SUMMIT ON INCREASING RAP CONTENTS

"A Contractor's Perspective"

National Center for Asphalt Technology

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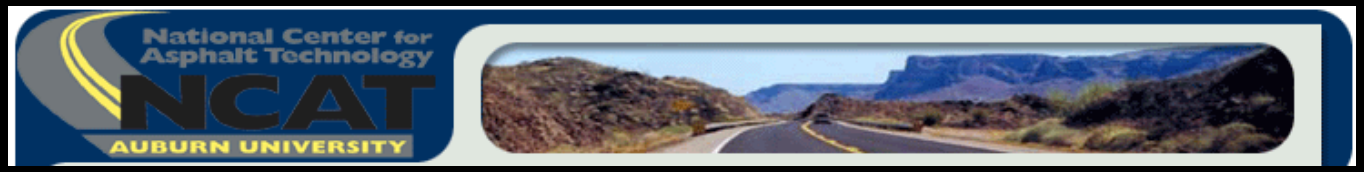

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CHALLENGES AND OPPORTUNITIES

WHAT DOES THE FUTURE HOLD?

- ANNUAL ENERGY AUDITS FOR AN ASPHALT PLANT - REQUIRED

- WHAT IS THE CARBON USAGE (FOOT PRINT) TO PRODUCE A TON OF HMA/WMA? (CO_2 – Green House Gases)

- CARBON USAGE WILL BE “FIGURED INTO” OUR CURRENT LIFE CYCLE COST ANALYSIS (for Pavement Type Selection).

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CHALLENGES AND OPPORTUNITIES

WHAT DOES THE FUTURE HOLD?

- Historical volatility in the energy sector:
  - Shortages in asphalt cement
  - Shortages in the “B” supply (to make SBS)
  - Shortages in commercial tire supply
  - Shortages in nation’s steel supply

- Natural Gas prices double in one year

- Asphalt cement doubles in less than one year (if you can get it)!

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CHALLENGES AND OPPORTUNITIES
WHAT DOES THE FUTURE HOLD?

- Smoke and Smell

- The “Fumes Issue”

- So,
  - How do we reduce our material cost(s)?
  - How do we reduce our dependence on virgin AC and virgin aggregate?
  - How do we make the industry more competitive?
  - How do we make better, long lasting pavements (with better compaction)?

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CHALLENGES AND OPPORTUNITIES

WHAT DOES THE FUTURE HOLD?

- HOW DO WE ALLEVIATE OUR HIGHWAY FUNDING INADEQUACIES?

- HOW DO WE GET MORE MILES OF PAVEMENT?

-HOW DO WE SIMPLY SURVIVE!

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THE ASPHALT INDUSTRY HAS TO LEARN HOW TO BE GREEN TO SURVIVE.

NOTE: This includes all manufacturing industries and DOT's.

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THE ASPHALT INDUSTRY HAS TO LEARN HOW TO RECYCLE BETTER!

NOTE: Recycling includes RAP, Crushed concrete, glass, shingles, tires, synthetic aggregates . . .

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SOLUTION (TO BE GREEN): PROMOTE INCREASE USE OF RAP

- RAP – Recycled Asphalt Pavement

  World's most recycled material!

- Value (at AC PG 76.22 @ $900/ton @ 4.6% and Aggregate at $30.00 per ton) - Louisiana Dollars

  $70.00 per ton

- So,
  - 20% RAP would reduce HMA by $14.00
  - 30% RAP would reduce HMA by $21.00
  - 40% RAP would reduce HMA by $28.00

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SOLUTION (TO BE GREEN): PROMOTE INCREASE USE OF RAP

- Use RAP in its BEST place:

BACK IN THE PAVEMENT (HMA/WMA)

RAP Value = $70.00 per ton

Aggregate Value = $30.00 per ton

So, don't use RAP as virgin aggregate (i.e. on shoulders?). Gain the value of its AC content.

(Not using RAP back in HMA is a poor economic decision!)

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EXAMPLE OF BAD RAP USAGE:

- A DOT used 10,000 tons of RAP on front slopes of newly constructed four lane.

-So, RAP value = $70.00 x 10,000 tons

$700,000 material cost

Had they used stone @ $30.00 per ton

$300,000 material cost

Therefore loss to taxpayer = $400,000!

Note: Assumes same transport to project for each product.

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WHAT'S THIS ABOUT WARM-MIX

- WMA - What is it?

Use of either (1) water to foam the AC or (2) chemical additives to help us lower the viscosity of the material. Instead of 280F to 350F HMA we can make 215F to 275F WMA.

A 30 percent reduction in fuel consumption has been reported in Europe!

More environmentally friendly – Less Carbon!

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SOLUTION – Warm Mix Asphalt

with RAP – THE WIN-WIN SOLUTION

- WHY DO WE WANT HIGHER RAP PERCENTAGES WITH WMA?

-The (a counterflow process) requires that the virgin aggregate be “superheated” prior to the addition of the RAP in the outer drum. Thus, the virgin aggregate will be as dry or drier than with conventional HMA.

-The “superheating” of the virgin aggregates (with RAP) will allow for sufficient baghouse temperatures (to keep it working properly – i.e. hot enough).

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SOLUTION – Warm Mix Asphalt

with RAP – THE WIN-WIN SOLUTION

WARM MIX DEMONSTRATION IN LOUISIANA w/ 40 PERCENT RAP

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ACCEPTANCE OF RAP:

- We can (and do), for instance, accept RAP at the plant and stockpile separately according to:

  - Aggregate Type
  - Aggregate Size (Maximum and NMAS)
  - Asphalt Content
  - Uniformity
  - Gradation (from a specific project)
  - Size of “milled” particles
  - Consistency of AC and Gradation (Standard Deviations)

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How Good (or Great) is our RAP?

- RAP HAS GOTTEN “A BAD RAP”!

- Epps/FHWA – Standard Deviations of RAP
  - No. 8 Sieve = 3 to 5 percent
  - No. 200 Sieve = 0.8 to 1.4 percent

- We’ve found that the existing RAP piles are more consistent than we thought (lower STDEV). They have already been processed, graded and proportioned.

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How Do We "Get the RAP in"?

- HMA MIXTURE EXAMPLE:
  - Sized Virgin Aggregate
    - 67's or 1" x ¾"
    - 78's or ¾" x 3/8"
    - 7's, 8's or 9's or 3/8" x No. 4
    - 11's or ¼" x 0 (screenings)
    - Coarse Sand (Concrete or field)
    - Rap 1 Size – small amounts w/ low STDEV
    - Rap 1, 2 or 3 Sizes (+ ¾", ¾" x No. 4 and –No. 4) – larger percentages

All controlled by individual feeder bins w/ MOISTURE CORRECTION compensated for in plant controls!

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Easy: Treat RAP like "Virgin Material"!

- RAP HAS GOTTEN "A BAD RAP"!

- Sizing (or fractionizing) RAP will further reduce variability and allow the producer to gain more control and place the material in a position for its best and greatest value!

- Treat RAP just like currently used sized virgin aggregate (two to three RAP bins).

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We can use EVERY rock!

- We MAY fractionate the RAP and use "suitable" piles (For Example: 3/4" x No. 4 and No. 4 to 0)

- What do you do with the +3/4?
  - Larger NMAS Mixtures
  - Black Base
  - Shoulder "Hot-Rap" Material

- If + No. 4 is Friction then "use it to its best ability"!

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WHAT DOES FACTIONATING LOOK LIKE?

RAP Sizing Plant

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WHAT DOES FACTIONATING LOOK LIKE?

¼ inch by 0 RAP

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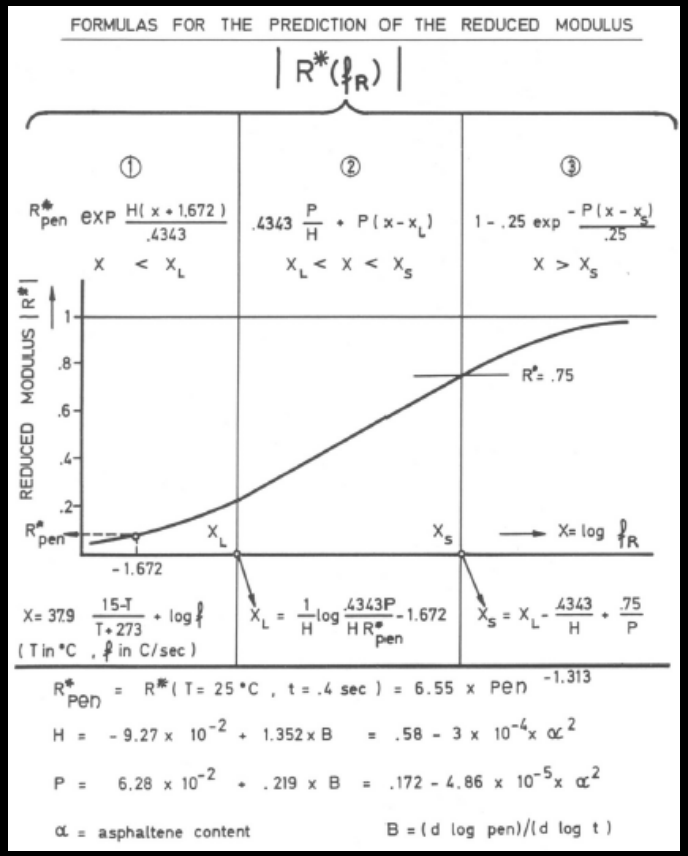
HOW DOES THE MATH WORK?



JUST KIDDING – IT'S NOT THAT COMPLICATED!

HOW DOES THE MATH WORK?

SIMPLY TREAT RAP LIKE VIRGIN AGGREGATE!

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So, what do we do with the +3/4" (oversize) RAP sizes?

1. Black Base

2. Shoulder Hot-Rap

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What is Black Base?

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What is Black Base?

- All Virgin = 80 percent 610 road base + 20 percent concrete sand + 2.0 to 3.0 percent 64.22.

-Can Replace up to 50 percent of virgin aggregate with RAP!

-Black Base Pavement Base Section can be thin (as compared to virgin 610 base).

-Faster Construction!

-Great Place to put large RAP particles and they work “great” in this thicker section.

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What is Shoulder Hot-Rap?

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What is Shoulder Hot-Rap?

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What is Shoulder Hot-Rap?

- All Virgin = 80 percent 610 road base + 20 percent concrete sand + 2.0 to 3.0 percent 64.22.
- Can Replace up to 50 percent of virgin aggregate with RAP!
- Material STAYS IN PLACE!
- Fewer accidents = FEWER LAWSUITS!
- Great Place to put large RAP particles and they work “great” in this thicker section.

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How can NCAT and DOT's Help?

- WHAT WE NEED FROM RESEARCH:
  - Figure out accurate Gsb of RAP.
  - Help us establish virgin aggregate standard deviations (for both gradation and moisture).
  - Help us establish RAP variations with single and multiple stockpiles and fractions.

THIS WILL ENABLE US TO BUILD OUR CONFIDENCE.

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How can DOT's Help?

-HELP BY PROVIDING US WITH MORE RAP AND INCREASE USE OF RAP!

- THERE ARE SUFFICIENT LOCATIONS, WITHIN THE PAVEMENT STRUCTURE, TO PLACE HMA/WMA RAP MATERIALS.

- REMEMBER: GIVE IT TO US AND WE CAN USE EVERY ROCK!

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The BEST Reason to use RAP.

‘CAUSE IT’S THE RIGHT THING TO DO!

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The BEST "Other" Reason(s) to use RAP.

"(It)takes approximately half of the energy per mile to produce an HMA pavement as compared to the equivalent RCCP pavement."

Brian Prowell – NAPA (Horvath and Hendrickson Study)

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The BEST "Other" Reason(s) to use RAP.

British Columbia "Tax on Carbon":

- 2007 – 10 cents per gallon of gasoline
- 2012 – 30 cents per gallon of gasoline

Or

- $10 per ton of carbon ($30 in 2012)

This would = $0.60/ton of HMA

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The BEST "Other" Reason(s) to use RAP.

RAP USAGE WILL DRASTICALLY REDUCE DEMAND ON FOREIGN OIL!

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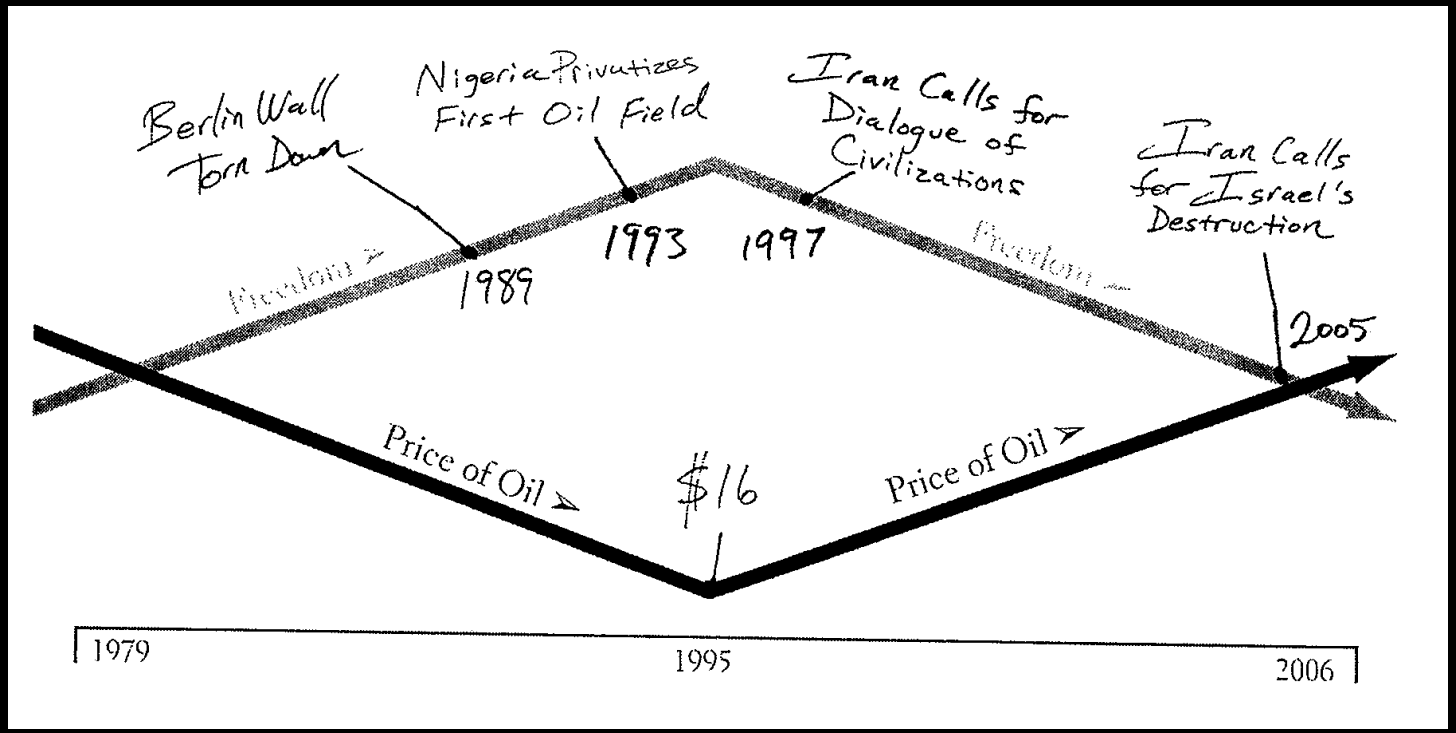
The BEST "Other" Reason(s) to use RAP:



Thomas L. Friedman – "Hot, Flat and Crowded"

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The BEST "Other" Reason(s) to use RAP:

Hugo Chavez – President of Venezuela – "Petrodictator"

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Remember:
I have to know how to do 3 things:

1. Know specs better than you.

2. Know how to make the "widget" better than you.

3. Plus, figure out how to do the above two while still making a profit!

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So, allow me the following:

1. Give me “professional” control over HMA JMF’s (with RAP).

2. Let me control my own process (while being checked by you).

3. Let me tell you how to make my product better!

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LET ME LEAVE YOU WITH A PROVOCATIVE THOUGHT:

BAD EXPERIENCES ARE BASED ON POOR JUDGEMENT

GOOD JUDGEMENT IS BASED ON BAD EXPERIENCES

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LET ME LEAVE YOU WITH A PROVOCATIVE THOUGHT:

POOR PERFORMING PAVEMENTS ARE BASED ON POOR ENGINEERING

GOOD ENGINEERING CAN BE BASED ON POOR PERFORMING PAVEMENTS

So, let us learn from history!

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QUESTIONS?

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