

Asphalt Paving 101

Building and Maintaining Quality Pavements

Photos courtesy Rabine Paving



Constructing a roadway at Motorola complex in Schaumburg, IL.

Whether the project is a revitalization of existing pavement or an addition—be it the facility’s cart paths, utility road, driveway or parking lot—golf course superintendents should have a basic understanding of what to expect from a quality service provider and how to maintain paved areas for optimal longevity of investment. Here, we present Asphalt Paving 101—an overview of what it takes to build and maintain quality pavements.



Asphalt cart path at Ivanhoe Country Club in Ivanhoe, IL.

Evaluating Your Short- and Long-Term Needs

Quality paving companies have engineers on staff who are able to evaluate current conditions and provide clear specifications and budgetary numbers that allow golf course superintendents or property managers to make educated economical decisions. Upon receiving an evaluation, you are able to put together invitations to bid using an engineer’s specifications, thereby allowing for apples-to-apples bidding. Along with an evaluation, many firms can also provide—often at no cost—five-year budgets based on specific course superintendents’ needs. With this information, superintendents can formulate clear-cut paths to address short- and long-term needs.

Common Specifications Based on Industry and IDOT Standards

Specifications for cart paths will vary depending on type of traffic and stability of subgrade soils. However, the type of traffic and the volume of traffic can vary drastically from one course to the next. Most courses today must support small maintenance-vehicle traffic such as utility vehicles, tractors and pick-up trucks on a daily basis, and large dump trucks a few times annually. This type of use demands building a pavement similar to a light commercial pavement such as would be found in a small office complex

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or a strip center. Some areas of a cart path may have to support garbage-truck traffic on a weekly basis, which would then require a heavy commercial or industrial pavement. Common commercial pavement specifications on a stable subgrade would be 10" of aggregate base and 3" of asphalt pavement. Common industrial pavement specifications on a stable subgrade would be 12" of aggregate base and 4" to 6" of asphalt pavement.

If soils are structurally marginal, a base of 8" and 3" of pavement in two layers is a common specification. If soils are structurally poor, or groundwater content is high, specifications should reflect a method of stabilizing the subgrade or maximizing the strength of the pavement by increasing pavement thickness. Taking measures to stabilize the subgrade when a naturally solid subgrade is not present is often what separates the best paving construction companies from the rest. It takes an educated engineer to identify the reason for an unstable subgrade and to specify the most economical solution. Very

often, engineering companies are called upon for a second opinion to solve these issues. This can extend the construction schedule and add extra cost not initially budgeted. If your paving contractor has engineers on staff to specify structural improvements without adding engineering costs and provides a warranty to back the changes, the job will continue with minimal delay.

Stabilizing the subgrade could consist of many different applications, such as increasing aggregate base, increasing the asphalt pavement thickness, installing soil-separation fabric, installing under-drainage, lime stabilization of sub-base, or even full-depth pavement as described below:

Increased Aggregate Base

After excavation and upon inspection of the subgrade, if the soil is a little soft or appears to retain minimal moisture (groundwater), the most common specification onsite is to increase the aggregate base section with additional crushed gravel (CA-6, road gravel). Many contractors believe in using a 3" to 5" stone when

increasing the aggregate base section and at times this is a good alternative.

Increased Asphalt Pavement Thickness

The most cost-effective way to improve the total pavement structure when moisture/deflection of subgrade or aggregate base is present is to increase the asphalt pavement thickness. The structural value of increased asphalt pavement is approximately double that of increased gravel base. For example, an increase of 4" of CA-6 gravel base would be required to equal an increase of 2" in total asphalt pavement thickness. The additional cost of increased asphalt base is often less than the cost of additional excavation and potential hauling of excavated soil.

Soil-Separation Fabric

When inferior soils are present in the subgrade and cannot be eliminated without unrealistic costs, the installation of a soil-separation fabric is necessary. Soil-separation fabric is available in many different brands, thicknesses and materials. The goal of



Caterpillar highway/road paver with laser-grade control system.

this fabric is to eliminate the ability of a hydraulic-like soil to interfere with the aggregate base section above it. The purpose of the soil-separation fabric may be temporary such as when moisture conditions are due to seasonal factors, or long-term when conditions are due to lack of stable subgrade soils.

Under-Drainage

Groundwater is always a concern when building a pavement, but more than ever when irrigation is present. In some cases, where sand and/or gravel are present naturally in the subgrade, under-drains most likely are not necessary. In many cases, subsoils at golf courses consist of different types of clays and organic soils that may provide for a stable sub-base, but do not allow for rapid groundwater drainage. Groundwater will take the path of least resistance, which in this case results in a consistently saturated aggregate base, especially when irrigation is present. Under-drainage systems usually consist of perforated pipe surrounded by washed stone and silt fabric, creating a free-draining trench below the aggregate base. When installed properly, under-drains will allow groundwater to pass under the aggregate base into a storm sewer system or into surface drainage systems onsite.

Lime Stabilization

Lime stabilization is used on a large scale when the cost of major soil removal or major aggregate base

improvement is needed to bridge over an unsuitable subgrade. Lime stabilization is a method of firming up the subgrade by mixing lime with the existing subgrade soils and then recompacting the soil to create a structurally suitable crust, ready for the aggregate base.

Full-Depth Pavement

Full-depth pavement is a method of eliminating a large portion of the cost of excavation and import of material by paving a thickened pavement with an all-asphalt base. The thickness of total pavement in this situation will often be half of the specified combined thickness of aggregate base and asphalt pavement. For example, 7" to 12" of full-depth asphalt pavement may be specified in place of 14" to 24" of combined aggregate base and asphalt pavement thickness. The subgrade must be very stable when this specification is utilized. In addition to economics, other advantages of this specification include less stress to tree roots when present due to less excavation, increased durability and life expectancy of the pavement, and elimination of potential base and shoulder erosion.

Specifications for parking lots and roads should be based on similar factors and conditions, although the minimum specifications for commercial parking lots and roads should not be less than 10" of aggregate base and 3" of total pavement, paved in two layers.

Quality Equipment + Quality People = Quality Pavements

When choosing your paving contractor, look for a company that continually invests in education and equipment technology. Over the last decade there have been major advances in the pavement construction and pavement maintenance industry, some of which are listed below:

Laser and GPS Technology

Laser and GPS technology installed on grading and paving machinery allows for more accurate and continuous real-time measurements of grade during construction.

Infrared Pavement-Repair Equipment

Infrared heaters are used to reheat the surface of an existing asphalt pavement. Minor repairs, reshaping and the removal or addition of material as necessary can then be completed. This method of repair eliminates the need for saw-cutting and removal of existing pavement and leaves a virtually seamless pavement for a finished product.

Asphalt Texturing

This technology consists of imprinted designs in the surface of a pavement. The textures may vary from straightforward brick patterns to unique designs. The surface of the textured area is often colored to enhance the design.

High-Grade Seal Coat

High-performance seal-coat material with mineral and fiber reinforcements blended with polymers is now available to the industry. This material improves adhesion, flexibility, durability and the overall life of the surface treatment.

Similar quality expectations demanded on state paving projects can be attained using DOT (Department Of Transportation)-approved equipment when paving a cart path, driveway or small parking lot. With today's new technology, golf course superintendents do not have to accept the inconsistencies delivered by drag boxes and other antiquated paving equipment. Saw-cutting and removing areas of newer pavements

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Parking lot for corporate office building in Vernon Hills, IL.

due to utility trenches, settling or puddles can now be infrared-repaired, leaving no saw-cut joints. Street print asphalt pavement is the most cost-effective decorative pavement. At a cost of \$3 to \$6 per square foot, you can acquire the look of brick or stone in a multitude of patterns and designs as well as custom designs such as the logo installed at Mauh-Nah-Tee-See Country Club in Rockford, IL (see photo).

The service life of an asphalt pavement can vary depending on long-term maintenance. If a seal-coating program is adhered to, the pavement life can be extended drastically. There are seal coats now available that will last two to three times the life of normal-quality seal coats, minimizing the challenge of closing down your course every one to two years. Make sure your paving company is a company that stays abreast of innovations in the industry, uses DOT-approved equipment and always strives to give you the best value for your investment.



Decorative paving at Mauh-Nah-Tee-See Country Club in Rockford, IL.





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