

Issue: I thought when you said Tom Beach and Wes Saunders-Pearce would look at the site and see about solving the problem—that you meant the water problem. I am very disappointed that Mr. Beach only addressed my driveway.

Porous or permeable asphalt

McKnight/Mailand Gully Project:

Aaron Hass took the place of Joe Mueller who was the official contact in St. Paul for the project. In Ramsey county is was Terry Noonan, Cliff Aichenger was spearheading it from the Watershed District. I can't remember the guys name from Maplewood.

10/1 May 13 - June 2
I called Tom Beach the day of the appeal and spoke with him about the issue, I left Wes Saunders-Pearce a voice mail. I then sent 3 emails with information to both, and made 2 subsequent phone calls to both—leaving voice mails. I even emailed the letter with the date of the next hearing and didn't hear back. I finally called Tom's supervisor Wendy. It was after that that I finally got a call back. He said he didn't get out in the field much but he guessed he could come out—he was planning on coming after June 10 until I stated it had to be soon because the meeting was on the 10th. He came out Thursday afternoon, June 5. Wes never came out and never communicated with me in any way.

Tom did state things about how they could have done work at the end of the driveway to keep the water from coming in, although he doesn't mention that in the letter. He also said that he thought a swale (such as we had) would work with asphalt—when I asked if he was 100% sure he said no. We have to monitor it now and change it as needed—which is why we need something malleable.

He said the rock doesn't permeate much once it is compacted, but we have a dip in the driveway before the swale (to hold some of the water) and we watch it percolate down and dissipate. We also loosen it up and are still adding more rock to increase the volume. If it is a dustless surface – why can't we put down pea rock—which is a small river rock? There is no dust in that. FYI: Pavers are filled with pea gravel/pea rock. I have tried to find out what a "dustless" surface is, and I haven't gotten a confident answer.

I saw the printed price sheet – but was wondering where they got their prices and who they found to do residential porous asphalt...

I was not able to find an asphalt company that does residential porous asphalt—and the companies I called did not know of anyone who did it. I did find a company, Bituminous Roadways, that does porous asphalt for industrial/businesses that would provide the product itself for \$1500.00—but that doesn't include the subgrade layers to make the system work. Also, I couldn't find a company that would actually do the work—even if I got the product.

Porous asphalt's high cost is usually offset in industrial work and roadways by environmental factors, other systems that may not be needed (and thus cost reduced overall)—not so in residential use.

There are clogging issues—especially if there is dirt or debris coming in from somewhere (i.e. all of the run off from the road).

The examples that were listed by the Ramsey-Washington Watershed District are large city, county, corporate or church examples. (Mpls – Street Gutters, Mahtomedi - Public Works Building, Shoreview – a residential street demonstration, Blaine – city hall garage addition, Watershed District – 7000sq' parking lot)

I have a call into Jill Thomas—president of the MN Asphalt & Pavement Association, for more information on maintenance, but she's on vacation. The guys at Bituminous Roadways say it needs to be vacuum swept once

or twice a year, the winters make it hard and if there is runoff it clogs it up. Which of course is what the water problem is—street runoff.

From *Porous Asphalt Pavement Performance in Cold Regions*, MN DOT Research Services April 2012.

> 1.2.3 Advantages and Disadvantages of Porous Asphalt Systems

...Pavement performance is negatively impacted due to clogging and raveling issues, and winter maintenance is problematic... Increased costs are incurred with PA due to the high asphalt content, higher quality aggregates, a liner below a crushed stone base, and extensive site preparation. Successful construction of PA requires extraordinary mixing, transportation, and placement measures and specialized equipment [8]. Initially, generalized knowledge about porous pavements among the public and industry professionals is still limited in many areas. Porous pavement clogging failures have occurred from unwitting applications of sand and surface sealing. (pg 18)

> 1.2.5 Porous Asphalt Mix Production and Site Preparation

...The main considerations for PA pavement site preparation involve proper preparation of the base and subgrade, and measures to protect the permeability of the pavement. **Areas adjacent to the porous pavement must be free of loose soils, etc. that could clog the pavement if runoff or construction operations carried foreign materials onto the PA surface.** If danger of such contamination exists, stabilization and/or separation should be maintained using filter fabric, check bales, etc. [12]. Completion of soil stabilization and landscape development prior to construction is optimal. (pg 19)

> 1.2.6 Porous Asphalt Pavement Structure Design

Most PA pavement systems are composed of four layers [9]. At the bottom, a minimally compacted, adequately permeable subgrade is usually needed. Replacement of inadequate subgrade materials is usually not feasible, but diskings to loosen soils may be advantageous. The reservoir base usually consists of a 1-2 inch diameter, clean, durable, crushed stone aggregate. A filter or “choker” layer of approximately two inches of ½-inch crushed stone aggregate is commonly applied at the top of the base to provide surface uniformity and stabilization for paving operations. The thickness of the base layer is normally determined based on water storage needs and frost depth considerations. A porous asphalt surface course is installed with thickness determined from bearing strength and pavement design requirements. Most parking lot installations of PA pavement are approximately 3 inches thick.

The aggregate reservoir base is typically an integral part of the design of PA pavements. The base should have sufficient storage capacity for expected local rain events to prevent overflow and flooding of the pavement, although contingency surface or subsurface ingress or egress structures are sometimes installed. If allowances for overflow are not made, the subgrade materials must possess sufficient permeability to allow water discharge from the reservoir base. As such, it is recommended to install PA systems over minimally compacted, granular subgrade [8]. The PA structure would not necessarily require a separate storage base layer if the subgrade were both sufficiently supportive and permeable to allow the maximum expected infiltrated flow. Although many sources recommend designing the reservoir base depth equal to frost penetration, more research is needed to clarify base depth needed to prevent frost damage in cold climates.

Porous asphalt is not proficient at correcting profile inconsistencies or structural insufficiencies; therefore the surface of the underlying base should be prepared adequately before PA placement. Excessive vehicle access to the base surface during paving should be minimized, and preparations made to take remedial action before and during paving operations if necessary. Construction of level (flat) subgrade, reservoir base, and pavement layers is highly desirable to prevent pooling in low areas, minimize clogging, and maximize vertical infiltration efficiency. (pg 19)

> 1.2.8 Porous System Functionality and Permeability

Typical porous asphalt pavement functional life expectancy is 5 to 8 years [2]. Functionality is negatively impacted by clogging-induced permeability reduction. Without pavement cleaning or vacuuming to mitigate clogging, permeability and noise reduction capacity are expected to decrease and eventually cause the PA to behave like dense graded asphalt. (pg 20)

> 1.2.10 Maintenance and Repair

...Porous asphalt pavements can suffer from earlier and more frequent frost and ice formation, apparently as a result of the insulating thermal properties of the extensive air voids [4]. Formation of black ice and extended frozen periods are currently considered the main problems associated with PA (and porous friction course) maintenance in the United States [5, 14]. (pg 21)