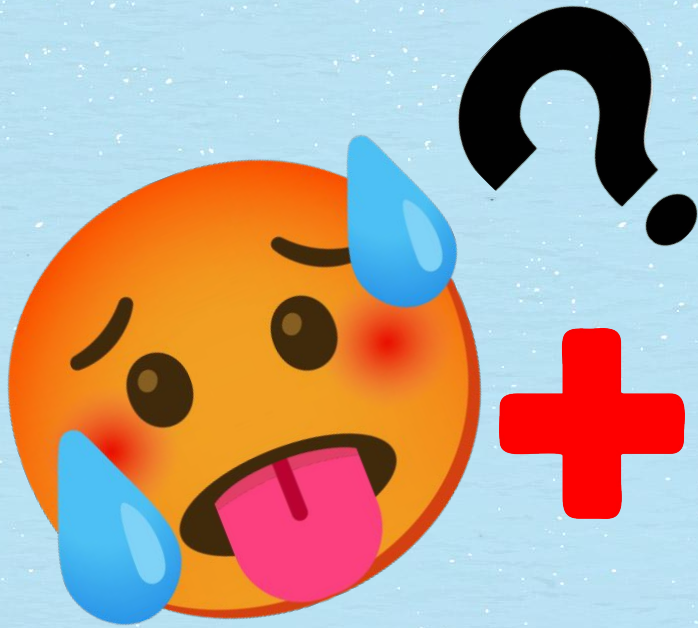


A close-up photograph of a wet asphalt surface. The asphalt is dark and glistening with water droplets of various sizes. In the upper left, a concrete curb is visible, and beyond it, some green foliage is blurred. The overall scene suggests a recent rain or a wet street. The text "Thirsty Asphalt" is overlaid in the center in a bold, blue, sans-serif font.

Thirsty Asphalt

What is Thirsty Asphalt?



Current Drainage System Problem

- Collects a lot of garbage that plugs the drain which causes flooding.
- Does not work if built higher than the road which causes puddles.

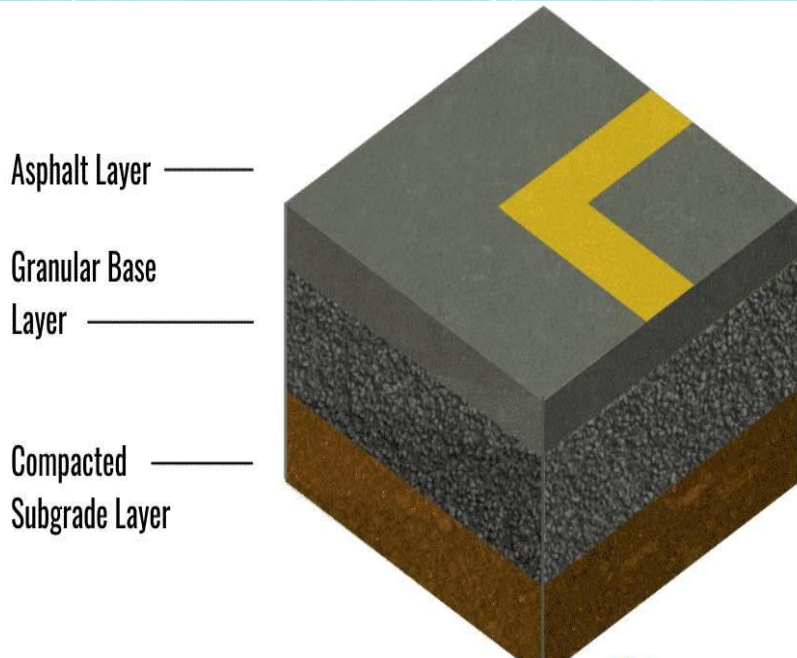


Current Road Problem

- Slippery on wet season.
- Absorbs heat and retains it on heat season.
- Can't take doggo for a nice walk!!!



Normal Asphalt vs Thirsty Asphalt



VS

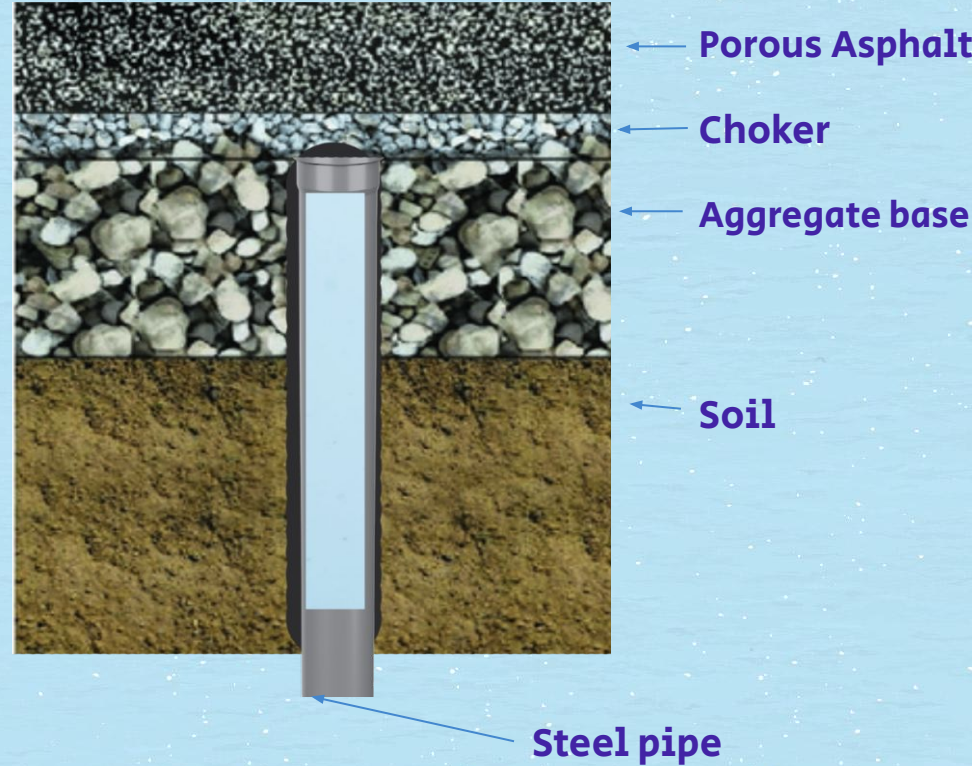
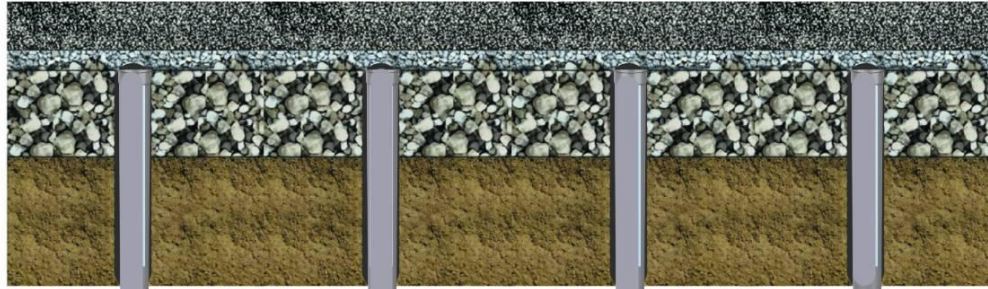


Diagram of Thirsty Asphalt

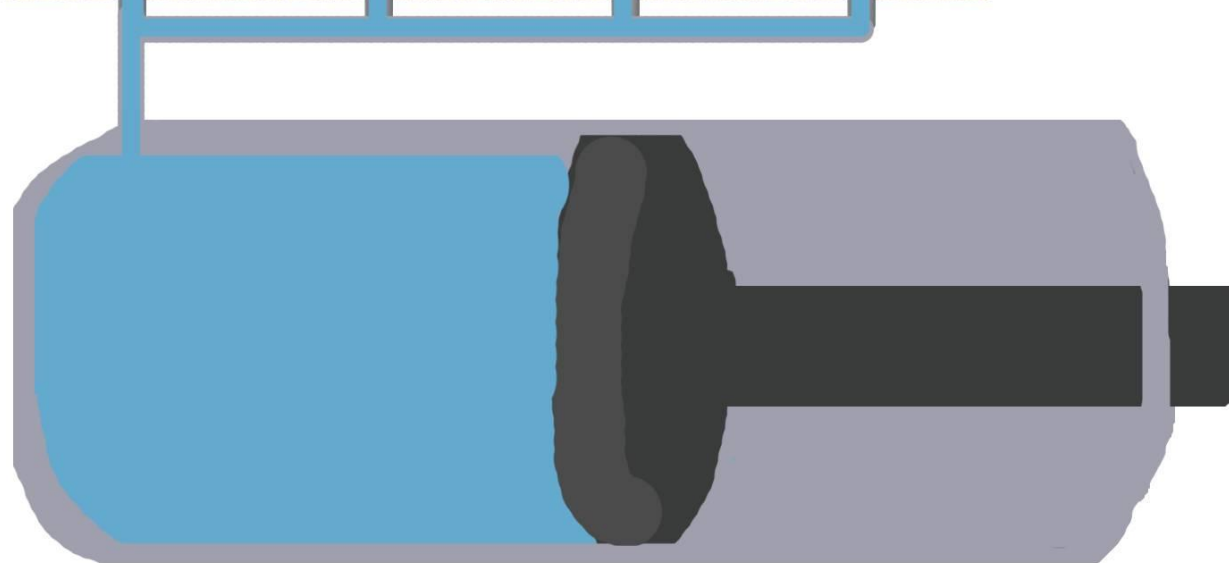
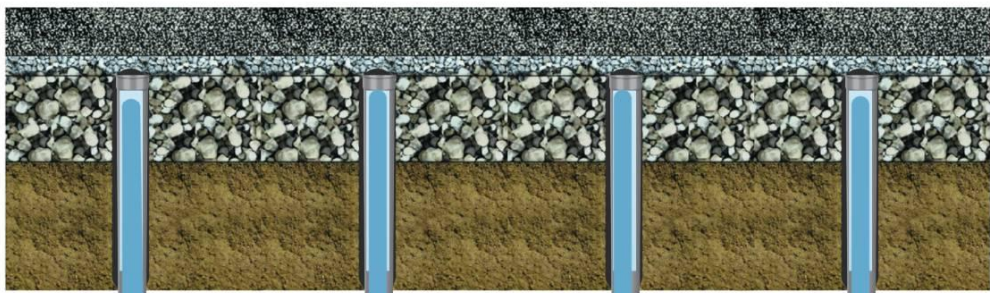


Not the
actual size

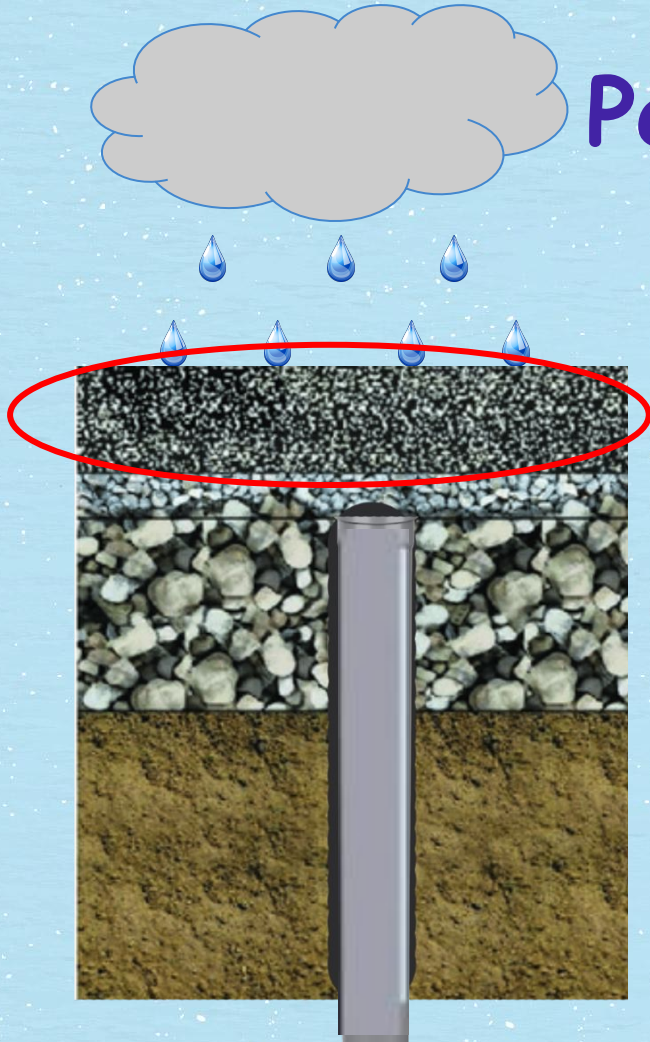
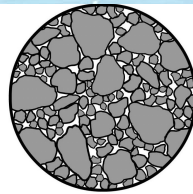
Underground
Water Tank
(Drawn by me)

Hydraulic
Piston





Permeable Asphalt

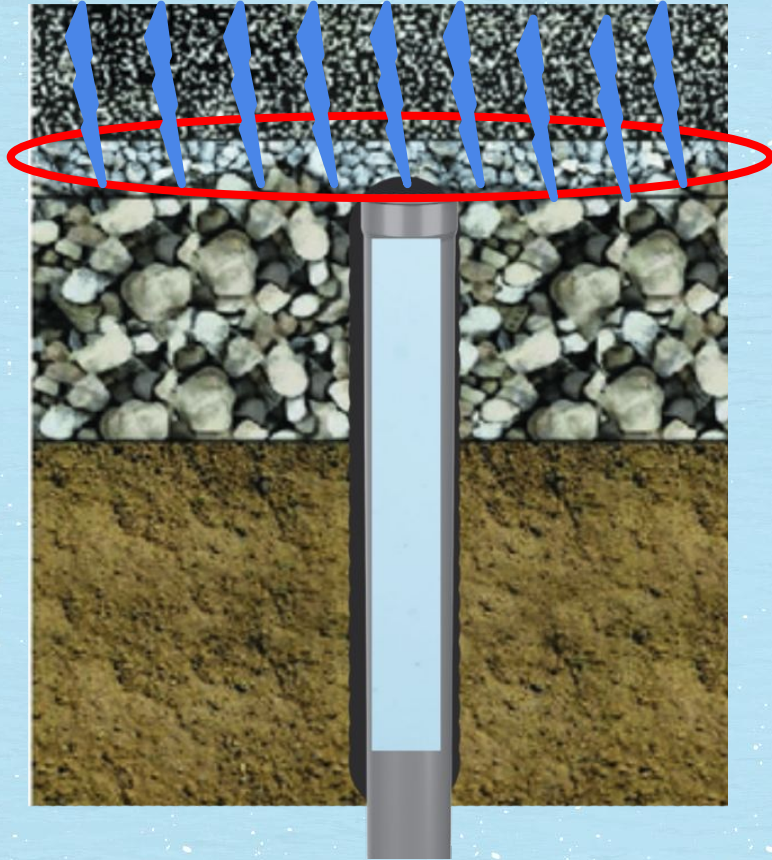


- Small Open-Graded Aggregates of Asphalt (**2 - 4 inches**)
- Void Space (Gaps) of **15 - 25%**
- Water passes through at a fast rate



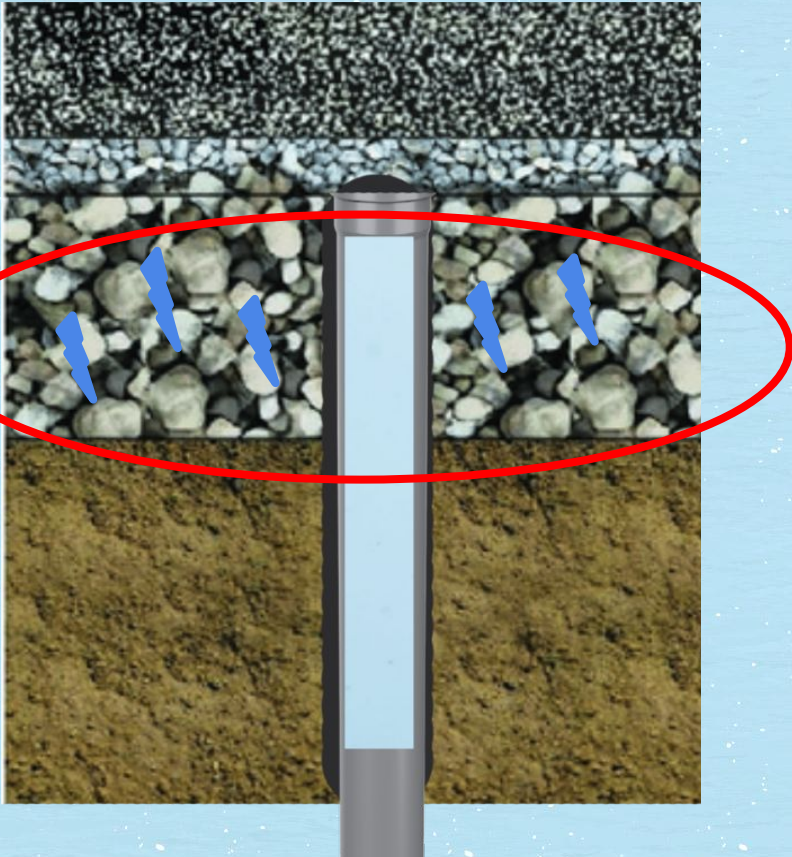
(Asphalt Institute, 2010)

Choker



- Layers is directly underneath Porous Asphalt
- Bigger aggregates of Asphalt
- For stabilization purposes
- Filter for pollutants

Aggregate Base Reservoir



- Underneath Choker Layer
- Aggregate of larger crushed stones
- Temporary storage of excess water
- Provides support for rest of concrete

1000 Gallon Stainless Steel Water Tank

550 gallons of rainwater can be collected for every 1000 square feet of rain.

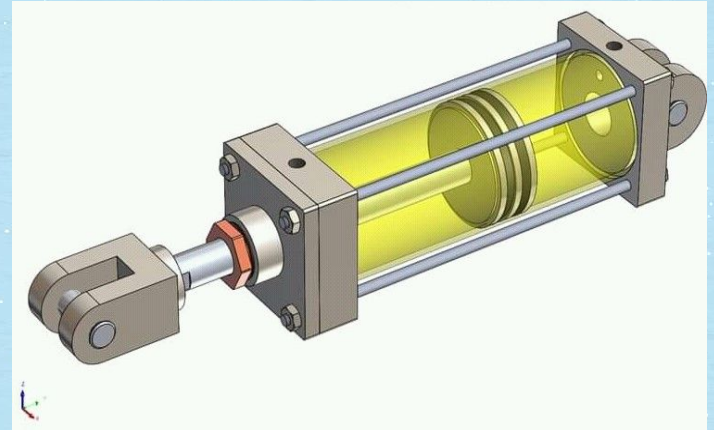
Serves as a temporary storage for excess rainwater

Cast Iron Hydraulic Piston

When activated, pressurized hydraulic fluid creates mechanical force; This causes the piston to extend, pushing rainwater out of tank.

Main goal

Piston helps to reroute water to various sources (i.e. water treatment facilities, reservoirs, etc.) or back up to the surface. These connections are all made underground, through steel pipes.




Pros and Cons of Porous Asphalt

Pros:

- Reduced risk of flash flooding
 - Lowers the chances of clogging for water drains (more flood protection)
 - Absorbs large quantities of water
- Effective stormwater management
 - Water tank allows for easy transportation of flood/rain water
- Low-Maintenance costs
 - Granite is very affordable and readily available

Cons:

- Can only be Implemented on flat, even surfaces (City College isn't viable) 
- Standard layering cannot be implemented in busy roadways
 - Unless there is a very thick aggregate base for support, Topmix Permeable can only support small loads

Applications

- Bike lanes
- Parking Lots
- Bx15 Bus Route
 - Will be possible due to thicker aggregate base



Cost and Time

The Permeable Stone pavers installation for the Bx15 bus route which is 3.8 miles would cost roughly \$8.7million, which includes the workers pay and the materials used over 4 years



Materials Needed

We would need steel tanks, metal pipes, chip spreaders, asphalt compactors, motor grades, rollers, road reclaimers, and cold planters



Asphalt



- Black petroleum like material that is made up of binder, filter, and aggregate
- They cost around \$7 to \$13 per square unit

Steel tanks



- Holds the water that falls from its connected pipes and the water that at hydraulic press would pump back into the surface
- Costs around \$8,000 per tank

Steel Pipes



- Transports the water from the choker layer to the steel tank
- Cost around \$200 per 40 pack

Asphalt Compactors



- Compresses to Asphalt until its flat
- They cost up to \$20,000 per compactor

Motor Grades



- Levels the ground for the addition of the layers
- Costs \$10,000 per unit

Road Reclaimers



- Stabilizes the deteriorated roadways by turning the asphalt layers into particles
- Cost around \$20,000 per unit

Cold Planers



- Removes the previously layers of concrete asphalt
- Cost around \$17,000 per unit

Rollers



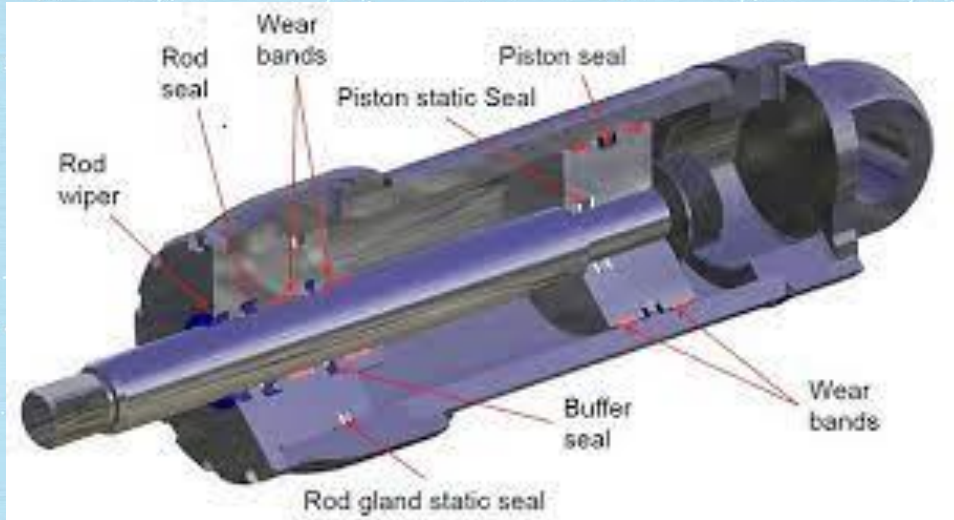
- Provide a stable surface to work on by flattening the ground
- Cost around \$8,000 per unit

Aggregate stone



- Made up of crushed stone, sand and gravel
- Their price are \$1,000 per 25 cubic feet

Hydraulic Piston



- Pumps out the water from the water tank to the surface so it can be recycled
- They cost around \$3,000 per unit

Coarse Aggregate



- Crushed stone form rock queries, which are mineral extraction sites
- Cost around \$17.00 per ton

Labor power

Workers would need to exert lots of force, Be skilled with hand held tools, know how to drive heavy vehicles, and manage time



Labor Power– Exert Lots of Power



- The construction workers would have to shovel the previous layers, carry asphalt materials, and smoothen out layers

Labor Power- Skilled With Driving Heavy Vehicles



- Construction workers would also have to drive multiple heavy vehicles that a variety of thing to the terrain. They would also have it park those vehicles correctly for its next use

References

- 1000 gallon Norwesco low profile septic tank*. NTO Tank. (n.d.). Retrieved May 2, 2023, from https://www.ntotank.com/1000gallon-norwesco-1comp-underground-low-profile-septic-tank-x6872503?gclid=Cj0KCQjw6cKiBhD5ARIsAKXUdyZYdHFIdan30u_xXE5g8MRtcU5KMtBh1IX9RQpEDWSmP5RJsItyMYaArIEEALw_wcB
- Free CAD designs, Files & 3D models: The grabcad community library*. *Free CAD Designs, Files & 3D Models | The GrabCAD Community Library*. (n.d.). Retrieved May 2, 2023, from <https://grabcad.com/library/hydraulic-piston-14>
- Knowles, D. (n.d.). How do permeable pavement systems compare? CraftonTull*. Retrieved May 1, 2023, from https://www.craftontull.com/insights/insight_posts/view/46/how-do-permeable-pavement-systems-compare
- Lombardo, J. (2020, May 21). How It Works: Porous Asphalt Pavements*. *forconstructionpros*. Retrieved May 1, 2023, from <https://www.forconstructionpros.com/asphalt/article/21134321/how-it-works-porous-asphalt-pavements>
- Pavement interactive*. *Pavement Interactive*. (n.d.). Retrieved May 1, 2023, from <https://pavementinteractive.org/reference-desk/pavement-types-and-history/pavement-types/pavement-typesmix-types/>

References