

Flooding Management For Train Stations And Tracks

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How can we mitigate flooding around the railroad tracks and property?

Problem



- Railroad tracks concentrated along bodies of water are highly prone to flooding, prevalent in coastal towns/cities
- There have been multiple instances of heavy storms causing flooding in stations and on tracks
- Operators and train crews are at risk of flood-related injury
- Potential damages to infrastructure, leading to costly repairs

Preexisting Innovations

- Floodwater diversion systems in Tokyo, JP, consisting of drainage pumps, cisterns, and flood gates
- Subgrade drainage using attenuation ponds, carrier drains, and drainage pipes (Fig. 1)

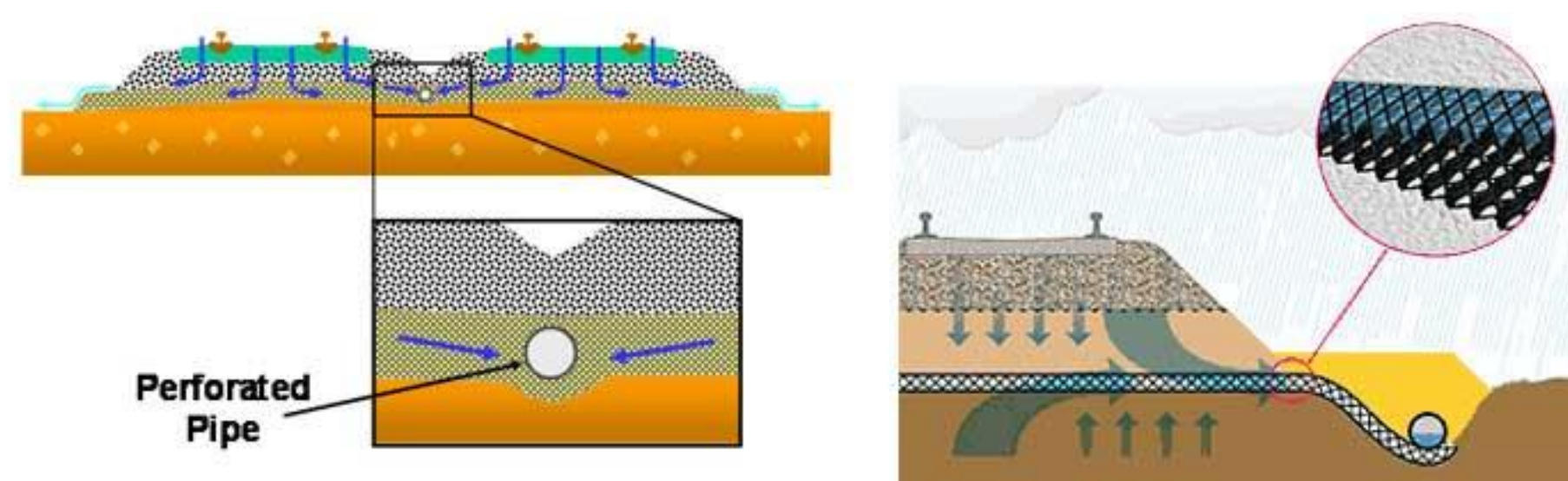


Figure 1: Subgrade drainage system

Solutions: Two Approaches

Underground Train Stations

- Installation of a pump system that activates when a certain level of water is detected by sensors in stations
- Stormwater is redirected to a chamber with a filtration system
- Filtered water can be used to supply public facilities such as toilets and cooling/HVAC systems



Surface-Level Tracks

- Drainage systems focused on parts of railroad tracks that are most vulnerable to flooding
 - **Bioswales:** trenches full of permeable soil and vegetation
 - **Storm Drains**
 - **Other Permeable Surfaces**

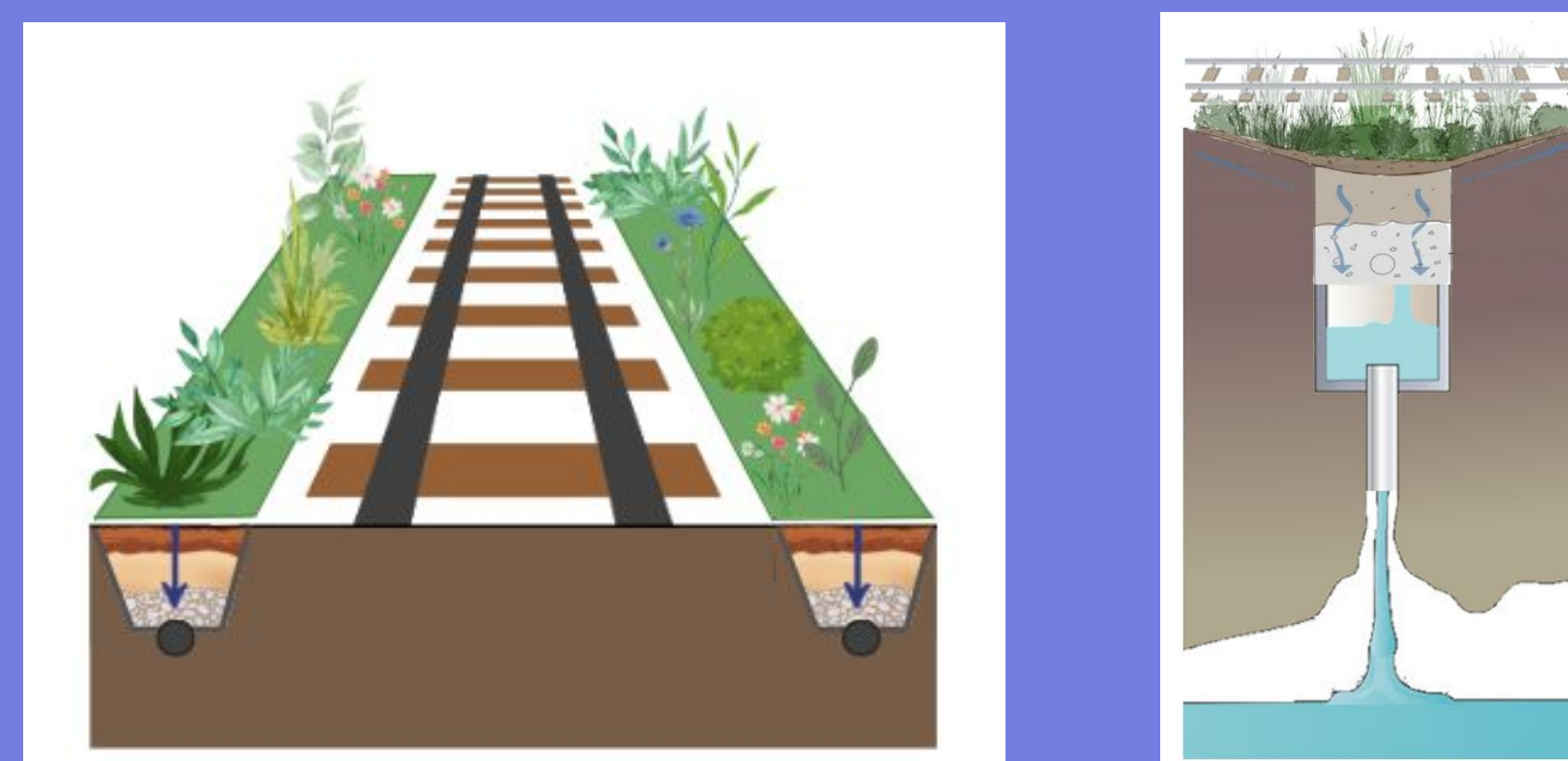


Figure 2: Novel drainage system; upper and side view

Community Impact

Safety:

- Mitigated risk of flood-related injury
- Reduced chance of damage to rail-based infrastructure

Economy:

- Prevention of high-cost repairs within tube, ground-level, and overhead railway systems
- Low-cost wastewater repurposing systems

Next Steps

- After installing bioswales, permeable surfaces, and cisterns, rail companies can implement local surveys and fundraising events to actively manage drainage systems and receive feedback



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