CLIMATE CHANGE AND ISLAND INFRASTRUCTURE
Storm Tracks
Island Roads

How are roads impacted by climate change?

- Flooding
- Erosion
- Corrosion

“TODAY’S FLOODS ARE TOMORROW’S HIGH TIDES”

William Sweet, NOAA Oceanographer
Flooding is not a new issue...

Dock Street - 1954

Five Corners - 1975
... But it’s becoming more frequent

East Chop Drive 2018
Oak Bluffs

Oak Bluffs Harbor 2018  
Wamsutta Ave 2017
Tisbury

Shipyard 2018

Danielle Zerbonne kayaking next to Beach Road 2017
Edgartown

Dock Street 2018  Chappy Ferry 2018
Up-Island

Lobsterville Beach 2012

Squibnocket Beach 2018
Up-Island

Menemsha 2018
Most At-Risk Roads

What if the roundabout was the only way to get from Vineyard Haven to Oak Bluffs?

What if the Triangle was the only way to get from Oak Bluffs to Edgartown?

If traffic is bad now, imagine those scenarios!
Potential Solutions

- Water can be diverted, if it has somewhere to go
Potential Solutions

- Innovative techniques can be incorporated into new construction projects
Potential Solutions

**Green - Softer Techniques**

**Living Shorelines**

- **Vegetation Only** - Provides a buffer to upland areas and breaks small waves. Suitable for low wave energy environments.

- **Edging** - Added structure holds the toe of existing or vegetated slope in place. Suitable for most areas except high wave energy environments.

- **Sills** - Parallel to vegetated shoreline, reduces wave energy, and prevents erosion. Suitable for most areas except high wave energy environments.

- **Breakwater** - Lays over the slope of the shoreline and protects it from erosion and waves. Suitable for sites with existing hard shoreline structures.

- **Revetment** - Vertical wall parallel to the shoreline intended to hold soil in place. Suitable for high energy settings and sites with existing hard shoreline structures.

**Gray - Harder Techniques**

**Coastal Structures**

- **Bulkhead** - Vertical wall parallel to the shoreline intended to hold soil in place. Suitable for high energy settings and sites with existing hard shoreline structures.
Habitat restoration can open up new funding opportunities
Potential Solutions

Stormwater Retention

curb side rain garden

overflow control structure

curb cut

curb and gutter

gravel pipe bed

prepared soil mixture (if needed):
50-60% sand
20-30% compost
20-30% topsoil

perforated pipe connecting to basin or stream outlet

native plants with deep root systems that absorb runoff and pollutants
Maintenance of Existing Systems

Island Challenges:

- Increased costs for maintenance
  - Off-island vendors and operators, ferries, etc.
- Increased sand accumulation
“Water is the greatest enemy of transport infrastructure.”

Christopher Bennett, Lead Transport Specialist
Causeways and Culverts

- Promote tidal flushing to improve water quality in coastal ponds
- Can be elevated to remain passable during storms, but can also be designed to ensure occasional breaching
“Some communities have rebranded retreat as progress and a patriotic act, not abandonment or capitulation.”

Liz Kozlov, Duke University
A hybrid of solutions is often necessary to suit the terrain, topography and water currents.

Hydrodynamic, wave transformation, and sediment transport are essential precursors.
The Department of Housing & Urban Development will be contributing $930 million on six projects spread out over the city designed to improve flood protection and regenerate areas of waterfront.

“There is no silver bullet solution to the problem of flooding in a coastal city.”

Jim Ruocco, Operation SPLASH

Miami Beach will be embarking on a $100 million project to raise roads, install pumps and water mains, and redo sewer connections over the next two years.

“There is no playbook on how to safeguard a vulnerable coastal city from rising tides.”

Philip Levine, Miami Beach Mayor