

# Effective Treatment of Large Cracks in our Airport Taxiways and Runways

*Presented by:  
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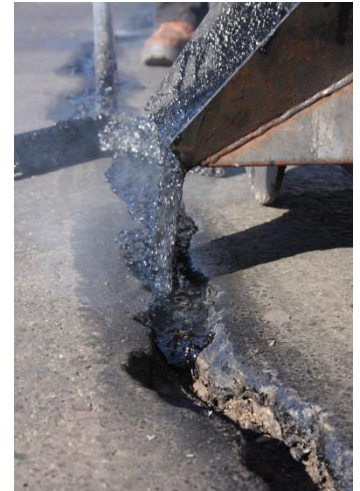


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# Agenda

- Typical Airport Repair Methods
- Mastic Materials
- Mastic Equipment
- Common Mastic Applications
- Where Mastic is being used today





# Airport Pavement Repair Methods



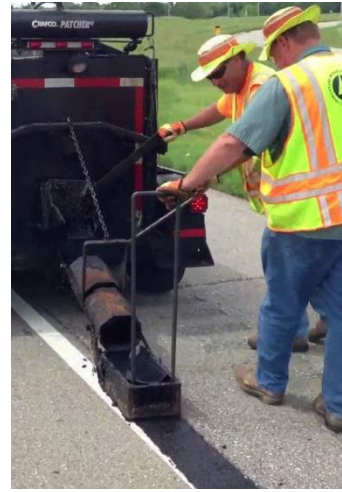
# Saw, Jack and Replace





# Mill and Replace With HMA





# Mastics



# What is Mastic?

A hot applied pourable, aggregate-filled, flexible, self-adhesive patching material used for maintenance and repair of asphalt and concrete pavements.



# Mastics Composition



Binder- Asphalt modified with Polymers and oils to better resist shoving and cracking.



Aggregate – designed to provide mass and stability for compression resistance and to meet load bearing requirements, while still allowing the material to flow.



# **Mastic Attributes**

**Flowable/Pourable**

**Aggregate Filled**

**Flexible**

**Bulkable**

**Durable/Resilient**

**Waterproof**

**Highly Adhesive**

**Rapid Set**

**Void less/No Compaction required**

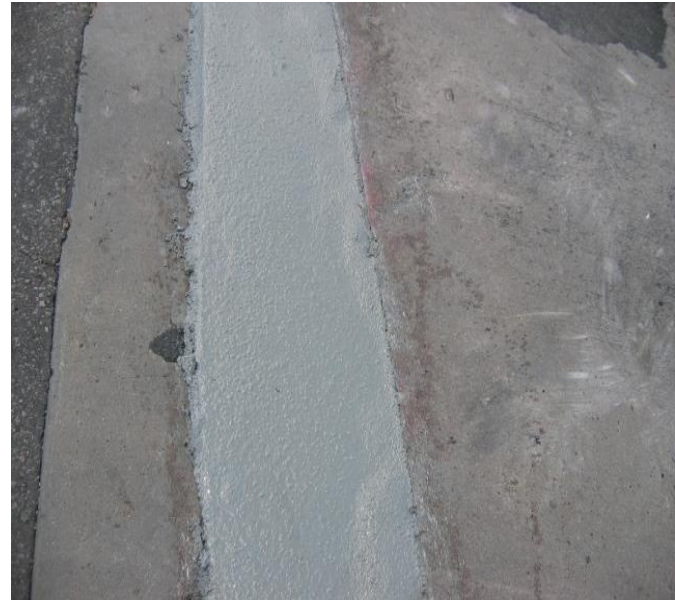
**Resistant to De-icing Chemicals**

# Types of Mastic

**Mastic - Black in Color  
For Asphalt**



**Mastic - Gray in Color  
For Concrete**





# Coarse vs. Fine Aggregate Blend

## Coarse Blend

Used to repair larger voids that carry more load bearing weight.  
Cosmetics not as important.

- Specific Gravity is approximately 1.80
- 116 Lbs. of Mastic to fill a cubic foot
- Weight per gallon: 13.91 lbs.



## Fine Blend

Used to repair smaller voids.  
Cosmetics are important where feathered edges are required.

- Specific Gravity is approximately 1.40
- 87 Lbs. of Mastic to fill a cubic foot
- Weight per gallon: 11.66 Lbs.



# Benefits of Mastics

- Mastics offer the best option for defective areas that are too extensive for crack sealing, while being less expensive than complete hot mix asphalt repair.
- No other product can provide waterproof repair like Mastics. The material is impermeable to water and air. Since this product is used to treat pavement damage as a result of water, having a waterproof repair is a huge win.
- Voidless repair means there is no need for compaction or consolidation after application. Reduced crew and equipment compared to hot mix asphalt.
- Easy installation. Highly flowable product, designed in premeasured package for consistency and maximum performance. No need to blend material in the field. Sets up in approximately 30 minutes, which is ideal for minimizing shutdowns on airport runways.



# Benefits of Mastics

- No air or moisture is trapped in the repair itself. The material finds all the voids and fills all the gaps.
- Flexibility – moves with the pavement instead of struggling against it. No need to worry about continuing pavement deterioration because of a stiff repair material. Resilient in both temperature extremes.
- Durable - the aggregate component gives the product mass and stability to withstand heavy loads. Provides a long-term solution (5+ years performance). Skid resistance is similar to hot mix asphalt.
- Highly adhesive material; bonds to both asphalt and concrete making it exceptionally track resistant.



# Mastic Testing

# Laboratory Testing for Mastic Binder

## Penetration

Measures the solidity of the asphalt binder

Typical: varies from  
35 to 60 max

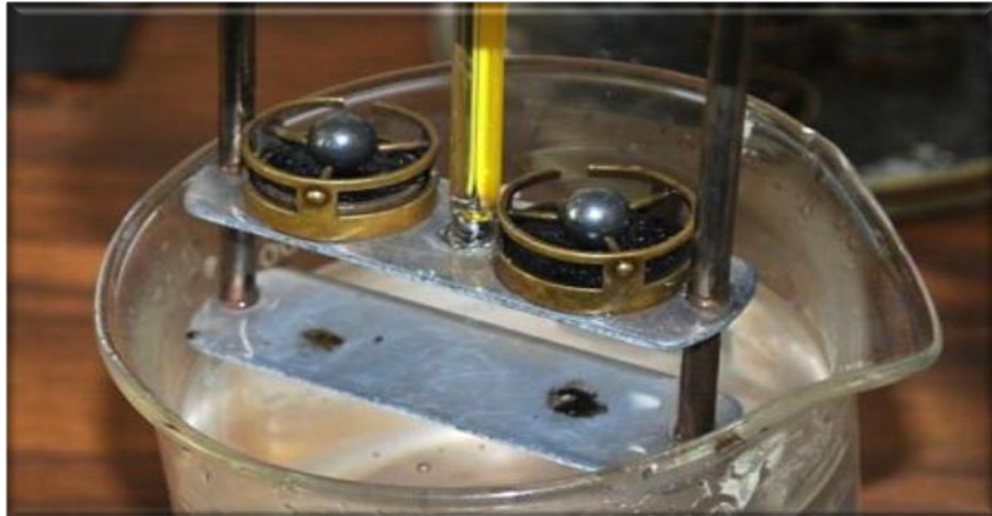




# Laboratory Testing for Mastic Binder

## Softening Point

Measures the temperature at which point a material loses its internal strength and cohesiveness.



# Laboratory Testing for Mastic Binder

## Cone Penetration

This test is an indication of material hardness or stiffness at a specified temperature.

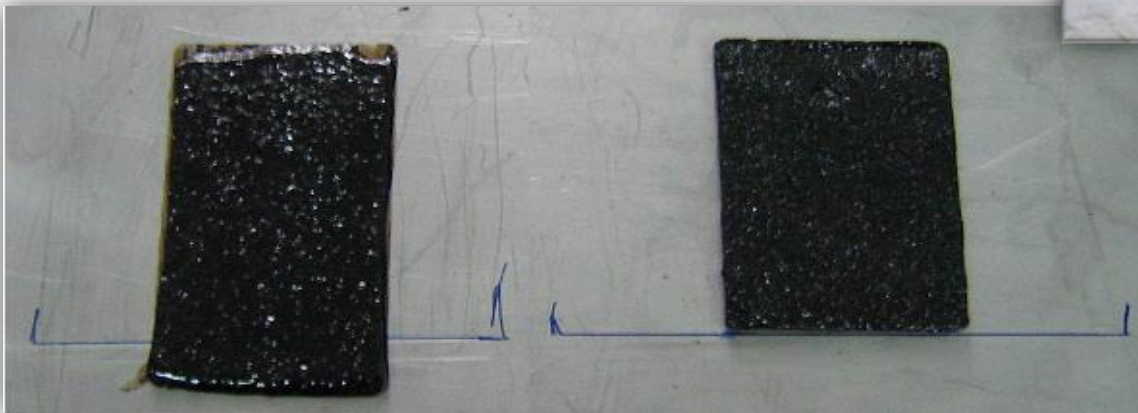
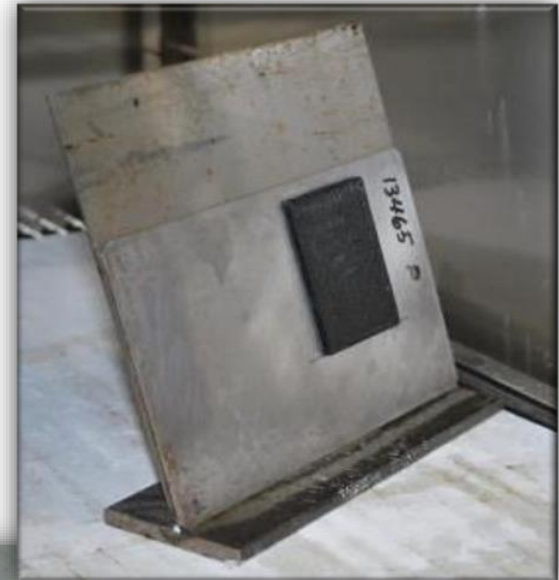


# Laboratory Testing for Mastic Binder

## Flow

Indicates high temperature flow resistance and the material's ability to resist tracking in the summer heat.

Max: 3-5 mm





# Laboratory Testing for Mastic Aggregate

## Aggregate Gradations

Requires aggregate to meet minimum and maximum specifications over established screens. Determines fine and coarse graded mastic mixes.



## Resistance to Abrasion

Determines basic hardness of aggregate.





# Mastic Equipment

# Mastic Melters/Applicators



**Crafco Patcher II  
& Patcher I**



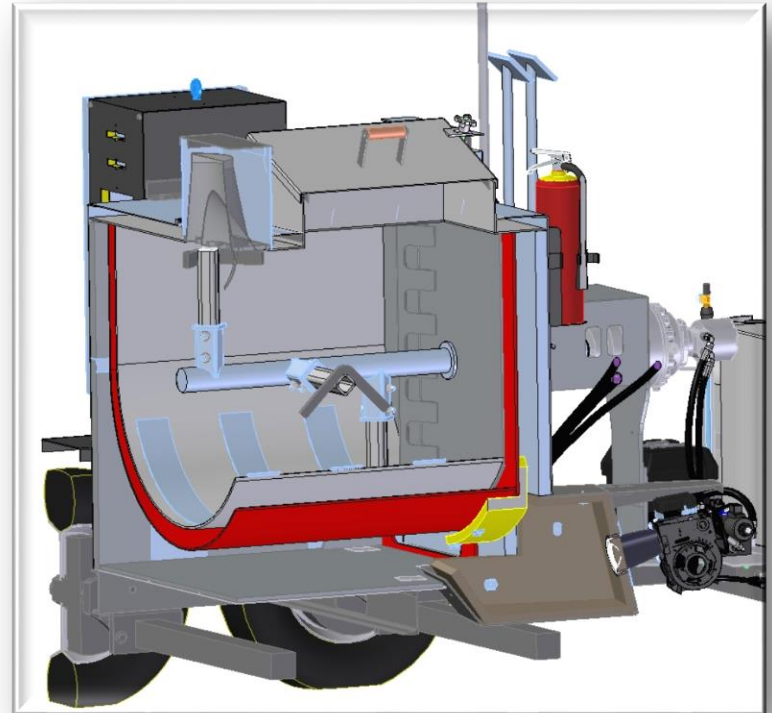
**Marathon Mastic Mixer**





# Mastic Melters/Applicators

- Designed to heat and mix rubberized asphalt containing aggregate
- Oil jacketed double boiler units
- Gravity fed
- Full sweep agitation designed to keep aggregate in suspension



# Mastic Installation Methods

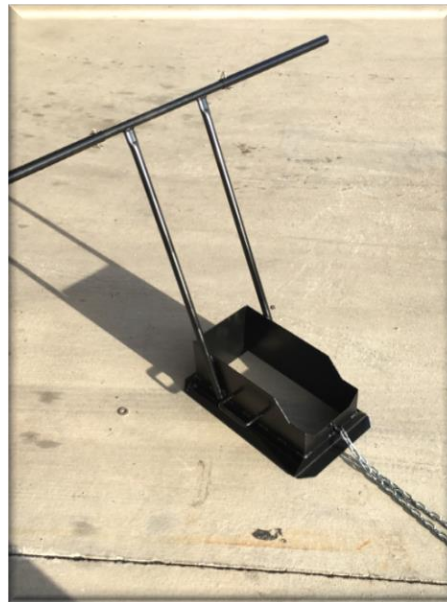
Heated Mastic can be applied:



Directly to the prepared area from the melter

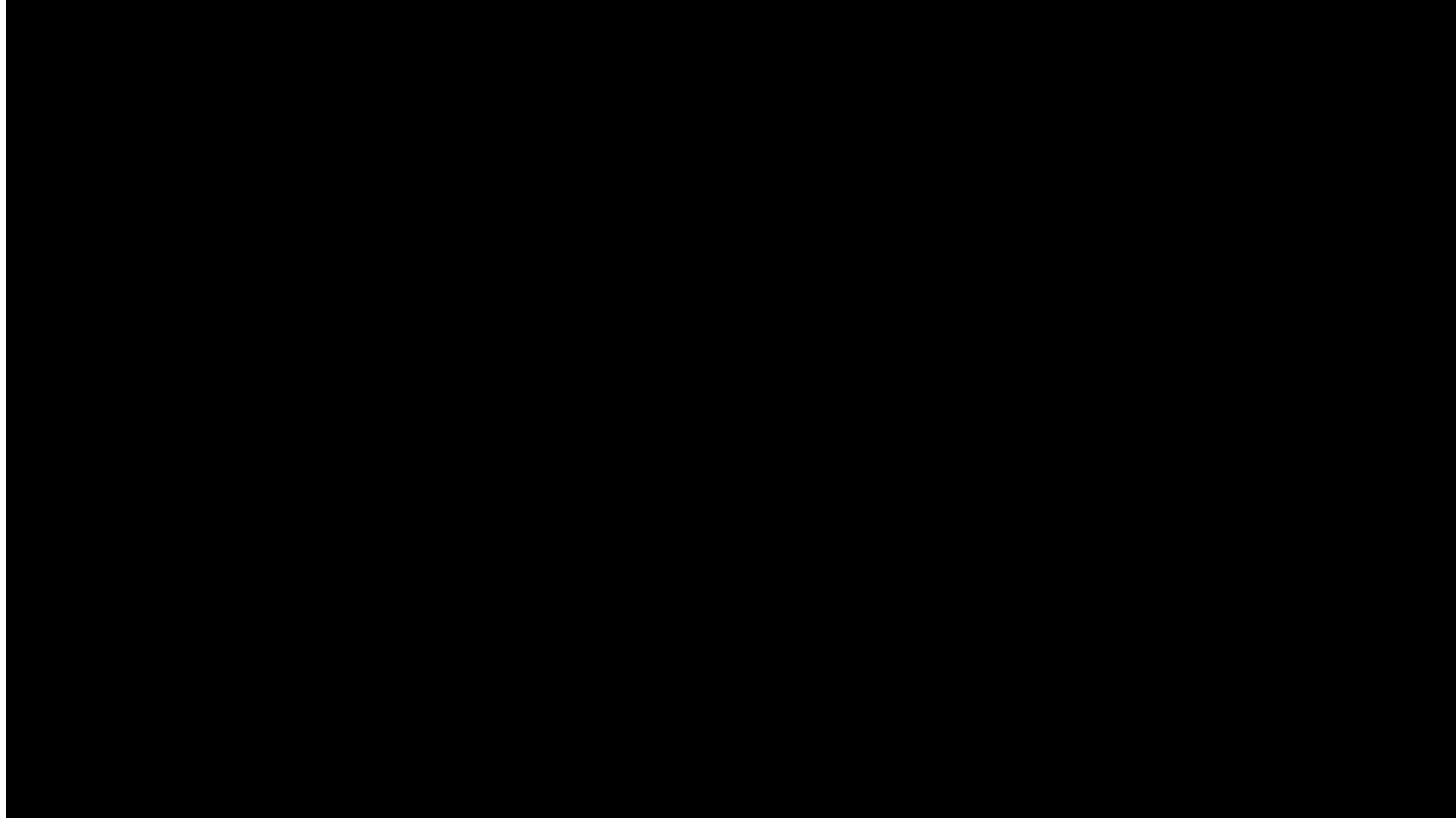


Using a drag box



Using a material handler

# Drag Box Video





# Mastic Material Handlers



**Hot Mastic Applicator**



# Mastic Material Handlers

Installing Gray Mastic into longitudinal concrete joint.



Using a V shaped metal squeegee to install Gray Mastic into smaller concrete joints.



Using a mastic applicator with attached squeegee to fill large cracks.



# Mastic Material Handlers

Gray Mastic being gravity fed from Mastic Mixer







# Mastic Applications

# Typical Mastic Applications

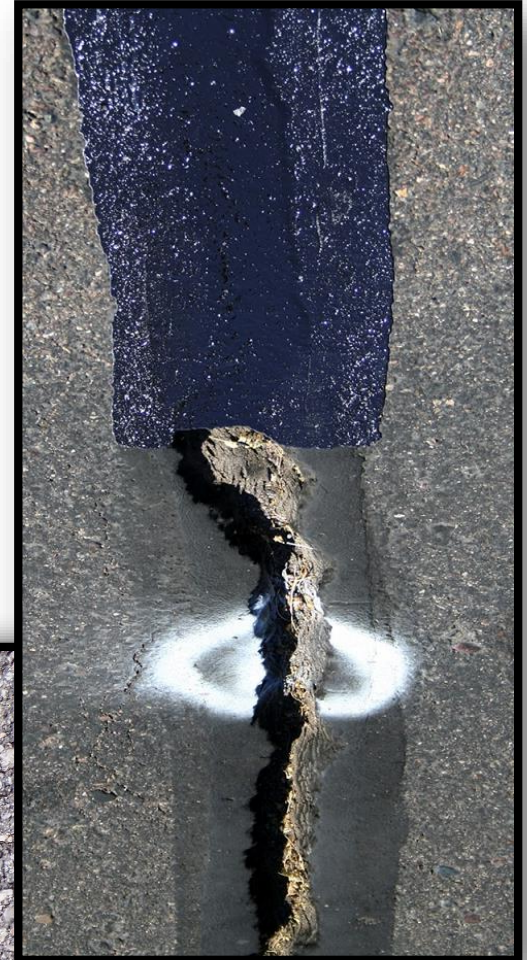
- Sealing Wide, Transverse & Longitudinal Cracks & Joints
- Filling Potholes
- Filling Utility Cuts
- Leveling Depressed Transverse Cracks
- Leveling Around Manhole Covers
- Leveling Concrete to Asphalt Transitions
- Filling Spalls in Concrete
- Filling Corner Breaks in Concrete



# Mastic Applications



For cracks greater than 1.5" (3.8 cm) wide in both asphalt and concrete.





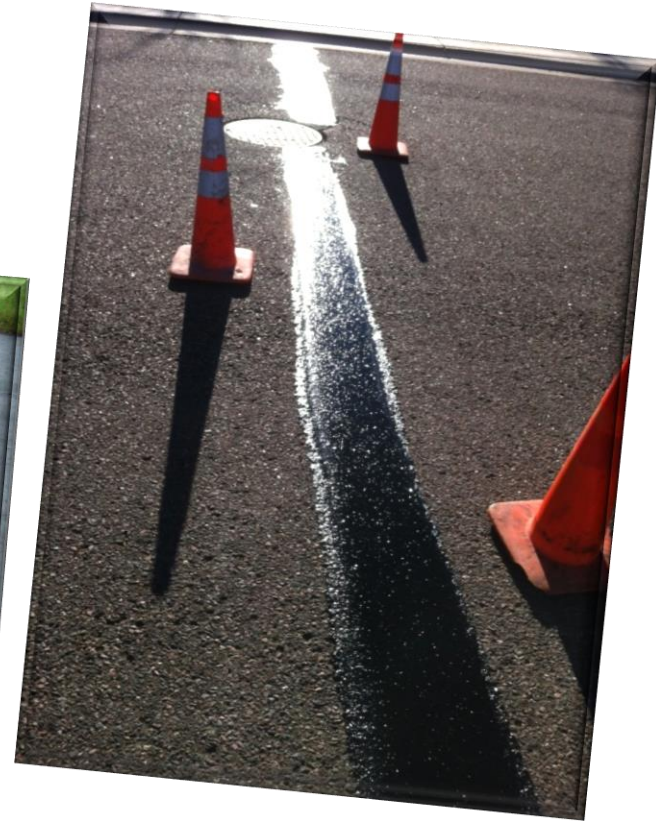
# Mastic Applications

Repair longitudinal  
cracks and  
unraveled paving joints



# Mastic Applications

Repair transverse cracks  
And level runway pavements





# Video – Transverse Repair with Shoe Box



Using the same method of repair as shown in this video, 2013 South Dakota DOT Pavement Maintenance bids had Major Crack Repair at \$45.00 per Linear Foot and Crack Leveling with Mastic was \$5.00 per Linear Foot.



# Mastic Applications



Recessed thermal cracks





# Mastic Applications

Fill potholes on  
parking lots and  
service roads



# Mastic Applications

Use Mastic for airport parking lots and taxiway maintenance





# Mastic Applications

## Manhole covers



# Mastic Applications

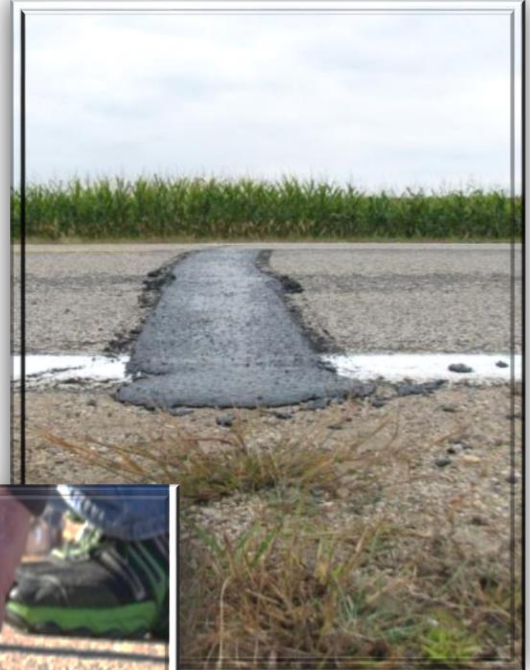
## Joint failures





# Mastic Applications

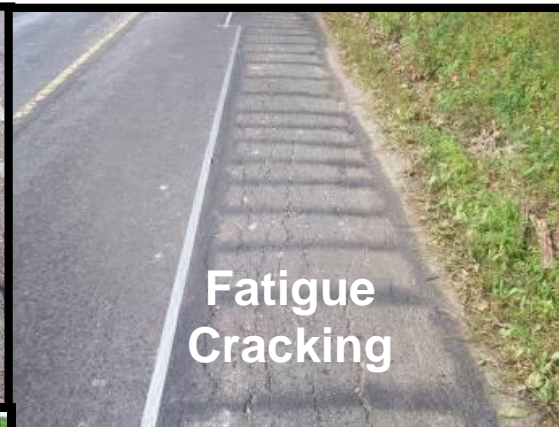
Mastic is used to level surfaces  
for improved ride quality





# Mastic Applications

## Pavement surface pre-treatment



**Many types of distresses need to be repaired before a surface treatment...**

- Standard crack treatments will not address all the defects.
- To remove and replace asphalt is costly and time consuming.

# Mastic Applications

## Pavement surface pre-treatment



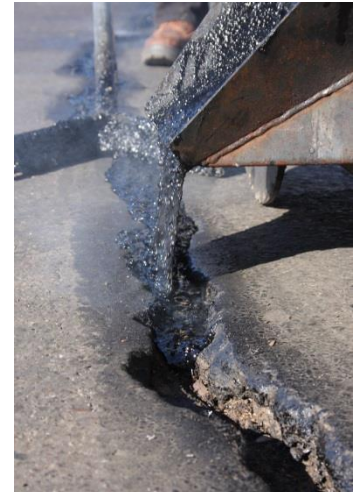


# Mastic Applications

## Sunken Edge Joint Repair







**Where is Mastic Being  
Used Today?**

# Mastic Applications

Concrete areas repaired using  
Gray Mastic



Vancouver airport 2002



# Toronto Pearson deicing pad

Concrete spalls repaired using  
Gray Mastic



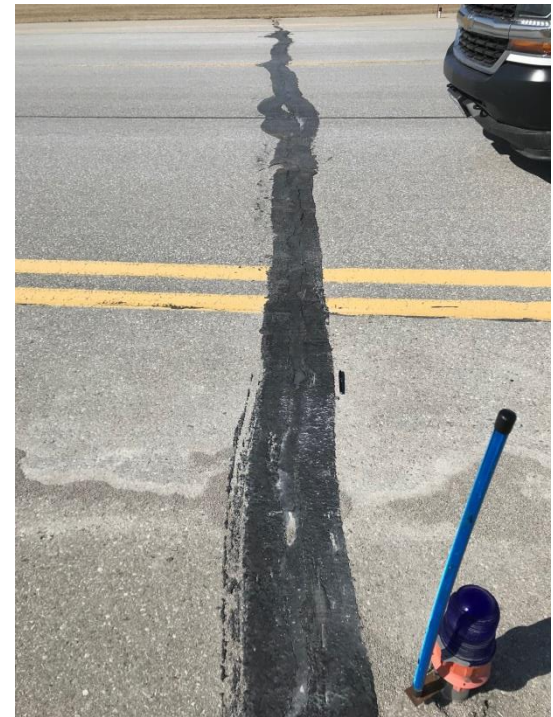


# Waterloo Airport

**Leveling Catch Basin**



**Large Transverse Crack 2017**



Two years after install



# Minneapolis Airport

## 2016 Longitudinal Joint Separation





# Onida SD Airport

## 2013-14 Transverse Thermal Runway Crack Leveling





# Parkston SD Airport

## 2013-14 Transverse Thermal Runway Crack Leveling





# Tea SD Airport

## Opportunity for Crack Leveling





# Vermillion Airport

Reseal With Mastic one on Taxiway



# Mastics Summary

## Mastic Benefits:

- Significant cost savings over traditional methods: up to \$45 per linear foot vs Mastics at \$5 per linear foot
- Quick repair and set up time – reduces shutdowns on airport runways.
- Smaller crew and less equipment needed compared to hot mix asphalt.
- Waterproof, highly adhesive, durable
- Voidless repair – protects cracks from water and air
- Resilient in both weather extremes





**Q&A**