Fractionating Plant For Rap

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by

Ronald Collins

Pavement Technology Inc.
RAP Usage

• Use of reclaimed asphalt pavement (RAP) is one of the most under utilized tools in the HMA industry
BATCH PLANT
ONE BIN COLD FEED
1980-1990's HMA Facility with Single RAP Bin
SUPERPAVE MIX WITH 1/2 RAP

White Rock 4-0

White Rock 3/8 - 4

White Rock 1/2 - 3/8

RAP 1/2 - 0

X%
Value of RAP?

- RAP is worth what it will replace in the mix.
- RAP is worth what ingredients it will replace at the time of use
  - $8-$12/Ton Aggregate
  - $350/Ton AC
  - $30/Ton Mineral Filler
30,000 Tons of RAP

= 70 - 6,000 Gallon Transport Trailers
and 28,200 Tons of Clean Aggregate

RAP is Worth the Virgin Material It Replaces
Virgin Aggregate (per ton) ........... $10 x 0.94 = $ 9.40
Liquid Asphalt (per ton) ............ $200 x 0.06 = $12.00

$21.40

RAP Milling Cost (in job) ...................... $0
Trucking (per ton) ............................. - $ 3.40

Difference $18.00

10% RAP ...... $1.80/ton 10 tons mix
20% RAP ...... $3.60/ton 5 tons mix
50% RAP ...... $9.00/ton 2 tons mix

Savings: Virgin Materials vs. RAP (if RAP at no cost)
Virgin Aggregate (per ton) ........ $10 \times 0.94 = 9.40$

Liquid Asphalt (per ton) .......... $350 \times 0.06 = 21.00$

\[ \text{Total} = 9.40 + 21.00 = 30.40 \]

RAP Milling Cost (in job) ......................... 0

Trucking (per ton) .................. - 3.40

\[ \text{Difference} = 27.00 \]

10% RAP ...... $2.70/ton  
20% RAP ...... $5.40/ton  
50% RAP ...... $13.50/ton

10 tons mix  
5 tons mix  
2 tons mix

\[ \text{Savings: Virgin Materials vs. RAP (if RAP at no cost)} \]
Virgin Aggregate (per ton) .......... $10 \times 0.95 = $ 9.50
Liquid Asphalt (per ton) ............ $200 \times 0.05 = $10.00

\[ \text{Total Cost} = $9.50 + $10.00 = $19.50 \]

Cost of RAP (per ton) ............ $2.00
Crushing Cost (per ton) ........... $3.00

\[ \text{Total Cost of RAP (per ton)} = $5.00 \]

\[ \text{Difference} = $14.50 \]

10% RAP ...... $1.45/ton 10 tons mix
20% RAP ...... $2.90/ton 5 tons mix
50% RAP ...... $7.25/ton 2 tons mix

Savings: Virgin Materials vs. RAP (if RAP is purchased)
Virgin Aggregate (per ton) .......... $10 x 0.95 = $ 9.50
Liquid Asphalt (per ton) ............ $350 x 0.05 = $17.50

$27.00

Cost of RAP (per ton) ............... $ 2.00
Crushing Cost (per ton) .............. $ 3.00

Total Cost of RAP (per ton) ....... $ 5.00

Difference $22.00

10% RAP ...... $2.20/ton 10 tons mix
20% RAP ...... $4.40/ton 5 tons mix
50% RAP ...... $11.00/ton 2 tons mix

Savings: Virgin Materials vs. RAP (if RAP is purchased)
PROCESSED RAP SCREENED TO ORIGINAL INGREDIENTS

- **RAP**
  - Black Rock 1-0
  - Black Rock 1/2 - 3/8
  - Black Rock 3/8 - 4
  - Black Rock 4 - 0

- **AA%**
- **DD%**
- **CC%**
- **BB%**
Benefits of Processing/Fractionating RAP

• Reduce Variability – Better Quality Control

• Greater Flexibility in designing mixes-gradation & AC content

• Smaller Particles being introduced-more efficient heat transfer
Current Technology

• Equipment capabilities outpace specification and mix design innovations

• Contractors are moving to multiple RAP cold bins and fractionated sizes
Reclaimed Asphalt Pavement Bins (RAP)

Cold Feed Bins

Today’s HMA Facility with Multiple RAP Bins
SUPERPAVE MIX WITH PROCESSED RAP - CHOICE #1
SUPERPAVE MIX WITH PROCESSED RAP - CHOICE #2
SUPERPAVE MIX WITH PROCESSED RAP - CHOICE #3
We Need to Trade in Our Old Roads For New Roads
3 Trillion Tons of HMA on America’s Roads
We Need an Aggressive Milling and Recycling Program in America
Today’s Machines Mill and Pick Up Fines
Rutting Often Occurs in Older Overlay Pavements
Overlays Change Bridge Clearances
Weight Limits Remain Constant with Milling
Multiple Overlays Create Drainage Problems
Milling Ensures Proper Water Drainage
An idle asset that could be worth $20 million
ALL INDICATIONS ARE THAT HMA MATERIALS COST WILL CONTINUE TO RISE
Greatest Cost in HMA Production:

- Asphalt Cement
- Aggregate
- Drying
Replacement Leads to Profitability

• If we can replace one or more of these costs with a lower price material and/or increase the percentage used we will position ourselves for greater savings.
State D.O.T has $5,000,000.00 to spend on mix…

no haul, no laydown, milling paid separately

Assume - $400.00 Liquid – 64-22
- $450.00 Liquid when using Recycle
- 5.5% Liquid
- Processing Recycle Cost – $3.00 / ton
- Haul Cost – $3.00 / ton
- Aggregate Cost – $10.00 / ton
- Plant Processing Cost – $6.00 / ton
- Overhead and Profit – $4.00 / ton

1. If State D.O.T. purchases – All Virgin Mix

   Tons of Virgin Mix = 120,627 tons

2. If State D.O.T. purchases 50% RAP Mix – 2” Inlay – Contactor gets RAP

   Tons of RAP Mix = 166,113 tons
Lane miles paved with All Virgin Mix

162 miles

Lane miles paved with 50% RAP Mix

223 miles

Additional miles paved through use of Recycle

61 miles
POTENTIAL ENERGY SAVINGS
- Asphalt Paving Industry
- Annual Production of 700,000,000 tons / year

1. Aggregate Drying Costs
   - Paving & sloping under stockpile storage yard
   - Saving of 0.6 gal. / ton or 420 million gal. fuel / yr. .............................. 10,000,000 bbl / yr.

2. Asphalt Storage System
   - Thorough insulation of the asphalt plant
   - Saving of 0.175 gal. / ton or 122.5 million gal. fuel / yr. .............................. 2,916,600 bbl / yr.

3. Recycle
   - Increase 30%...based on 5.5% liquid asphalt
   - Saving of 236 gal. / ton or 2.725 billion gal. oil / yr. .............................. 64,900,000 bbl / yr.

   Total........................77,816,600 bbl / yr.

4. Pulverized Coal
   - Switching to pulverized coal (after sloping stockpiles)
   - Saving of 1.5 gal. / ton or 1.05 billion gal. fuel / yr. .............................. 25,000,000 bbl / yr.

   Total.....................102,816,600 bbl / yr.
How Will We Use RAP in the Future?

1. Screen/Size like virgin aggregate – (Virgin) White aggregate/(RAP) Black aggregate
2. Feed through separate cold bins – Bins for white rock and bins for black rock
3. Produce your recycle binder at plant – Flux tank – computerized blending on line
4. Use greater percentages of RAP – 50-60%
“If we always do what we’ve always done, we’ll always get what we’ve always gotten”
Thank You