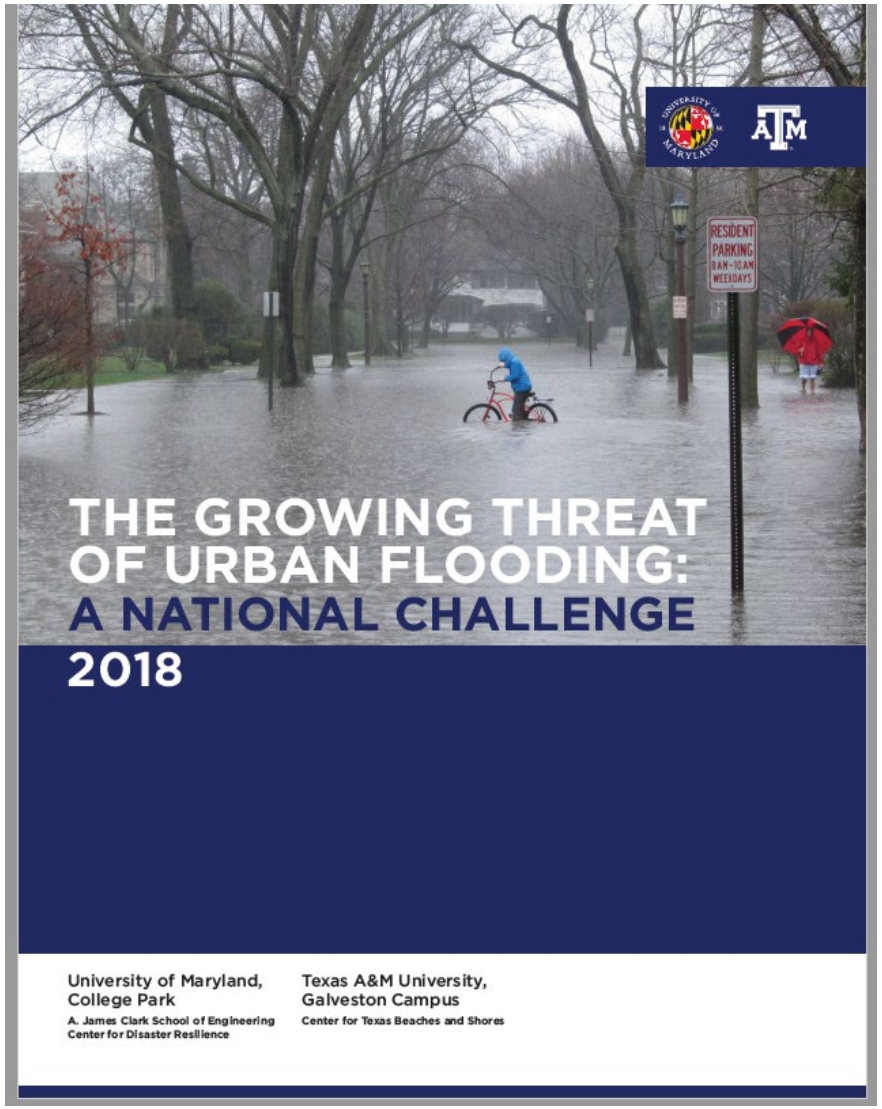
Quantity Control for Small Storms

Making the Case

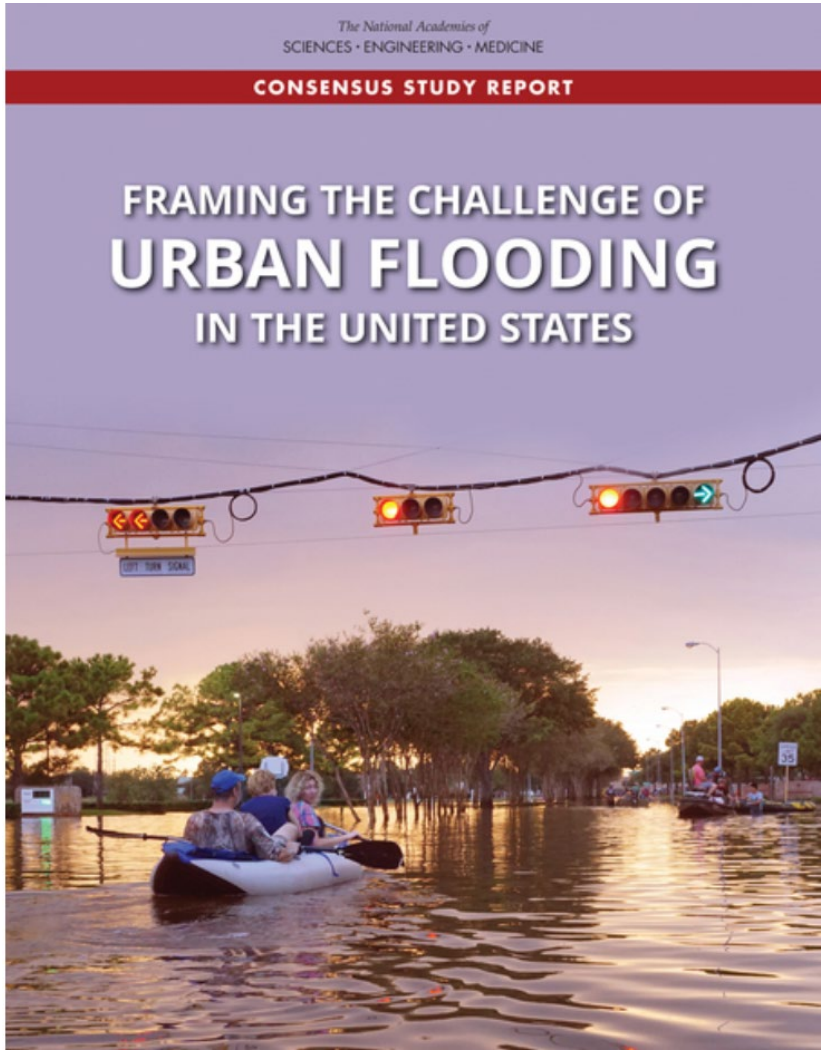
University of Maryland and Texas A&M University



- "In much of the United States, urban flooding is occurring and is a growing source of significant economic loss, social disruption, and housing inequality."

- "The growing number of extreme rainfall events that produce intense precipitation are resulting in—and will continue to result in—increased urban flooding unless steps are taken to mitigate their impacts."

National Academies



"..flood problems are likely to get worse with continued urban development and population growth in urban areas, as well as with climate change, which is increasing sea-level rise and the frequency of heavy precipitation events."

Problem: Flooding in New Jersey

- Riverine, Urban flooding and Combined Sewers is a volume issue
- Undersized storm sewer and conveyance systems
- Expecting to witness increases in rainfall intensity and volume with Climate Change

New Jersey's Current Standards

Maintain groundwater recharge volume or infiltrate the difference in runoff for 2 year storm

- What percentage of applications apply infiltration?

Quantity control for 2, 10, 100-year storms

- Minimum 2.5" orifice requirement results in limited attenuation of smaller events

States and locales with on-site retention standards for post-construction stormwater controls:

- **Alaska** (Phase 1): retain first 0.52 inch of rainfall from 24 hour event preceded by 48 hours of no precipitation
- **Arizona** (Phase 1): detain on-site the 100 year, 2 hour storm event
- **Brooklyn:** up to 1 inch
- **California:** requires regulated sites to evapotranspire, infiltrate, harvest and reuse, or biotreat either the 85th percentile storm volume, the volume of annual runoff required to achieve 80% capture, the runoff from a 0.2-inch per hour storm event, or the runoff produced from a storm twice the hourly intensity of the 85th percentile storm
- **Colorado:** infiltrate Water Quality control volume (80^{th} percentile storm event)

States with on-site retention standards for post-construction stormwater controls (cont.):

- **Connecticut:** requires new and redevelopment sites to retain the volume generated by 1 inch of rainfall (the water quality volume), except redevelopment sites with greater than 40% impervious cover are required to retain the volume generated by 0.5 inch of rainfall
- **Delaware:** Runoff Reduction for Resource Protection Event (1 year) (post development runoff volume to predevelopment volume) or 0% effective Impervious cover
- **District of Columbia** (Phase 1): retain 1.2 inch (90^{th} percentile storm)
- **Hawaii** (Phase 1): retain on-site 1 inch storm
- **Idaho** (Phase 1): retain first 0.6 inch rainfall

States with on-site retention standards for post-construction stormwater controls (cont.):

- **Maryland:** requires permittees to comply with and enforce state regulations that require development to use environmental site design (green infrastructure) practices to manage the runoff from a 1 inch storm event.
- **Massachusetts:** general small MS4 permit, issued by EPA Region 1, includes a numeric performance standard for on-site retention of post-construction runoff
- **Michigan:** post-construction rate and volume to not exceed pre-development for all storms up to 2 year, 24 hour storm
- **Minnesota:** 1 inch retention on-site
- **Mississippi:** requires measures that infiltrate, evapotranspirate, harvest and/or use first inch of rainfall

States with on-site retention standards for post-construction stormwater controls (cont.):

- **Montana:** requires regulated sites over one acre to use low impact development to retain 0.5 inch of rainfall, which represents the 90th percentile storm event
- **New Mexico** (Middle Rio Grande): capture 90th percentile rainfall event
- **New York:** requires new development to reduce runoff by infiltration, ground water recharge, reuse, recycling, or evaporation of 100% of the post-development water quality volume (calculated from the 90th percentile storm), unless infeasible
- **Oregon** (Phase 1): 80% average annual runoff volume reduction
- **Pennsylvania:** sites < 1 acre, remove 1 inch of runoff from impervious cover; all sites, no post development runoff volume increase for the 2 year storm

States with on-site retention standards for post-construction stormwater controls (cont.):

- **Philadelphia:** 1.5 inch retention
- **Puerto Rico:** if practicable, retain 1 inch
- **Tennessee**: requires new and redevelopment sites to infiltrate, evapotranspire, harvest and/or use the first 1 inch of every rainfall event with no discharge to surface waters.
- **Utah:** retain on-site the 90th percentile storm event
- **Vermont:** Capture 90% annual storms
- **West Virginia:** requires regulated sites to keep and manage on-site the first 1 inch of rainfall with no discharge to surface waters
- **Wisconsin:** infiltrate runoff to achieve 60-90% of predevelopment volume based on impervious cover level

Recommendation

- A quantity (volume) control standard for smaller storm events to be added to the Stormwater Management rules.

Onsite retention (discussed previously in stakeholdering), or slow release if onsite retention is not physically possible.