

## Choosing an Asphalt Mix for Your Application

### INTRODUCTION

Asphalt paving mixes have been developed for various applications. In Michigan, these mixes are commonly known by their numerical and letter designations that have been created by the Michigan Department of Transportation (MDOT). Each designation specifies the various proportions and sizes of aggregate (stone and sand) and the type of liquid asphalt (bituminous cement) in the hot mixed asphalt (HMA).

This newsletter and the table on the reverse side describe some of the commonly used asphalt mixtures, their properties, and relative costs. This will help you select a HMA mixture to best suit your particular application.



### BACKGROUND

By varying the amount and the size of the aggregate, using different types of bituminous cement, and by adjusting the thickness of the pavement, HMA mixtures can be fine-tuned for specific uses.

Letter and number designations for asphalt mixes have been used for decades. Periodically, MDOT revises their HMA specifications by creating new mixes, modifying mixes, and phasing other mixes out. This can create confusion for municipal officials, property owners, and property developers that do not specify asphalt mixes on a routine basis.

### AGGREGATE PROPORTIONS IN HMA

The size and proportion of fine aggregates (sands) and coarse aggregates (gravel) in a HMA play a significant role in the designation of an asphalt mixture. The amount and size of coarse aggregate and the proportion of crushed aggregate in a mix affects the stability of a mix and its finished appearance.

For example, the table on the next page shows the maximum size aggregate in a 36A mixture is  $\frac{1}{2}$ " compared to  $\frac{3}{4}$ " in a 13A mixture. The table also indicates that a 36A has a much higher portion of crushed aggregate than 13A (60% compared to 25%).

This allows 36A to be placed in thinner lifts than 13A without the risk of dragging stones with the asphalt paving machine's screed during installation. The coarser aggregate in 13A also has a more "open" texture compared to the smoother surface appearance of 36A.

### PAVEMENT STRENGTH

Structural strength of an HMA pavement is directly related to its thickness. The greater the thickness, the greater the strength. HMA placed in a thick, single layer cannot be properly compacted by rollers. If a thick asphalt pavement is needed, it should be placed in multiple layers.

### SUPERPAVE AND OTHER MIXES

Superpave is an MDOT designation that dictates a particular testing method for mixtures rather than a particular aggregate or asphalt mixture. Generally, municipalities do not specify Superpave because it increases costs.

Roads that are subject to moderate or heavy traffic and heavy vehicles should be paved in multiple layers with mixtures specifically developed for these applications. MDOT's mixes for state highways and interstate freeways that receive heavy use have designation numbers of 3, 4 & 5. These mixes have high proportions of crushed fine and coarse aggregates and are more difficult to compact. It is uncommon to use these mixes on most city and rural roads.

Becoming less commonly used, are a series of mixes designated by letters such as: CATM, CALC, CATC. These mixes do not allow the use of recycled asphalt pavement (RAP) and therefore are more costly.



## ASPHALT MIX PROPERTIES

MDOT Mix	Common Uses	Aggregate Max. Size	Crushed Min. %	Lift Thickness	Relative Production Cost*	Comments
3E Base 4E Leveling 5E Top	Major state highways and interstates	½" to 1"	50% to 100%	1½" to 3½"	\$50 to \$60/ton	Can be difficult to place and compact. MDOT specifications require Superpave testing methods for these mixes.
13A	Residential streets, parking lots, driveways, paths	¾"	25%	1½" to 2¼"	\$40/ton	Commonly used mix in Northern Michigan. Can be used for base, leveling or top course. Has a more open texture finish than 36A.
36A	Paths, tennis courts, top course for driveway, parking lots, residential streets	½"	60%	1" to 1½"	\$45/ton	Commonly used mix in Northern Michigan. Should not be used as a base course. Has a smoother textured finish than 13A. Is often used as a top course over other mixes. Used for projects requiring an aesthetic finish.
1100T	Driveways, parking lots, light traffic roads	½"	25%	2"	\$40/ton	Used for one course applications. Produces a smoother finish than 13A at a lower cost than 36A
LVSP (Low Volume Superpave)	Light to moderate traffic streets, parking lots, driveways	¾"	25%	1½" to 2¼"	\$45/ton	Identical to 13A specifications. Requires Superpave testing methods.
CALC CATC CATM	County roads and highways	½" to ¾"	95% min.	1½" to 2½"	\$50/ton	Becoming less commonly used. Requires 95% crushed content that cannot contain recycled material (recycled asphalt pavement or RAP).

\* Cost does not include trucking, placement, and finishing. Cost varies with quantity produced.

For more information about asphalt paving contact Martin Graf, P.E. at Gosling Czubak Engineering Sciences (800) 968-1062.

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