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# CL-3

CONSTRUCTION LEAFLET NO. 3  
**THE ASPHALT INSTITUTE**  
ASPHALT INSTITUTE BUILDING  
COLLEGE PARK, MARYLAND 20740

## FULL-DEPTH ASPHALT PAVEMENTS FOR BICYCLE PATHS

(Applicable also to Paving Golf Cart Paths,  
Sidewalks, and Walkways)

### GENERAL INFORMATION

Correctly designed and constructed, asphalt pavements will give many years of service with little or no maintenance. Because asphalt is the most commonly used material for paving bicycle paths, golf cart paths, and walkways, this leaflet was prepared as a guide to the proper design and construction of asphalt pavements for these facilities.

#### Subgrade Preparation

The earth subgrade must serve both as a working platform to support construction equipment and as the foundation for the pavement structure. Therefore, it is most important for the architect or engineer to see that it is properly compacted and graded. All topsoil should be removed and low-quality soils must be improved by adding asphalt or other suitable admixtures such as lime or granular materials. Local soil areas that are highly susceptible to frost heaving and frost boils should be removed and replaced with better materials or reworked to make uniform the upper portion of the subgrade. To prevent growth of weeds, the subgrade should be treated with an approved herbicide. **For additional information on subgrade preparation, the reader may refer to the Asphalt Institute's Construction Leaflet No. 1 (CL-1), Subgrade Preparation for Asphalt Pavements. Also available is Construction Leaflet No. 2 (CL-2), Model Specifications for Small Paving Jobs. Inquire at nearest Asphalt Institute office.**

#### Surface Type

The Asphalt Institute recommends Full-Depth<sup>®\*</sup> Asphalt Pavement construction. In this method, the paving mixture is placed directly on the prepared subgrade. Full-Depth pavements give smooth, durable and economical surfaces that resist high unit loads.

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\*Full-Depth<sup>®</sup> Asphalt Pavement – The term Full-Depth (registered by The Asphalt Institute with the U.S. Patent Office) certifies that the pavement is one in which asphalt mixtures are employed for all courses above the subgrade or improved subgrade. A Full-Depth asphalt pavement is laid directly on the prepared subgrade.

### **Composition of Mix**

Asphalt mixes referred to in this publication are those specified in ASTM D 1663 (see Table 1). Asphalt mixes specified by local agencies may be used in their place if they have a history of satisfactory performance. Contact an Asphalt Institute engineer for information on local mixes.

### **Compaction**

Compaction of asphalt mixtures is one of the most important construction operations contributing to the proper performance of the completed pavement, regardless of the thickness of the course being placed. That is why it is so important to have a properly prepared subgrade against which to compact the overlying pavement.

Asphalt concrete placed and compacted in Deep Lifts® [10 centimetres (4 inches) thick or more] has several major advantages over thin-lift construction. Deep Lifts will retain heat much longer than thin lifts, permitting adequate time for compaction. Because of the longer heat retention of Deep Lifts, the construction season can be lengthened. Currently available compaction equipment of sufficient capacity can effectively compact Deep Lifts of asphalt concrete.

Initial compaction procedure is to roll the interior portion of the spread with three to four passes, then work to within 300mm (12 in.) of the unsupported edge. The roller should advance toward the edge in approximately 100mm (4 in.) increments with subsequent passes. This permits the bulk of the roller weight to be supported on partially compacted mix that has developed sufficient stability, thereby reducing the lateral thrust from the roller on the uncompacted mix. This pattern is applicable whether steel-wheel or pneumatic-tired rollers are used. Final compaction then is obtained by conventional rolling.

### **Drainage**

Good drainage is important for pavement durability. The prospective builder should determine if a problem exists at the outset and make plans to correct any drainage deficiencies. It is desirable to blend the surface of the pavement to the contour of existing ground so that surface drainage runs over it or away from it in its natural course. Water should not be allowed to stand at the pavement's edge.

## **BICYCLE PATHS**

**PAVEMENT STRUCTURE** — The Full-Depth asphalt pavement for bicycle paths should be a minimum of 10cm (4 in.) thick. The Deep Lift technique can be employed to place the full asphalt layer in one pass of the paver. ASTM Standard D 1663, Asphalt Concrete Mix Designation 5A or 6A, is recommended, see Table 1.

**PAVEMENT WIDTH** — How wide to build an asphalt-paved bicycle path is a primary consideration. Generally, the recommended width is 2.4m (8 ft.). However, ready availability of conventional road construction equipment and maintenance vehicles may, when over-all cost is considered, govern ultimate width. There are small pavers available, but most asphalt paving machines in use today place widths ranging from 2.4 to 3.7m (8 to 12 ft.). The use of normal size equipment can offset the cost of hauling in mix and hand-laying. In remote areas or in difficult terrain, consideration should also be given to building the pavement wide enough for necessary maintenance and ambulances or rescue-squad vehicles to use during an emergency.

## **GOLF CART PATHS**

**GENERAL** — Pavements for golf cart paths are normally built like bicycle paths, having a minimum width of 1.5m (5 ft.). However, to minimize golf shoe spike wear, the pavement should be designed and constructed in two layers.

**PAVEMENT STRUCTURE** — A minimum of 10cm (4 in.) of asphalt concrete pavement is recommended. A 7.5cm (3 in.) Full-Depth asphalt base should be placed first and topped by a 2.5cm (1 in.) asphalt surface course. An open-graded mix, or a sand mix with an asphalt content higher than required for a normal highway paving mix, provides a good wearing course for players wearing golf shoes. If desired, a single 10cm (4 in.) course may be placed. ASTM D 1663, Asphalt Concrete Mix Designation 5A or 6A, is suggested for the base course, while ASTM D 1663, Sand Asphalt Mix Designation 7A, is recommended for the surface course, see Table 1.

## SIDEWALKS

**GENERAL** — Asphalt sidewalks are constructed like bicycle paths, except that they usually are not as wide. If desired, they can be given almost any surface color or texture by application of special materials.

**PAVEMENT STRUCTURE** — A minimum of 10cm (4 in.) of Full-Depth asphalt concrete placed in a single layer is recommended. Asphalt concrete will resist high unit loads and provide a smooth, long-lasting pavement. ASTM D 1663, Asphalt Concrete Mix Designation 5A or 6A, is recommended, see Table 1.

Table 1. RECOMMENDED MIX DESIGNATIONS

Sieve Size	ASTM D 1663		
	Asphalt Concrete		Sand Asphalt
	Mix Designation and Nominal Maximum Size of Aggregate		
	12.5mm (1/2 in.) (5A)	9.5mm (3/8 in.) (6A)	4.75mm (No. 4) (7A)
	Grading of Total Aggregate (Coarse Plus Fine, Plus Filler if Required) Amounts Finer Than Each Laboratory Sieve (Square Opening), Weight Percent		
25.0mm (1 inch)	---	---	---
19.0mm (3/4 inch)	100	---	---
9.5mm (3/8 inch)	---	90 to 100	100
4.75mm (No. 4)	45 to 70	60 to 80	80 to 100
2.36mm (No. 8) <sup>a</sup>	25 to 55	35 to 65	65 to 100
1.18mm (No. 16)	---	---	40 to 80
600µm (No. 30)	---	---	20 to 65
300µm (No. 50)	5 to 20	6 to 25	7 to 40
150µm (No. 100)	---	---	3 to 20
75µm (No. 200) <sup>b</sup>	2 to 9	2 to 10	2 to 10
Asphalt Cement, weight percent of total mixture <sup>c</sup>	4½ to 9½	5 to 10	7 to 12

<sup>a</sup>In considering the total grading characteristics of an asphalt paving mixture the amount passing the 2.36 mm (No. 8) sieve is a significant and convenient field control point between fine and coarse aggregate.

<sup>b</sup>The material passing the 75 mm (No. 200) sieve may consist of fine particles of the aggregates or mineral filler, or both.

<sup>c</sup>The quantity of asphalt cement is given in terms of weight percent of the total mixture.