

Sixth Edition 2019

ASPHALT PAVEMENT DESIGN GUIDE



**Prepared by the
New Jersey Asphalt Pavement Association
in cooperation with the
New Jersey Department of Transportation**

INTRODUCTION

This guide is provided by the New Jersey Asphalt Pavement Association in cooperation with the New Jersey Interagency Materials Committee as a tool for owners, architects, engineers and developers when preparing plans and specifications for pavements to be constructed in New Jersey.

The guide is not intended to be used as a substitute for professional asphalt pavement design by competent engineers using site specific traffic and soils information. By necessity this manual uses generalizations and simplifications; however, the use of these designs and specifications, together with proper construction controls, will provide users with cost effective and functional pavements that will provide long service life with minimal maintenance.

The sixth edition of this guide has been prepared in order to provide designers current information on agency specifications to incorporate the latest knowledge, techniques, and technology that have been developed in asphalt pavement construction since the last edition. This publication is not intended to set standards or regulations. The views of the authors expressed herein do not necessarily reflect the decision making process with regards to the advice, opinions, or merits of certain processes, procedures, or equipment.

The New Jersey Asphalt Pavement Association is pleased to thank the members of Interagency Materials Committee in assisting with the preparation of this guidebook. This book is the result of hours of dedicated work by experienced asphalt professionals.

Requirements for Successful Asphalt Pavement Construction

- 1. Proper Planning & Design**
- 2. Proper Quality Control**
- 3. Proper Construction**
 - a) Materials**
 - b) Subgrade**
 - c) Workmanship**
- 4. Proper Maintenance**

HOT MIX ASPHALT

WHAT IS AN ASPHALT PAVEMENT?

Asphalt pavements may be referred to by several names. In different trades and sections of the state it may be referred to as bituminous concrete, hot plant mix, asphalt concrete, blacktop, hot mix asphalt (HMA) or warm mix asphalt (WMA).

Asphalt pavements are composed of crushed aggregates glued together to form a solid mass by asphalt binder. The aggregates total ninety-three (93) to ninety-seven (97) percent by weight of the total mixture and are mixed with three (3) to seven (7) percent asphalt binder. It is manufactured in a central mixing plant where the asphalt and aggregates are heated to a temperature of approximately 300° F, properly proportioned and mixed. The completed paving mixture is hauled by trucks to the mechanical spreader where it is placed in a smooth layer and compacted by rollers while still hot. (Hot mix asphalt may be placed by hand when it is impractical to use a paver.)

Asphalt pavements are constructed of one or more courses of hot mix asphalt placed directly on sub-base or existing HMA.

ASPHALT PAVEMENT SPECIFICATIONS

All work involving hot mix asphalt pavements and resurfacing can be covered by using the current New Jersey Department of Transportation Standard Specifications in conjunction with the typical sections that follow.

ASPHALT PAVEMENT RESURFACING

Resurfacing is the placing of one or more courses of asphalt pavement over an existing asphalt or concrete pavement. This is the means for extending the service life or rehabilitating old deteriorated pavements.

ADVANTAGES OF ASPHALT PAVEMENT

1. Versatility - asphalt pavements can be designed to accommodate any traffic loading or subgrade soil condition, and can be used to rehabilitate worn out pavements as well as to build new ones. Phased construction can easily be incorporated.
2. Economy- Asphalt Pavements are:
 - economical to construct
 - can be constructed rapidly and immediately ready for use
 - 100% recyclable
 - require minimal maintenance
 - provide outstanding performance
3. HMA pavements are not affected by ice control chemicals.
4. Building and site esthetics are enhanced.
5. Traffic noise is minimized when asphalt pavement is utilized. Specialty mixes such as Open Graded Friction Course are available when extra noise reduction is necessary.
6. Pavement striping is highly visible on the black surface.
7. Asphalt pavement is a flexible-type pavement.
8. HMA surfaces can be color coated and stamped for special applications.



NJDEP Award Winning Asphalt Rubber Mix Used on Route 95 in Central New Jersey

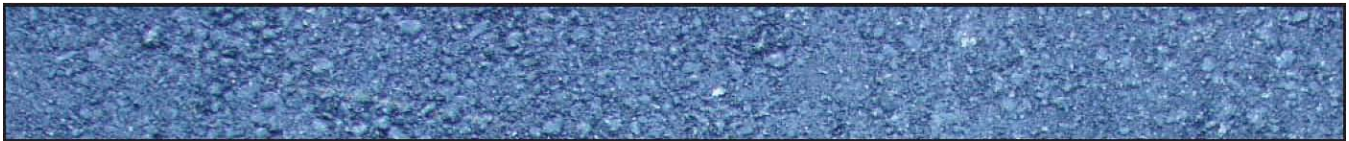
ASPHALT RUBBER MIXTURES

A rubber modified binder for use as a paving compound is created by proportioning very fine ground recycled tire rubber with paving grade binder and a special high shear blending unit. This material is then pumped into a special reaction tank for a specified period of time before it is introduced into the asphalt plant for highly specialized mixes in areas where noise reduction and crack relief are essential.

ASPHALT PAVEMENT

HMA is a state of the art mix design system which replaced the old standard Marshall method of mix design.

There are four important HMA parameters which the owner must specify in order to ensure the proper design. These parameters include the type of asphalt binder which, in all but the most unusual circumstances, should be PG 64-22 or PG64E-22, and the compaction level, which should be determined based on traffic loading – typically Medium or Low. The next two parameters go hand in hand and should always be considered together. Aggregate size and lift thickness are inseparable. All aggregate size selection should allow for at least 4-6 times the nominal maximum aggregate size (NMAS) for desired lift thickness. This means 9.5mm aggregate surfaces should be a minimum of 1 ½” thick.



SPECIFICATIONS FOR ASPHALT PAVEMENT

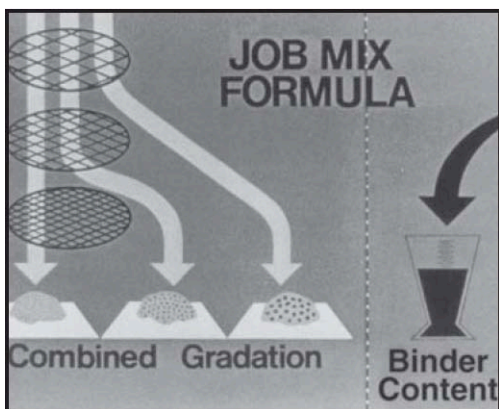
There are a wide variety of hot mix asphalt compositions used in New Jersey that vary from fine to coarse in size and gradation. Furthermore, New Jersey hot mix asphalt mixtures utilize different aggregates or combinations of aggregates, the principal types being crushed stone and sand. Good economics dictate the use of local aggregates.

The most widely used hot mix asphalt specifications in New Jersey are those contained in the New Jersey Department of Transportation Standard Specifications for Road and Bridge Construction and as amended for Local Aid projects.

The New Jersey Asphalt Pavement Association recommends the use of these specifications.

A copy of the New Jersey Department of Transportation Standard Specifications for Road and Bridge Construction can be obtained from the New Jersey Department of Transportation located at 1035 Parkway Ave, P.O. Box 600, Trenton, NJ 08625.

You may also obtain a copy by visiting <http://www.state.nj.us/transportation/eng/specs/> or by calling (609) 530-5031.



BASE DESIGNATION

19 mm HMA (25 mm for some State Highways)

A minimum lift thickness of 3” (4” for 25 mm mixes) is recommended. Aggregate sizes of the mix design should be checked prior to use in thinner lifts.

12.5 mm HMA (not typically used for State Highways, but is used as an Intermediate Course)

A minimum lift thickness of 2” is recommended.

SURFACE DESIGNATIONS

12.5 mm HMA

This surface mix has a high stability designed for use on roadways with heavy traffic levels such as interstates.

A minimum lift thickness of 2” is recommended.

9.5 mm HMA

This surface mix is recommended for most surface applications.

A minimum lift thickness of 1½” is recommended.

4.75 mm HMA

This mix is designed primarily for thin lift leveling or correcting minor deviations. It is a fine mix that can be placed in lifts as thin as ½”. It should not be placed in lifts exceeding 1” and should not normally be specified as a final wearing course for structural repairs or resurfacings, but is appropriate for thin overlays for pavement preservation.

ASPHALT PAVEMENT

ASPHALT PAVING MIXTURES

Pavement design requires the proper asphalt paving mixtures for base and surface pavements.

It is important that a mix design for the paving mixture be established for and approved by an engineer. It is also important to choose a state approved hot mix asphalt producer providing state approved mixes.

The asphalt mixtures referred to in this manual are New Jersey Department of Transportation standard mixtures which are readily available throughout New Jersey and have proven through extensive use to have all of the desirable characteristics of good asphalt pavements.

TACK COAT

A tack coat of asphalt (typically emulsified asphalt) is applied to ensure bond between the existing surface and the asphalt overlay. Excessive tack coat can cause slippage or can flush to the surface. All longitudinal and transverse joints shall be properly tacked. For additional information, see New Jersey Department of Transportation specifications.

SUBGRADE SPECIFICATIONS

Topsoil, large rocks and other types of low quality, unsuitable soil shall be removed and replaced. The subgrade must be properly shaped to the desired sections and elevation and shall be compacted so that it is firm, hard and unyielding. A firm and unyielding subgrade is essential to good pavement construction. To prevent growth of weeds, the subgrade should be treated with an approved herbicide. (See NAPA Publication IS-51)

SPECIFICATIONS

The online version of the New Jersey Department of Transportation Standard Specifications for Road and Bridge Construction, containing all changes made to date, contain the following specifications for Asphalt Pavement, its components,



A modern hot mix asphalt facility provides high production, good quality mixes (including recycled asphalt pavement if desired) while meeting stringent air quality standards.

and its production and testing:

Division 400.	Pavements
Section 401	Hot Mix Asphalt (HMA Courses)
Section 402	HMA Friction Courses
Section 403	Ultra-Thin Friction Courses
Section 404	Stone Matrix Asphalt (SMA)
Section 406	High Performance Thin Overlay (HPTO)
Section 407	Bituminous Rich Intermediate Course
Section 408	Asphalt Rubber Gap Graded Courses
Division 900.	Materials
Section 901.	Aggregates
Section 902.	Asphalt
Division 1000.	Equipment
Section 1002.	Compaction Equipment
Section 1003.	HMA Site Equipment
Section 1008.	Miscellaneous Equipment
Section 1009.	HMA Plant Equipment
Section 1012	Pavement Preservation Equipment

ENGINEERING SERVICES

The New Jersey Asphalt Pavement Association welcomes the opportunity to work with architects, consulting engineers, public agency officials, owners, and industry engineers in the preparation of pavement specifications, construction details and construction controls toward the end of quality asphalt pavement installations. The Association's address and telephone number appear on the back cover. Other sources where information and guidance on asphalt pavement construction may be obtained are:

National Asphalt Pavement Association
5100 Forbes Boulevard
Lanham, MD 20706-4413
(301) 731-4748
FAX (301) 731-4621

The Asphalt Institute
Greg Harder
2696 Research Park Drive
Lexington, KY 40511-8480
(859) 288-4960
FAX (859) 288-4999

ASPHALT PAVEMENT TERMINOLOGY IN MIX DESIGN

The NJDOT uses a specific nomenclature for specifying Asphalt Pavement mixtures. The requirements for Asphalt Pavement mixtures are identified by the abbreviated fields in the Pay Item description as defined in the following examples:

HOT MIX ASPHALT 12.5M64 SURFACE COURSE

“HOT MIX ASPHALT” – the term “Hot Mix Asphalt” is located in the first field in the Pay Item description for the purpose of identifying the mixture requirements.

“12.5” – the second field in the Pay Item description designates the nominal maximum size aggregate (in millimeters) for the job mix formula (Other sizes may be

4.75, 9.5, or 19mm).

“M” – the third field in the Pay Item description designates the medium design compaction level for the job mix formula based on traffic forecasts (Another level may be L=Low).

“64” – the fourth field in the Pay Item description designates the high temperature (in °C) of the performance-graded binder (Another option may be E). All binders shall have a low temperature of -22 °C, unless otherwise specified.

“SURFACE COURSE” – The last field in the Pay Item description designates the intended use and location within the pavement structure (Other options may be intermediate or base course).

Other Pavement types include:

- OPEN GRADED FRICTION COURSE**
- MODIFIED OPEN GRADED FRICTION COURSE**
- ASPHALT-RUBBER OPEN-GRADED FRICTION COURSE**
- ULTRA-THIN FRICTION COURSE**
- SMA (Stone Matrix Asphalt)**

ESTIMATING QUANTITIES

For a cursory estimate of the quantity of material required, use—1 ton of hot mix asphalt covers 17 square yards, 1" thick.

Table 1: Recommended Mixes for Roadway HMA Applications

Low Volume Design Level (< 300,000 ESALS)					
Surface	Mix Designation	Aggregate Size	Binder Type	Compaction Level	Recommended Min. Compacted Thickness
	9.5M64	9.5mm (3/8")	PG 64-22	50 gyrations	1.5"
	12.5M64	12.5 mm (1/2")	PG 64-22	50 gyrations	2"
Base	12.5M64	12.5mm (1/2")	PG 64-22	50 gyrations	2"
	19M64	19mm (3/4")	PG 64-22	50 gyrations	3"
Medium Volume Design Level (> 300,000 ESALS)					
Surface	9.5M64	9.5mm (3/8")	PG 64-22	75 gyrations	1.5"
	9.5ME	9.5mm (3/8")	PG 64E-22	75 gyrations	1.5"
	12.5M64	12.5 mm (1/2")	PG 64-22	75 gyrations	2"
	12.5ME	12.5 mm (1/2")	PG 64E-22	75 gyrations	2"
Base	12.5M64	12.5mm (1/2")	PG 64-22	75 gyrations	2"
	19M64	19mm (3/4")	PG 64-22	75 gyrations	3"



Warm Mix Asphalt application used in Northern New Jersey

WARM MIX ASPHALT (WMA)

Warm-mix asphalt allows the producers of asphalt pavement material to lower the temperatures at which the material is mixed and placed on the road. Reductions of 50 to 100 degrees Fahrenheit have been documented. Such drastic reductions have the obvious benefits of cutting fuel consumption and decreasing the production of greenhouse gases. As of 2013, NJDOT allows the use of approved WMA additives and foaming technology. For more information on Warm Mix Asphalt, please visit:

www.warmmixasphalt.com

PAVEMENT DESIGN

The design of a hot mix asphalt pavement requires some knowledge of the following:

- TRAFFIC
- DRAINAGE
- SUBGRADE SOILS SUPPORT

TRAFFIC

Asphalt pavements must be designed based upon traffic levels. Of primary concern is heavy truck traffic. Pavement life can be significantly affected by truck traffic, therefore, the weight and volume of the heaviest traffic is a principal factor in pavement design. The following traffic assumptions have been made for the purposes of providing typical pavement sections for the following:

Typical Pavement Section (High Volume, Commercial, or Industrial Roads)

Heavy traffic with trucks. (Page 12)

Typical Pavement Section (Medium Volume & Light Industrial Streets)

Street traffic is limited to a medium duty classification which includes some heavy truck and bus traffic. (Page 13)

Typical Pavement Section (Low Volume Residential or Light Duty Streets)

Light duty streets, parking lots, and storage areas. (Page 14)

Typical Pavement Section (Residential Drive)

Essentially limited to passenger cars. (Page 15)

DRAINAGE

Proper drainage is imperative in the design and construction of hot mix asphalt pavements.

Where high water tables occur or where water may accumulate in low areas, consideration must be given to subsurface drainage. The installation of underdrains and/or interceptor drains may be required to prevent the accumulation of water beneath the pavement structure.

Good surface drainage is also essential. A minimum cross slope or crown of 1.5% is recommended. The roadway shoulder or adjacent ground should be graded so that surface drainage runs away from the pavement and does not stand on the pavement's edge.

On large parking lots, sloped sections, catch basins, and storm drains may be necessary for proper drainage.

Table 2: Traffic Volumes

Traffic Designation	Typical Roadway Applications
Low ($< 3,000,000$ ESALS)	<ul style="list-style-type: none"> • All local roadways.
Medium ($> 3,000,000$ ESALS)	<ul style="list-style-type: none"> • Two-lane, multilane, divided, and partially or completely controlled access roadways. • Medium to highly trafficked city streets, state routes, U.S. highways, and some rural interstates. • Truck-weighing stations or truck climbing lanes on two-lane roadways.



SUBGRADE SOILS

A FIRM AND UNYIELDING SUBGRADE IS ESSENTIAL TO GOOD PAVEMENT CONSTRUCTION.

For the designs recommended in this manual, all soils are divided into three classes: Good (G), Medium (M) and Poor (P).

A Bearing Ratio (CBR) design value is assigned for each class.

It is desirable to use laboratory tests to evaluate the load-supporting characteristics of subgrade soils. However, if laboratory test equipment is not available, designs may be made on the basis of a careful field evaluation by an engineer who can assign the subgrade soils to one of the following categories:

(G) GOOD SUBGRADE SOILS – Good subgrade soils retain a substantial amount of their load bearing capacity when wet. Included are the clean sands and sandy gravels and soils free of detrimental amounts of plastic materials. A good subgrade will have a CBR value of 20 or higher.

(M) MEDIUM SUBGRADE SOILS – These retain a moderate degree of firmness under adverse moisture conditions. Included are such soils as loams, silty sands and sandy gravels containing moderate amounts of clay and fine silt. A medium classification will have a CBR value of 5 through 20.

(P) POOR SUBGRADE SOILS – These soils become quite soft and plastic when wet. Included are those soils having appreciable amounts of clay and fine silt. The coarser silts and sandy loams also may exhibit poor bearing properties in areas where frost penetration in to the subgrade is a factor. A poor classification will have a CBR value of 5 or less. Soils with a CBR value of less than 5 should be removed and replaced with an approved dense graded aggregate base course (DGABC).

detail the commonly used soil evaluation systems and test procedures. Field evaluation of the soil involves visual inspection and simple field tests.

EQUIVALENCES

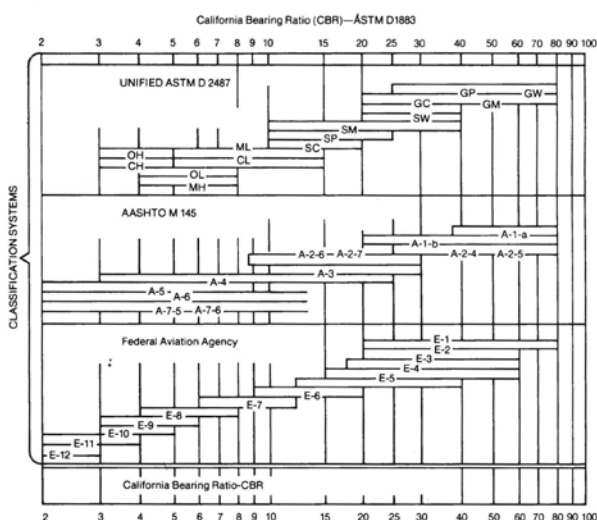
Consideration may be given to a pavement section using a graded aggregate base course with a hot mix asphalt leveling and surface course. New Jersey has several excellent aggregate sources, including recycled material that may be an economic alternative. Dense graded aggregate base course (DGABC) should meet New Jersey Department of Transportation Specifications for Road and Bridge Construction.

Paving materials have different abilities to sustain the loads to which they are subjected. Relative strength values of the various materials used in asphalt pavements have been evaluated so that it is possible to develop designs with different components to give comparable pavement performance. The AASHTO Design Committee from road test findings established a list of coefficients of pavement components for surface, base and subbase courses. The use of these coefficients permits equating materials into inches of one component to inches of another in the asphalt pavement structures.

The criteria established in the AASHTO Guide for Design of Pavement Structures, The Asphalt Institute’s “Thickness Design Manual” MST, The National Asphalt Paving Association’s “A Guide to Thickness Equivalences for Design of Asphalt Pavements” IS20, and The New Jersey Department of Transportation and The New Jersey Asphalt Pavement Association’s experience with millions of square yards of pavements constructed in New Jersey were considered and utilized in part to develop the pavement designs and material equivalences used in this manual.

Asphalt pavements must retain a minimum thickness of hot mix asphalt surfacing (including leveling courses) when used on granular bases. Minimum surface thicknesses should be increased with increased weight and volume of traffic and when used on poor subgrades.

TABLE I



Soil Classification Strengths:

The Asphalt Institute’s “Soil Manual for Design of Asphalt Pavement Structures” Series No. 10 (MS 10), describes in

PAVEMENT BASE COURSE EQUIVALENCY

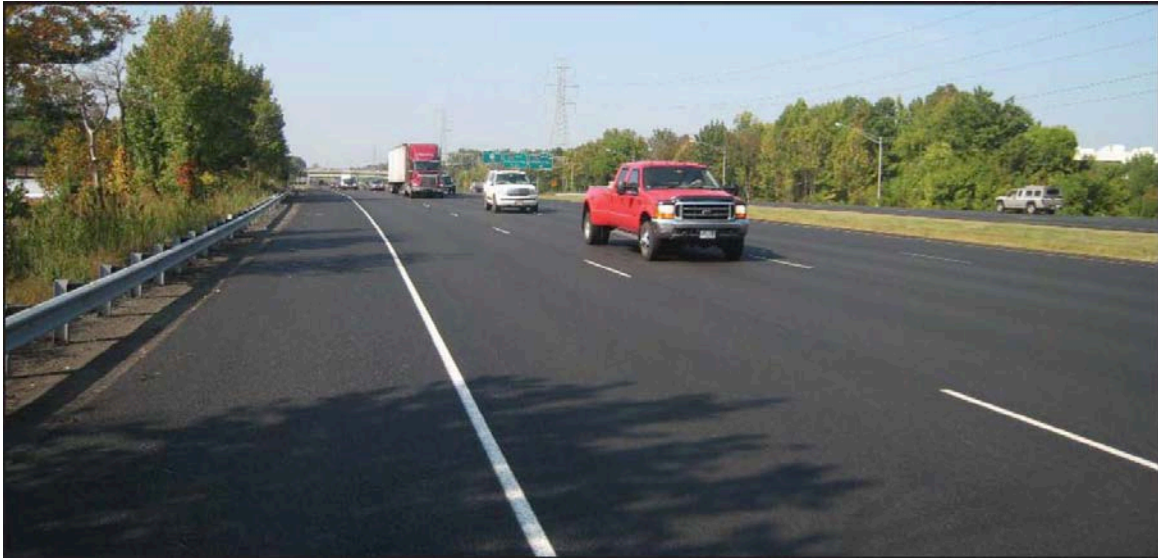
ONE INCH OF HOT MIX ASPHALT BASE COURSE EQUALS 3" OF DENSE GRADED AGGREGATE BASE COURSE.

ASPHALT PAVEMENT RECYCLING

Hot mix asphalt recycling is a proven technology. It is cost effective, meets all specifications and the quality of the recycled asphalt pavement has been proven to be equal to conventional mixes. When using reclaimed asphalt pavement (RAP) in HMA, the virgin aggregate and asphalt are reduced, therefore significant savings can be realized. In addition the use of rap/reclaimed asphalt materials aids the environment. Recycling may include the use of glass, steel slag, recycled concrete, asphalt, and asphalt shingles.

All NJDOT- approved HMA mixes can contain up to 15% RAP in surface course mixes and up to 20% in intermediate and base course mixes. NJAPA producer members can also produce NJDOT-approved quality RAP mixes with recycled content in excess of 30%.

Removal of badly deteriorated pavements, surface irregularities and maintaining curb reveal, etc. can be economically accomplished with minimal disruption to traffic using the cold milling process. The RAP obtained through these processes can be recycled in a cost effective rehabilitation process.



The use of reclaimed material is less expensive than using all virgin aggregate and binder. Cold milling existing asphalt pavements will allow the desired section and grade to be established. It can also be used to maintain a desired height of curb when overlaying existing roadways. Existing pavements are typically removed by the cold milling process.



Stone Matrix Asphalt application on Route 80 in Northern New Jersey

STONE MATRIX ASPHALT (SMA)

Stone matrix asphalt (SMA), sometimes called stone mastic asphalt, is a gap-graded HMA originally developed in Europe to maximize rutting resistance and durability. The mix design goal is to create stone-on-stone contact within the mixture. Since aggregates do not deform as much as asphalt binder under load, this stone-on-stone contact greatly reduces rutting. SMA is generally more expensive than a typical dense-graded HMA because it requires more durable aggregates, higher asphalt content, modified asphalt binder and fibers. It can also be produced using binders modified with approved warm mix additives, in lieu of fibers. In the right situations it is cost-effective because of its increased rut resistance and improved durability. SMA has been used in the U.S. since about 1990.

PAVEMENT PRESERVATION

Pavement preservation is a strategy to enhance pavement performance by extending the life of existing pavements, improving safety, and meeting user expectations.¹

While there are a variety of asphalt pavement options, the primary pavement preservation choices are:

- Thinlays™ - Thinlays™ are hot mix asphalt pavements that are placed in a thin overlay of less than 1.5 inches. They can be placed as thin as 5/8 of an inch, and are typically 3/4 to 1 inch thick.
- Micro-Surfacing – Micro-Surfacing is a technique where asphalt binder and aggregate are sprayed onto an existing pavement. Micro-Surfacing is placed at less than 3/8”.
- Slurry Seal – Slurry Seal is another technique where asphalt binder and aggregate are sprayed onto an existing pavement. Slurry Seal is placed at less than 1/4”.
- Chip Seal and Cape Seal – Chip Seal and Cape Seal are techniques similar to Micro-Surfacing. Chip Seal is a technique where asphalt binder is sprayed onto an existing road surface and fine aggregate is immediately placed on top of it. Cape Seal is a technique where a Chip Seal is overlaid with a Micro-Surfacing treatment

Pavement preservation is best done when you choose the right treatment for the right road at the right time. It is important to know the condition of your road before deciding which treatment is the right one. Pavements that are not displaying any distress are candidates for slurry seal, micro-surfacing, and chip / cape seals. Distressed pavements, provided the distress is not major, are candidates for Thinlays™. Even severely distressed pavements can be preserved with Thinlays™ - these would require milling to remove the distressed material first.

Cost Effectiveness

Studies show that Thinlays™ have the lowest overall annual cost. Thinlays™ have an annual cost per lane mile which is lower than both Micro-Surfacing and Slurry Seal. Asphalt producers in New Jersey can offer a variety of thinlay options suited to a customer’s needs.

Ride Quality & Safety

Ride quality is measured by the International Roughness Index, or IRI. Thinlays™ provide an average improvement to pavement smoothness of 18%-36%. Micro-Surfacing and Slurry Seal treatments will typically improve smoothness by less than 10% and often will provide no improvement.

Professional Engineers often consider the Skid Resistance of a roadway as an important safety factor. Thinlays™ have been shown to be skid resistant. While Micro-Surfacing and Slurry Seals can also provide improved skid resistance, the roughness of these surfaces is noisier and less pedestrian-friendly.

Noise surveys of various pavement treatments have indicated that Thinlays™ treatments have the lowest level of On Board Sound Intensity, which measures the noise level inside a vehicle. Traditional Hot Mix Asphalt provides only slightly higher noise readings while Micro-Surface and Slurry Treatments have been proven to be significantly louder.

More Information

New Jersey Asphalt Pavement Association – www.njapa.com

National Asphalt Pavement Association – www.asphaltpavement.org -

Thinlays™ Position Paper SR-210 - http://www.asphaltpavement.org/PDFs/SR210-Thinlay_Position_Paper.pdf

Thinlays™ Information Series 135 - <http://www.asphaltpavement.org/images/stories/is-135.pdf>

Federal Highway Administration (Tech Brief) - <https://www.fhwa.dot.gov/publications/research/infrastucture/pavements/ltp/11049/11049.pdf>

International Slurry Surfacing Association - <http://slurry.org/>

Pavement Preservation and Recycling Alliance - <http://ppralliance.org/>



Thin asphalt overlays can be placed with conventional paving equipment for a quick, efficient operation.

¹ *Moving Ahead for Progress in the 21st Century (MAP-21) Act, U.S. Statutes at Large 126 (2012): 405–988*

ASPHALT PAVEMENT RESURFACING AND REHABILITATION

Asphalt overlays are the most common, practical and economical way to salvage, strengthen and modernize old pavements.

Properly designed, constructed and maintained hot mix asphalt pavement resurfacings offer the following advantages:

1. Strengthen existing pavement structurally
2. Reduce maintenance appreciably
3. Extend service life appreciably
4. Allows use of roadway while improvements are in progress
5. Provides safer pavements
6. Improve ride quality and appearance
7. Reduced energy costs
8. 100% Recyclable
9. Provides noise reduction

RESURFACING CONSIDERATIONS

The key to successful resurfacing is careful evaluation of the existing pavement and the selection of an adequate pavement design. The following information should be considered:

1. Physical condition including surface condition and structural adequacy.
2. Type of construction of existing pavement.
3. Drainage of existing pavement.
4. Load and traffic use (weight and volume of heaviest traffic).

The thickness of the overlay is designed to improve a lower-than-average pavement condition, but not to provide the extra strength needed for localized, structurally weak areas. Should the overlay thickness be based on the weakest condition in the section, it would be oversized for the rest of the section, and more costly. The proper procedure is to correct the weaker areas. Removal of structurally weak areas and patching with full-depth hot mix asphalt to ensure strength equal to or exceeding the surrounding pavement is an economical means of preparing for overlays.

A minimum thickness of 4½” of hot mix asphalt is recommended for rigid pavement overlays.

GEOTEXTILES (PAVING FABRICS)

Fabrics are available for use with HMA overlays. When placed between the original pavement and the HMA overlay or between two courses of HMA overlay, it becomes an integral part of the roadway section. When properly used, fabrics reduce water infiltration and reflective cracking. Fabrics should be installed in accordance with the manufacturer’s instructions and conform to AASHTO M-288, Section 10.



ASPHALT PAVEMENT CONSTRUCTION

Asphalt pavement shall be designed, mixed, and constructed in accordance with New Jersey Department of Transportation Standard Specifications for Road and Bridge Construction. The following tables provide general guidelines for pavement design under certain conditions.

ASPHALT PAVEMENT RESURFACING

OVERLAY OF CONCRETE PAVEMENT CONSTRUCTION DETAILS

	Minimum Compacted Thickness	Recommended Mix	HMA
Surface Course	2"	Refer to Page 5	9.5mm, 12.5mm
Base Course	Variable	Refer to Page 5	12.5mm, 19mm
Leveling Course (when required)	Variable	Refer to Page 5	4.75mm, 9.5mm
Existing Portland Cement Concrete Pavement			

MULTIPLE LIFT RESURFACING CONSTRUCTION DETAILS

	Minimum Compacted Thickness	Recommended Mix	HMA
Surface Course	2"	Refer to Page 5	9.5mm, 12.5mm
Intermediate Course	Variable	Refer to Page 5	12.5mm
Base Course	Variable	Refer to Page 5	12.5mm, 19 mm
Existing HMA Pavement			

SINGLE LIFT RESURFACING CONSTRUCTION DETAILS

	Minimum Compacted Thickness	Recommended Mix	HMA
Surface Course	1.5" to 2"	Refer to Page 5	9.5mm, 12.5mm
Existing HMA Pavement / Typically Cold Milled			

HIGH VOLUME, COMMERCIAL OR INDUSTRIAL ROADS

SUBGRADE

Subgrade soils must be evaluated to determine the load-supporting characteristics. Refer to page 7.

The subgrade must be properly shaped to the desired section and elevation and shall be compacted. Refer to Page 4.

DRAINAGE

Good subsurface and surface drainage is essential to quality hot mix asphalt pavements. Refer to page 6.

TACK COAT

Refer to page 4.

ASPHALT PAVEMENT CONSTRUCTION

Hot mix asphalt shall be designed, mixed and constructed in accordance with New Jersey Department of Transportation Standard Specifications for Road and Bridge Construction, 2007 including revisions and additions.

The hot mix asphalt base may be placed in a single course. A total thickness of up to 4.5" of base mix may be placed in one lift. If several courses are desired or if job specifications require several courses, it is recommended that the first course be 3" minimum depth.



CONSTRUCTION DETAILS

Subgrade Class		Minimum Compacted Thickness	HMA Mix
Good	Surface Course	2"	9.5M64, 9.5M64E, 12.5M64, 12.5M64E
	Base Course	5"	19M64, 19M64E
	Subbase	8"	DGABC
Medium	Surface Course	2"	9.5M64, 9.5M64E, 12.5M64, 12.5M64E
	Base Course	6"	19M64, 19M64E
	Subbase	8"	DGABC
Poor	Surface Course	2"	9.5M64, 9.5M64E, 12.5M64, 12.5M64E
	Base Course	7"	19M64, 19M64E
	Subbase	8"	DGABC

*Mix Selection: Please refer to NAPA Publication 128 for further design assistance.

MEDIUM VOLUME AND LIGHT INDUSTRIAL STREETS

SUBGRADE

Subgrade soils must be evaluated to determine the load-supporting characteristics. Refer to page 7.

The subgrade must be properly shaped to the desired section and elevation and shall be compacted. Refer to Page 4.

DRAINAGE

Good subsurface and surface drainage is essential to quality hot mix asphalt pavements. Refer to page 6.

TACK COAT

Refer to page 4.

ASPHALT PAVEMENT CONSTRUCTION

Hot mix asphalt shall be designed, mixed and constructed in accordance with New Jersey Department of Transportation Standard Specifications for Road and Bridge Construction, 2007 including revisions and additions.

Hot mix asphalt base may be placed in a single course. A total thickness of up to 4.5" of base mix may be placed in one lift, unless proper compaction equipment is available for thicker lifts. If several courses are desired or if job specifications require several courses, it is recommended that the first base course be 3" minimum depth.



CONSTRUCTION DETAILS

Subgrade Class		Minimum Compacted Thickness	HMA Mix
Good	Surface Course	2"	9.5M64, 12.5M64
	Base Course	4"	19M64
	Subbase	6"	DGABC
Medium	Surface Course	2"	9.5M64, 12.5M64
	Base Course	5"	19M64
	Subbase	6"	DGABC
Poor	Surface Course	2"	9.5M64, 12.5M64
	Base Course	6"	19M64
	Subbase	6"	DGABC

*Mix Selection: Please refer to NAPA Publication 128 for further design assistance.

LOW VOLUME, RESIDENTIAL OR LIGHT DUTY STREETS, PARKING LOTS, STORAGE AREAS

SUBGRADE

Subgrade soils must be evaluated to determine the load-supporting characteristics. Refer to page 7.

The subgrade must be properly shaped to the desired section and elevation and shall be compacted. Refer to Page 4.

DRAINAGE

Good subsurface and surface drainage is essential to quality hot mix asphalt pavements. Refer to page 6.

TACK COAT

Refer to page 4.

ASPHALT PAVEMENT CONSTRUCTION

Hot mix asphalt shall be designed, mixed and constructed in accordance with New Jersey Department of Transportation Standard Specifications for Road and Bridge Construction, 2007 including revisions and additions.

The hot mix asphalt base may be placed in a single course. If several courses are desired or if job specifications require several courses, it is recommended that the first base course be 3" minimum depth.

An intermediate course of 9.5mm should be added to reduce permeability and increase durability during construction if the



final surface is not scheduled until subdivision build out.

POROUS PAVEMENTS

To assist municipalities with the restrictive storm water regulations, the NJAPA recommends that a porous pavement be utilized as special designs will be necessary. The NJDOT's Modified Open Graded Friction Course (MOGFC) specification is a recommended guideline.

CONSTRUCTION DETAILS

Subgrade Class		Minimum Compacted Thickness	HMA Mix
Good	Surface Course	2"	9.5L64
	Base Course	5"	12.5L64, 19L64
	Subbase	8"	DGABC
Medium	Surface Course	2"	9.5L64
	Base Course	6"	19L64
	Subbase	8"	DGABC
Poor	Surface Course	2"	9.5L64
	Base Course	7"	19L64
	Subbase	8"	DGABC

*Mix Selection: Please refer to NAPA Publication 128 for further design assistance.

RESIDENTIAL DRIVES, PLAY AREAS

PAVEMENT WIDTH

Residential driveways for a single automobile, the pavement should be a minimum 10' in width.

The minimum radius for a right angle where the driveway meets the street is 10'.

SUBGRADE

Subgrade soils must be evaluated to determine the load-supporting characteristics. Refer to page 7.

Top soil must be removed and subgrade properly shaped to the desired section and elevation and shall be compacted. Refer to page 4. Treat the subgrade with an approved herbicide to inhibit future weed growth.

AGGREGATE BASE CONSTRUCTION

In certain situations, graded aggregate base construction may be desirable. See "Pavement Base Course Equivalency" page 7 for recommended thickness.

DRAINAGE

Good subsurface and surface drainage is essential to quality hot mix asphalt pavements. Refer to page 6.

TACK COAT

Refer to page 4.

ASPHALT PAVEMENT CONSTRUCTION

Hot mix asphalt shall be designed, mixed and constructed in accordance with New Jersey Department of Transportation Standard Specifications for Road and Bridge Construction.

The hot mix asphalt base may be placed in a single course to the required thickness. Small mechanical pavers are available for this type of construction. Whenever possible, hand placement should be avoided. However, where access to the work area is limited, hand placement may be the only feasible method.



CONSTRUCTION DETAILS

Subgrade Class		Minimum Compacted Thickness	HMA Mix
Good Medium	Surface Course	1 1/2"	9.5L64
	Base Course	3"	12.5L64, 19L64
	Subbase	4"	DGABC
Poor	Surface Course	1 1/2"	9.5L64
	Base Course	3"	12.5L64, 19L64
	Subbase	6"	DGABC

*Mix Selection: Please refer to NAPA Publication 128 for further design assistance.

SUGGESTIONS FOR OBTAINING A QUALITY RESIDENTIAL DRIVEWAY PAVEMENT

Select contractors known for quality work and established reputations in the community. Ask for local references. Insist on a written contract or agreement. Specify materials and workmanship in accordance with New Jersey Department of Transportation Specifications. Specify a minimum compacted thickness.

SIDEWALKS, GOLF CART PATHS, BIKE PATHS

SUBGRADE

Subgrade soils must be evaluated to determine the load-supporting characteristics. Refer to page 7.

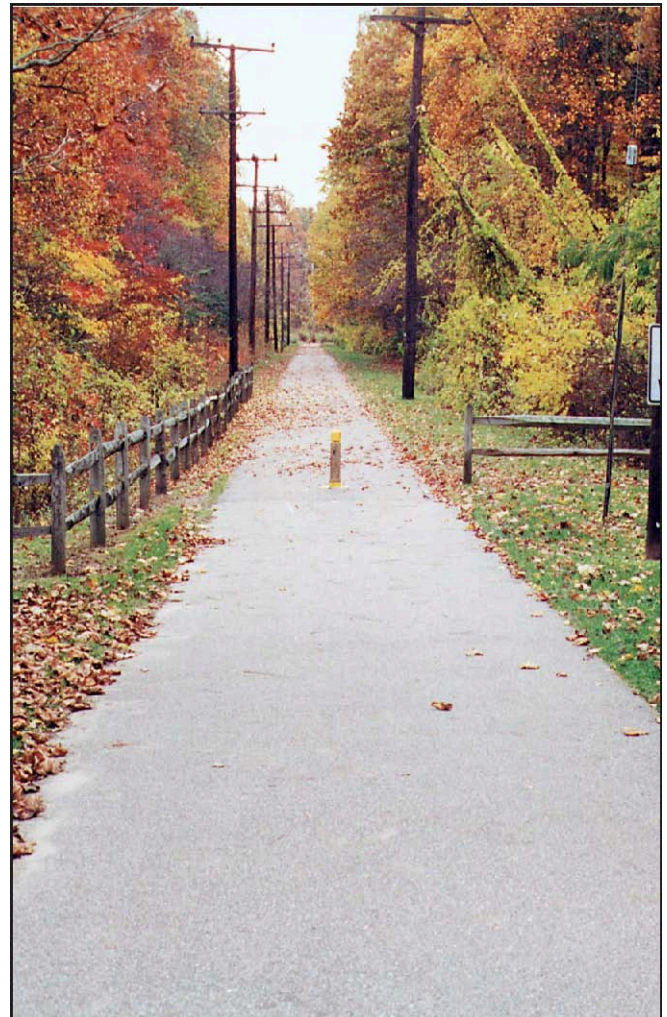
The subgrade must be properly shaped to the desired section and elevation and shall be compacted. Refer to page 4.

DRAINAGE

Good subsurface and surface drainage is essential to quality hot mix asphalt pavements. Refer to page 6.

ASPHALT PAVEMENT CONSTRUCTION

A single course of 9.5 mm mixture is recommended due to the confined areas generally involved where constructing Sidewalk, Golf Cart Paths or Bike Paths except where poor sub-base is encountered. Finer mixes, such as a 4.75mm mix, may be available upon request. Hot mix asphalt shall be designed, mixed, and constructed in accordance with New Jersey Department of Transportation Standard Specifications for Road and Bridge Construction, 2007 including revisions and additions.



CONSTRUCTION DETAILS

Subgrade Class		Minimum Compacted Thickness	Design Level	HMA Mix
Good Medium	Surface Course	3"	Low Volume 50 Gyration	9.5L64
Poor	Surface Course	4"	Low Volume 50 Gyration	9.5L64

Surface Courses should be placed by a paver. Hand work should be restricted where feasible.

TENNIS & MULTI-USE COURTS, RUNNING TRACKS

SUBGRADE

Subgrade soils must be evaluated to determine the load-supporting characteristics. Refer to page 7.

The subgrade must be properly shaped to the desired section and elevation and shall be compacted. Refer to page 4.

Good drainage is essential for coated surfaces.

TACK COAT

Refer to page 4.

ASPHALT PAVEMENT CONSTRUCTION

Hot mix asphalt shall be designed, mixed and constructed in accordance with New Jersey Department of Transportation Standard Specifications for Road and Bridge Construction.

The hot mix asphalt may be placed with a mechanical paver or by hand, if the contractor elects. In either case, for tennis court construction, the finished course must not vary from line, grade or cross-section more than 1/8" in 10' when measured in any direction. For running tracks, the finished course must not vary more than 1/4" in 10'.

Proprietary surfacing is available for tennis courts and running tracks. Most members of The New Jersey Asphalt Pavement Association are familiar with the various materials and can provide information on them or it may be necessary to

contact the manufacturer directly.

DRAINAGE

The finished tennis court surface should slope 1" in 10', 0.83%, on a true plane from end to end, corner to corner, or side to side. Side to side is preferable for a playing surface and for construction. The surface should not slope to the net or away from the net in more than one direction.

For information, contact the America Sports Builders Association. For more information, check out the Association's website at www.sportsbuilders.org or contact ASBA at 7010 W. Highway 71, Suite 340, PMB #312, Austin, TX 78735-8331. Toll Free: 866.501.ASBA

A special mix other than 9.5 mm may be used for the surface course for running tracks. There are several resilient hot mixes available which combine rubber aggregate with regular aggregate plus a high asphalt content. Specifications and technical assistance are available from the firms that furnish the special aggregate.

OTHER USES FOR ASPHALT PAVEMENT

There are a wide variety of uses for hot mix asphalt mixes and/or pavements that are not listed or shown elsewhere in this guide. The same basic principles used for constructing successful pavements would apply to installing pavements for other uses. Some pavement or mix modifications might be required, but are generally, minor in nature. Some of the other uses for the product follow:

AIRFIELDS

- Runways
- Taxiways
- Holding Areas
- Heliports

MOTOR SPORTS RACE TRACKS

Specialty mixes not included in NJAPA's "Recommended mixes for roadway HMA applications" (Chart 1) may be required. NAPA, The Asphalt Institute and automotive sanctioning bodies should be consulted during the design process.

DRAINAGE FACILITIES

- Ditches & Gutters
- Curbs
- Berms
- Slope Protection

POROUS PAVEMENT PARKING LOTS

EROSION CONTROL

- Jetties & Groins
- Grout for Jetties
- Storm water management ponds

FARM

- Barnyards
- Feed lots
- Stable Floors
- Silage Storage

HYDRAULICS

- Reservoir Linings
- Pond Linings
- Dam Faces
- Canal Linings
- Sewage Lagoons
- Leachate facilities

INDUSTRIAL-COMMERCIAL

- Dock Surfaces
- Building Floors
- Material Storage Areas

PATCHING

Maintenance For All Types of Pavements

RAILROADS

- HMA Ballast Underlayment
- Full Depth Hot Mix Asphalt

RECREATION

- Boat Ramps
- Athletic Fields
- Skate board and roller blade facilities

POROUS PAVEMENTS*

Porous Asphalt Offers a Powerful Tool in the Toolbox for Storm Water Management

In the natural environment, rainfall sinks into soil, filters through it, and eventually finds its way to streams, ponds, lakes, and underground aquifers. The built environment, by way of contrast, seals the surface. Rainwater and snowmelt become runoff, which may contribute to flooding. Contaminants are washed from surfaces directly into waterways without undergoing the filtration that nature intended.

For these reasons, managing storm water is a significant issue in land use planning and development. Storm water management tools can serve to mitigate the impact of the built environment on natural hydrology. Unfortunately, however, they also can lead to unsound solutions such as cutting down stands of trees in order to build detention ponds.

Porous asphalt pavements allow for land development plans that are more thoughtful, harmonious with natural processes, and sustainable. They conserve water, reduce runoff, promote infiltration, which cleanses storm water, replenish aquifers, and protect streams.

A typical porous pavement has an open-graded surface over an underlying stone recharge bed. The water drains through the porous asphalt and into the stone bed, then, slowly, infiltrates into the soil. If contaminants were on the surface at the time of the storm, they are swept along with the rainfall through the stone bed. From there they infiltrate into the sub-base so that they are subjected to the natural processes that cleanse water.

Construction and Performance

Porous asphalt pavements are fast and easy to construct. With the proper information, most asphalt plants can easily prepare the mix and general paving contractors can install it. The stone bed, often eighteen to thirty-six inches in depth, provides a tremendous subbase for the pavement. As a result, porous asphalt pavements tend not to exhibit cracking and pothole formation problems. The surface wears well. Under the stone bed is a geotextile which keeps fine particles from moving into the stone bed from below and filling



NAPA publications are available for specialized mix design and placement techniques.

in the spaces. The underlying stone bed can also provide storm water management for adjacent impervious areas such as roofs and roads. To achieve this, storm water is conveyed directly into the stone bed, where perforated pipes distribute the water evenly.

Economics

Porous pavement is a sound choice on economics alone. A porous asphalt pavement surface costs approximately the same as conventional asphalt. Because porous pavement is designed to "fit into" the topography of a site, there is generally less earthwork. On projects where unit costs have been compared, the porous pavement has been the less expensive option. Porous pavements are therefore attractive on both environmental and economic grounds.

Environmental Applications

Asphalt pavements have been used for many years to enhance water quality and porous pavements are no exception. Porous pavement structures designed to eliminate storm water runoff have been shown to enhance water quality before entering the groundwater systems.

Variations on the Theme

Porous asphalt can be used successfully in parking lots, walkways, and playgrounds. Several current suburban projects are exploring its use in subdivision roads. The open-graded asphalt surface used for porous pavements has been used extensively to surface high-volume highways that carry heavy trucks. Its benefits include noise reduction, a decrease in splash and spray kicked up by vehicles in heavy downpours, and mitigation of the urban heat island effect.

NJDOT Version

The New Jersey Department of Transportation recommends the use of open graded friction course for Porous Pavement Surface Course – it is highly recommended that polymer-modified binder 64E-22 be used with this mix in order to minimize scuffing, provide increased binder film thickness, and enhance durability for longer service life. Reference the latest NJDOT Specifications for further details.

**Most text courtesy of the Asphalt Pavement Alliance.*



2019 PRODUCER / PRODUCER-INSTALLATION CONTRACTOR MEMBERS

Company	Location	Phone No.	Fax No.
A.E. Stone, Inc.	Egg Harbor Township, NJ	(609) 641-2781	(609) 641-0374
American Asphalt Company, Inc.	W. Collingswood Heights, NJ	(856) 456-2899	(856) 456-4398
Arawak Paving Co., Inc.	Hammonton, NJ	(609) 561-4100	(609) 567-4750
Braen Stone Industries	Haledon, NJ	(973) 595-6250	(973) 595-6920
Brick Wall Corporation	Forked River, NJ	(732) 787-0226	(732) 495-6225
Central Jersey Hot Mix Asphalt, LLC.	Jackson, NJ	(732) 323-0226	(732) 323-3244
Earle Asphalt	Farmingdale, NJ	(732) 308-1113	(732) 462-9626
Glasgow, Inc.	Glenside, PA	(215) 884-8800	(215) 884-1465
HK Group	Skippack, PA	(610) 584-8500	(610) 584-5432
Interstate Asphalt Products LLC	Runnemede, NJ	(856) 931-1515	
National Paving Company, Inc.	Berlin, NJ	(856) 767-1950	(856) 767-0806
Newark Asphalt Corp.	Newark, NJ	(973) 482-3503	(973) 268-3639
R.E. Pierson Materials Corporation	Bridgeport, NJ	(856) 467-4199	(856) 467-5360
Riverside Materials, Inc.	Philadelphia, PA	(215) 426-7299	(215) 426-7251
Seashore Asphalt Corp.	Woodbine, NJ	(609) 861-2100	(609) 338-8957
South State Materials, LLC	Bridgeton, NJ	(856) 451-5300	(856) 455-3461
The Stavola Companies	Tinton Falls, NJ	(732) 542-2328	(732) 542-7519
Tilcon New York Inc.	Wharton, NJ	(973) 366-7741	(973) 659-3929
Trap Rock Industries, LLC.	Kingston, NJ	(609) 924-0300	(609) 497-0135
Weldon Asphalt Co.	Westfield, NJ	(908) 233-4444	(908) 233-4215
Winslow Hot Mix, LLC.	Winslow Township, NJ	(609) 561-2100	(609) 561-2540

2019 INSTALLATION CONTRACTOR MEMBERS

Company	Location	Phone No.	Fax No.
Asphalt Paving Corp.	Malaga, NJ	(856) 694-2200	(856) 694-0607
Black Rock Enterprises, LLC	Old Bridge, NJ	(732) 967-6400	(732) 967-6402
Cardinal Contracting Company, LLC	Southampton, NJ	(609) 859-4100	(609) 859-4145
Crisdel Group, Inc.	South Plainfield, NJ	(908) 561-7550	(908) 561-6187
Della Pello Paving, Inc.	Union, NJ	(908) 687-6070	(908) 964-3693
A Deluca Paving LLC	New Providence, NJ	(908) 464-8022	(908) 389-1870
Green Construction, Inc.	South River, NJ	(732) 238-9370	(732) 613-0838
Intercounty Paving Associates, LLC	Hackettstown, NJ	(908) 852-5868	(908) 852-9015
J.A. Alexander, Inc.	Bloomfield, NJ	(973) 680-0220	(973) 680-0221
JEM Paving	West Berlin, NJ	(856) 768-0300	(856) 768-0305
Jersey Construction, Inc.	Hammonton, NJ	(609) 704-0005	(609) 704-0020
L.N. Rothberg & Son, Inc.	Middlesex, NJ	(732) 356-9505	(732) 356-0974
Lucas Brothers Incorporated	Morganville, NJ	(732) 536-6663	(732) 536-5831
Meco, Inc.	Clarksburg, NJ	(609) 443-4344	(609) 443-9304
Paving Associates	Staten Island, NY	(718) 448-7283	(718) 727-3485
Renda Roads, Inc.	Whitehouse, NJ	(908) 534-6608	(908) 534-1992
Roman Asphalt Corp.	Newark, NJ	(973) 482-1113	(973) 482-2501
Schifano Construction Corp.	Middlesex, NJ	(732) 356-4140	(732) 752-3473
SJA Construction Inc.	Marlton, NJ	(856) 985-3400	(856) 985-7700
Smith Sondy Asphalt	Wallington, NJ	(973) 777-7833	(973) 777-4210
Tarheel Enterprises, Inc.	Morgan, NJ	(732) 721-9111	(732) 721-9333
Top Line Construction Corp.	Somerville, NJ	(908) 231-7570	(908) 231-7402

2019 LIQUID ASPHALT MEMBERS

Company	Location	Phone No.	Fax No.
Associated Asphalt	Roanoke, VA	(800) 542-5780	
CL Consulting and Management	Wharton, NJ	(973) 366-4748	
PBF Energy	Parsippany, NJ	(973) 769-5138	

NJAPA
 850 Bear Tavern Road, Suite 108
 Trenton, NJ 08628
 Phone: (609) 838-1867 Fax (609) 482-4819

2019 ASSOCIATE MEMBERS

Company	Location	Phone No.	Fax No.
Martin A. Ackley Associates	Atco, NJ	(856) 768-7768	(856) 768-0868
Advance Scale Co.	Lindenwold, NJ	(888) 447-2253	(856) 627-7200
Advance Testing Co.	Campbell Hall, NY	(845) 496-1600	(845) 496-1398
Advanced Infrastructure Design, Inc. (AID)	Hamilton, NJ	(609) 838-2216	(609) 586-1301
All State Materials Group	Sunderland, MA	(413) 665-7021	(413) 665-9027
Andrew Mills Digital Media	Manasquan, NJ	(201) 401-6895	
Antigo Construction, Inc.	Antigo, WI	(715) 627-2222	(715) 623-7073
Astec	Chattanooga, TN	(423) 867-4210	(423) 867-4636
Atlantic Infrared Inc.	Pt. Pleasant Beach, NJ	(732) 899-8994	(732) 899-2644
Bayshore Recycling Corp.	Keasbey, NJ	(732) 738-6000	(732) 738-9150
CC&T – Division of GT Mid Atlantic (Groff Tractor)	Freehold, NJ	(732) 780-4600	(610) 586-2740
C&H Agency Inc.	Totowa, NJ	(973) 890-0900	(973) 890-9038
C&L Sweeper Service Corp.	Jackson, NJ	(732) 886-1940	(732) 886-6401
Cargill Industrial Specialties	Plymouth, MN	(800) 842-2631	(763) 268-5072
CREATEs	Mullica Hill, NJ	(856) 256-5327	
Chadler Solutions	Fairfield, NJ	(973) 797-0496	(973) 227-4026
Chase Construction Products	Westwood, MA	(781) 332-0700	(781) 332-0702
Clayton Sand Company	Lakewood, NJ	(732) 751-7652	(732) 751-7614
CohnReznick LLP	Eatontown, NJ	(732) 578-0700	(732) 578-1711
Construction Information Systems, Inc.	Kinnelon, NJ	(800) 247-1727	(973) 492-8378
Dosch King Emulsions Inc.	Whippany, NJ	(973) 887-0145	(973) 887-4942
Eastern Concrete Materials, Inc.	Elmwood Park, NJ	(201) 797-7979	(201) 791-9631
Foley, Incorporated	Piscataway, NJ	(732) 885-5555	(732) 457-0551
Arthur J. Gallagher & Co.	Mt. Laurel, NJ	(856) 482-9900	(856) 482-1888
Gencor Industries, Inc.	Orlando, FL	(407) 290-6000	(407) 578-0577
Gibraltar Rock Inc.	Fairless Hills, PA	(215) 295-0777	(215) 295-2421
Gilson Company Inc.	Lewis Center, OH	(740) 548-7298	(740) 548-5314
The Graham Company	Philadelphia, PA	(215) 567-6300	(215) 567-0804
GT Mid Atlantic	Vineland, NJ	(856) 697-1414	
Hanson Aggregates Pennsylvania, Inc.	Allentown, PA	(610) 366-4600	(610) 366-4628
Hanson Aggregates BMC, Inc.	Penns Park, PA	(215) 598-3152	(215) 598-8317
Hauck Asphalt Products	Rockford, IL	(717) 272-3051	(717) 273-9882
Heatec, Inc.	Chattanooga, TN	(423) 821-5200	(423) 821-7673
Hoffman Equipment Co.	Deptford, NJ	(215) 817-5874	(856) 227-0046
Ingevity Evotherm	North Charleston, SC	(843) 259-0759	
Instrotek, Inc.	Durham, NC	(919) 875-8371	(919) 875-8328
Jesco, Inc.	South Plainfield, NJ	(908) 753-8080	(908) 753-7853
Key-Tech	Keyport, NJ	(732) 888-8308	(732) 888-8307
K&L Gates, LLP	Newark, NJ	(973) 848-4000	(973) 848-4001
Komatsu Northeast	South Plainfield, NJ	(908) 561-9000	(908) 561-8637
Martin Stone Quarries, Inc.	Bechtelsville, PA	(610) 367-2011	(610) 367-8613
Maxam Equipment, Inc.	Kansas City, MO	(717) 599-9959	(816) 241-6465
Meeker Equipment Company, Inc.	Lansdale, PA	(215) 361-2900	(215) 361-1725
North American Aggregates	Cranford, NJ	(908) 956-6867	(908) 956-6992
PennJersey Machinery, LLC	Somerville, NJ	(908) 218-1919	(908) 218-9674
Rizco – A Creative Campaign Company	Spring Lake, NJ	(732) 223-1944	(732) 223-1163
Road Science, Division of Arrmaz Custom Chemicals	Reading, PA	(484) 650-0381	(484) 772-5801
Stansteel/Hotmix Parts and Service	Louisville, KY	(800) 826-0223	(502) 244-4046
Dan Swayze & Son, Inc.	Scotch Plains, NJ	(908) 789-1336	(908) 789-7232
Taylor Oil Company	Somerville, NJ	(908) 725-7727	(908) 725-7746
Troxler Electronic Laboratories, Inc.	Research Triangle Park, NC	(919) 308-3284	(919) 549-0761
UGI Energy Services Inc.	Wyomissing, PA	(610) 373-7999	(610) 374-4288
USI	Florham Park, NJ	(973) 965-3162	(610) 537-4508
Utility Trailer Sales of New Jersey, Inc.	North Brunswick, NJ	(732) 745-1222	(732) 745-2699
Ziegler Chemical & Mineral Corp.	Piscataway, NJ	(732) 752-4111	(732) 752-9477



NJAPA

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PAVEMENT ASSOCIATION**

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