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CONSTRUCTION LEAFLET NO. 11
THE ASPHALT INSTITUTE
ASPHALT INSTITUTE BUILDING
COLLEGE PARK, MARYLAND 20740

# FULL-DEPTH® ASPHALT PAVEMENTS FOR PRIVATE DRIVEWAYS



## GENERAL INFORMATION

In order to be a good investment, a residential driveway must be properly constructed. The information contained in this leaflet is designed as a general guide to the proper design and construction of asphalt pavements for private driveways, and to assist the homeowner in obtaining a driveway that will be sound, economically constructed, attractive and durable.

A driveway that is correctly designed and constructed by the Full-Depth asphalt method will give many years of service with little or no maintenance. Such a driveway is simple and economical to build, and in practically every area there are reputable contractors who will furnish and properly use the materials, equipment, and labor needed to build a completely acceptable pavement.

## DEFINITIONS OF TERMS USED

**Asphalt:** A dark brown to black cementitious material in which the predominating constituents are bitumens which occur in nature or are obtained in petroleum processing. In varying proportions, asphalt is a constituent of most crude petroleums.

**Full-Depth Asphalt Pavement:** Pavement in which asphalt mixtures are used for all courses above the subgrade or improved subgrade.

**Asphalt Concrete:** A high-quality, thoroughly-controlled hot mixture of asphalt cement and well-graded, high-quality mineral aggregate.

**Subgrade:** The soil prepared to support a structure or a pavement system. It is the foundation for the pavement structure. The subgrade soil sometimes is called "basement soil" or "foundation soil."

**Asphalt Base Course:** A foundation course consisting of mineral aggregate, bound together with asphaltic material.

**Asphalt Surface Course:** The top course of an asphalt pavement, sometimes called asphalt wearing course.

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## DRAINAGE

Good drainage is important for pavement durability. It is desirable to blend the surface of the pavement to the contour of the existing ground so that the surface water runs over it or away from it in its natural course. In flat areas, the driveway should be sloped or crowned not less than 1/4 in./ft (2 cm/m) so all surface water will drain off. Roof drainage from downspouts should, if feasible, be piped well away from the edge of the driveway. In some cases, pipe cross drains may be needed to take the water under the driveway. Water should not be allowed to stand at the edges.

Generally, an underdrain system is not required when the pavement is constructed by the Full-Depth asphalt method, even over poor soil or in certain other undesirable drainage conditions. However, an underdrain system may be required if the driveway pavement is constructed by another method involving the use of an untreated gravel or crushed rock base.

## PAVEMENT WIDTH

Primary consideration should be given to building a driveway of proper width. It should be no less than 8 ft (2.4 m), but 10 ft (3 m) is a more practical minimum width. If the driveway will be used for both pedestrians and automobiles a 12 ft (3.7 m) width should be considered.

It usually is desirable to preserve aesthetic objects such as trees and rocks. Also, to avoid unsightly cuts in hilly areas, driveways should conform to the terrain. Therefore, where the property will accommodate it, a curving driveway will be more attractive. A curved driveway needs to be increased in width on sharp curves.

## PAVEMENT THICKNESS

Full-Depth asphalt pavements for residential driveways should be a minimum of 4 in. (10 cm) compacted thickness on a properly prepared subgrade (see SUBGRADE PREPARATION, below). This minimum is sufficient for many years of service (automobiles and an occasional truck) if the driveway is properly constructed. However, if there is concern about foundation conditions, such as soft subgrade or an exceptional number of heavy vehicles using the pavement, it may be desirable to increase the thickness to 5 in. (13 cm) or, under extreme conditions, 6 in. (15 cm). Thickness design is further discussed in The Asphalt Institute's publication, **Full-Depth Asphalt Pavements For Parking Lots, Service Stations and Driveways**, Information Series No. 91 (IS-91).

## SUBGRADE PREPARATION

Before construction begins, buried utility lines in the vicinity of the proposed driveway should be located. If they are likely to be damaged during construction, they should be relocated or protected.

The subgrade soil must serve as a working platform to support construction equipment and it also must serve as the foundation for the pavement structure. Because it must be capable of carrying the loads transmitted to it from the pavement structure, it is most important that the subgrade be properly graded and adequately compacted.

After grading, and compacting with a roller, the subgrade should be tested to determine if it will support the construction equipment. This is done by driving a heavily-laden truck over it and noting the deflections. If a subgrade area shows pronounced deflection, this indicates that the soil has not been sufficiently rolled or that the soil-moisture content of the subgrade is too high. If additional rolling fails to correct the unstable condition, the soft areas should be removed and replaced with 2 or 3 in. (5 - 8 cm) of hot-mix asphalt concrete. In some cases of extremely poor subgrade, it may be necessary to remove the upper portion of the subgrade and replace it with select material.

Where it is possible that weeds may grow in the subgrade soil, prior to paving the subgrade should be treated with a non-toxic commercial sterilant.

## COMPOSITION OF PAVING MIXTURE

It is recommended that the asphalt paving mixture to be used be of a type locally and readily available. Typically this would be a State Highway Department mix used for residential streets. Because they are used extensively, these mixes are usually the least expensive. If such locally specified mixes are not available, it is advisable to use the American Society for Testing and Materials' Standard Specification D3515, **Hot-Mixed, Hot-Laid Asphalt Paving Mixtures.** Mix Designations and Nominal Maximum Size of Aggregate, 1/2 in. (12.5 mm) or 3/8 in. (9.5 mm) are recommended.

## SPREADING THE MIXTURE

The thick lift technique [placing in lifts of 4 or more in. (10 or more cm)] is in most instances satisfactory. However, if subgrade conditions or traffic loads necessitate thicknesses greater than 4 in. (10 cm), it is suggested that the asphalt be placed in two layers. In some cases it may also be necessary to place the mix in more than one layer to achieve desired smoothness. Three in. (8 cm) of base and 2 in. (5 cm) of surface mix or 4 in. (10 cm) of base and 2 in. (5 cm) of surface are suggested thickness combinations for 5 and 6 in. (13 and 15 cm) total thicknesses.

Small pavers are available but most asphalt paving machines in use today place widths ranging from 8 to 12 ft (2.4 to 3.7 m). Relatively sophisticated self-propelled pavers as well as simpler towed equipment have been successfully used for residential driveway construction.

Whenever possible, hand placement of the mixture should be avoided. However, where access to the driveway site is limited, hand placement may be the only feasible construction method. When the asphalt mixture is placed by hand it is essential that forms be set at the edge of the driveway. These will ensure a neat edge and will minimize surface imperfections when used as a reference for a strike-off board. When used as forms for this purpose, redwood boards may be left in place to provide a separation between driveway and lawn.

## WEATHER CONDITIONS

Weather conditions affect asphalt construction. To obtain the best results asphalt paving should be done in other than wet or extremely cold weather.

## COMPACTION

Regardless of the thickness of the course being placed, compaction of asphalt pavement mixtures is one of the most important construction operations contributing to the proper performance of the completed pavement. That is why it is so important to have a properly prepared subgrade against which to compact the overlying pavement. A steel-wheeled tandem roller is generally used for this type of work. However, many other types of roller, including small self-propelled vibrating rollers, can be used to attain the required compaction.

## MAINTENANCE

It is not necessary to seal the surface of a newly-constructed asphalt concrete driveway. When the pavement is properly constructed, the driveway should afford many years of service before a thin application of driveway sealer containing mineral grit (available at hardware stores) becomes desirable to improve the surface texture and seal small cracks. But, if the pavement is not properly compacted during construction a surface sealer may be needed within two to four years.

## TIPS ON SELECTING A CONTRACTOR

On relatively small construction jobs such as residential driveways, it is very important that a reputable, competent contractor be chosen. And, since private homeowners generally do not have the benefit of strict specifications, trained inspectors, and the technical expertise that the public contracting agencies have at their disposal to control the project, the following tips may be helpful toward selecting a reliable contractor and obtaining the best possible driveway structure.

- Select a contractor known for high–quality work and who has an established reputation in the community.

- Obtain proposals from more than one contractor and ensure that all are bidding on the same type of mix and construction. In order that true and valid comparisons can be made, all proposals should cover the same units.

- When discussing a project, be sure that the thicknesses agreed on are compacted thicknesses.

- Visit pavement projects built by the prospective contractors and talk with the owners of the projects.

- Insist on a written contract or agreement, in addition to any guarantee offered by the driveway contractor. Whenever possible, make provision to retain some portion of the payment due the contractor until there is complete satisfaction with the quality of the finished driveway.

## SPECIFICATIONS

Specifications adaptable for driveways may be obtained from the nearest Asphalt Institute office. Ask for **Model Specifications for Small Paving Jobs**, CL–2.