Colored Binders:

What Are They and How are They Used?

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Basic Questions...

- What do They Look Like?
- Where do You Use Them?
- > Why do You Use Them?
- > Who is Using Them? (and Where?)
- > Who Makes Them?
- What are They Made of?
- How do You Use Them?
- What's the Catch? (Can I Really Use them Here?)



What do they Look Like?

Also: Blue, Green, Orange, Beige



Where do You Use Them?

Sidewalks





Crosswalk





Where do You Use Them?

Plazas





Bus/Bike/Pedestrian Lanes



Where do You Use Them?

Driveways



Parking Lots



Why do You Use Them?



Why do You Use Them?



Safety





Safety (cont): The Lodeve Tunnel on freeway A75 (between Millau and Montpellier in southern France



Who is Using Them? (and Where?)

➢ Who:

- Public Agencies
- Companies
- Homeowners

> Where:

- Europe (esp. UK, Holland, France, Germany)
- Japan
- China
- East Coast USA (Pennsylvania Avenue)





Who Makes Them?

Synthetic Binders with Pigment

- Total, France (Kromatis, Binder and Emulsion Liquids)
- > TODA, Japan/ Chicago (CS-Phalt Pellets)
- > Bituchem, UK (Chiptex, Natratex, Colourtex)
- Mexphalt C, Holland (Shell)



Who Makes Them?

Pigmented Asphalt

- AXOtint by Lafarge Aggregates of UK: uses red iron oxide as pigment
- Coloured asphalt by CEMEX of UK
- Colourfalt by Hanson Quarry Product Europe, UK
- AXOgold and AXOstone by Lafarge Aggregates: finishing process expose aggregates for natural color
- ABILOX from Ability Building Company of Australia: used Chromium Oxide based greens and Cobalt blues
- Colorfalt by Ventraco Colour of the Netherlands: uses inorganic and organic pigments, e.g. iron oxide, chromium oxide, titanium dioxide; colors include white, yellow, green, blue, and violet.



What are they Made of?

Synthetic Binders

- Proprietary Synthetic Binders and Emulsions
- Usually Formulated so that Viscosity and Other Physical Properties Amenable to Mixing and Compaction
- Sometimes Composed of Resins from Crude Refining

Binder for Pigmented Asphalt

- Standard Paving Grade Asphalt
- > Asphalts with Reduced Asphaltenes



Pigments

Inorganic Pigments

- Iron (III) oxide (Fe2O3): red or yellow color
- Chromium (III) oxide (Cr2O3): green color
- > Ultramarine blue: blue color

Organic Pigments

- Phthalocyanine blue: blue color
- Azo pigment: yellow color
- Toluidine red: red color



How do You Use Them?

Mix Production

Portable, On-Site Mixing, or
 Mixing at Full-Scale Plants
 (must waste a small batch to 'clean' equipment)



How do You Use Them?

Laydown

- Hand placement, small compactors, or
- Full-scale pavers and rollers









#1 Cost

For International Shipping, Binders can Cost \$1000-\$4000/ton, with mix prices from \$100-\$300 per ton

Better to think in terms of Cost/yd² (\$5 to \$15/yd²)



#2 Physical Properties and Performance

- Superpave Binder Properties?
- Superpave Mixture Volumetrics?
- Other Mixture Properties (fracture, fatigue, moisture resistance)?



#3 Color Longevity

- Pigment Fading
- > Rubber, Oil Deposits, Misc. Debris



#4 Lack of Production/ Construction Experience
> Plant Mixing Techniques?

- Laydown Behavior?
- > Bid Price?





