

Porous Pavers: Unflooding Stevens Pathways

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Abstract

Stevens campus is located in Hoboken NJ, a water-side city that faces growing threats of flooding. While the city of Hoboken has taken many measures to mitigate the effects of this flooding, many areas on campus are still affected by heavy rains such as the stone pathways, most notably Wittpenn Walk.

Flooding



Potential Solution

- Replace current pavers (typical cement, sand, water, and gravel mix) with porous ones (similar mix, but without sand)
- Implement a system that allows water to pass through concrete into drainage system
- Ensure excess water flows into rain-water storage system or river
- Preserve soil density of Castle Point

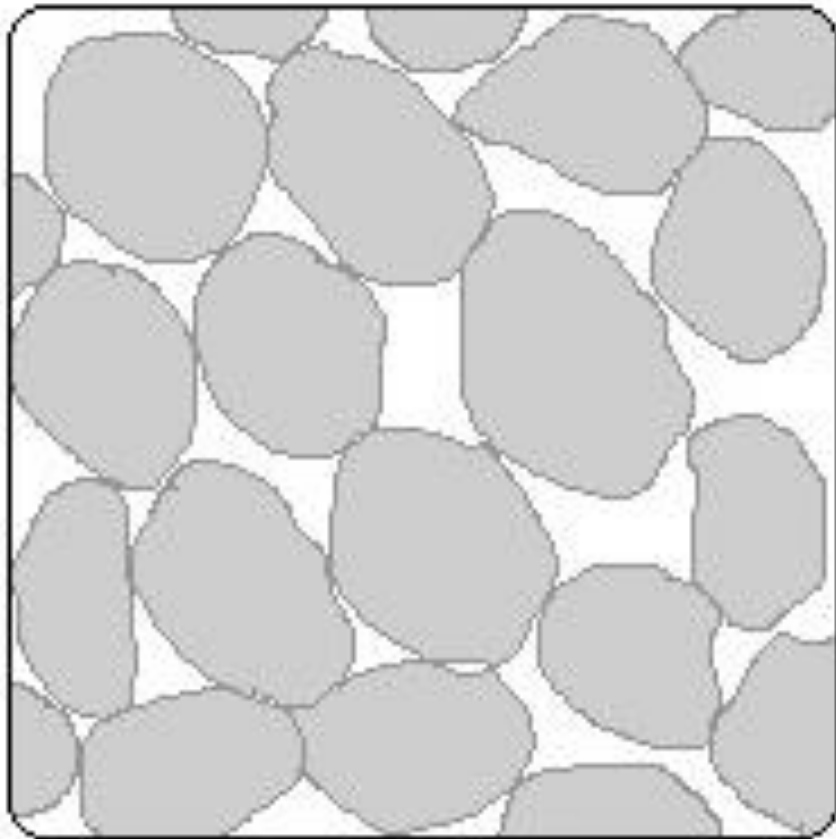
STEVENS
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Design

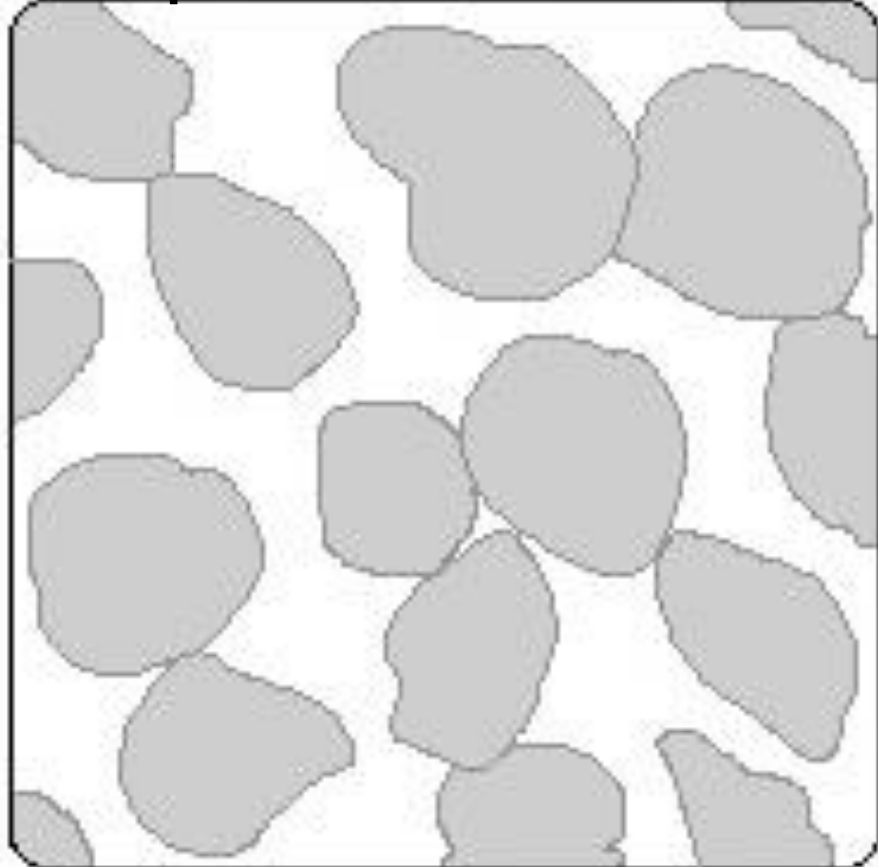
System components:

- Top layer: cosmetic pavers (made of rounded gravel, cement, and water)
- Sub-base attenuation layer:
 - Comprised of rounded aggregate with 40% voids
 - Allows for better water permeability compared to typical 20-30%
 - Will be comparable in compressive strength (500–4000 psi) to typical concrete (2,500–3,000 psi)
- Drainage system:
 - Collects water to prevent oversaturation of ground
 - Drains water into Hudson River
 - Little risk of freezing damage due to high void percentage
 - Draining pipes laid in sub-base layer

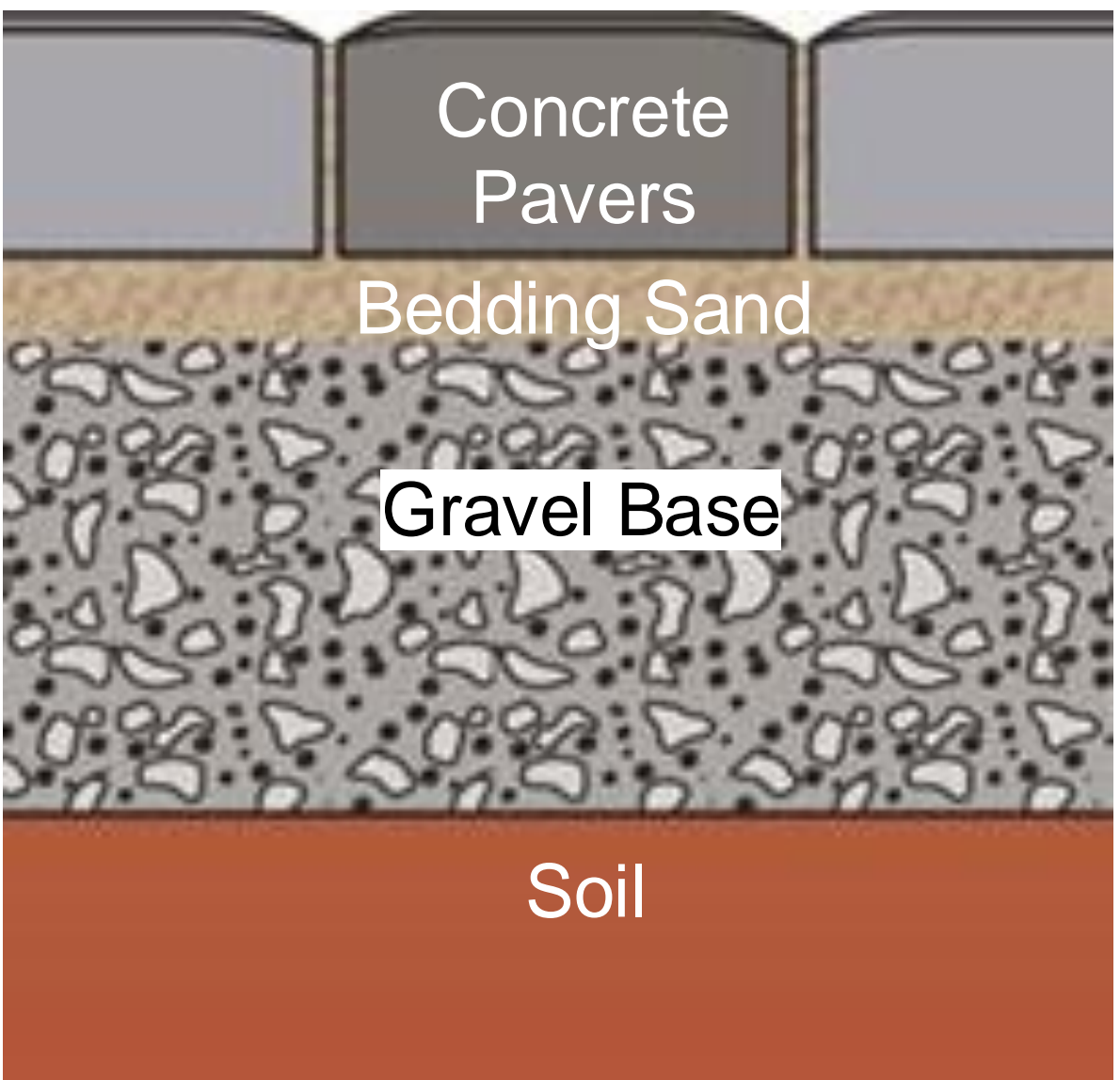
Current: 25% Voids:



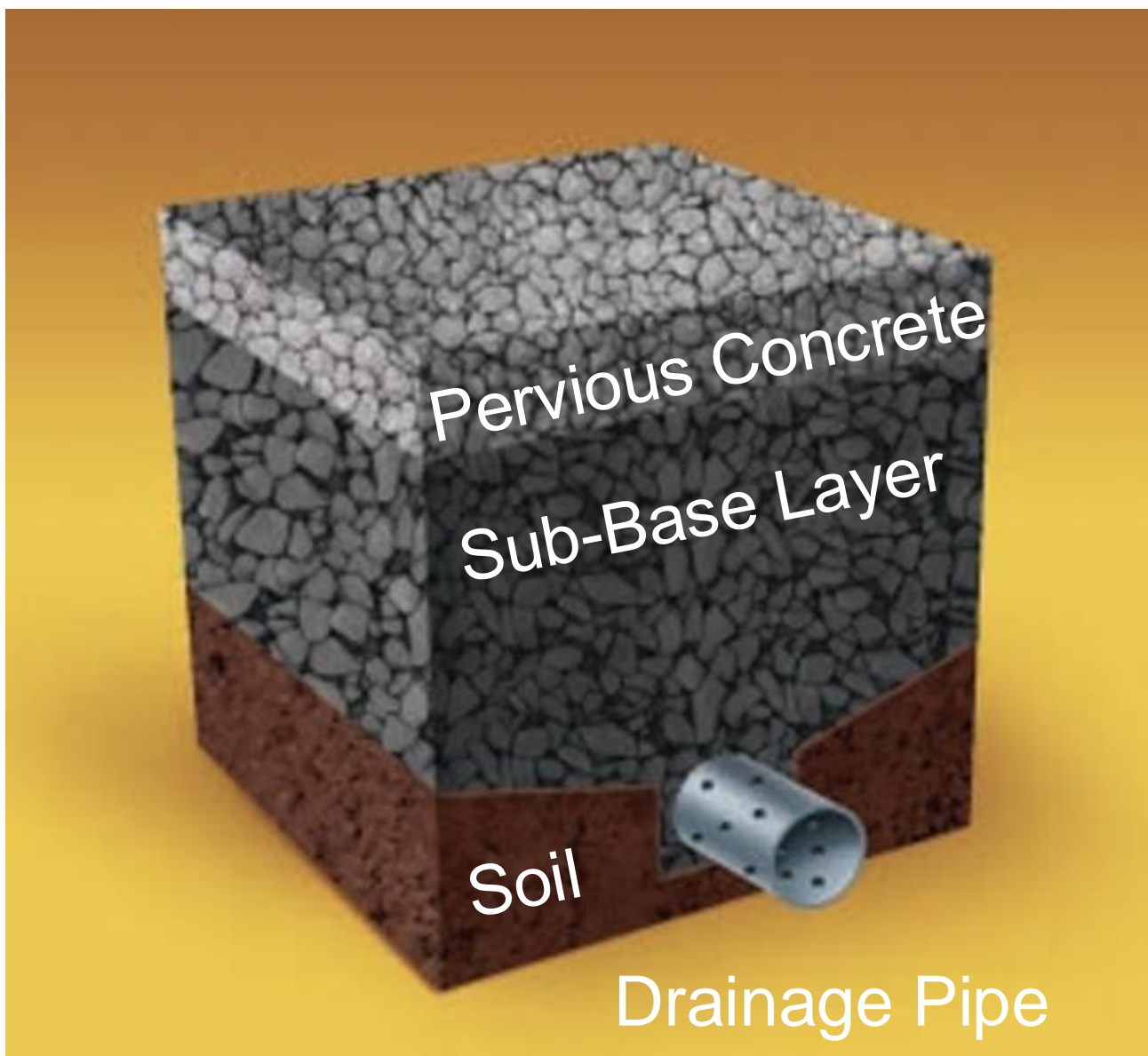
Proposed: 40% Voids



Standard Pavers Design



Proposed Design



Item

Cost (@7920 ft²)

Pavers (\$6.50/ft²) \$51,480

Sub-Base(\$3.50/ft²) \$27,720

Drainage \$6,000

Labor \$45,000

Total \$130,200

Conclusion

Overall, this solution could **help prevent flooding** in many areas of campus leading to **easier transportation** throughout campus. While this project has a high cost, the cost of maintenance will be less in the long-term since collected rainwater will help off-set the costs of utilizing the public water supply systems. This solution can also help **make Stevens more durable** in the face of dangerous weather, which is only become more common in our climate.

Acknowledgements & References

Professor Goodman and Gissinger Chloe Brenna and Kayden Cannilla
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