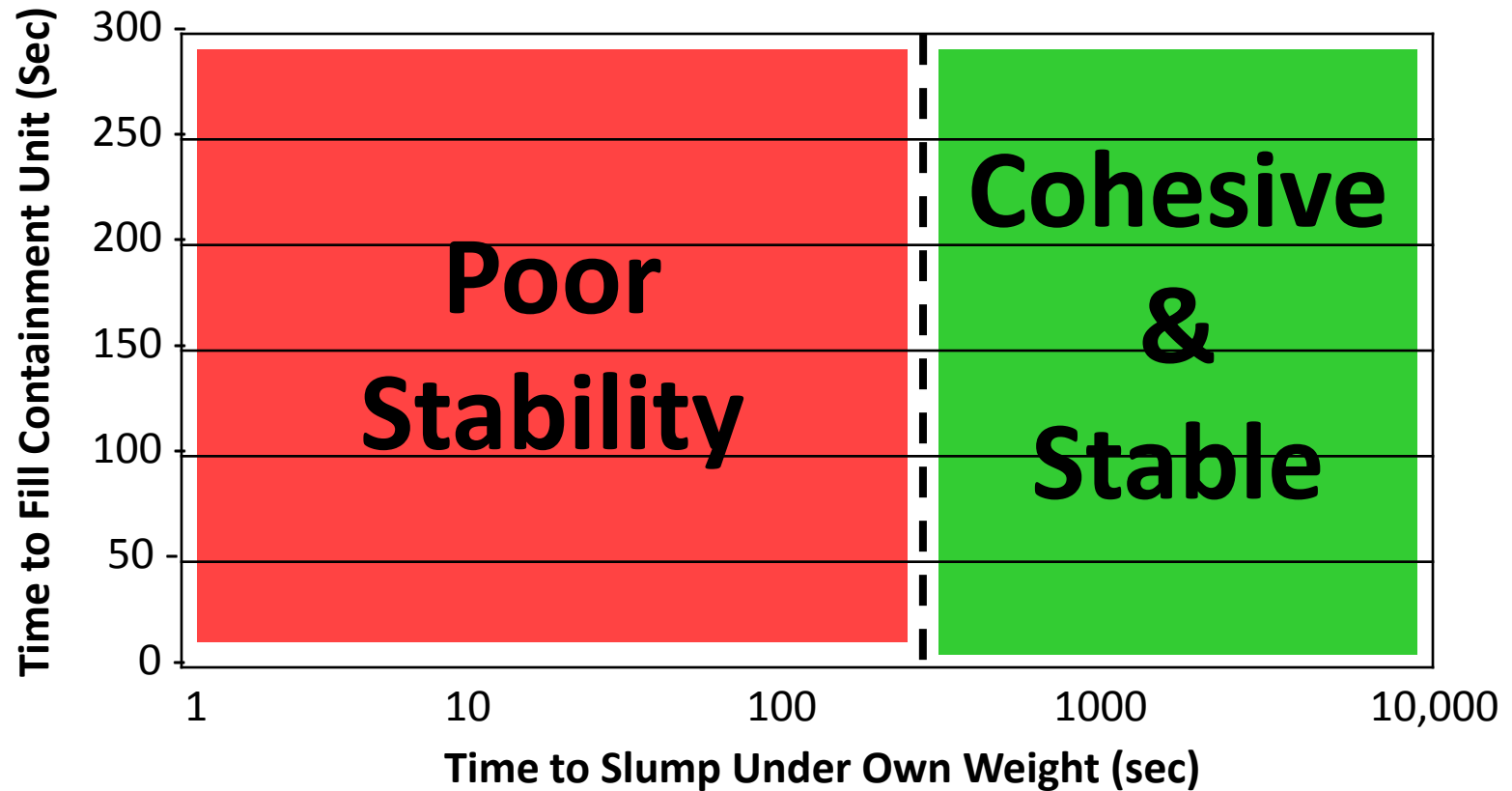
Materials workability or ease of placement in the field, stability, and cohesion.



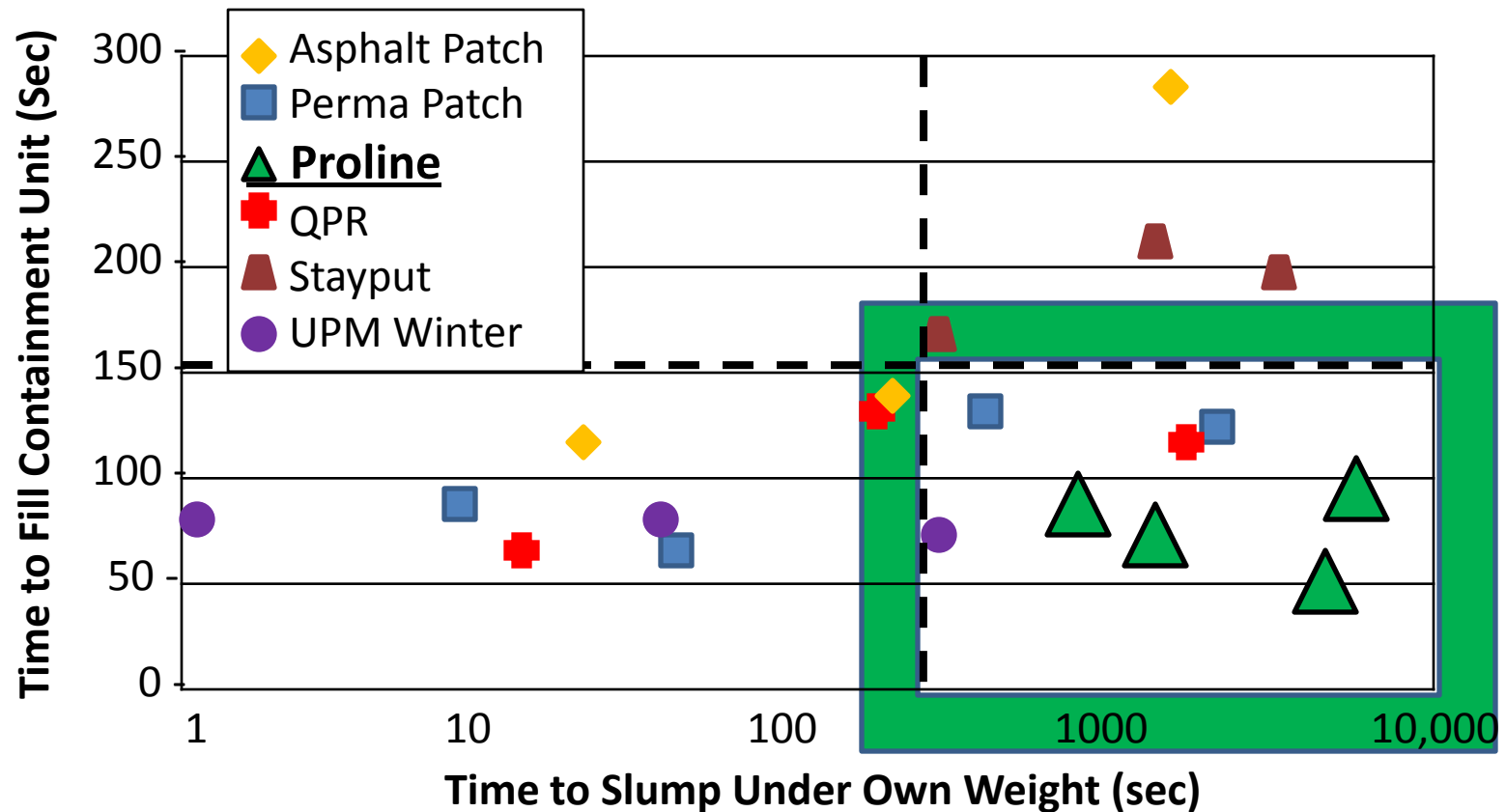
# Workability & Install Time in Field



# Stability and Cohesion



# Proline is the only material that tested both Workable & Cohesive 100% of the Time!



# Texas Stability Test Results

“Unlike the previous materials, the load values for Proline were slightly better than those attained by Instant Road Repair. This is an indication that Proline will have similar stability, or slightly better, than IRR. Not only that, but the Cold Patch Slump Test results revealed that this material is both workable and cohesive.”

# Accelerated Pavement Testing

## *\*Preliminary Results*

- At 0 hours after installation, **Proline sustained the largest number of wheel passes** before reaching a rut depth of 3/8 inch.
- At 48 hours after installation, Proline's rut progression had stabilized at 1/8 inch for over 1,000 wheel passes. This indicates that **Proline was again the material displaying the best stability.**
- An isolated rain event occurred between the 48 and 168 hour tests. Despite the variability in temperature and moisture, **Proline again exhibited the best stability in the 168 hour test.** The number of wheel repetitions to failure for Asphalt Patch, Perma Patch, and Stayput were significantly lower.



# Accelerated Pavement Testing

## *\*Modified Results*

Proline sustained the largest number of wheel passes before reaching a rut depth due to compaction greater than 3/8 inch. The average number of wheel passes to failure was 816, which is more than 10 times larger than that attained by IRR. In fact, one Proline material installation did not achieve a rut depth due to compaction greater than 3/8 inch and testing was terminated after 1,008 wheel passes were applied. The constant initial rut progression of this material is a good indication of the material's resistance to deformation under the application of load.

As was the case in previous tests, Proline demonstrated the best performance.

# Field Evaluations

## **Fort Worth:**

Proline and Pacher were the best and worst performing materials, respectively. Proline was installed in nine locations from which condition scores remained above 80. Pacher was the only material with condition scores under 70.

## **Amarillo:**

The best and worst performing materials were Proline and Stayput. A total of six Proline patches were installed in the Amarillo district. Of these patches, two failed while all others remained with condition scores greater than 90. For Stayput, six of the eight patches installed failed after just 6 weeks.

## **Lubbock:**

Overall, Perma Patch and Stayput did not perform as well as Pacher and Proline.

## **Lufkin:**

Many of the condition surveys performed on the patch installations in the Lufkin District were discontinued early. TxDOT personnel explained that hurricane events in their area caused them to shift their maintenance activities, resulting in the lack of available data.

## **Yoakum:**

Pacher and Proline exhibited very good performance. Condition scores for all patches in these two materials remained well above 90. On the other hand, Perma Patch and Stayput experienced one failure each.

## TxDOT Overall Results

Overall results “ suggests that Proline is the patching material that performs the best in the field.”

# Winter Field Evaluations

The specific goal was to evaluate the performance of the homemade mixtures in cold weather conditions. In addition to these homemade mixtures, Proline was installed as a benchmarking product. This material performed consistently well in all laboratory tests, accelerated pavement tests, and field evaluations.

## Results

Preliminary results from the modified winter evaluation demonstrate that Proline performs slightly better than both Lab and Bovina homemade mixtures. One Proline patch installation did not demonstrate any sign of distress, whereas the other Proline patch demonstrated minimal dishing at 8 weeks after installation. Of the two homemade mixtures, the Bovina homemade performed slightly better than the Lab homemade.

# Cost-Effectiveness Analyses

## Cost Considerations:

- Material cost, including shipping cost,
- Time to fill order,
- Specific storage requirements,
- Shelf life,
- Bag durability,
- Stability,
- Special handling requirements,
- Performance, and
- Other, specifically environmental impact.

The overall ranking of the mixtures, given the criteria used, in descending order is as follows:

- **Proline (Best)**
- Lubbock Mix and UPM
- Asphalt Patch
- Lab Homemade Mix
- QPR
- Perma Patch (Worst)

Unfortunately, the information for IRR and Stayput was incomplete since the vendor was not willing to participate in the study. These mixtures were therefore not ranked, but available information on each of the criterion is summarized.