

Ohio Asphalt Paving Conference

FEBRUARY 3-4 2021

Darke County 404LV



Ohio Asphalt Paving Conference

► Darke County 404LV



Ohio Asphalt Paving Conference

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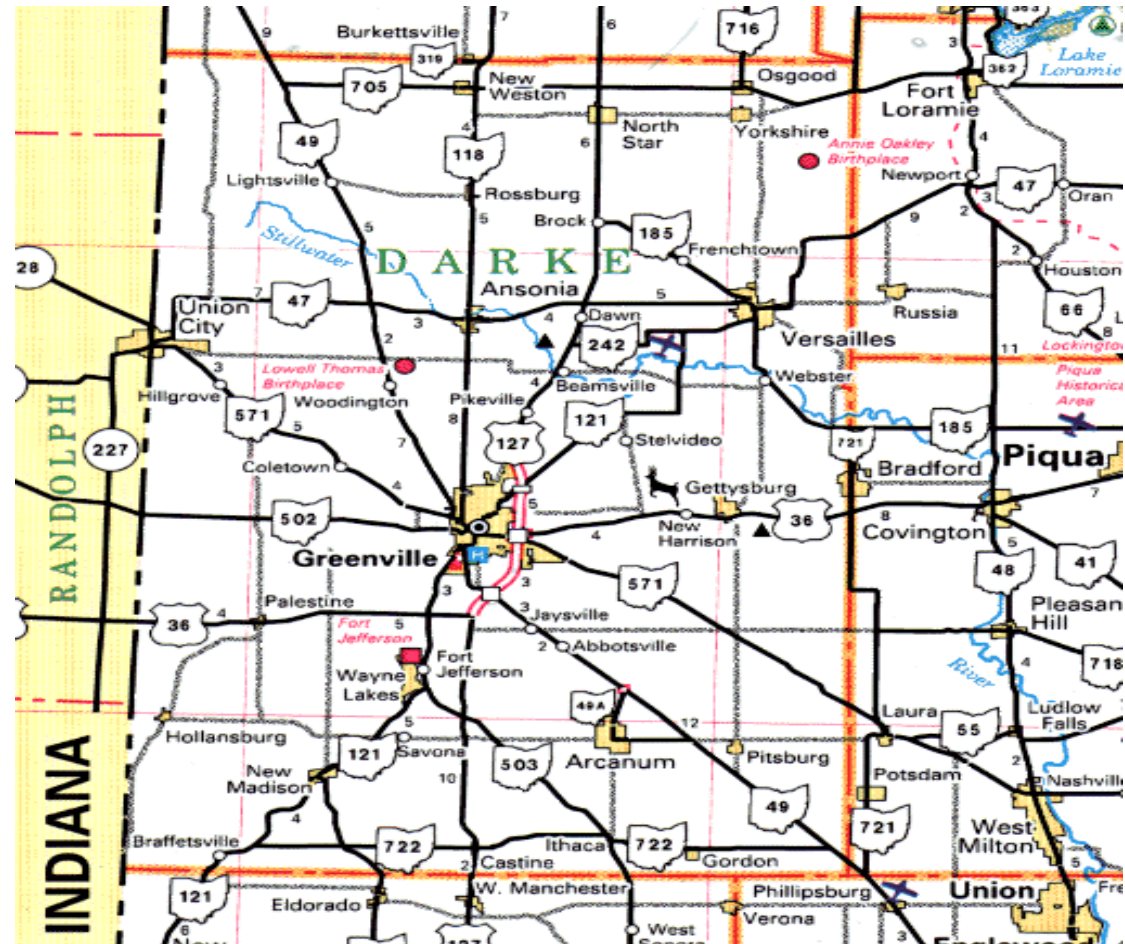
Darke County Ohio

Established Jan 3, 1809
Named After William Darke
(American Revolutionary
War Officer)



Darke County Ohio

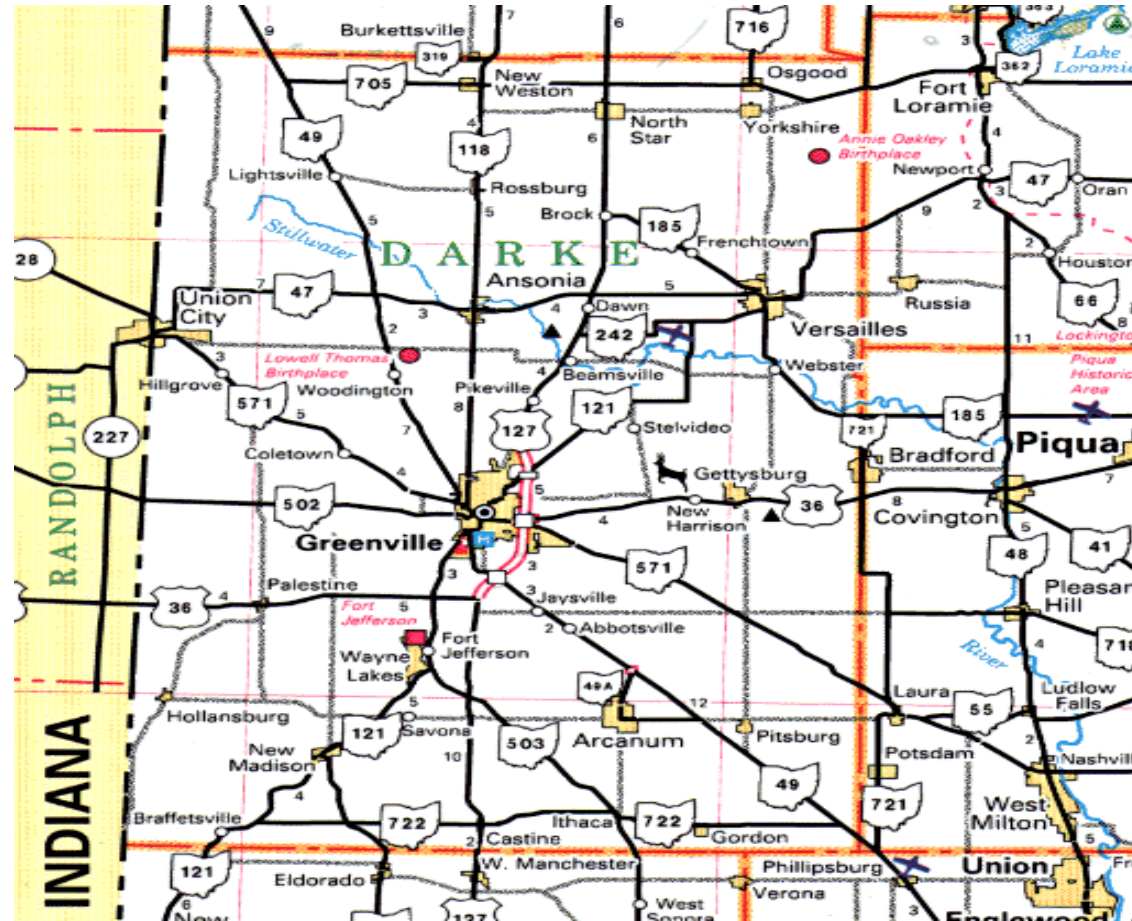
County Seat: Greenville



Darke County Ohio

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Area: 600 Square Miles
(9th Largest County
in Ohio by area)

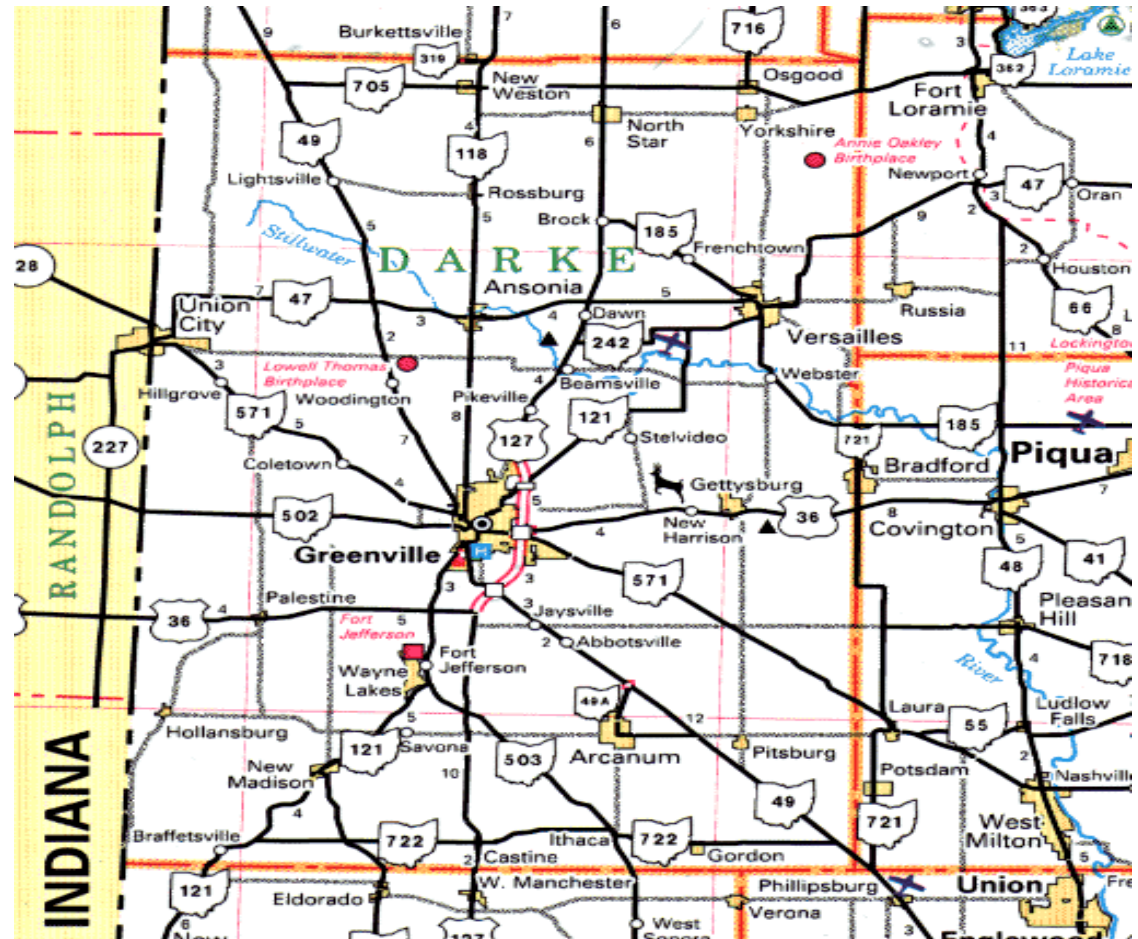


Darke County Ohio

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Population: 51,300

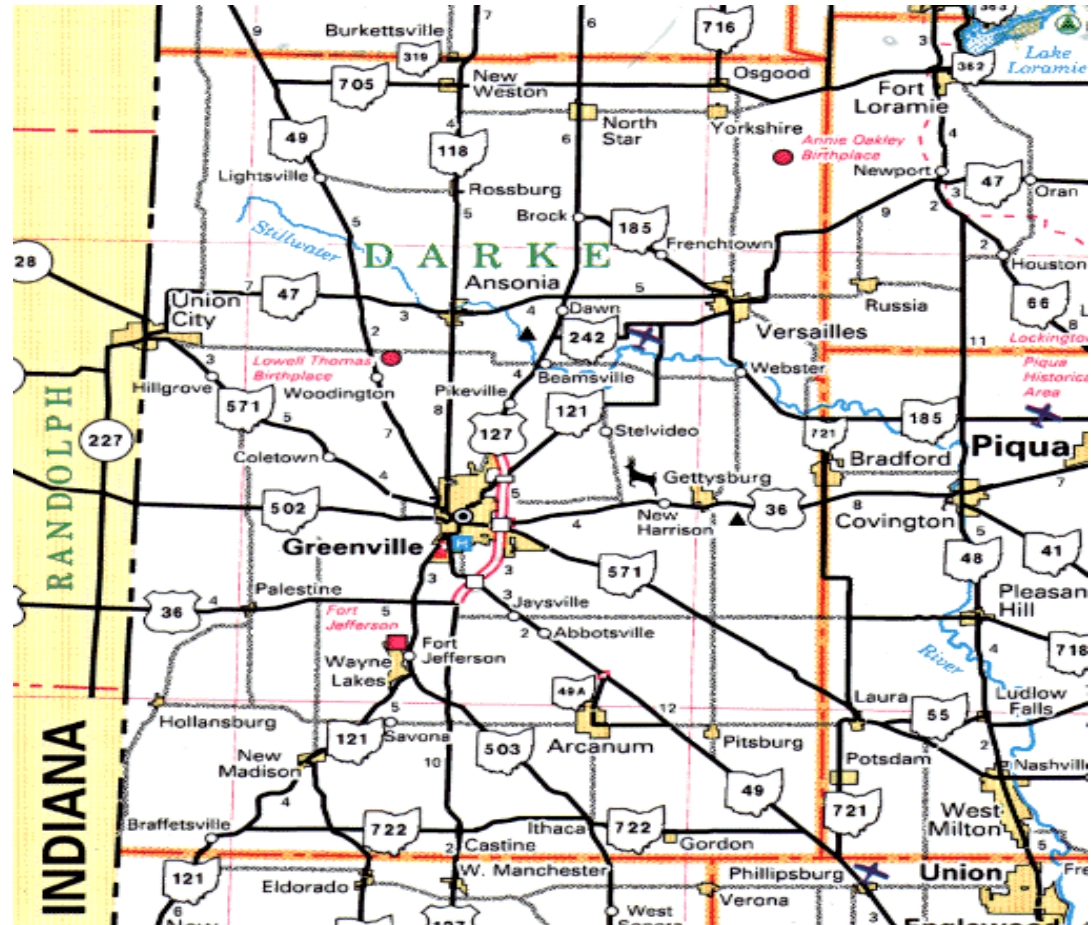


Darke County Ohio

County Seat: Greenville

Area: 600 Square Miles
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Population: 51,300
County Roads: 523

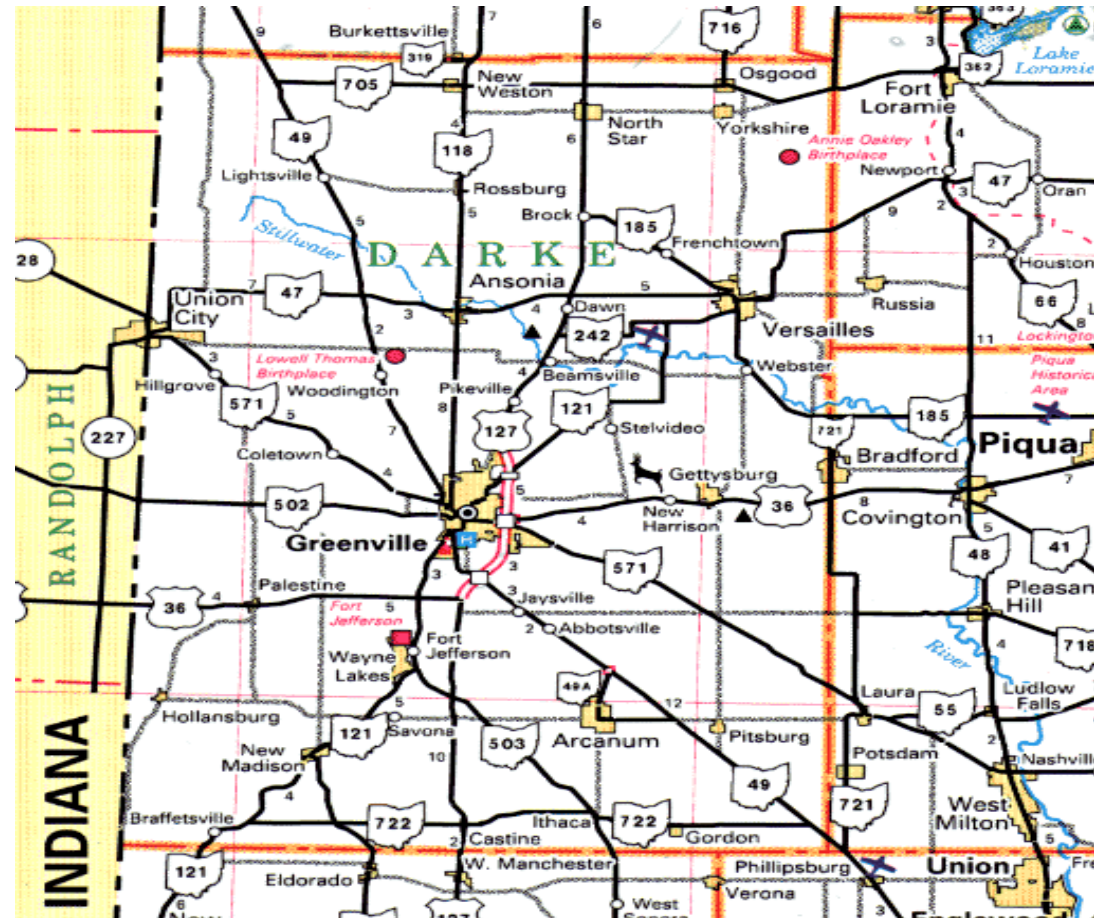


Darke County Ohio

County Seat: Greenville

Area: 600 Square Miles
(9th Largest County
in Ohio by area)

Population: 51,300
County Roads: 523
Lane Miles: 1,046



Darke County Traffic

Traffic Loading
300 – 2000 Vehicles
per day
Rural to Semi-Urban
Classification



Darke County Traffic - Farm

Intensive
Agriculture



Dark County Traffic - Livestock

Large
Livestock
Facilities



Darke County Historical Designs

- ▶ 404 Asphalt Concrete
 - A staple of Ohio asphalt paving since 1965
 - A prescriptive specification vs. end result specification
 - A specification having experienced the benefit of refinement over time based on field performance
 - ▶ A surface mix using 5.8% AC-20 for gravel designs and 6.0% AC-20 for limestone designs



Darke County Historical Designs

- ▶ Pavement section consisted of:
 - ▶ 404 Surface Mix – 1" thick



Darke County Historical Designs

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 - ▶ 402 Intermediate Mix – $\frac{3}{4}$ " thick "scratch course"

Darke County Historical Designs

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 - ▶ 404 Surface Mix – 1" thick
 - ▶ 402 Intermediate Mix – $\frac{3}{4}$ " thick "scratch course"
- ▶ 402 Surface – 1-1/4" single lift was placed on some resurfacing projects

Darke County Historical Designs

- ▶ 1997 ODOT 404 Hot Mix Asphalt in Construction Specification Book

Darke County Historical Designs

- ▶ 1965 to 1997 ODOT 404 Hot Mix Asphalt in ODOT Construction Specification Book
- ▶ 2002 ODOT 404 Hot Mix Asphalt Removed from ODOT Construction Specification Book

Darke County Historical Designs

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- ▶ 2002 ODOT 404 Hot Mix Asphalt Removed from Construction Specification Book
- ▶ 448 Type 1 Hot Mix Asphalt slowly replaces 404 Asphalt

Darke County Historical Designs

- ▶ 1997 ODOT 404 Hot Mix Asphalt in Construction Specification Book
- ▶ 2002 ODOT 404 Hot Mix Asphalt Removed from Construction Specification Book
- ▶ 448 Type 1 Hot Mix Asphalt slowly replaces 404 Asphalt
- ▶ 404LVT introduced in 2009 for a 1-inch thick asphalt overlay that corrects minor surface distresses, provides increase to pavement strength, enhances ride comfort, and improves road profile and driver safety.

Darke County Historical Designs

- ▶ 448-1 asphalt mixes were coarser and designed for heavier traffic loading with higher daily traffic numbers.



Darke County Historical Designs

448-1 mixes
tended to lose
fines on the
Darke County
roadways
because of
limited traffic
loading and
lower asphalt
content



Darke County Historical Designs

448-1 surface mixes were exhibiting cracks after 1 to 2 years of placement because of limited traffic loading and stiffer asphalt cements



404LVT Asphalt Concrete

► Item 404-LVT

- LVT implies for use on Low Volume Traffic pavements
- An industry initiative
- Experimental specification
- Builds on success of 404

404LVT Asphalt Concrete

- ▶ Item 404-LVT
 - Intended as a cost-competitive solution for...
 - ▶ Maintaining low volume roads (ADT < 2500)
 - ▶ Restoring ride quality
 - » Smoothness
 - ▶ Longitudinal profile & transverse slope
 - ▶ Improving safety
 - ▶ Asphalt stabilized, skid resistant wearing course capable of resisting aggregate dislodging and surface delaminating

404LVT Asphalt Concrete

- ▶ Pavements suitable for 404-LVT treatment show the following distresses:
 - Dry-looking, “bony” pavements that are porous or permeable
 - Pavements that have begun to ravel and lose surface aggregate
 - Pavements with extensive cracking too fine for crack sealing
 - Pavements with cracking of the surface too extensive for crack sealing alone
 - Pavements previously chip or cape sealed but have lost aggregate or show thin delamination

Good Roads for 404LVT



Good Roads for 404LVT



Good Roads for 404LVT



Bad Roads for 404LVT

- ▶ Candidate pavements will have...
 - No unrepaired structural (fatigue) damage
 - No appreciable rutting ($> \frac{1}{4}$ inch)
 - No base failure
 - Sufficient remaining structural capacity to last the life of the 404-LVT treatment.

Bad Roads for 404LVT



Bad Roads for 404LVT



Bad Roads for 404LVT



404LVT Design Considerations

- ▶ **April 28, 2008 – 404LV consisted of:**
- ▶ 6.4% Total AC Limestone Design (6.2% Total AC Gravel)
- ▶ 3.9% Virgin AC Limestone Design (3.7% Virgin AC Gravel)
- ▶ % Passing #4 Sieve – 60-70 %

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▶ April 5, 2011 – 404LV consisted of:

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- ▶ 3.9% Virgin AC Limestone Design (3.7% Virgin AC Gravel)
- ▶ % Passing #4 Sieve – 65-75 % ←

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▶ June 5, 2015 – 404LVT consisted of:

- ▶ 6.8% Total AC Limestone Design (6.6% Total AC Gravel)
- ▶ 5.8% Virgin AC Limestone Design (5.6% Virgin AC Gravel)
- ▶ % Passing #4 Sieve – 72%



Darke County 404LV

- ▶ Darke County experimented in 2016 with a 1" overlay on a rural road with minimal traffic loading.
- ▶ The asphalt cement for the project was a polymer modified **PG70-22**.
- ▶ Review of the pavement after 1 year showed thermal cracking that had to be crack sealed so an alternate design was requested.



Darke County 404LV

- ▶ Darke County used historical knowledge to capture the design requirements that would work best for their roads:

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Darke County 404LV

- ▶ Darke County used historical knowledge to capture the design requirements that would work best for their roads:
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Darke County 404LV

- ▶ Darke County used historical knowledge to capture the design requirements that would work best for their roads:
- ▶ 6.8% Total AC (5.9% Virgin AC)
- ▶ Virgin AC: PG58-28 from ODOT's approved supplier list
- ▶ 50% or more of the fine aggregate shall be natural sand

Darke County 404LV

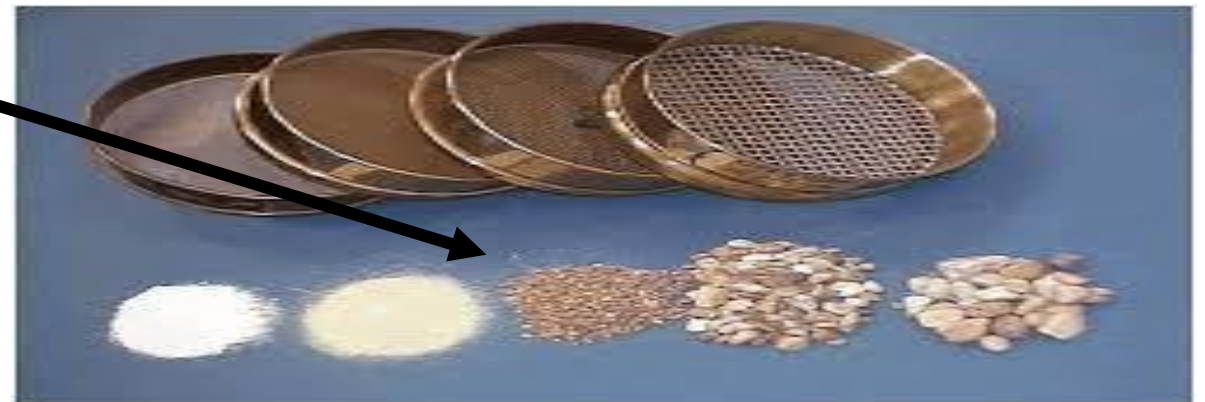
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- ▶ 50% or more of the fine aggregate shall be natural sand
- ▶ Gradation: 72% passing the #4 Sieve
- ▶ 25% Recycled Asphalt Pavement (RAP)

Darke County 404LV

- ▶ **404LV Method of Acceptance:**
- ▶ Acceptance based on the daily mean for gradation and binder content.
- ▶ Binder content: $\pm 0.5\%$
- ▶ Binder range: 1.0
- ▶ # 4 Sieve: $\pm 6\%$
- ▶ # 4 Sieve range: 12



Darke County Success

- ▶ Since 2017, Darke County 404LV has been applied to 108.53 miles of County roads using a ½" leveling course with a 1" surface course. It has also been applied to many Township roads, Village streets, and Private parking lots with the results being very well received.



Questions??



