



Effective Treatment of Large Cracks in our Airport Taxiways and Runways

*Presented by:
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Sept 19-22 2016*

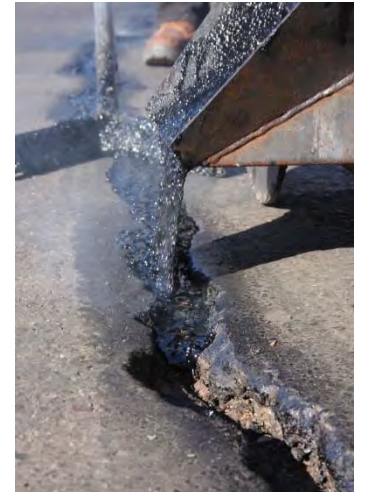


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Agenda

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





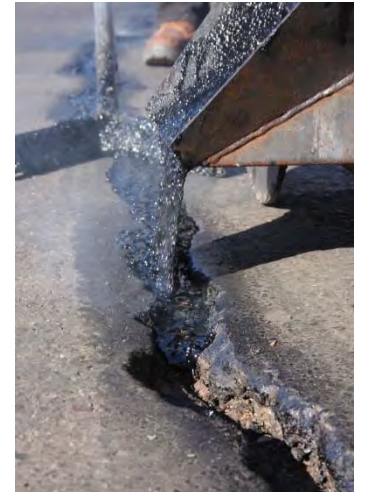
Airport Pavement Repair Methods

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



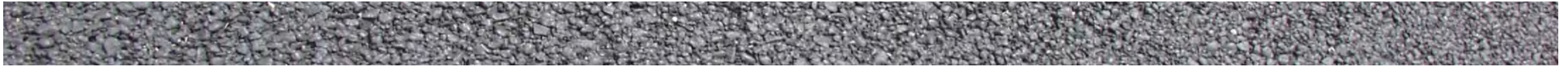
**Mastic - Black in Color
For Asphalt**



**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

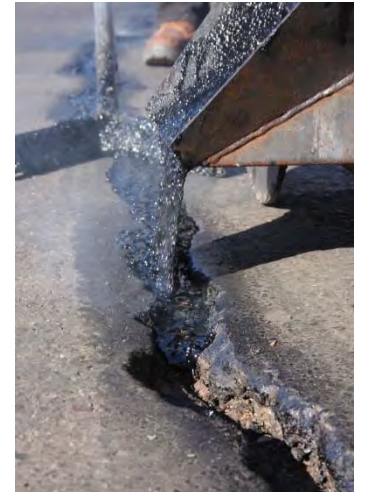


- Mastics offer the best option for treatments too extensive for crack sealing, while being less expensive than complete hot mix asphalt repair.
- No other product can provide waterproof repair like Mastics. The material is impermeable to water and air. Since this product is used to treat pavement damage 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

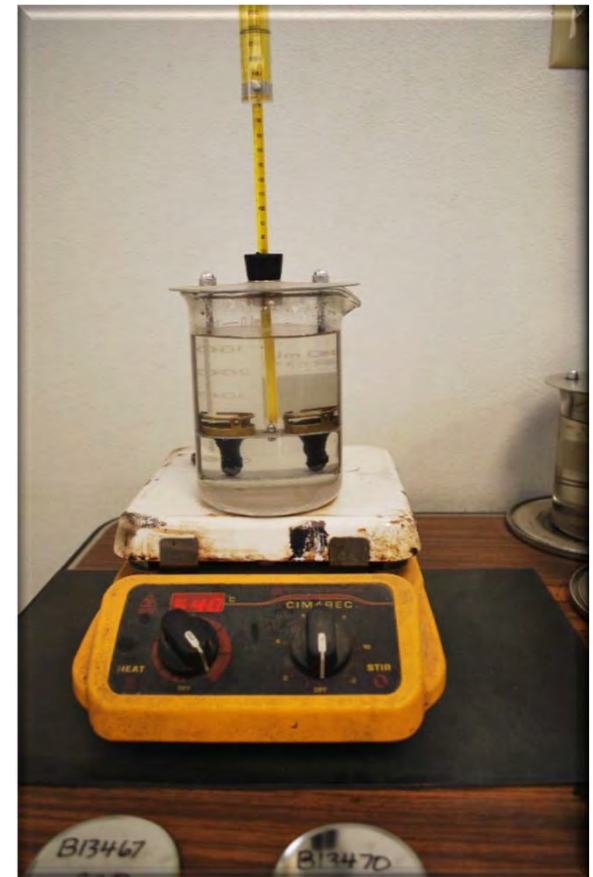
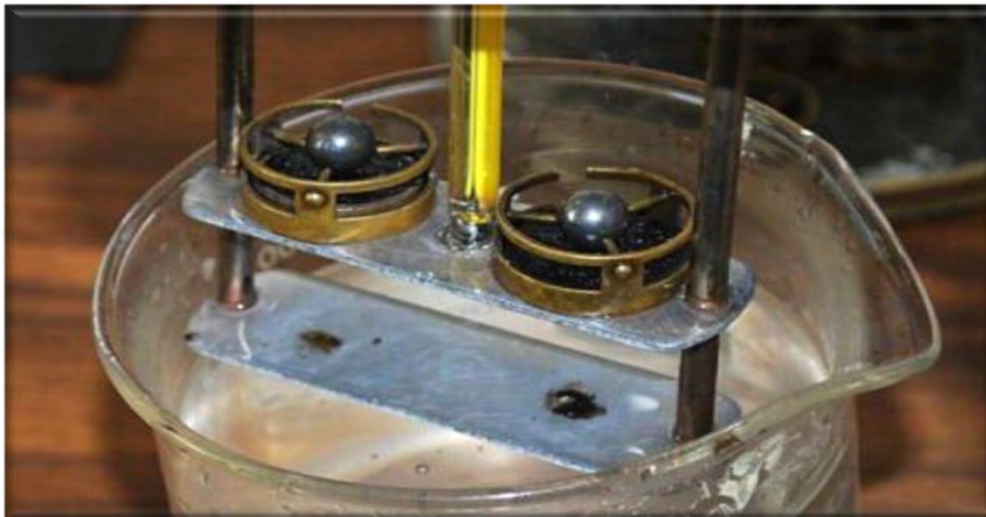
Typical: varies from
35 to 60 max



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.

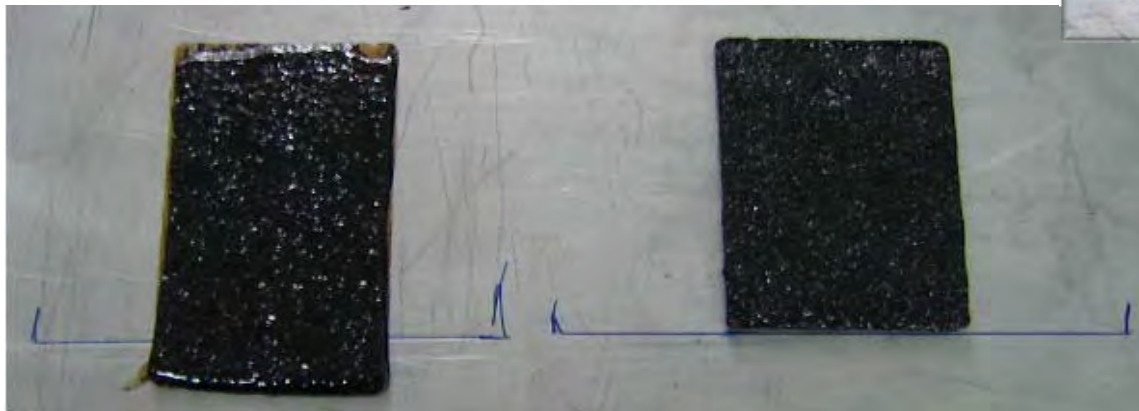
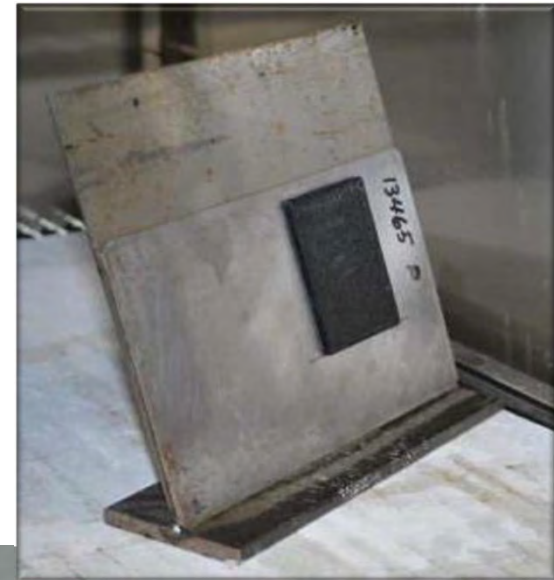


Laboratory Testing for Mastic Binder

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



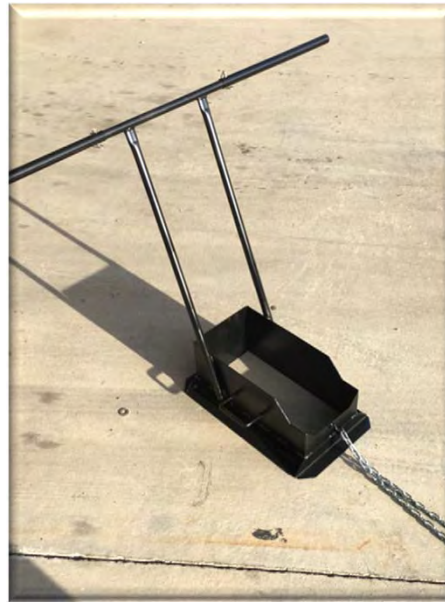
Heated Mastic can be applied:



Directly to the prepared area from the melter

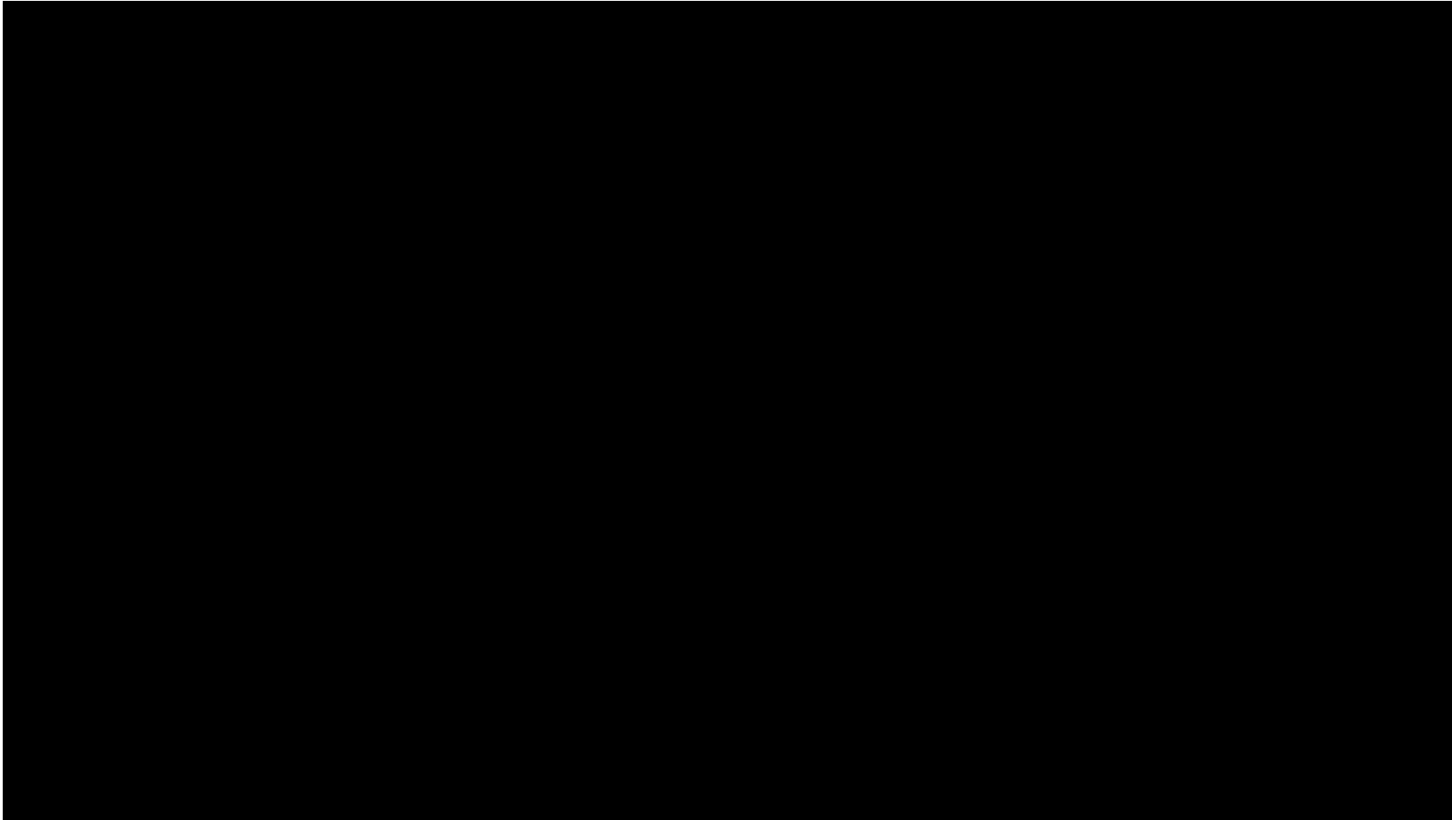


Using a drag box

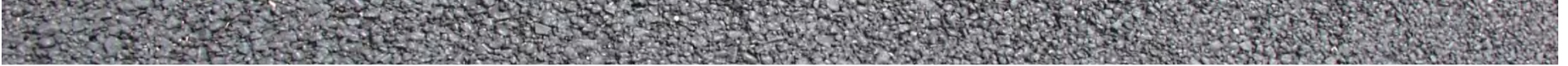


Using a material handler

Drag Box Video



Mastic Material Handlers



Hot Mastic Applicator

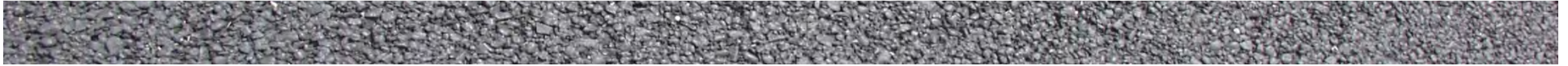


Mastic Material Handlers

Asphalt crack that has been filled with mastic using mastic applicator with attached squeegee.



Mastic Material Handlers



Installing Gray Mastic into longitudinal concrete joint.



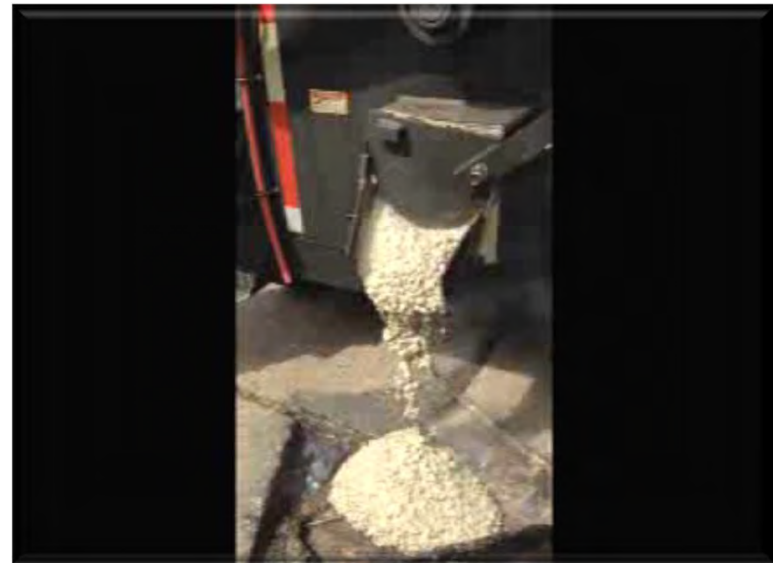
Using a V shaped metal squeegee to install Gray Mastic into smaller concrete joints.

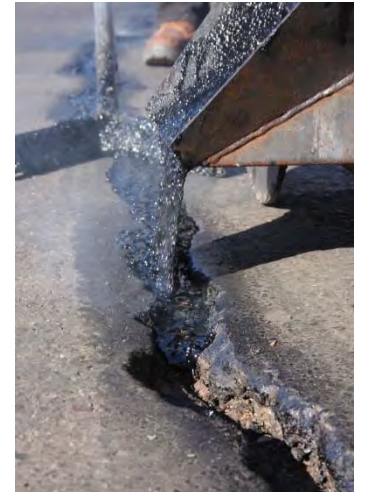


Using a mastic applicator with attached squeegee to fill large cracks.

Mastic Material Handlers

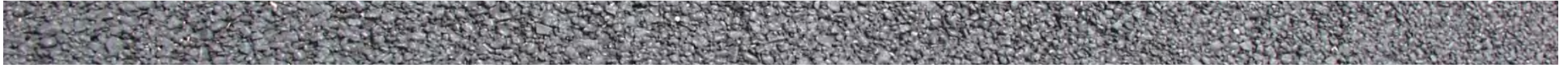
Gray Mastic being gravity fed from Mastic Mixer





Mastic Applications

Typical Mastic Applications

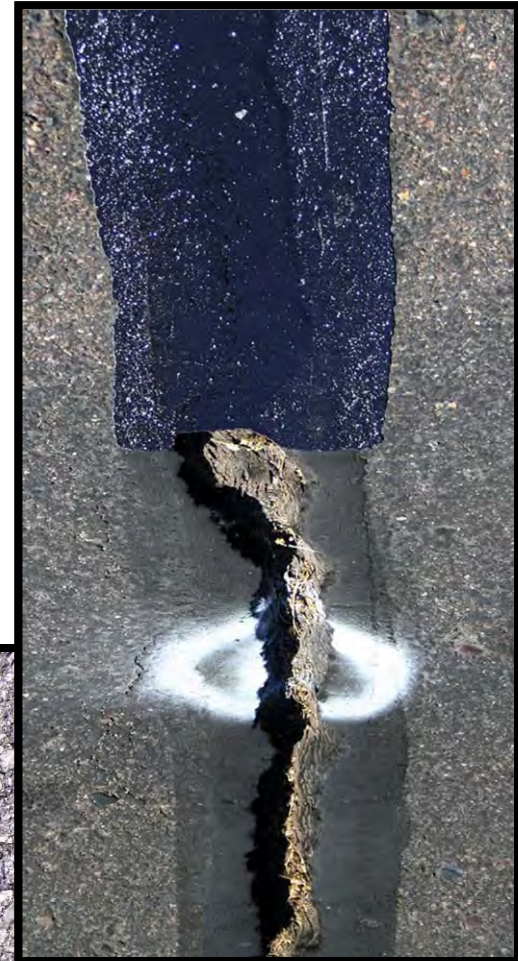


- Sealing Wide, Transverse & Longitudinal Cracks & Joints
- Filling Potholes
- Filling Utility Cuts
- Leveling Depressed Transverse Cracks
- Leveling Around Manhole Covers
- Leveling Concrete to Asphalt Transitions
- Filling Spalls in Concrete
- Filling Corner Breaks in Concrete

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**

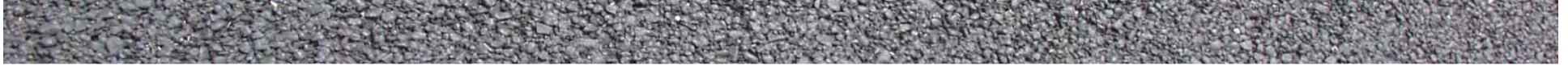


Video – Transverse Repair with Shoe Box



Using the same method of repair as shown in this video, 2013 SDDOT 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



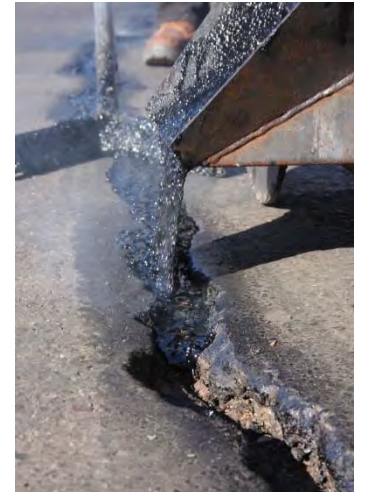
Mastic Applications



Concrete areas repaired using
Gray Mastic



Vancouver airport 2002



Where is Mastic Being
Used Today?

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