Limestone Aggregates in Alabama Concrete Pavements

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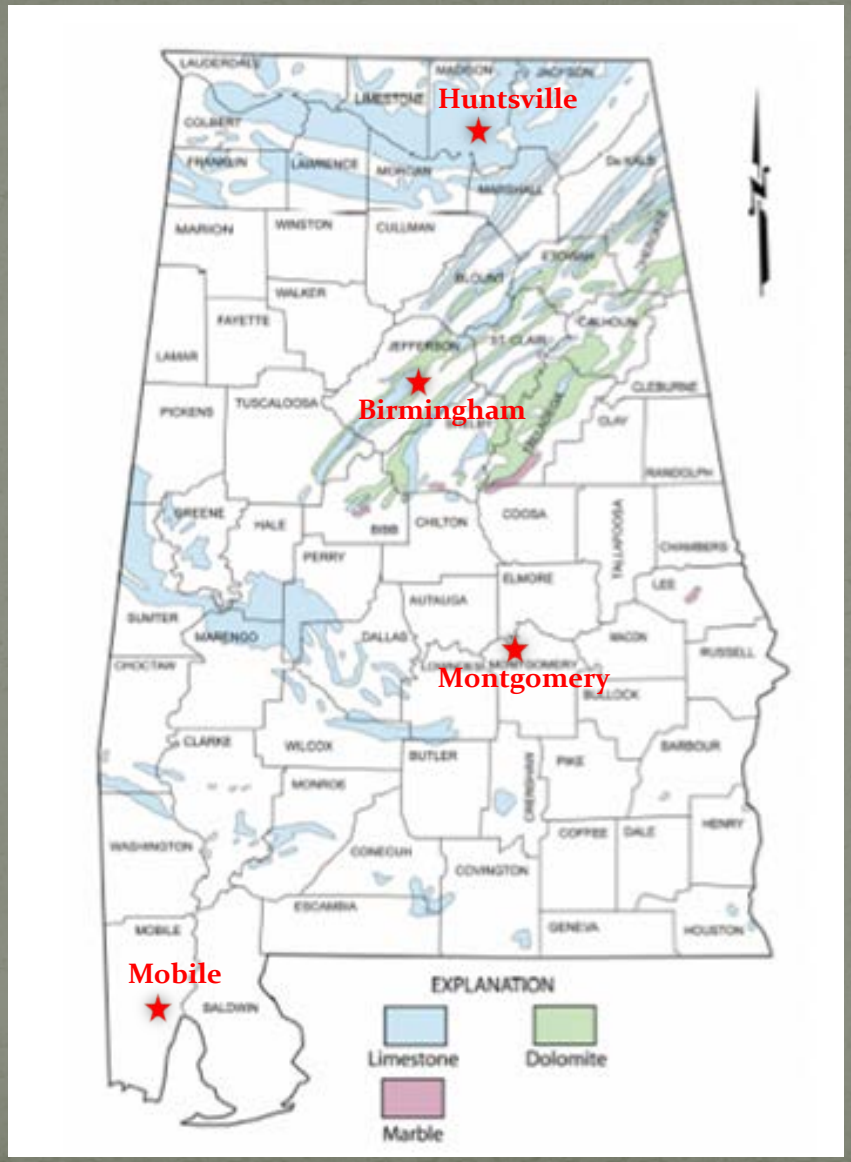
Aggregate Availability in Alabama



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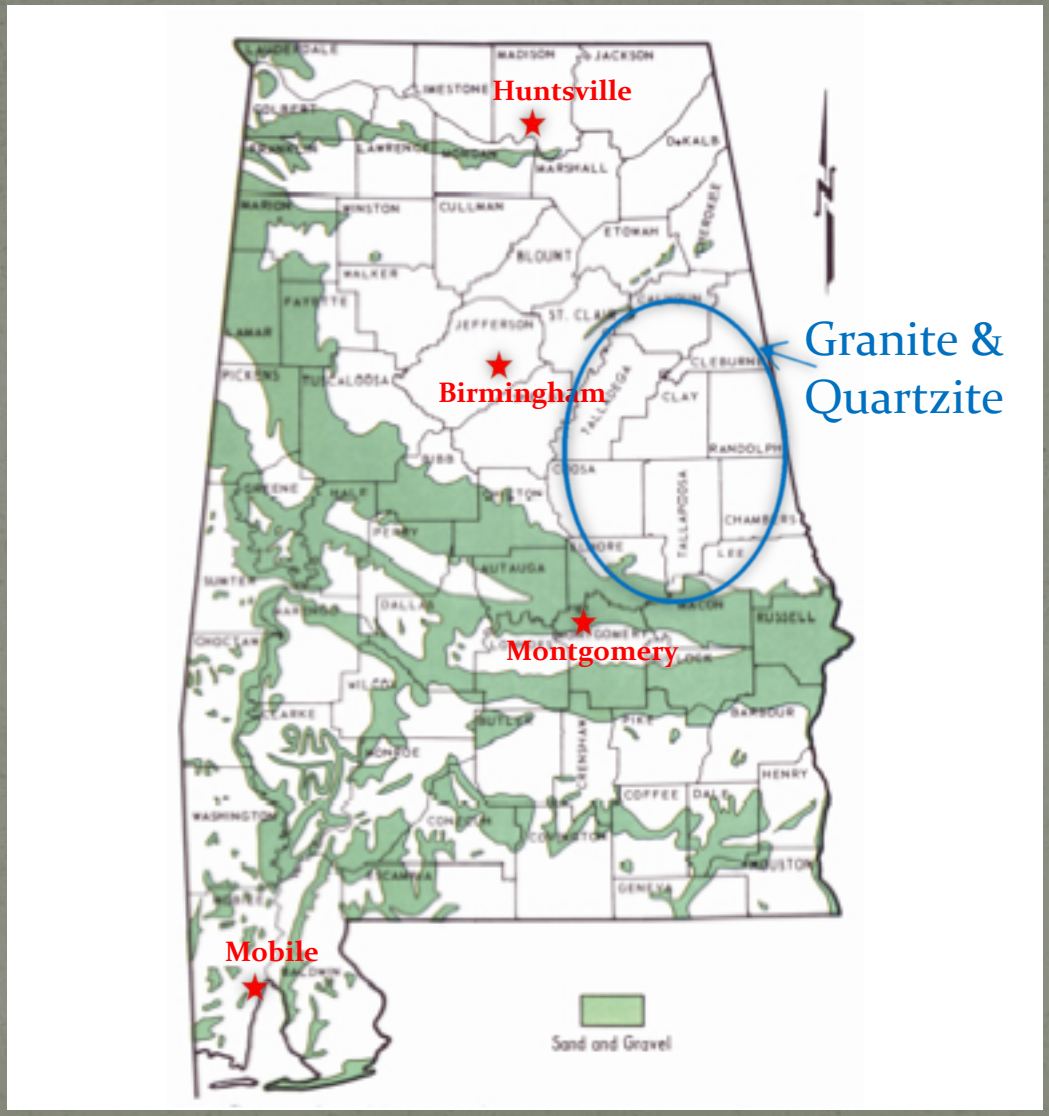


Past Experiences with Limestone Aggregate in Concrete Pavement

- Interstate concrete pavements from the 1960s showed similar friction numbers for years.
- After diamond grinding during the mid-1980s, pavements with limestone coarse agg had noticeable reductions in friction numbers.
- As a result, the aggregate specs for concrete pavement were changed to the following:
  - "*The coarse aggregate for mainline and ramp pavement shall be granite, sandstone, quartzite, or gravel with a specific gravity greater than 2.550 (specific gravity requirement applies to gravel only). Gravel with a specific gravity less than or equal to 2.550 and limestone will not be allowed.*"

Concrete Pavement Construction Under the Limestone Moratorium

- STPAAF-I059 (342)
  - Etowah Co.
  - ~11 mile unbonded overlay on I-59 NB/SB, north of Gadsden
  - Coarse Aggregate: **Granite** from Wedowee, AL
  - Add'l mix for paving shoulders used limestone from Attalla, AL
- IM-I065 (393)
  - Jefferson Co.
  - ~2 Mile reconstruction of I-65 NB/SB b/t I-459 & US-31 in Hoover
  - Coarse Aggregate: **Quartzite** from Oxford, AL
  - Add'l mix for paving shoulders used limestone from Saginaw, AL
- IM-IMD-I020 (325)
  - Jefferson Co.
  - Reconstruction of I-20/I-59 split interchange in Birmingham
  - Coarse Aggregate: **Granite** from Alexander City, AL

Revisiting the Use of Limestone in Concrete Pavement

- Research Project was initiated by PCA Southeast & CEMEX at The Univ. of Alabama, under Dr. Eric Giannini & Dr. Jay Lindly, with additional input from ALDOT.
- Initial scope:
  - Review of other states' specs for concrete pavement aggregates
  - Comparison of carbonate aggregate sources
    - Are Alabama limestone sources approved for surface treatments in other states?
  - Review of historical pavement performance
  - Review of construction & rehab techniques

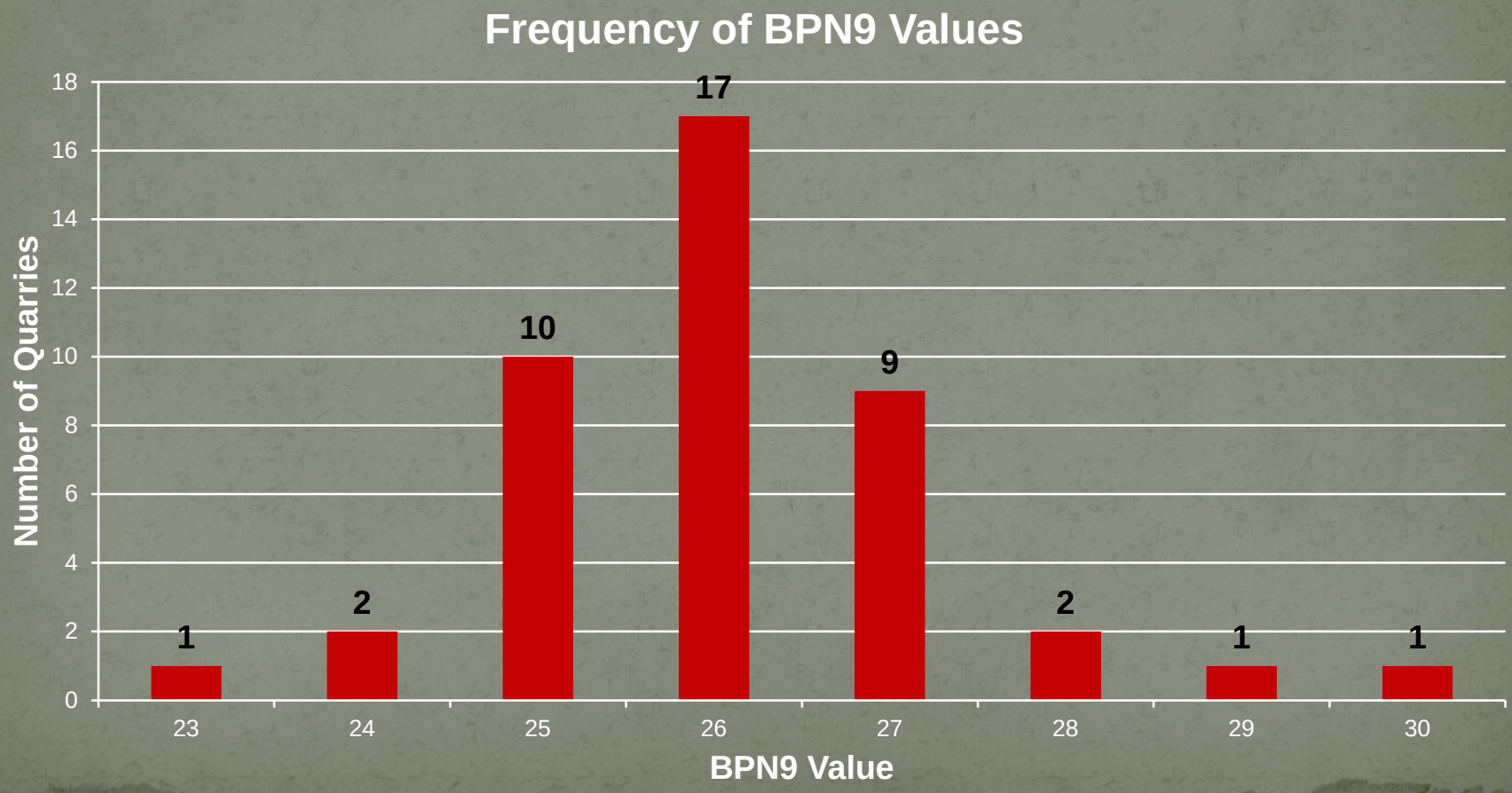
Evaluating Our Limestone

CRUSHED LIMESTONE
TYPE I

ID NUMBER	SOURCE NAME/LOCATION	LOOSE UNIT MASS kg/m³ (lbs/ft³)	BULK SPECIFIC GRAVITY	BULK SPECIFIC GRAVITY (SSD)	ABSORPTION %	FLAT/ELONG. 3:1 5:1	L.A. ABRASION %	BRITISH POLISHING NUMBER (BPN9)	SODIUM SULFATE SOUNDNESS % SOUND	TOTAL SILICA CONTENT %
0048	MARTIN MARIETTA MATERIALS AUBURN, AL	1570(98)	2.842	2.851	0.3	8.1 1.0	34	27	100	2.6
0077	C. A. LANGFORD COMPANY, INC. GUNTERSVILLE, AL	1522(95)	2.721	2.734	0.5	6.1 0.0	17	27	99	3.5
0134	VULCAN MATERIALS COMPANY DOLCITO QUARRY TARRANT, AL	1538(96)	2.774	2.793	0.7	5.7 0.5	18	26	99	7.0
0137	VULCAN MATERIALS COMPANY OHATCHEE, AL	1570(98)	2.834	2.843	0.3	8.0 1.5	16	26	100	4.5
0140	ROGERS GROUP, INC. MOULTON, AL	1506(94)	2.646	2.669	0.9	2.3 0.0	22	26	99	2.3
0141	VULCAN MATERIALS COMPANY FT PAYNE, AL	1506(94)	2.697	2.706	0.3	12.9 1.6	21	26	100	3.3
0142	ROGERS GROUP, INC. TUSCUMBIA, AL	1378(86)	2.574	2.609	1.3	17.3 2.1	24	26	98	2.3
0144-K	CARMEUSE LIME & STONE, INC. LONGVIEW QUARRY SAGINAW, AL SEE NOTE 6	1490(93)	2.729	2.375	0.2	13.3 0.7	24	25	100	3.5
0144-L	DUNN CONSTRUCTION LONGVIEW OPERATION SAGINAW, AL	1426(89)	2.747	2.757	0.3	13.4 3.2	25	24	100	1.8
0148	VULCAN MATERIALS COMPANY CHEROKEE, AL	1410(88)	2.628	2.656	1.1	7.2 2.0	18	26	99	8.0
0151	VULCAN MATERIALS COMPANY LACON, AL	1490(93)	2.686	2.701	0.5	12.0 0.4	24	27	99	5.0
0152	VULCAN MATERIALS COMPANY TRINITY, AL	1426(89)	2.658	2.675	0.6	11.0 2.0	25	27	100	3.6

Evaluating Our Limestone

- 45 In-state limestone/dolomite quarries
- Average BPN9 Value: 26



Proceeding Forward

- Address/update our grinding policies
  - Current grinding specs appear to be inadequate for pavements with our limestone
  - UA researchers are investigating best practices for grinding pavements w/ softer, polishing-prone aggregates
  - Issue: how to best evaluate grinding practices without endangering the public
- Consider allowing a percentage of limestone
  - Asphalt specs allow up to 50% limestone, based on BPN9 values, in surface treatments (except OGFC)

Questions?

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