

# LESSONS LEARNED:

GEOTECHNICAL ENGINEERING

## OBSERVATIONS AND LESSONS FROM THE SCHOOL OF EXPERIENCE

### PHASED CONSTRUCTION - ASPHALT PAVEMENT SYSTEMS

Phased asphalt construction usually means that the subbase aggregate and base course of asphalt are placed early in the construction process, while the final asphalt surface is placed near project completion. For residential projects, this can mean that the surface asphalt is placed several months or even years after the subbase and base asphalt are installed. For retail or commercial construction, the time between the installation of base and final asphalt is usually much shorter. What are the implications of phasing the pavement construction and is it a good idea for my project?

#### **Pavement Design - A Basic Primer**

All pavement systems are designed on the basis of three factors: (1) the strength of the subgrade soil, (2) the traffic loading conditions, and (3) the strength of the materials that are combined to create the pavement system. The strength of the soil is usually evaluated empirically, most commonly based on a test known as the California Bearing Ratio (CBR) test. The traffic loading conditions are generally a function of the Average Daily Traffic (ADT) volume and the concentration of heavily loaded vehicles. For residential construction, most jurisdictions will publish an average traffic loading factor per residential unit serviced by that pavement. For retail or industrial use, the traffic loading conditions are normally determined by a traffic study or provided by the end user of the facility. The strength of the pavement system, usually expressed in terms of a "structural number," is a function of the materials that make up the pavement system. Commonly, the local department of transportation will publish a structural number factor for the various types of stone, base asphalt and surface asphalt used in an area.

#### **Phased Construction - Performance Implications**

The idea of phasing asphalt pavement construction probably got its start in residential development. In residential development, it is desirable to create access to the limits of the overall development as quickly as possible. This not only makes it easier for trade industries to access individual housing sites, but also makes it possible for brokers to show a property. And, of course, phasing the construction allows the final surface course of the pavement system to have a nice, smooth, clean finish, especially following those inevitable pavement cuts that are required to install utilities.

Although phased construction has its benefits, it also has a drawback. Studies have shown that the most critical loading conditions for most developments occurs during the construction phase. In particular, the pavement system is subjected to loading that includes construction equipment, low-boys, concrete trucks, pre-fabricated joist and drywall deliveries, and other heavy, high concentrated truck loading which does not occur once the development is finished. Not only does this represent the highest traffic loading condition, but it occurs at a time when the pavement section is not at its full strength, simply because the surface asphalt has not been placed.

Although it is usually not economically feasible to increase the pavement section to satisfy this potential loading issue, it should be recognized that prudent steps can be taken to help reduce the likelihood of failures of the pavement system during construction. For example, an intermediate type of asphalt can be used in lieu of, or in addition to, a base layer to reduce the amount of surface water infiltration into the pavement subbase. In addition, geotextiles and geogrids can be installed between the subgrade soil and subbase aggregate in order to provide additional separation and reinforcement. This should normally be undertaken in areas that are relatively low and wet, or in areas where there is known to be a concentration of construction traffic. These concentrations are typically considered to be the initial entryways to the development and intersections within the development.

Phased asphalt construction is a concept that creates a cleaner, smoother more attractive final pavement surface. Unfortunately, under some circumstances, an intermediate or incomplete pavement is simply not strong enough to support the construction traffic loading. Even in situations where the initial pavement system has been designed to handle at least some of the construction traffic, replacement of failed pavement areas should be anticipated prior to placement of the final wearing course of asphalt. The use of an intermediate asphalt layer, geotextile separation fabric, and geogrid reinforcement can further reduce the potential for these failures.

We hope this **Lessons Learned** will be beneficial to you in the planning of your next project.

Respectfully,  
**ECS Corporate Services, LLC**