

# Advanced Cold Asphalts

**HIGH PERFORMANCE ASPHALT COLD MIX**

**FOR**

**POT HOLE AND UTILITY CUT REPAIRS**

**By**

**TODD MELLEMA**

# What is Advanced Cold Asphalt?

- Advanced Cold Asphalt (ACA) are High Performance Asphalt Cold Mixes engineered to provide permanent to near permanent repairs to asphalt pavements.



# What Makes Advanced Cold Asphalts Different?

By controlling the process from start to finish.





# Using select specification binders.

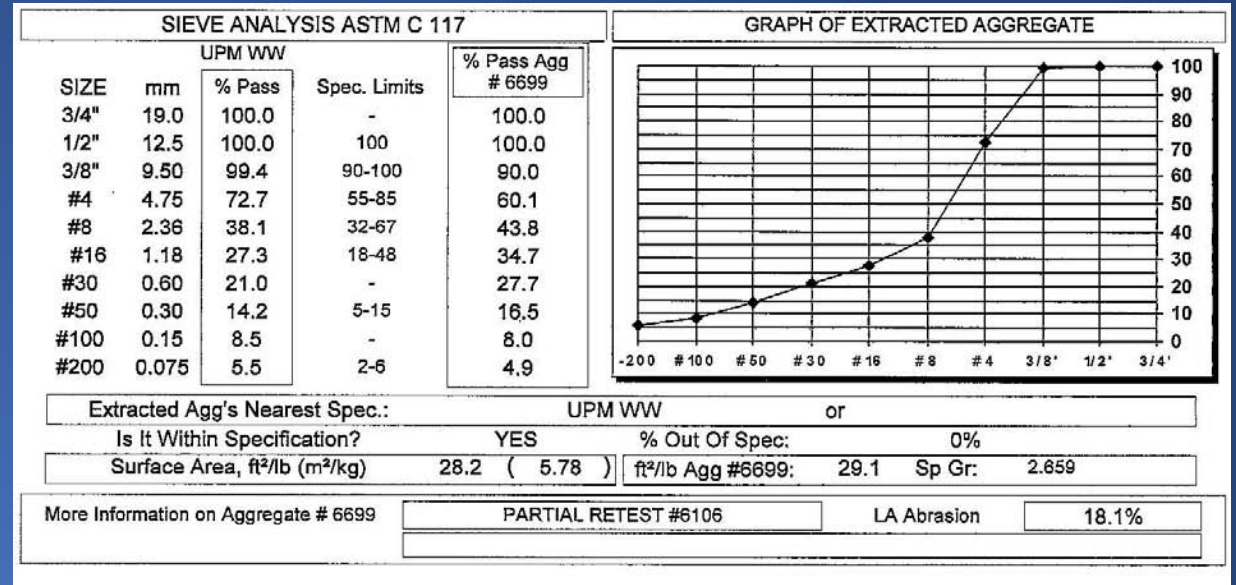


# Utilizing modifiers to improve performance.





# Selecting and testing aggregates to meet strict specification criteria.



# Ensure the manufacturing process is followed as specified.



**Unique Paving Materials Corporation** UPM® Production / Mix Sample Report

**FOR SAFE HANDLING AND STORAGE OF UPM®**

- ☐ UPM is a petroleum outback asphalt, shipped at elevated temperature and is potentially highly flammable.
- ☐ UPM blend has a flash point above 200°F. We ship UPM blend above smoking or open flames near the tanker or storage tanks.
- ☐ Do not expose the liquid blend or vapors to an open ignition source such as welder, cigarette or lighter.
- ☐ Do not heat or store UPM blend above 225°F.
- ☐ Anyone involved with the storage or transportation of UPM blend must use appropriate safety equipment.
- ☐ Any and all valves used in the storage and movement of UPM blend is a torch to heat and free valves.
- ☐ Do not return heated aggregate back to the cold feed bins.
- ☐ Stabilize aggregate temperature before adding UPM blend.
- ☐ Do not heat aggregate and liquid mixture above 200°F.
- ☐ Minimize the use of release agents while mixing.

Signature \_\_\_\_\_ Printed Name \_\_\_\_\_

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Form 204.124 (04-2011)  
3600 E. 93rd Street • Cleveland, OH 44126 • Phone 800.441.4880 • Fax 216.341.8514

**Unique Paving Materials Corporation** UPM® Production / Mix Sample Report

Lab Report Number \_\_\_\_\_

Production Date \_\_\_\_\_ Mix Start Time \_\_\_\_\_ End Time \_\_\_\_\_

Work Requested ☐ Extraction ☐ Workability Aest # \_\_\_\_\_

Producer Name \_\_\_\_\_ Address \_\_\_\_\_

City/State/Zip \_\_\_\_\_ Telephone \_\_\_\_\_

Plant Superintendent \_\_\_\_\_ Plant Operator \_\_\_\_\_

Was transport weighed in/out? ☐ Yes, Net Weight: \_\_\_\_\_ ☐ No, Reason: \_\_\_\_\_

Blend Source \_\_\_\_\_ Target Viscosity \_\_\_\_\_

Mix Grade \_\_\_\_\_ ☐ UPM® / ☐ Other: \_\_\_\_\_

Transport Name \_\_\_\_\_ Blend Temp \_\_\_\_\_

Arrival Date \_\_\_\_\_ Arrival Time \_\_\_\_\_

Were valves checked? ☐ No ☐ Yes, By whom: \_\_\_\_\_

Was sample taken? ☐ Yes ☐ No, Reason: \_\_\_\_\_

Mix from ☐ Transport / ☐ Tank / Previous Contents \_\_\_\_\_ Balance in Tank \_\_\_\_\_ gal.

Jar Test Fines ☐ Increased ☐ Decreased ☐ No change Need to adjust JMF ☐ Up ☐ Down

Ambient Temperature: Low \_\_\_\_\_ °F High \_\_\_\_\_ °F Clouds ☐ Clear / ☐ Partial / ☐ Precipitation: \_\_\_\_\_

Stabilized Aggregate Temperature: \_\_\_\_\_ °F Mix Temperature: Low \_\_\_\_\_ °F High \_\_\_\_\_ °F

Test at 140 °F \_\_\_\_\_ % Blend Mix Temperature: \_\_\_\_\_ °F

Final Blotter Appearance: ☐ Light ☐ Medium ☐ Heavy

Initial Stripping Test: ☐ None ☐ Slight ☐ Moderate ☐ Substantial

Action Taken \_\_\_\_\_

Final Water Strip Test Result \_\_\_\_\_ Board Strip Test Result \_\_\_\_\_

**BATCH PLANT:** Using \_\_\_\_\_ feeder bin(s); using \_\_\_\_\_ recycle bin(s); produced @ \_\_\_\_\_ TPH.

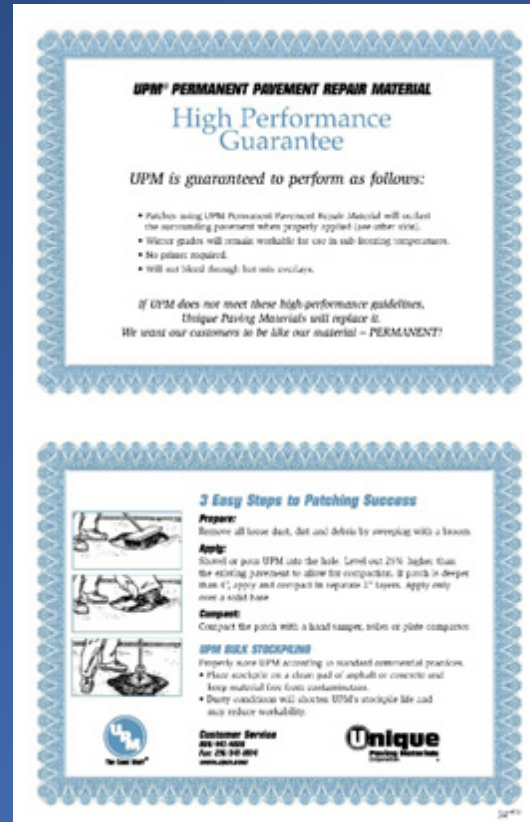
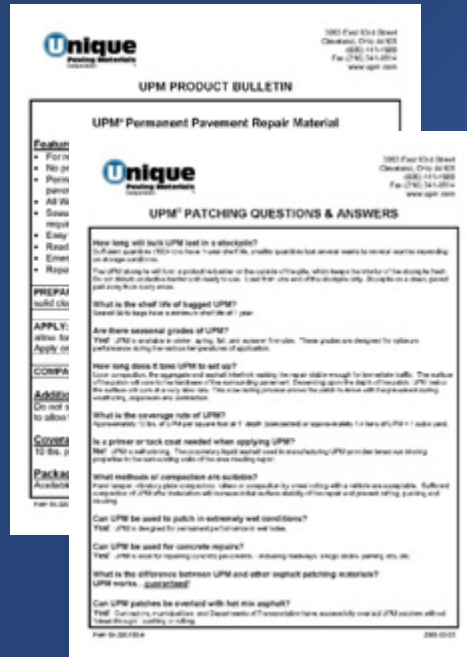
Aggregate #	Bin 1 pull %	lbs	Total	Lbs of Agg
Aggregate # _____	Bin 2 pull % _____	lbs _____	Total _____	Lbs of Agg _____
Aggregate # _____	Bin 3 pull % _____	lbs _____	Total _____	Lbs of Blend _____
Dry mix _____ seconds	Dry mix _____ seconds		Total (Agg & Blend) _____	lbs _____

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# Make installation recommendations to ensure desired results.





# Perform finished product analysis and follow up with recommendations to the improve mix.

Grade Of Mix:	UPM 2.5 SPX COLD MIX	Produced:	Monday, September 19, 2011
Wt. Received:	13 POUNDS	Received:	Friday, October 21, 2011
STANDARD EXTRACTION (GLOB IN PILE)		Tested:	Friday, October 21, 2011
<b>OBSERVATIONAL RESULTS ON THIS SAMPLE</b>		<b>UPM BLEND TERMINAL</b>	
Was sample well coated?	YES	UNITED ASPHALT, CEDARBROOK, NJ	
If not, is it remixable?	NOT APPLICABLE	BATCH # UN-11-35, 0826-11A	
Temperature remixable?	NOT APPLICABLE	Blend Vis. = 660 cSt at 140°F	
Does it strip in water?	NO & PASS @ 140F & WEST	E.F.T.R. 1.17	
Is sample cohesive?	YES		
Is sample workable?	YES, BUT VERY STIFF		
Overall Appearance	FAIR		
<b>EXTRACTION TEST RESULTS ASTM D 2172 TEST METHOD D</b>			
Percent Bitumen	9.63	Target % Bitumen:	5.40
Percent Moisture	2.1	Agg # 9104 Abs.	0.8%
Percent Minus 200	5.5	Agg # 9104 -200	0.6%
<b>SIEVE ANALYSIS ASTM C 117</b>		<b>GRAPH OF EXTRACTED AGGREGATE</b>	
EX 9 TO 89			
SIZE mm	% Pass	Spec. Limits	% Pass Agg # 9104
3/4" 19.0	100.0	-	100.0
1/2" 12.5	100.0	100	100.0
3/8" 9.50	97.7	90-100	98.9
#4 4.75	68.9	55-85	46.2
#8 2.36	29.0	5-40	14.2
#16 1.18	15.9	0-10	6.6
#30 0.60	10.2	-	3.1
#50 0.30	7.8	0-5	1.5
#100 0.15	6.3	-	0.9
#200 0.075	5.5	0-3.5	0.6
Extracted Agg's Nearest Spec.: EX 9 TO 89 or			
Is It Within Specification? NO % Out Of Spec: 5.9% UNDERSIZED			
Surface Area, ft <sup>2</sup> /lb (m <sup>2</sup> /kg) 22.1 ( 4.53 ) ft <sup>2</sup> /lb Agg #9104: 6.4 Sp Gr: 2.667			
More Information on Aggregate # 9104			
MIX DESIGN		LA Abrasion 23.3%	
C.A. SPX & MIX @ ≥72°F TO 150°F			
<b>COMMENTS</b>			
The -200 @ 5.5%, S.A. @ 22.1 ft <sup>2</sup> /lb are both very high, but with 9.63% blend (due to drain out) gave a "good" EFTR of 1.17. Extracted agg is within 5.9% of the comb of #9/#89 spec. Mix passes all strip tests, cohesive, but very stiff.			
Total Points of a Possible 100 =		69.2	
Score		D+	

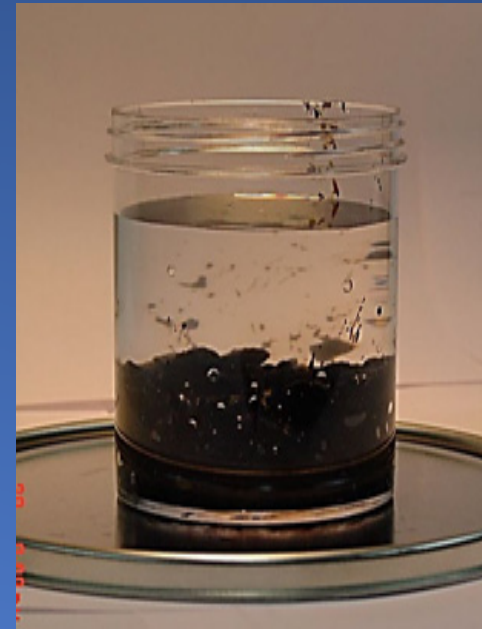
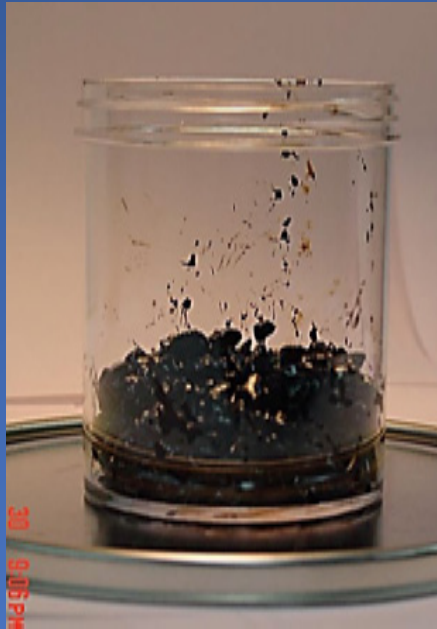
Grade Of Mix:	UPM 2.0 SPX COLD MIX	Produced:	Monday, December 12, 2011
Wt. Received:	9.4 POUNDS	Received:	Thursday, December 29, 2011
STANDARD EXTRACTION		Tested:	Thursday, January 05, 2012
<b>OBSERVATIONAL RESULTS ON THIS SAMPLE</b>		<b>UPM BLEND TERMINAL</b>	
Was sample well coated?	YES	DENVER INDUSTRIAL (DISSCO) OF DENVER, CO	
If not, is it remixable?	NOT APPLICABLE	BATCH # DC-11-25, 0947-11A	
Temperature remixable?	NOT APPLICABLE	Blend Vis. = 485 cSt at 140°F	
Does it strip in water?	NO & PASS @ 140F	E.F.T.R. 0.99	
Is sample cohesive?	YES		
Is sample workable?	YES		
Overall Appearance	GOOD		
<b>EXTRACTION TEST RESULTS ASTM D 2172 TEST METHOD D</b>			
Percent Bitumen	4.93	Target % Bitumen:	5.40
Percent Moisture	0.3	Agg # 9727 Abs.	1.0%
Percent Minus 200	1.3	Agg # 9727 -200	0.6%
<b>SIEVE ANALYSIS ASTM C 117</b>		<b>GRAPH OF EXTRACTED AGGREGATE</b>	
EX # 89			
SIZE mm	% Pass	Spec. Limits	% Pass Agg # 9727
3/4" 19.0	100.0	-	100.0
1/2" 12.5	100.0	100	100.0
3/8" 9.50	100.0	90-100	99.8
#4 4.75	52.3	20-55	56.2
#8 2.36	11.0	5-30	9.7
#16 1.18	5.8	0-10	4.9
#30 0.60	4.1	-	3.2
#50 0.30	2.6	0-5	1.9
#100 0.15	1.8	-	1.0
#200 0.075	1.3	0-3.5	0.6
Extracted Agg's Nearest Spec.: EX # 89 or			
Is It Within Specification? YES % Out Of Spec: 0%			
Surface Area, ft <sup>2</sup> /lb (m <sup>2</sup> /kg) 8.5 ( 1.74 ) ft <sup>2</sup> /lb Agg #9727: 6.4 Sp Gr: 2.658			
More Information on Aggregate # 9727			
MIX DESIGN		LA Abrasion 35.7%	
C.A. SPX & MIX @ 150°F			
<b>COMMENTS</b>			
The -200 @ 1.3%, S.A. @ 8.5 ft <sup>2</sup> /lb are both OK & combined with 4.93% blend resulted in a "good" EFTR of 0.99. Extracted agg meets the #89 spec. Mix doesn't strip under water (amb to 140F), workable & cohesive. AFT @ 1.20 mil is above 90% of calculated min good.			
Total Points of a Possible 100 =		92.4	
Score		A-	

# How do you know if you have an ACA?

Do a Strip Test.

1. Add cold mix to jar
2. Add water
3. Shake vigorously

If it's an ACA there should be virtually no striping of the oil off the rock. The oil should stick to everything including the inside of the jar.





# Simple Stripping Test – Conventional Cold Mix

Stripping-fine aggregate suspended in water settling on cold mix resulting in cloudy water.



Cold mix stripping in a simple jar test demonstrates performance in the rain.

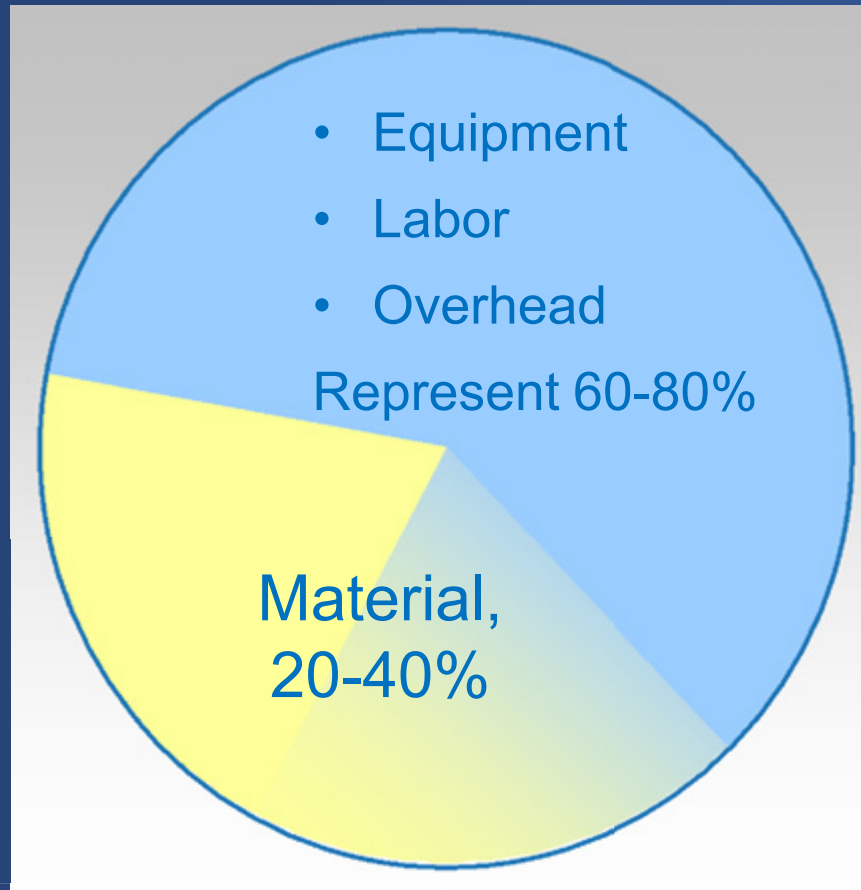


# Which mix is the Advanced Cold Asphalt?





# Why is all this all this important?



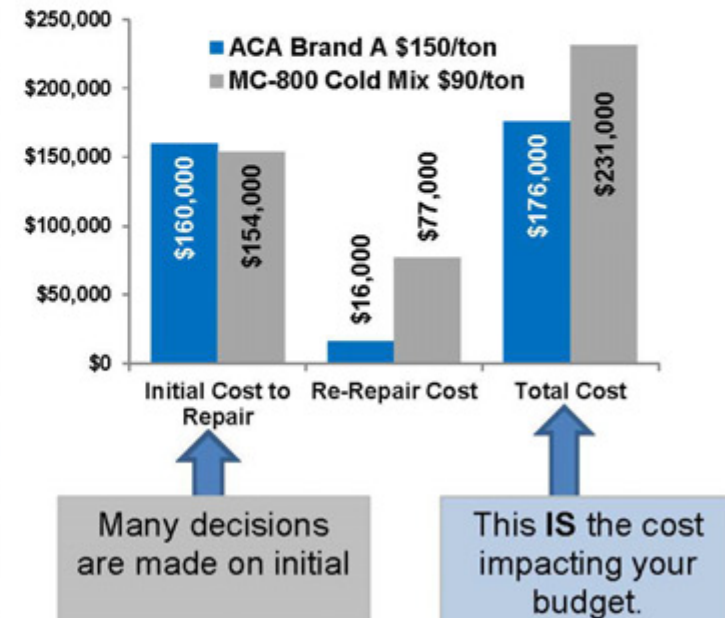
Material cost is not the controlling component when using cold mix.

# Cost Modeling ACA vs MC Mix

Don Koehler 1-19-16

Don Koehler 1-19-16	ACA Brand A		MC-800 Cold Mix	
Components of Total Cost	Initial Repair	Re-Repair	Initial Repair	Re-Repair
Cold Mix price , \$/ton	\$150.00	\$150.00	\$90.00	\$90.00
Cold Mix usage, total tons/Year	100	10	100	50
Cold Mix usage, tons/month	8	1	8	4
Cold Mix pounds/pothole	50	50	50	50
Cold Mix Survivability	90%	10%	50%	50%
Labor Cost, \$/hour w/ burden	\$35.00	\$35.00	\$35.00	\$35.00
Equip/Fuel Cost, \$/hr	\$40.00	\$40.00	\$40.00	\$40.00
Number of Crews	2	2	2	2
Men per Crew	3	3	3	3
Potholes repaired per hour	8	8	8	8
Labor Cost/Pothole, \$	\$26.25	\$26.25	\$26.25	\$26.25
Equip/Fuel Cost/Pothole, \$	\$10.00	\$10.00	\$10.00	\$10.00
Material Cost/Pothole, \$	\$3.75	\$3.75	\$2.25	\$2.25
Total Cost of Single Pothole, FIRST REPAIR	\$40.00	\$40.00	\$38.50	\$38.50
Potholes/month	333	33	333	167
Potholes/year	4,000	400	4,000	2,000
Initial Cost to Repair	\$160,000		\$154,000	
Re-repair Cost, \$/Year		\$16,000		\$77,000
Tons of Cold Mix required	110		150	
Re-repairs will exceed maintenance resources				
Initial Cost Savings to Repair using UPM	-\$6,000			
Savings using UPM based on Re-repairs	\$61,000			
Total Saving using UPM	\$55,000			
>Yellow cells are variables; Other cells are calculated				

Cold Mix Source	Initial Cost to Repair	Re-Repair Cost	Total Cost
ACA Brand A \$150/ton	\$160,000	\$16,000	\$176,000
MC-800 Cold Mix \$90/ton	\$154,000	\$77,000	\$231,000
TOTAL Saving with UPM			\$55,000
Saving			24%





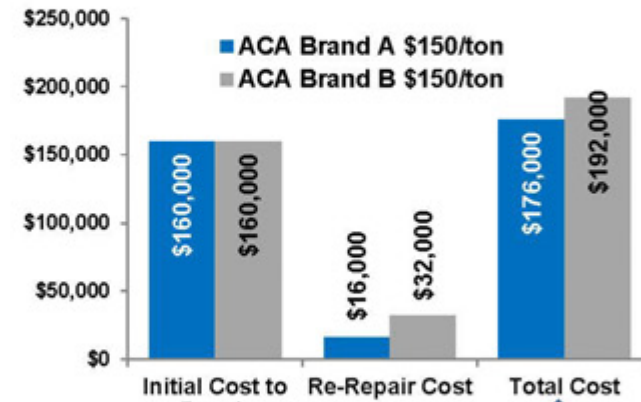
# Cost Modeling ACA Brand A vs ACA Brand B

Don Koehler 1-19-16

Components of Total Cost	ACA Brand A		ACA Brand B	
	Initial Repair	Re-Repair	Initial Repair	Re-Repair
Cold Mix price, \$/ton	\$150.00	\$150.00	\$150.00	\$150.00
Cold Mix usage, total tons/Year	100	10	100	20
Cold Mix usage, tons/month	8	1	8	2
Cold Mix pounds/pothole	50	50	50	50
Cold Mix Survivability	90%	10%	80%	20%
Labor Cost, \$/hour w/ burden	\$35.00	\$35.00	\$35.00	\$35.00
Equip/Fuel Cost, \$/hr	\$40.00	\$40.00	\$40.00	\$40.00
Number of Crews	2	2	2	2
Men per Crew	3	3	3	3
Potholes repaired per hour	8	8	8	8
Labor Cost/Pothole, \$	\$26.25	\$26.25	\$26.25	\$26.25
Equip/Fuel Cost/Pothole, \$	\$10.00	\$10.00	\$10.00	\$10.00
Material Cost/Pothole, \$	\$3.75	\$3.75	\$3.75	\$3.75
Total Cost of Single Pothole, FIRST REPAIR	\$40.00	\$40.00	\$40.00	\$40.00
Potholes/month	333	33	333	67
Potholes/year	4,000	400	4,000	800
Initial Cost to Repair	\$160,000		\$160,000	
Re-repair Cost, \$/Year		\$16,000		\$32,000
Tons of Cold Mix required	110		120	
Re-repairs will exceed maintenance resources				
Initial Cost Savings to Repair using UPM		\$0		
Savings using UPM based on Re-repairs		\$16,000		
Total Saving using UPM		\$16,000		

>Yellow cells are variables; Other cells are calculated

Cold Mix Source	Initial Cost to Repair	Re-Repair Cost	Total Cost
ACA Brand A \$150/ton	\$160,000	\$16,000	\$176,000
ACA Brand B \$150/ton	\$160,000	\$32,000	\$192,000
TOTAL Saving with UPM			\$16,000
Saving			8%



Many decisions are made on initial

This IS the cost impacting your budget.

# Advanced Cold Asphalt Producers



AQUAPHALT™



AQUA  
PATCH





# Advanced Cold Asphalt Applications

Advanced Cold Asphalt can be used in almost any asphalt pavement repair where the sides and bottom of the hole is sound.



Honey, I hit a small pot hole...

# Utility Cuts





# Skin Patch Repairs



# Pot Holes





# More Pot Holes



# When should one use ACA's

- High Performance Cold Mixes or ACA's were originally developed to be utilized in the winter months when Hot Mix was not available.
- However today they used year round for a variety of uses.





# Patching is like Painting

The end result is only as good as your prep work.



# Installation Best Practices

## Hole Preparation

- Clean the Hole
- Get rid of any loose chunks of asphalt or concrete.
- Sweep out hole.
- Ensure the mix has something to adhere to.
- Water does not need to be removed.





# Hole Preparation



- Make sure there is no ice, snow or loose debris in the repair site



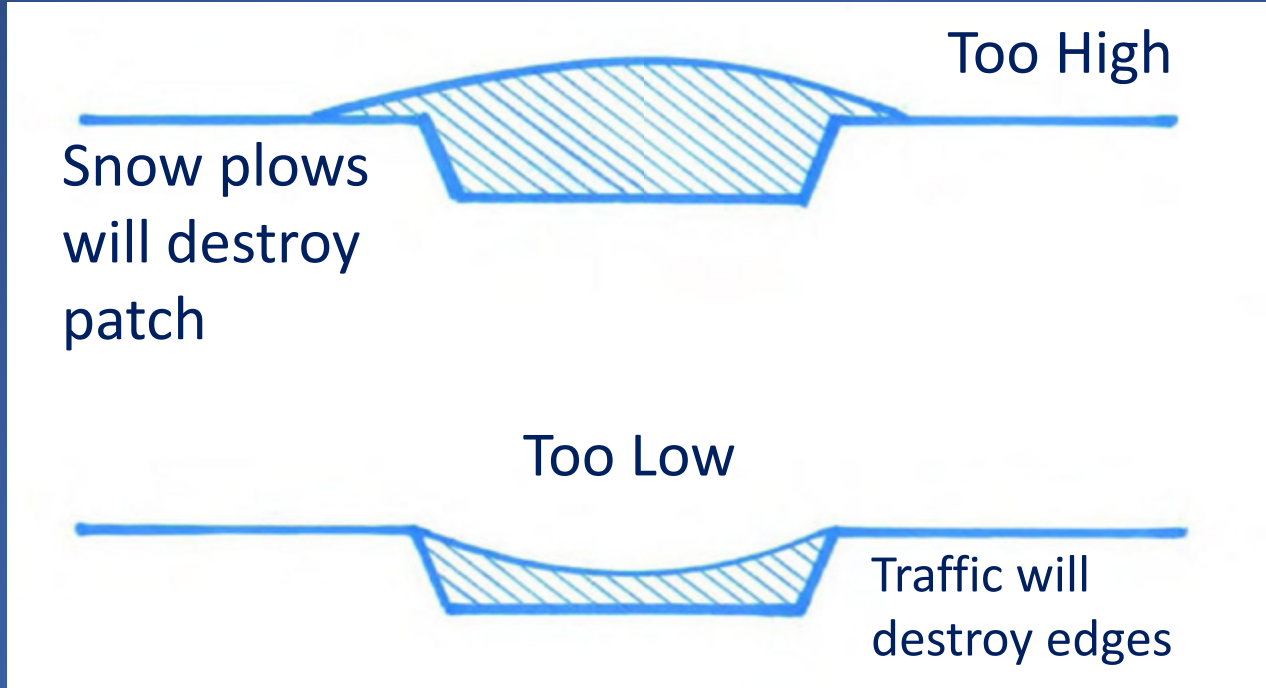
# Concrete Joints and feather patches

- Imperative that the hole is dust free.
- Sweep or blow out!
- ACA's will stick to whatever it contacts.



# Crowning

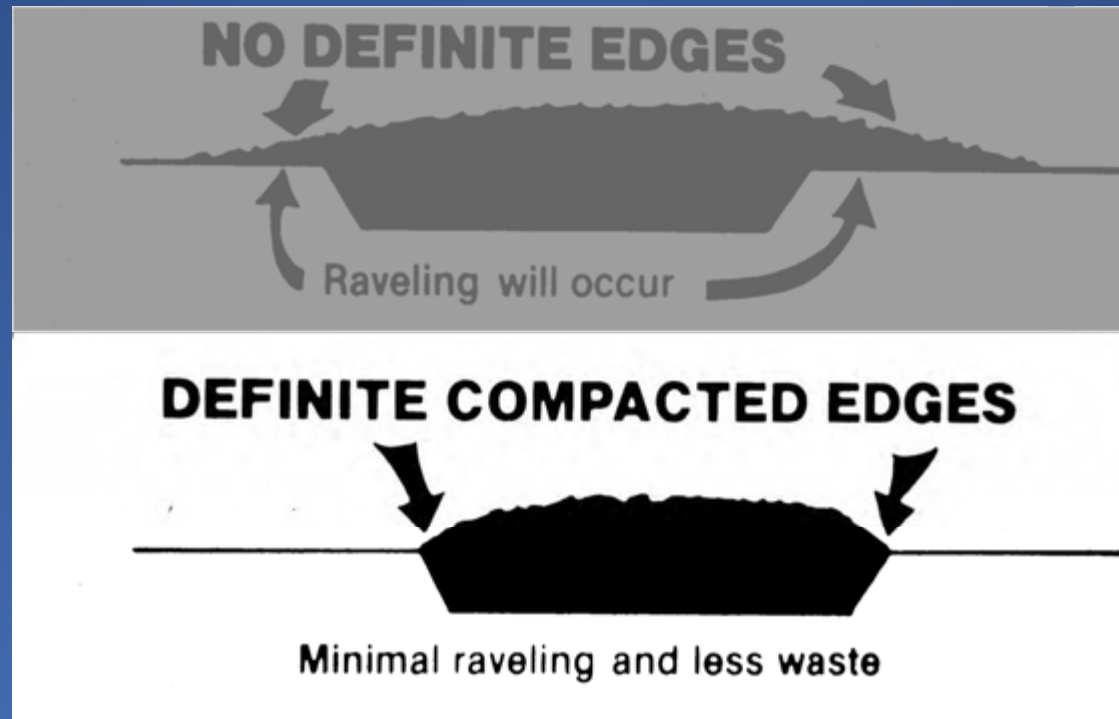
- Proper crowning will leave patches at the proper level once fully compacted





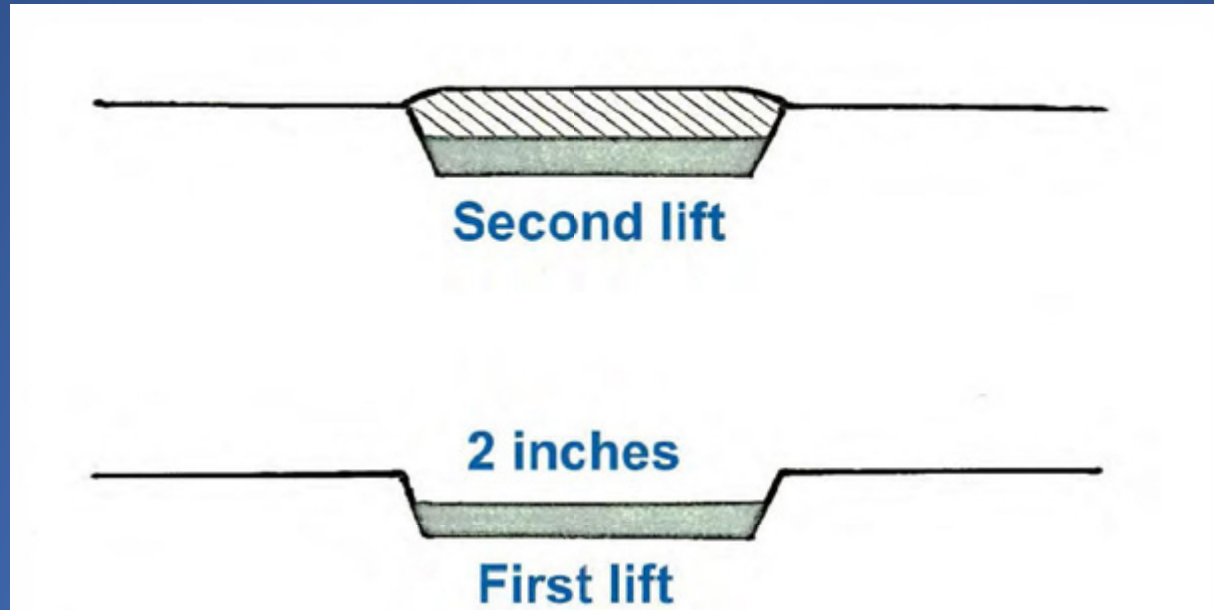
# Edging

- Definite compacted edges work best.
- Keep material over the hole, do not go beyond.



# Layering

- Patches deeper than 3" should be applied and compacted in separate lifts.
- Proper compaction can not be achieved with lifts deeper than 2".
- Pushing and rutting can occur.





# Priming

- Most primers or tack-coats are emulsions and needs to “break” to be effective.
- Emulsions are not effective in cold weather, the tack will freeze before it “breaks”.
- Most ACA’s are self priming. No primer is necessary.

# Compaction Methods



Truck Rolling



Roller



Plate Compactor



Hand Tamper



# Simply Drive Over It



# Throw & Go is NOT effective





# Neglected Repairs Can Grow



# Application Steps

- Use common sense
- Follow simple procedures
- Attitude!!





# Clean the Hole

- Use a broom, blower or air compressor but clean the hole.





# Remove Large Chunks & Remove Crack Filler





# Remove Paving Fabric





# Compact the Base





# Install The First Lift





# Compact





# Place Final Lift & Compact





# Dust Coat With Portland & Open To Traffic





# Anyone Notice?

- Occasionally it's obvious the reason quality varies.
- To consistently reproduce premium results requires the control of critical parameters every time.
- That is what Advanced Cold Asphalts are all about.



# Thank you

# Questions?

Presented By

Todd Mellema

DISSCO

303-935-2485