

ALABAMA CONSERVES ON US
ASPHALT

POROUS PAVEMENT
PARKING LOTS

GUIDE SPECIFICATIONS



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Overview

As cities and counties across Alabama continue to develop, storm water management is a challenge facing all our communities. The use of porous asphalt pavement structures offers an opportunity to address this challenge through parking lot and other paved area applications. With proper design and installation, the system is designed to allow infiltration of storm water into the pavement structure, and then release the treated water to infiltrate into the soils below, eliminating the need for detention basins that often requires additional land. The system is comprised of a permeable ("open-graded") hot mix asphalt surface placed over a granular working platform on top of a reservoir of large stone. The reservoir layer is designed to have the storage capacity to hold the water. Traditional dense graded asphalt may be used as the surface material in heavy traffic areas but the system then needs to be designed to allow storm water to infiltrate into the reservoir layer through open aggregate edges, drain tiles, pipes, etc. as determined by the engineered design.

Description

This guide specification provides mixture design, quality control and acceptance testing requirements for use on porous asphalt mixtures for parking lots.

Figure 1 - The site before the porous asphalt parking lot.



Figure 2 - Truck delivering the Non-Woven Geotextile Filter Fabric.



Figure 3 - Aggregate sizes of No. 2 or 3 or equivalent stone for reservoir layer.



Figure 4 - Dozer spreading aggregate reservoir layer on Non-Woven Geotextile Filter Fabric.



Figure 5 - Roller leveling the surface.

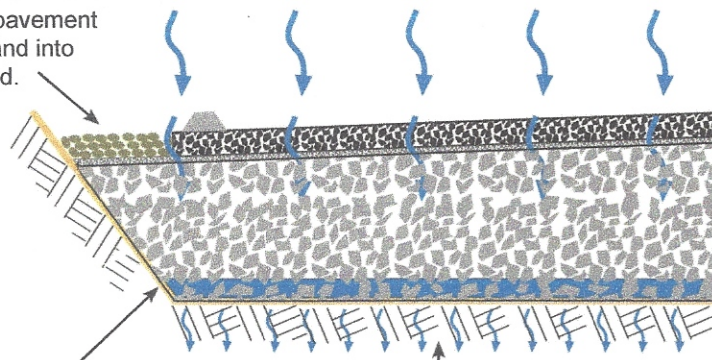


Figure 6 - Dump trucks carefully entering and exiting dumping points to prevent damage to fabric.



Typical Porous Pavement Cross Section

Unpaved Stone Edge - A backup system in case the pavement surface should ever become sealed. Storm water can flow off pavement surface to stone edge and into stone recharge bed.



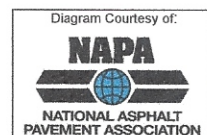
Open-Grade Asphalt Pavement
An open-graded asphalt mix that is porous, allowing storm water to flow through surface into stone recharge bed.

Choker Course - Single size crushed aggregates (1/2 inch) stabilizes surface for paving.

Stone Recharge Bed - Heart of system. Large, single size, crushed stone with 40% voids stores storm water for infiltration.

Non-Woven Geotextile - Protects stone recharge bed above from contamination and allows water to flow through.

Uncompacted Subgrade - Keeps permeability high to allow as much infiltration as possible.



Materials

The porous asphalt pavement structure should meet the following requirements:

- Existing soil subgrade under the porous asphalt pavement structure should not be compacted or subject to excessive construction equipment traffic prior to geotextile and stone bed placement. The bottom of the recharge bed should remain flat and where elevation changes exist, consider a terraced approach rather than constructing steep slopes.
- A Non-Woven Geotextile Filter Fabric should be placed as the separation layer between the soil subgrade and the stone reservoir layer. See Section 810 of the ALDOT Standard Specifications.
- The aggregate reservoir layer should be placed at a thickness as determined by the designer and utilize single-size stone that has been washed and does not contain excessive dust or fine materials. Aggregates should meet the gradation and material property requirements set forth in Section 801 of the ALDOT Standard Specifications and should consist of either Gradation Size No. 2 or Size No. 3 or equivalent stone. The intent is to provide a single-size crushed large stone with approximately 40 percent voids.
- The working platform placed over the reservoir layer should also meet the requirements set forth in Section 801 of the ALDOT Standard Specifications and should consist of either Gradation Size No. 9 or equivalent stone.
- Dense Graded Aggregate (or any other impermeable material) should NOT be used within the pavement structure.
- The hot mix asphalt surface layer should be at least four (4) inches thick and placed in at least two separate lifts. The asphalt mixture should utilize a gradation consistent with an Open-Graded Friction Course (OGFC) as described in Section 420 of the ALDOT Standard Specifications. The National Asphalt Pavement Association (NAPA) publication Information Series 131 (Porous Asphalt Pavements for Stormwater Management) also provides guidance on the gradation for this asphalt mixture.

Figure 7 - Panoramic view of the porous parking lot project.



Asphalt Mixture Requirements

- AAPA recommends utilizing PG 76-22 liquid asphalt binder in these porous pavement applications.
- Laboratory air voids should be approximately 16 percent or greater to assure permeability in the mix.
- The asphalt content should be 6.0% or greater to provide the necessary coating of the aggregates and for long term durability.

Construction Considerations

Porous Asphalt Mixtures require some special construction considerations which are unique and different from convention asphalt paving practices.

- Temperature Limitations: A minimum ambient air temperature of 60 degrees is recommended for placement of Open-Graded Friction Course.
- Since drain-down of the liquid asphalt can occur with these types of mixtures, consider lowering the plant temperatures as much as 50 degrees or consider using an ALDOT Approved Chemical Warm Mix Additive in the hot summer months to avoid this problem.
- Utilize conventional paving equipment for placement of the porous asphalt layer.
- In order to seat the aggregates within the mixture, make two or three passes with a small roller immediately after placement. More frequent rolling tends to reduce the infiltration capabilities of the porous mixture. Be careful to avoid over rolling the mixture. After final rolling, traffic should be restricted for the first 24-48 hours when the pavement tends to be tender. Care must be taken so that the porosity of the pavement is not compromised.

Figure 8 - The thickness of the aggregate (approximately 2 Feet).



Figure 9 - A small roller compacting the pavement.



Figure 12 - A demonstration shortly after the porous parking lot was installed.



Figure 10 - The standard dense graded asphalt entering the parking lot.



Figure 11 - The porous asphalt section of the parking lot



References:

- The National Asphalt Pavement Association (NAPA) Publication Information Series 131 (Porous Asphalt Pavements for Stormwater Management) is a design guide that details issues from site design through maintenance for Porous Asphalt Pavements.
- The National Asphalt Pavement Association (NAPA) Publication Information Series 140 (Structural Design Guidelines for Porous Asphalt Pavements) provides guidance on using the AASHTO 93 design methodology for structural design of Porous Asphalt Pavements.



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