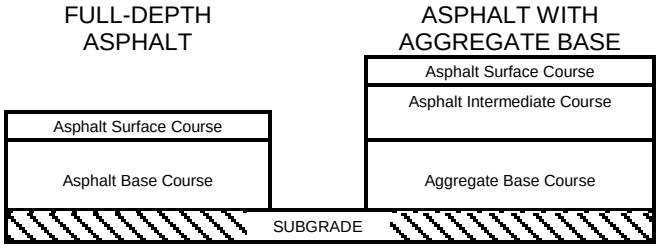
SECTION 2.2
PARKING LOTS FOR CARS

A convenient, attractive parking area is an important part of many kinds of business, industrial, and other facilities. Flexible asphalt concrete pavement is used extensively for this purpose. Properly designed and constructed, it stays smooth, sound, and attractive in appearance for many years with little or no maintenance. Flexibility allows the pavement to conform to minor subgrade settlements and still retain a continuous surface, free of abrupt bumps.

The elements of proper design and construction are discussed in the following paragraphs. Special attention is given where oversight or neglect sometimes has led to less than satisfactory performance of parking lot pavement.

Either a full-depth asphalt or an asphalt with aggregate base design may be chosen. One may be more economical than the other depending upon the size, nature, or location of a project. Good quality in both is affordable and ensures lasting value. Sample specifications are provided for reference in Section 3 of this guide.



RECOMMENDED MINIMUM THICKNESS DESIGNS
INCHES AND (MILLIMETERS

SUBGRADE SUPPORT	FULL-DEPTH ASPHALT	WITH AGGREGATE BASE AGGREGATE	ASPHALT
POOR (CBR 3)	6.5 (165)	6.0 (150)	4.5 (115)
FAIR (CBR 5)	5.5 (140)	6.0 (150)	3.5 (90)
GOOD (CBR 7)	5.0 (125)	6.0 (150)	3.0 (75)

These designs are intended to ensure that only surface maintenance and not structural repair will be needed in the future. In addition to surface treatment options, it now is easy and economical to renew hot mix asphalt surfaces by milling and resurfacing. This has become a valuable option especially where pavement surface must be kept at about the same elevation.

Where pavement elevation is not a constraint, conventional resurfacing (without milling) may be more appropriate. This not only provides a new surface but also adds structural strength.

SUBGRADE SUPPORT CAPACITY

The subgrade is the prepared soil foundation for the pavement structure. Pavement thickness design starts with a realistic value for the load support capacity of the subgrade. The pavement then is made thick enough so that load pressures transmitted to the subgrade are reduced to a level consistent with subgrade support capacity.

Values in the table represent the support capacity of a range of fine grained soils often encountered in Ohio. Coarse grained soils (very sandy or gravely soils) will have higher support capacities. The descriptions indicate the relative firmness the soil retains after it has been compacted and then exposed to the influx of moisture. The CBR (California Bearing Ratio) value is a laboratory test measure of that quality.

A professional site investigation of soils and moisture conditions is recommended. The purpose is to identify conditions that may affect the overall design as well as to determine soil support capacity for pavement thickness design.

Preparation of the subgrade to insure compaction at optimum moisture content and uniform support prior to placement of aggregate or asphalt concrete base is recommended. See The discussion below and ODOT specification Item 204, Subgrade Compaction and proof Rolling, for guidance.

PAVEMENT THICKNESS AND MATERIALS

THICKNESS --The recommended minimum pavement thickness designs in the table are appropriate for all cars and light trucks using parking areas intended for such vehicles.

Traffic lanes and other areas used frequently by heavy trucks or busses must be designed for those vehicles, see Section 2.3, Pavement For Heavy Truck Use.

MATERIALS -- The asphalt concrete mixtures recommended for use are ODOT standard construction specification Item 441, Asphalt Concrete Intermediate Course, Type 2 and Flexible Pavements of Ohio (FPO) specification 404LVT, Asphalt Concrete , for the surface course. These materials are described and some suggestions for specifying them are found in the FPO Technical Bulletin, "Specifying Asphalt Pavements in Ohio," on the FPO website, www.flexiblepavements.org.

For full depth designs, a 1.5 inch Item 404LVT, surface course, with one or more Item 441, Type 2 base courses (1.75 in. min. and 3 in. max.) are recommended.

For aggregate base designs a surface course of a minimum of 1.25 inch (38 mm) of Item 404LVT and a base course of a minimum of 1.75 inches of Item 441, Type 2 are recommended.

The aggregate base recommended is ODOT Item 304. The material is a high quality, dense graded, crushed aggregate. The particle size gradation should be uniform from coarse to fine and the upper limit on the very fine fraction (passing the No. 200 sieve) should not be exceeded. An excess of that fraction will weaken the base under wet conditions.

METRIC LAYER THICKNESS--Layer thickness in millimeters was converted from inches and then indicated according to the practice adopted by the Ohio DOT. That practice is to specify layer thickness less than 45 millimeters to the nearest millimeter and thickness greater than 45 millimeters to the nearest 5 millimeters.

SUBSURFACE DRAINAGE

Failure to provide effective subsurface drainage is a common cause of poor performance of parking lot pavement. Pipe underdrains with porous backfill always should be installed beneath the pavement at critical locations.

For example, pavement often is sloped to drain surface water to the center of a traffic lane from parking stalls on each side. In this case, a continuous pipe underdrain should be installed beneath the centerline with the flowline about a foot (300 mm) below the subgrade surface. The pipe often can be outletted into surface water inlet boxes.

The subgrade as well as the pavement surface should be sloped to the centerline.

Precautions may be necessary to keep the porous backfill from becoming clogged by siltation between the time underdrains are installed and the time paving is done. When aggregate base is used, there should be a clean connection with porous backfill when the base is placed.

SURFACE DRAINAGE

Both the subgrade and the pavement surface should slope not less than a quarter inch per foot (6 mm per 300 mm).

Large areas sometimes cannot be constructed in a single plane having that minimum slope. The solution then is to design the area in a series of planes. Solving the problem by reducing the slope is not recommended because, at some point, ponding would become inevitable.

In the event that local requirements limit the rate of surface water run-off, a detention basin should be considered as an alternative to reducing the slope to less than the recommended minimum.

SUBGRADE PREPARATION

Top soil, roots, boulders and the like always should be removed before starting subgrade preparation. Other soils having a maximum dry weight of less than 100 pounds per cubic foot (1600 kilograms per cubic meter) are not suitable for pavement subgrade and should be removed and replaced with suitable soil or granular material to a depth of 6 to 12 inches (150 to 300 mm).

Suitable subgrade soil should be compacted to at least 95 percent of its maximum dry weight. The moisture content during compaction should be at or very near optimum for compaction of the soil. Either aeration or adding and mixing water into soil often is necessary to bring it to optimum moisture content. The test method commonly used for maximum dry weight and moisture-density determinations is AASHTO T-99.

Because appearance can be misleading, the degree of compaction should be determined by testing. Most fine grained soils are firm when dry whether compacted or not. If not well compacted, they become very soft when wet.

Specifying that proof rolling be done soon after compaction is a good practice. A heavy roller or other heavy equipment can be specified to locate soft, yielding areas which should be corrected before paving.

The subgrade surface should be at proper elevation and cross-slope before paving starts. There should be no loose material or low areas where water would accumulate and soften the subgrade beneath the pavement rather than flow to the underdrains.

AGGREGATE BASE CONSTRUCTION

Aggregate should be placed by means of a mechanical spreader taking care to avoid separation of particle sizes. The base should be compacted thoroughly with the moisture content at optimum for compaction. At optimum moisture content, the aggregate is quite damp but there is no free water.

ASPHALT CONCRETE CONSTRUCTION

Standard practice in Ohio is to place hot mix asphalt by weight per unit of area rather than to actual thickness. This makes it easy to check the rate of placing and the total quantity placed using load delivery ticket weights. For mixtures with gravel or stone aggregate, the specified weight to volume conversion is 4,000 pounds per cubic yard, or 111 pounds per square yard per inch of thickness (2370 kilograms per cubic meter or 2.37 kilograms per square meter per millimeter of thickness).

Asphalt concrete should be placed by means of an asphalt paver. These are available in a range of sizes. Hand placing, although satisfactory when skillfully done, should be limited to small areas.

Both placing and compaction by rolling must be completed while the asphalt is hot and workable. Thin layers lose heat rapidly after spreading onto a cool surface and the time available for effective rolling then may be less than 10 or 20 minutes. For that reason, placing and rolling always should be done as a continuous process.

The compaction requirements for ODOT Items 301, 441, Type 2 and Type 1 are found in ODOT specification Items 401.13 and .16.

TACK COAT

Individual layers must be bonded together for the total thickness of asphalt to act as a structural unit. Unless a layer is placed upon a freshly placed layer, the surface of the previously placed layer should be cleaned of all foreign material and a liquid asphalt tack coat should be applied to it.