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Research & Innovation Implementation Program

Identifying Innovations for Statewide Implementation

Communicating Research Results & Innovations throughout PennDOT

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BUREAU OF PLANNING AND RESEARCH INNOVATION INFORMATION

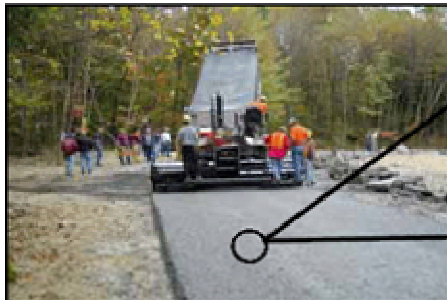
Driving Surface Aggregate (MS-0450-0004)

Driving Surface Aggregate (DSA) is a mixture of crushed stone developed specifically as a surface wearing course for unpaved roads. Developed by Penn State University's Center for Dirt and Gravel Road Studies, DSA has a unique particle size gradation designed to maximize packing density and produce a durable road surface that performs better than conventional aggregates.

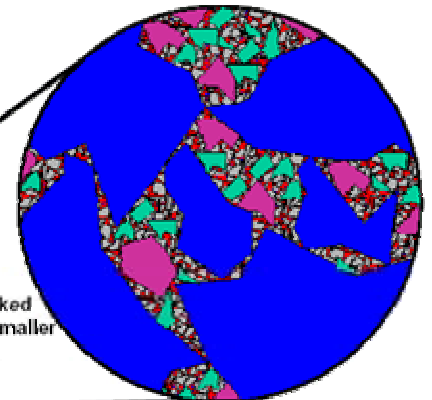
Benefits of DSA

The even distribution of many sizes of rock particles, especially fines (extremely small particles of rock less than 1/200th of an inch in diameter), gives DSA its high packing density, strength, and durability. Compared to alternatives, benefits of DSA include:

- Denser, stronger road surface
- Greater resistance to traffic abrasion
- Fewer soil particles at road surface, producing less traffic dust
- Less water pollution because surface run-off contains less silt and clay fines



Inside the DSA:
Larger particles locked
tightly in place by smaller
particles and fines.



INNOVATION INFORMATION



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DSA Specifications (Publication 447, Section 400)

All material is to be derived from crushed rock; no silt or clay may be added.

- 98% of fines (#200) must be crushed rock
- pH range: 6 to 12.45
- Los Angeles Abrasion Test: < 40% passing
- Proper size distribution (see Size Distribution Chart)
- Optimum moisture content (see PTM No. 106 and photos)

Size Distribution:			
	Passing Sieve	Lower Limit %	Upper Limit %
■	1.5"	100	
■	3/4"	65	95
■	#4	30	65
■	#16	15	30
■	#200	10	15



A hand-compacted ball can be used to estimate moisture. DSA that is too dry crumbles (left), DSA at optimum moisture retains a ball shape (middle), and DSA that is too wet will not compact (right).

DSA Application

Equipment

See Publication 408 for approved spreaders (Section 320) and compaction equipment (Section 108).

General Instructions

- The subgrade must be prepared as specified in Publication 408, Section 210. DSA must not be placed on soft, muddy, or frozen areas.
- Use acceptable methods (see PTM No. 106) to mix DSA and water to obtain optimum moisture content before delivery to project site. Use tarps to cover the load's exposed surface during transport until immediately before placement.
- Place DSA on the subgrade using mechanical spreaders without causing segregation, to a minimum uncompacted depth of 150 mm (6 in) and a maximum uncompacted depth of 200 mm (8 in) in one lift.
- Compact DSA to between 95% and 100% of the maximum dry-mass density (according to PTM No. 106, Method B).

Listed in PennDOT's Publication 447,

"New Product Evaluation for Low Volume Local Roads"

ftp://ftp.dot.state.pa.us/public/PubsForms/Publications/PUB_447.pdf

For additional information, please contact a PennDOT District Municipal Services Representative.

Adapted from Driving Surface Aggregate Informational Bulletin published by Center for Dirt & Gravel Studies, Pennsylvania State University. 2006. Further information available at www.dirtandgravelroads.org