Illinois' Recycling Initiative: *Moving Forward in Road Building, IDOT Style.*

20,000,000 tons of Hot Mix Asphalt (HMA) are made in Illinois each year. The state buys anywhere from 5 - 9 million tons a year!

Illinois Department of Transportation

Illinois Asphalt Pavement Assn. iapa

Murphy Pavement Technology

Recycling is global

Proudly presented for the Illinois Asphalt Pavement Association's Annual Meeting
March 2007

Timothy R. Murphy, P.E.
President
Murphy Pavement Technology

Forget Rednecks .....here is what Jeff Foxworthy has to say about .. Chicagoans

- If you know all 4 seasons: almost winter, winter, still winter and road construction, you live in Chicago.
- If "Vacation" means going anywhere south of I - 80 for the weekend, you live in Chicago.
- If you've had a lengthy telephone conversation with someone who dialed a wrong number, you live in Chicago.

What Jeff Foxworthy might say…

"If you have large RAP stockpiles… You know you're a Chicagoan."

Photo Dan Gallagher

Recycling is global

Joint effort by IDOT and IAPA is first of its kind in the world!

Owners invested time, effort, and energy with IDOT.

How did we start?

- Met using several statewide forums.
- Negotiated movement forward to include increased % and other uses for RAP.
- Agreed to implement, review, and adjust RAP percentages on an on-going basis.
- Encouraged ingenuity.

Diminishing Resources Dictates that we Increase Recycling

With the costs of construction materials skyrocketing, IDOT is redoubling its efforts to maximize the use of RAP and is encouraging all local agencies to do the same.

Since 1991

- (21) aggregate sources have closed, accounting for 6.5 million tons / year.
- (2) new aggregate sources have opened.

Chicagoland Statistic

Recycling is all around us

However, asphalt is the most recycled product in the world!

A Positi

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What is Green Engineering?

Green engineering embraces the concept that decisions to protect human health and the environment can have the greatest impact and cost effectiveness when applied early to the design & development phase of a process or product.

RAPOPOLY

- Where do we start?
- How do we win?
- When will we ‘build onto’ the program?

Where do we start?

- New specification
  - Consolidated several policy memos and various specifications,
  - Simplified designer options.
- Public relations campaign aimed at local agencies
  - Recycling Article "Got RAP?" thru *Illinois Interchange* by MLT,
  - Seminars & HMA Plant Tours.

Recycling Usage = f(Quality, Quantity)

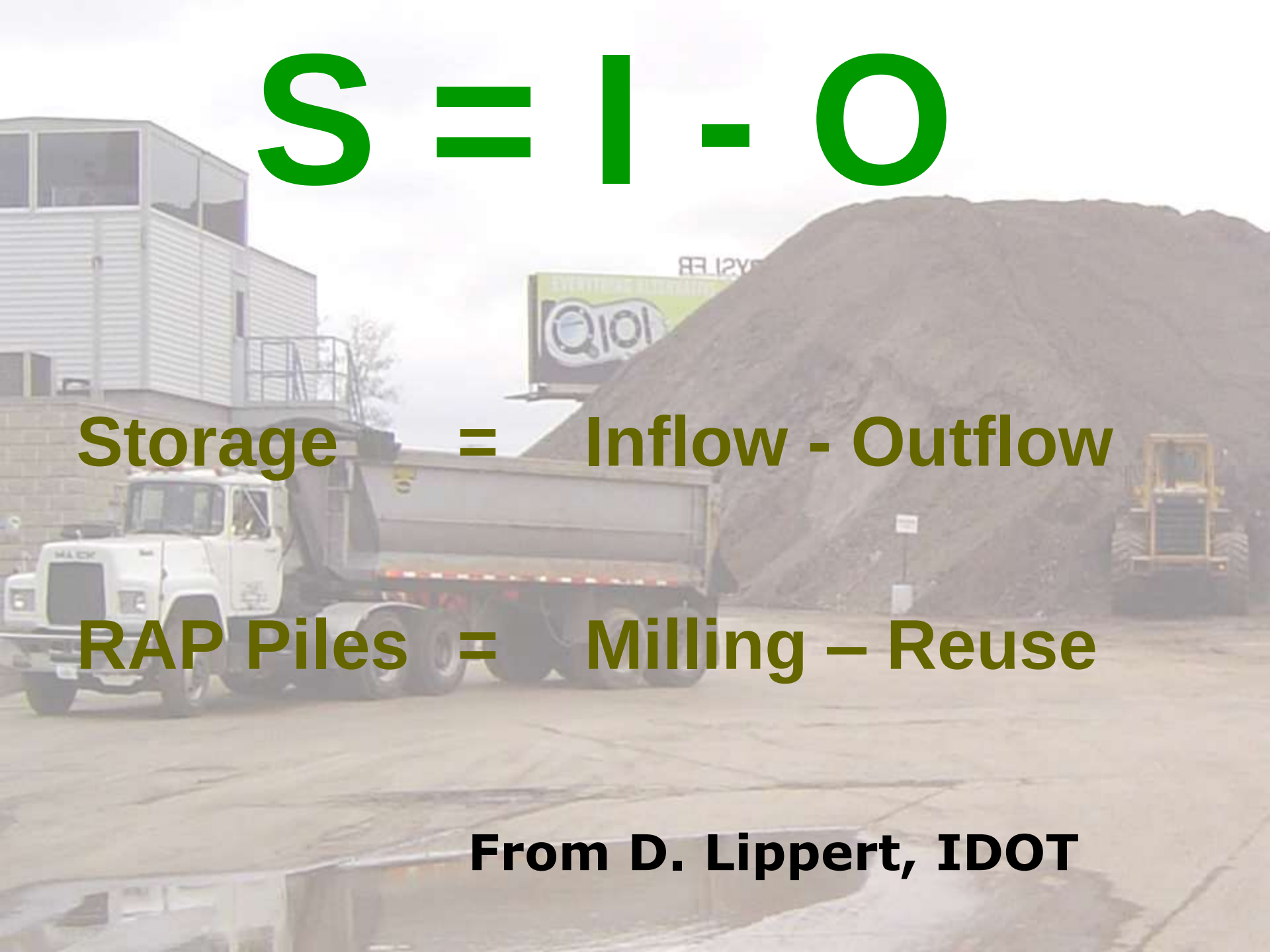
Quality = How good it is.

Quantity = How much we have.

Important function.

Review of RAP Materials

- RAP is reclaimed asphalt pavement resulting from cold milling or crushing of an existing dense graded hot mix asphalt pavement.
- RAP must originate from routes or airfields under federal, state, or local agency jurisdiction.



S = I - O

Storage = Inflow - Outflow

RAP Piles = Milling – Reuse

From D. Lippert, IDOT

S = I - O

From D. Lippert, IDOT

The Captain of our Ship

Asphalt plant quality inputs

Look at the Volumes!!!

How do you win?

Seminars must demonstrate how the specification:

- Maintains high quality.
- Rewards ingenuity.
- Reduces taxpayer cost.

Opportunity Focused Special Provision for RAP [The Specification]

Opportunity is from Agency knowledge on measuring performance and from Contractor knowledge of their operations.

New Maximum RAP in HMA

N_{des}	Binder/Leveling	Surface
30	30	30
50	25	15
70	15/ 25[2]	10 / 15[2]
90	10	10
105	10	10

10% RAP allowed in dense graded polymer modified mixtures; 15% in 4.75-mm mixture.

2/Note: Value of Maximum % RAP if 3/8” RAP is utilized.

Illinois DOT [Extended Life Pavements]

Dan Ryan Expressway (I-94) total reconstruction, 2006 / 2007

- Walsh Construction – prime
- K-Five & Gallagher Asphalt – sub's
  - Stabilized sub-base: Superpave N50 Binder
  - Aggregate sub-grade, 12" w/ crushed concrete and 100% RAP capping aggregate.

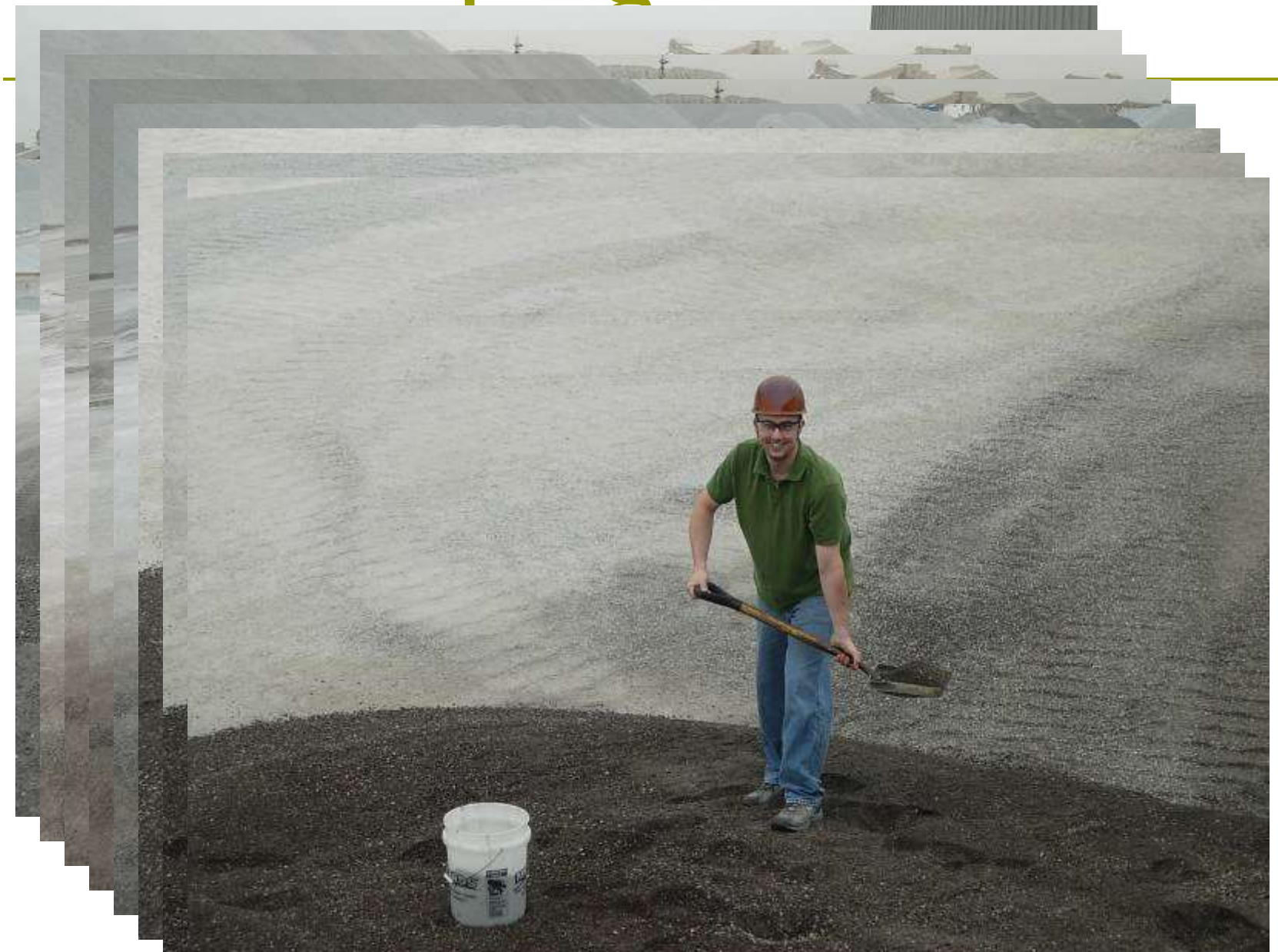
100% re-use of old pavement. (~200,000 cu. yds.)

Dan Ryan (I-94) Specification

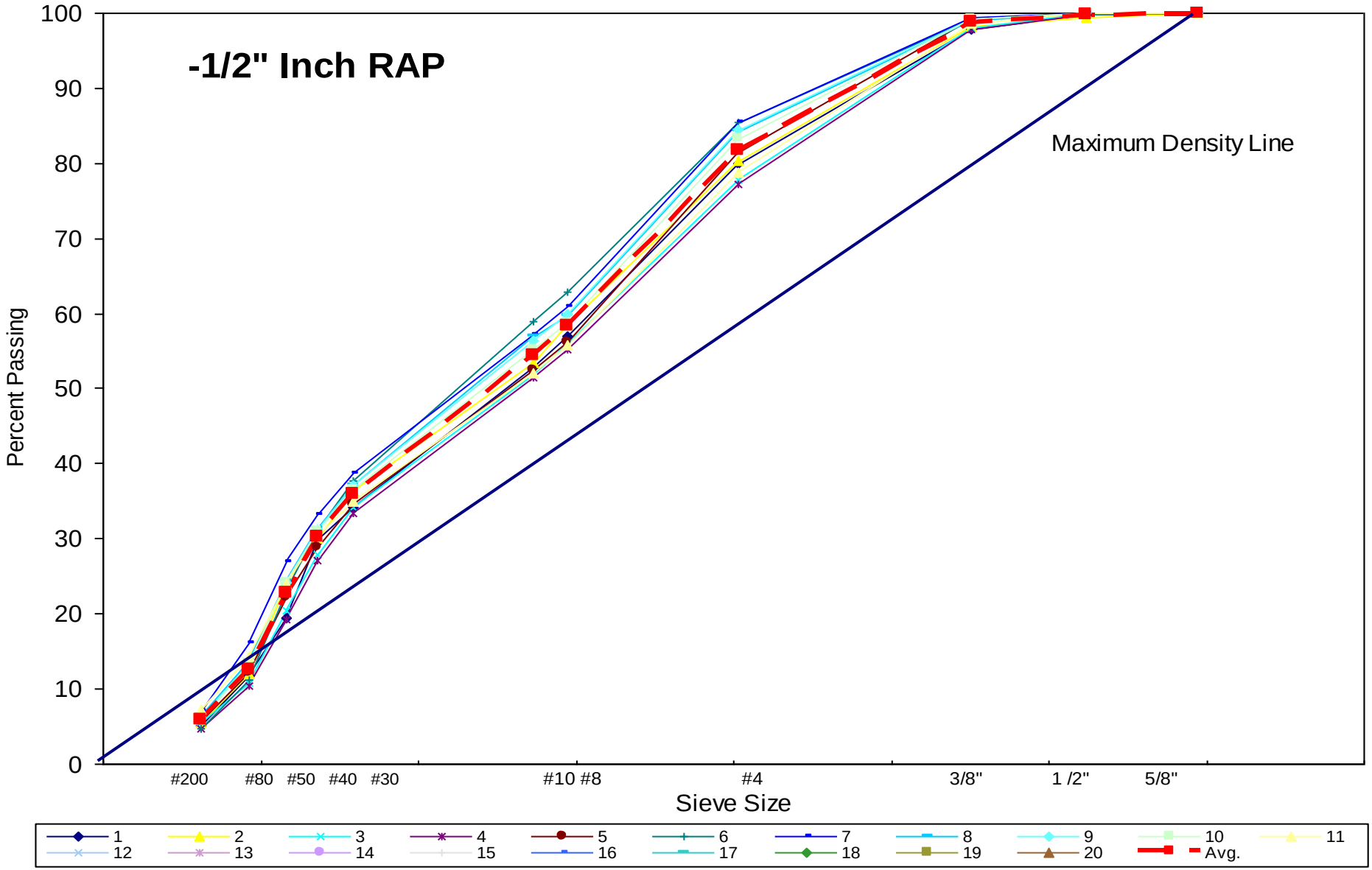
- 2006: N50 HMA Binder with 40% RAP.
- 2007: More of the same and more opportunities.

Virgin Aggregate Sampling

RAP Sampling



-½” RAP Uniform & Consistent



Homogeneous / Conglomerate RAP Tolerances

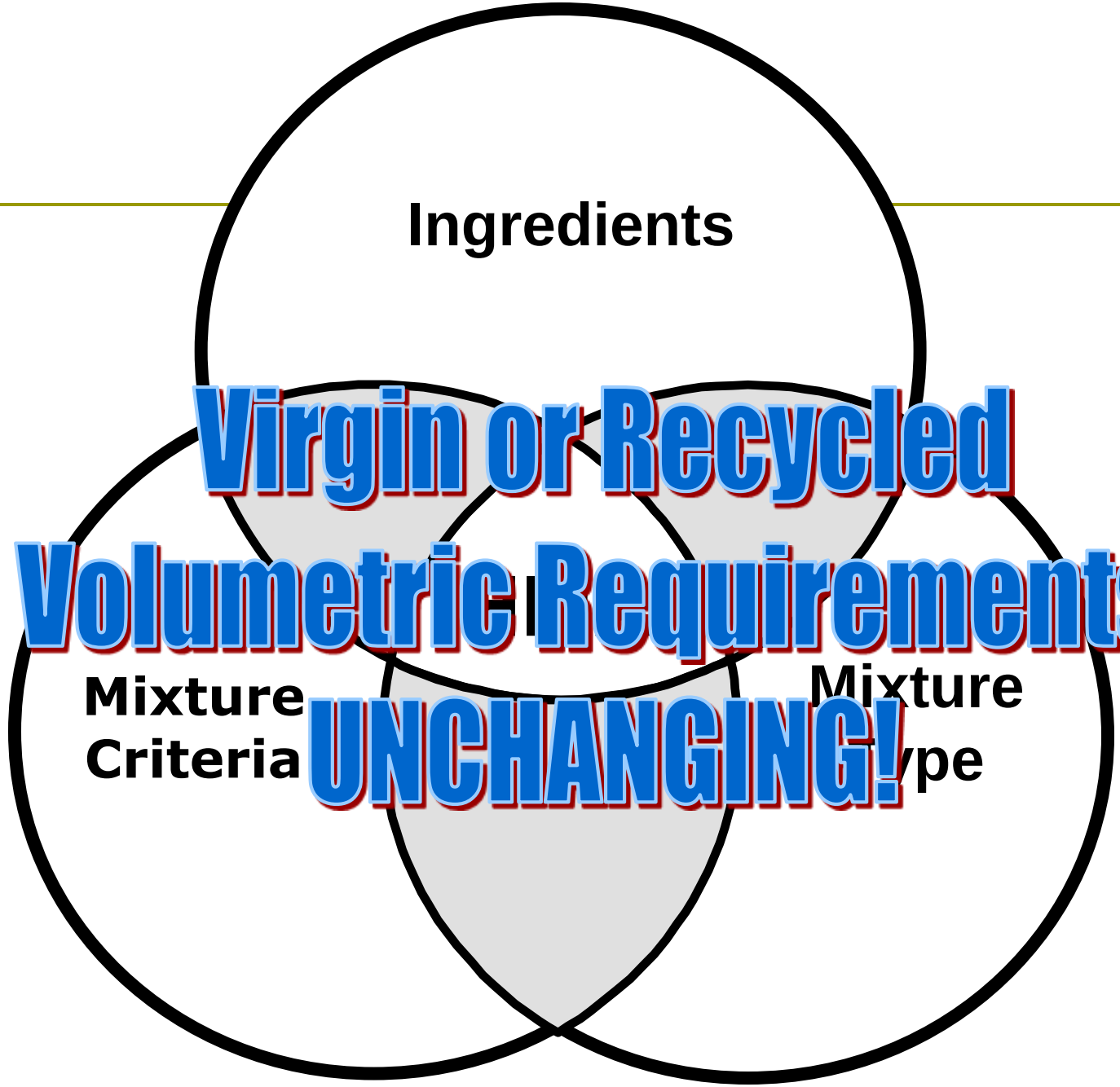
Parameter	Tolerance, %
½″ (12.5 mm)	± 8
#4 (4.75 mm)	± 6
#8 (2.36 mm)	± 5
#16 (0.600 mm)	± 5
#200 (0.075 mm)	± 2.0
AC	± 0.4[1]
G_{mm}	± 0.02[2]

Store RAP in a cool dry place

Picture from Dan Gallagher

In 1990's we saw fractionating RAP as the future

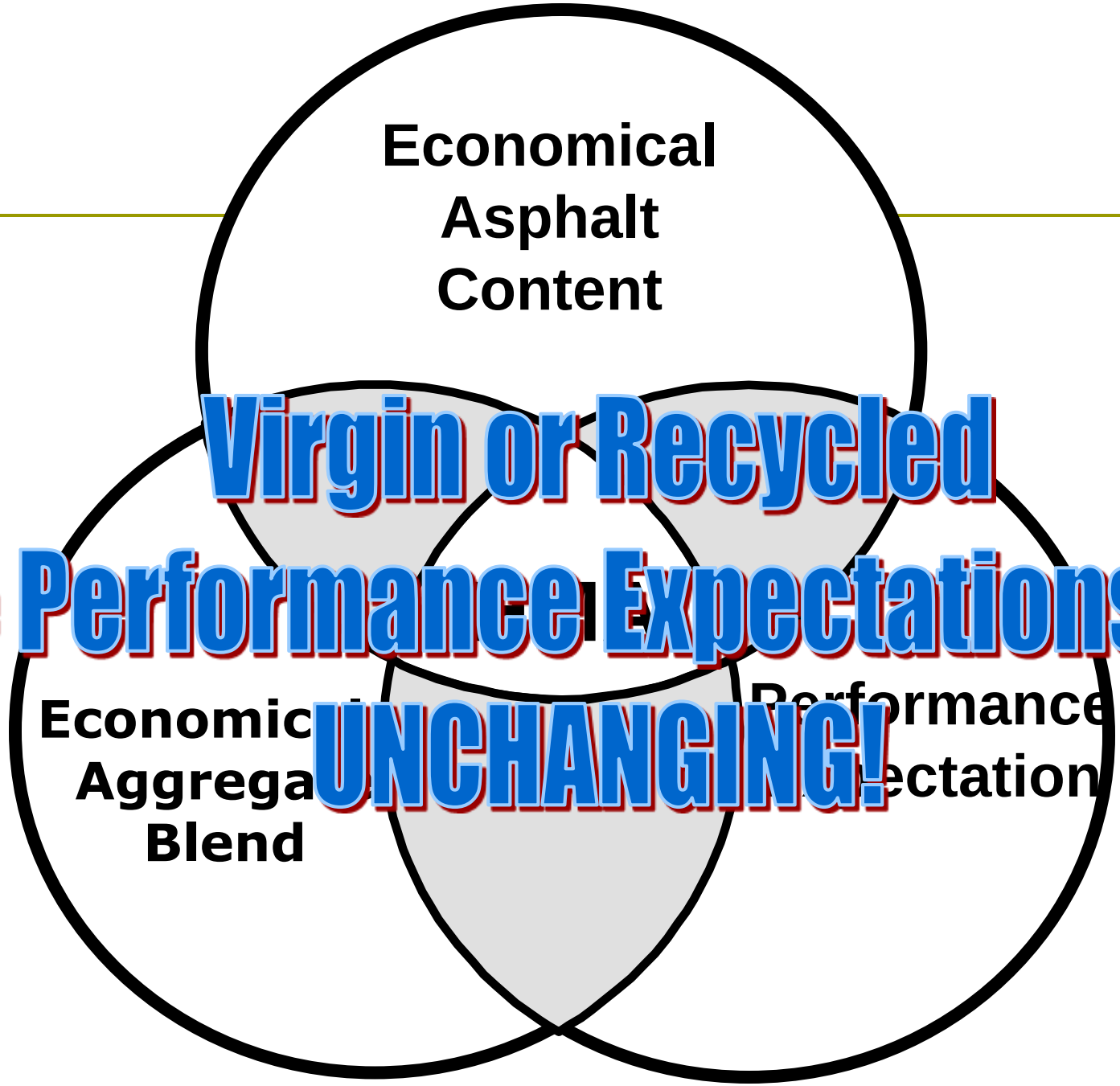
Multiple RAP Feeders



Virgin or Recycled the Volumetric Requirements are UNCHANGING!

Volumetric Measures – No Change

Volumetrics were and still are very important quality measures.



Virgin or Recycled the Performance Expectations are UNCHANGING!

Economics are many things

Financially impacted items are:

- Production,
- Trucking,
- Diminishing resources.

Energy costs are climing rapidly. Why?

Will they ever decrease?

Potential Savings, 200?

Rock ($[illegible]/ton)	New Asphalt ($[illegible]/ton)	RAP 5% AC ($6/ton)	Mix
[illegible] = $9.40	[illegible] = $24.60	[illegible]	[illegible].00
[illegible] = $7.50	[illegible] = $20.50	[illegible] = $1.20	[illegible]20
		Total Savings	$2.40 @ 10% $4.80 @ 20%

If placed cost /ton = $50.00 this represents a 10% savings.

Let's just look at the road system today…

What we know:

0% RAP costs approximately $5.00/ton more than a 20% RAP mixture.

Somewhere Illinois:

Place 1-mile by 30 ft. wide, 4" of HMA.

Question: What can you pave?

Mayor, we need to talk…

What we know:

0% RAP costs approximately $5.00/ton more than a 20% RAP mixture.

Somewhere Illinois:

Re 1-mile by 30 ft. wide, 4" of HM

Q

Savings of ~$20k / mile

Asp [12 /sq.) [2,0]

Sq. yds. = [5,280 ft. / mile x 30 ft.] = 17,600

9 sq. ft. / sq. yd.

Tons = 17,600 sq. yds. x 4" x Asphalt density = 3,942

How to Market Recycling of HMA Successfully

Build a team to work through the details

People Working Together to Form

Alliances in Action

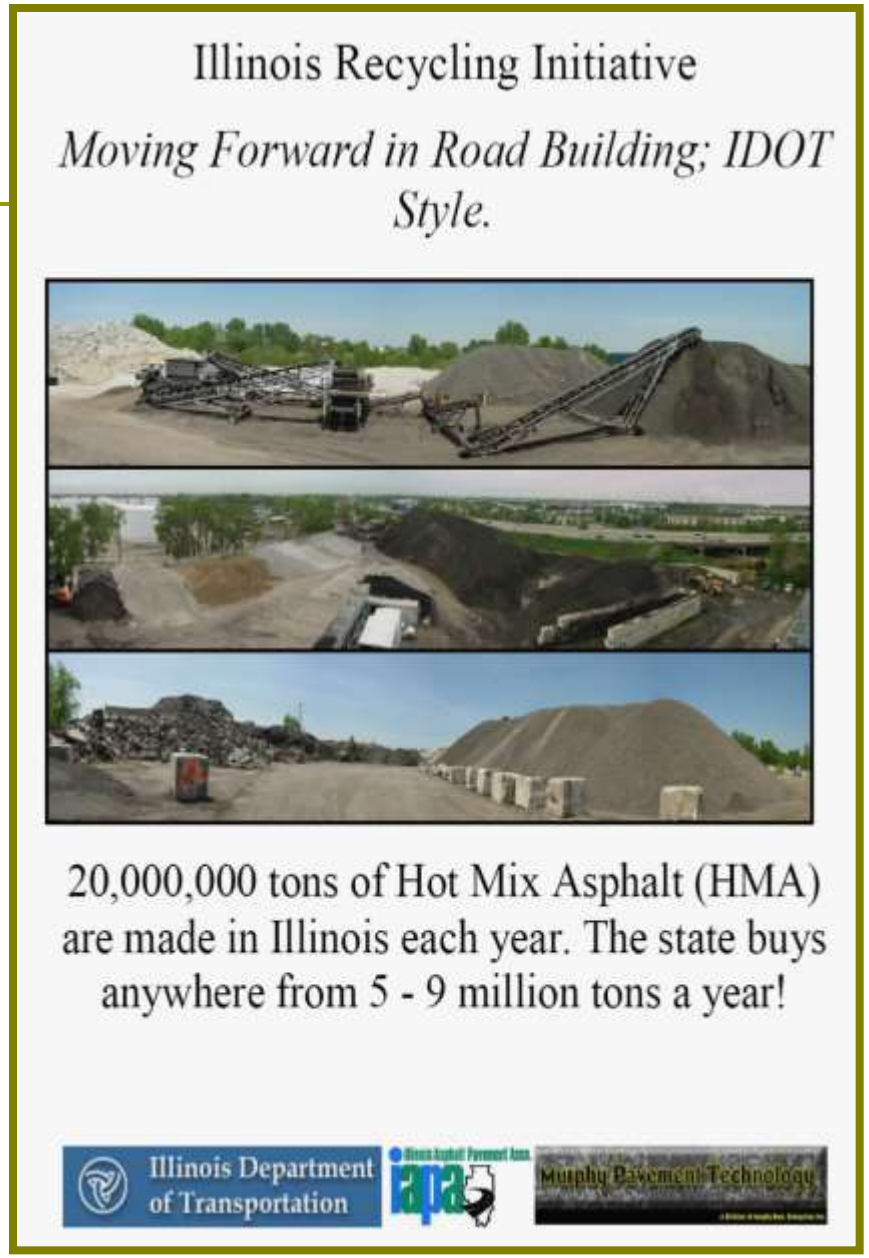
Academia - Agency - Association - Consultant - Contractor - Supplier

Personal thanks go out to:

- Kevin Burke, III – BLR (Coordination)
- Marvin L. Traylor, Jr. – IAPA (Sophistication & Compensation)
- Melvin H. Kirchler & Abdul Dahhan – R1D1 (Motivation)
- James Trepanier – BMPR (Observation & 4-new specifications)
- Bill Pine – HRG (Baileyination)
- My Mom – MOTHER (Birth-of-a-nation)

Marketing

- Brochure,
- Seminars,
- Asphalt Plant Tours.



Cold milling operation for improving slope, maintaining curb reveal, and improves bonding; all while recycling asphalt

Seminar and Plant Tour Intent

Kick-off seminar of July, 2006

Invitee list by IAPA; seminar at CTL

- IAPA Members,
- CDOT,
- ISTHA,
- O'Hare,
- Consultants.

Recycling Initiative Agenda (½-day)

Module 1

Recycling Usage = f(Quality, Quantity).

Module 2

Recycling specification enhancements.

Module 3

QC / QA integration with state-of-the-art Hot Mix Asphalt facilities.

Module 4

Placement and compaction.

Seminar Locations

- District One (Chicagoland) @ 6 locations (Ave. +40 per)
- District Two @ Rockford (50)
- District Three @ Utica (50)
- District Four – Nine; (Tentatively May 15 – 17.)

Consulting firms call for in-house sessions.

Hot Mix Asphalt Plant Tours

- Advanced
- Arrow Road
- Bigane
- Curran
- Gallagher
- K-Five
- Peter Baker
- Plote
- Rockford Blacktop (Lunch included)

The Essentials to Our Success

1. Create and sustain a breakthrough value proposition. [The Past]
2. Cultivate inner networks. [Today]
3. Customer centric. [The User]
4. Adaptability or finding a better way. [Research]
5. Opportunity focused. [The Specification]
6. Pack your board with industry experts. [The Doers]
7. Use blue-chip customers to gain credibility. [The Future]

Kudos to Industry Experts who worked together to properly prepare [The Doers]

- IDOT
  - BMPR & BLRS
  - R1D1
- IAPA
- FHWA
- NHI
- FDOT

- Arrow Road
- Asphalt Pavement Alliance (APA)
- Gallagher Asphalt
- K-Five Construction
- National Slag Association
- Vulcan Materials
- Walsh Construction

The Doers Charge

- Retain quality & performance
- Strive for highest value use
- Create policies that have economic sustainability
- Protect the environment
- Identify short and long term issues
  - Specification changes
  - Research topics (Binder, Volumetrics, LCCA)

FHWA Policy [See Hal]

1. Recycling and reuse can offer engineering, economic and environmental benefits.
2. Recycled materials should get first consideration in materials selection.
3. Determination of the use of recycled materials should include an initial review of engineering and environmental suitability.
4. An assessment of economic benefits should follow in the selection process.
5. Restrictions that prohibit the use of recycled materials without technical basis should be removed from specifications.

IDOT Gave Birth To

- Late 1970's: Recycled HMA spec's.
- Mid 1980's: FM20; clean / crushed sand.
- Early 1990's: QC / QA.
- Mid 1990's: Superpave.
- Mid 2000's: Driving our Recycling Future.

We have been successful up to now; how will we continue to be successful?

QC / QA

Research

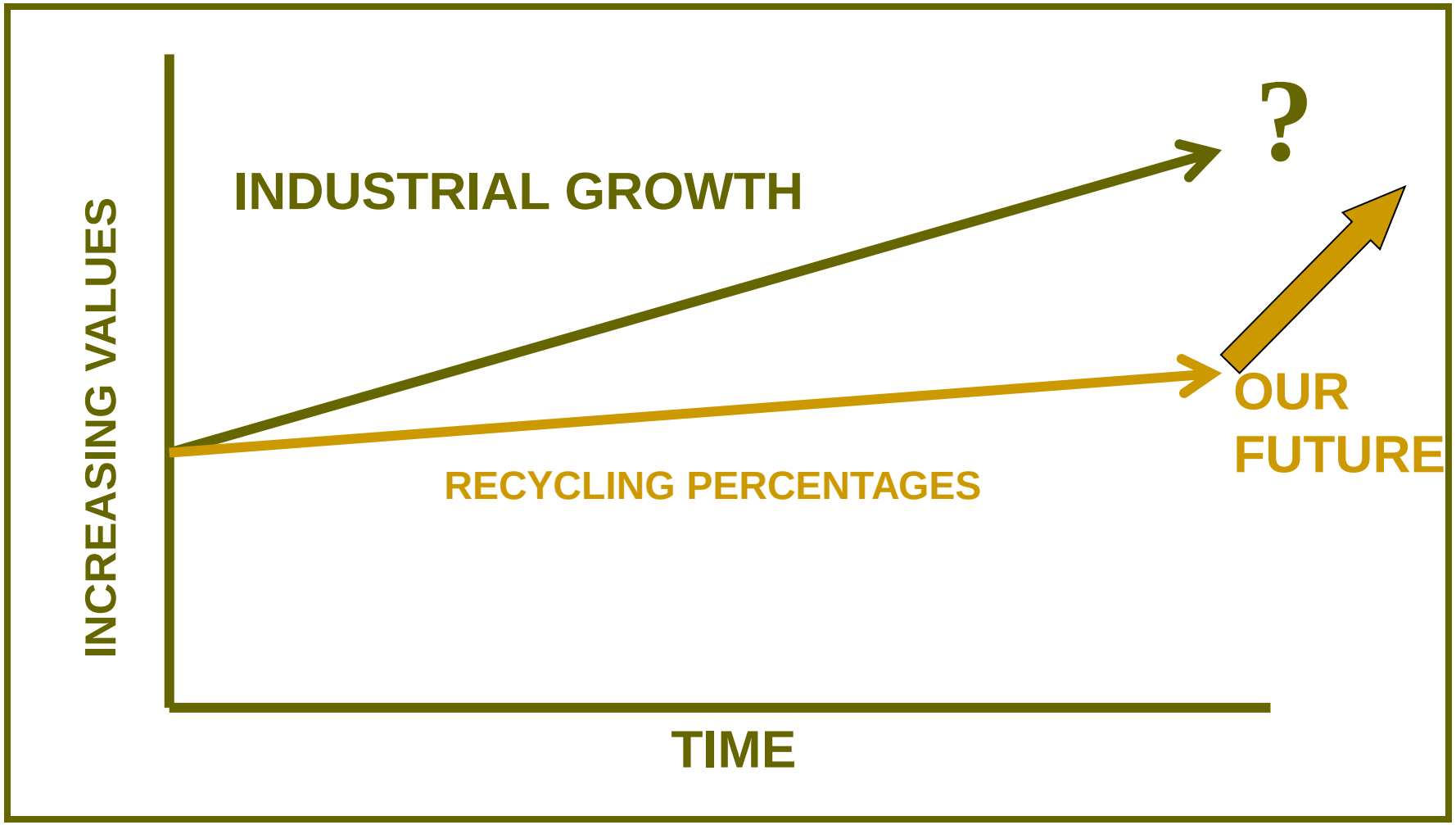
Training

When will we 'build onto' the program?

I believe this is just the beginning; we are trying to engineer in a changing environment.

- We should anticipate that the end result is increased recycling in the future.
- We can do it because we have gotten our VMA house in order:
  - Aggregate gravity
  - Field VMA
  - Dust / AC

Growth vs. Recycling over Time



You know your from Chicagoland when your aggregate gravity > D3 – D9

- G_{sb} = 2.660
- G_{sb} = 2.630

Because of this; we can increase RAP percentages successfully.

This will increase strength and durability from past aggregate gravity values used.

Watch Our Future Design Criteria and Products Allowed in HMA

High RAP Mixtures

- Effect on asphalt characteristics and material supply – Asphalt Institute and Liquid Suppliers,
- Coating all particles – increased temperatures for drying, heating, and mixing – HMA producers,
- Striping – visual strip rating – Zehr, IDOT.
- Loss of any performance measure that we deem to be valuable – Academia.

Work with blue-chip customers to gain credibility. [The Future]

- Development of…
- Municipality of…
- Village of…
- Town of…
- Township of…
- County of…
- State of…

The Illinois Approach [Today, Tomorrow, and The Future]

Active promotion of recycling technology by providing:

1. Needed specifications,
2. Best practices,
3. Design guidance, and
4. Continuing research and education;

to overcome barriers and to increase the allowable % used in the future.

What will you *really* remember most about today?

What will you *really* remember most about today?

- RAP is an excellent resource that must be properly managed.
- RAP percentages will continue to increase through contractor ingenuity and IDOT over-site.
- Contractor's did this with IDOT.

Questions?

Thoughts on the future…

Shall we make a list together on how to increase RAP usage or do you want me to pontificate? Use:

- Fine-graded for LV to increase sand fraction.
- ¼" clear stone to ↑ VMA and ↓ dust.
- Maintain VMA minimums.
- Encourage Pine to do more Bailey classes. Koester (Howell Asphalt) and MPT added it to the Level III HMA Course.