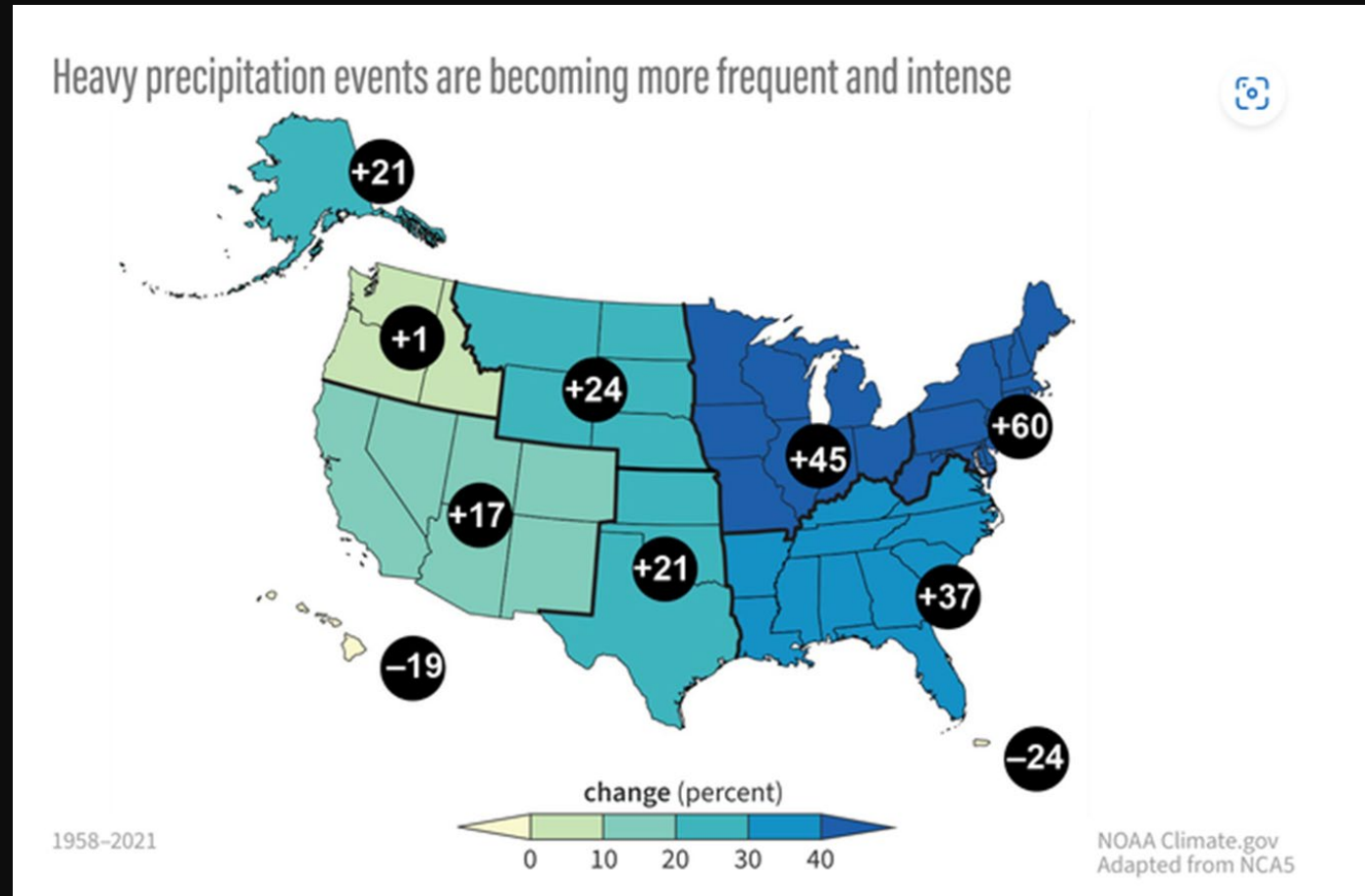




Culverts & Closed Drainage Systems (CCDS)



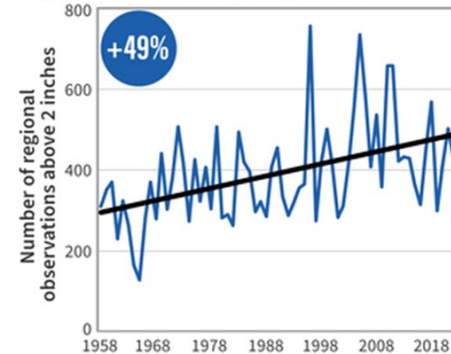
Why are stormwater culverts important?



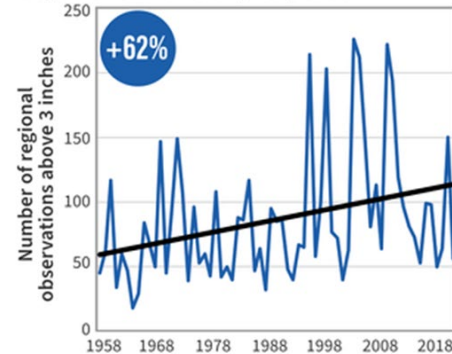
Why are stormwater culverts important?

The number of days with extreme precipitation has **increased** in the Northeast

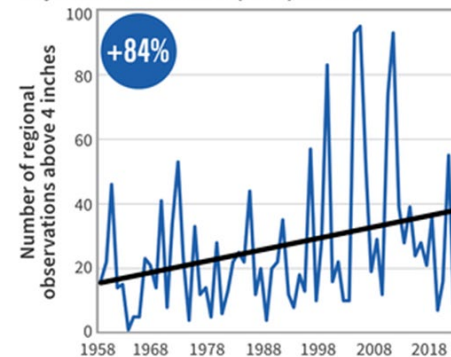
Days with 2+ inches of precipitation



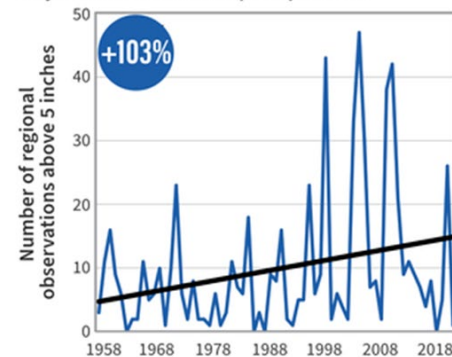
Days with 3+ inches of precipitation



Days with 4+ inches of precipitation



Days with 5+ inches of precipitation



1958–2021

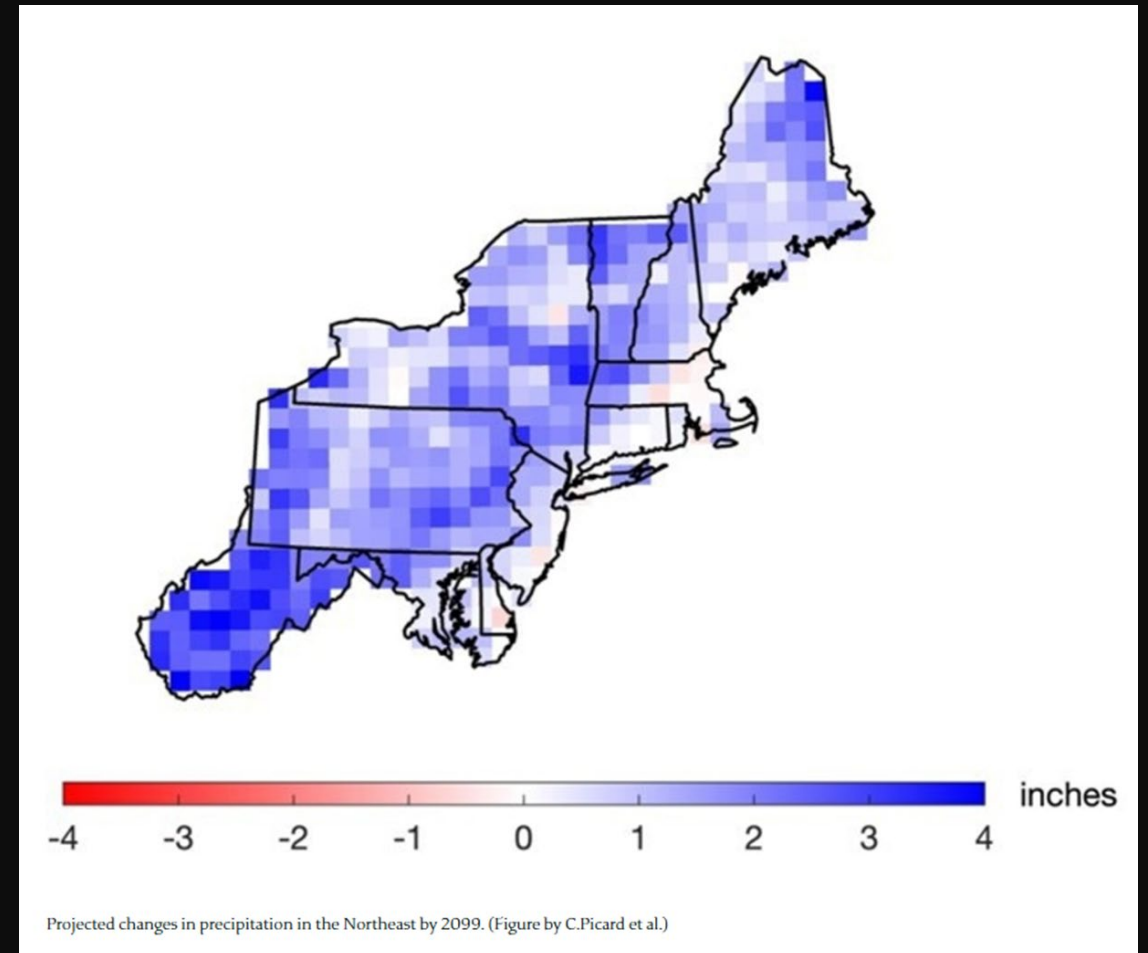
NOAA Climate.gov
Data: Adapted from NCA5

Why are stormwater culverts important?

The findings are published in Climatic Change.

“As climate change brings warmer temperatures, you have more water vapor in the atmosphere, which creates the right conditions for extreme precipitation,”

Christopher Picard '23, an earth sciences major and undergraduate researcher in the Applied Hydroclimatology Group at Dartmouth



Why are stormwater culverts important?

New Hampshire Public Radio | By Mara Hoplamazian
Published November 20, 2023 at 1:12 PM EST



Mara Hoplamazian / NHPR

Jennifer Bland, Acworth's emergency management director, stands in the remnants of Crane Brook Road. The road washed out this July, after the town rebuilt it from flooding damage in 2021.

Why are stormwater culverts important?

New Hampshire Public Radio | By Paul Cuno-Booth
Published July 16, 2023 at 8:24 PM EDT



5 of 5

Flooding on Page Street and Hanover on the East Side of Manchester on Sunday, July 16, 2023.

Jeffrey Hastings / Courtesy Manchester InkLink



Why are stormwater culverts important?

New Hampshire Public Radio | By NHPR Staff, Mara Hoplamazian, Sadaf Tokhi
Published July 12, 2024 at 9:20 AM EDT



1 of 6

Scenes from the damage along North Littleton Road out to Dalton.

Courtesy / Littleton Fire Rescue



Why are stormwater culverts important?



Ariel view of the flooding that occurred on 12/18 at Plymouth State University in Plymouth, NH

Why are stormwater culverts important?

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[Homeowners - Be Flood Aware](#)[Turn Around Don't Drown](#)[Red Cross Emergency App](#)



Turn Around, Don't Drown PSA Music Video featuring Matt Hawk

Home > Your Government > Departments > Fire Department > Emergency Preparedness > Flood Safety > Turn Around Don't Drown

Turn Around, Don't Drown

Turn Around Don't Drown, or **TADD for short**, is a National Oceanic and Atmospheric Administration (NOAA) National Weather Service campaign used to educate people about the hazards of driving a vehicle or walking through floodwaters. Hundreds of signs depicting the message have been erected at low water crossings during the past decade.

The phrase "**Turn Around Don't Drown**" has become a catchphrase in the media, classroom, and even at home. It's one thing to see or hear the phrase, and another to put it into practice.

Flooding is the 2nd leading cause of weather-related fatalities in the U.S. (behind heat).

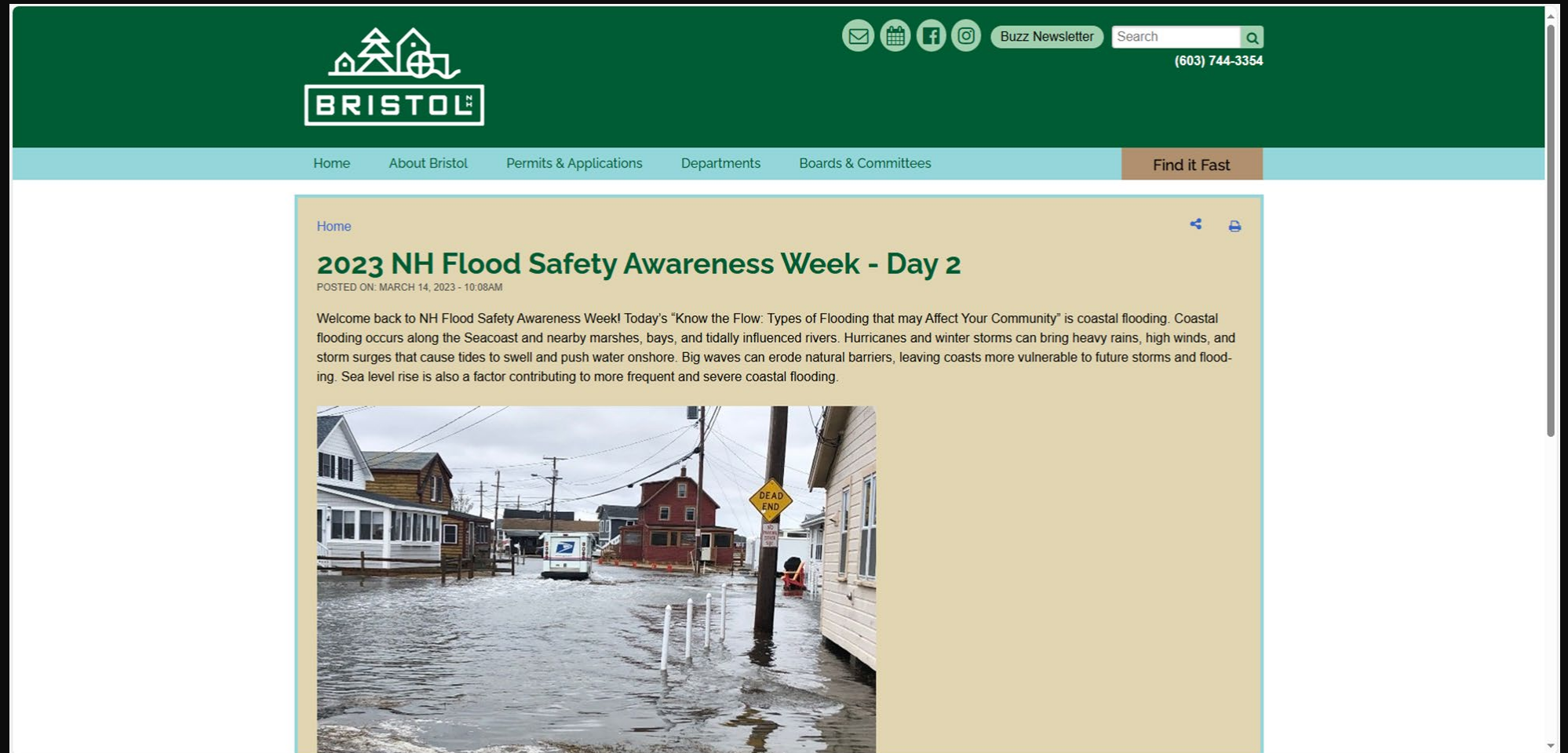
On average, flooding claims the lives of 89 people each year. Most of these deaths occur in motor vehicles when people attempt to drive through flooded roadways. Many other lives are lost when people walk into floodwaters. This happens because people underestimate the force and power of water, especially when it is moving. The good news is most flooding deaths are preventable with the right knowledge.

<https://weather.gov/tadd>

Hi! 🤖 How can I help?



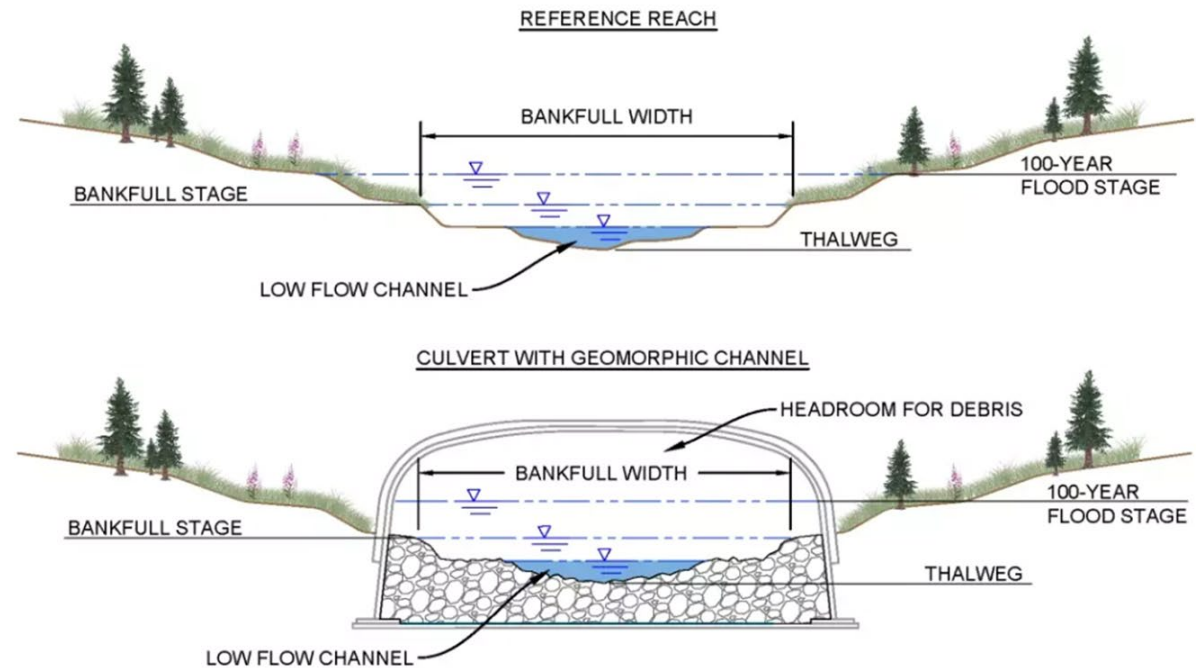
Why are stormwater culverts important?



Why are stormwater culverts important?



U.S. Fish & Wildlife Service



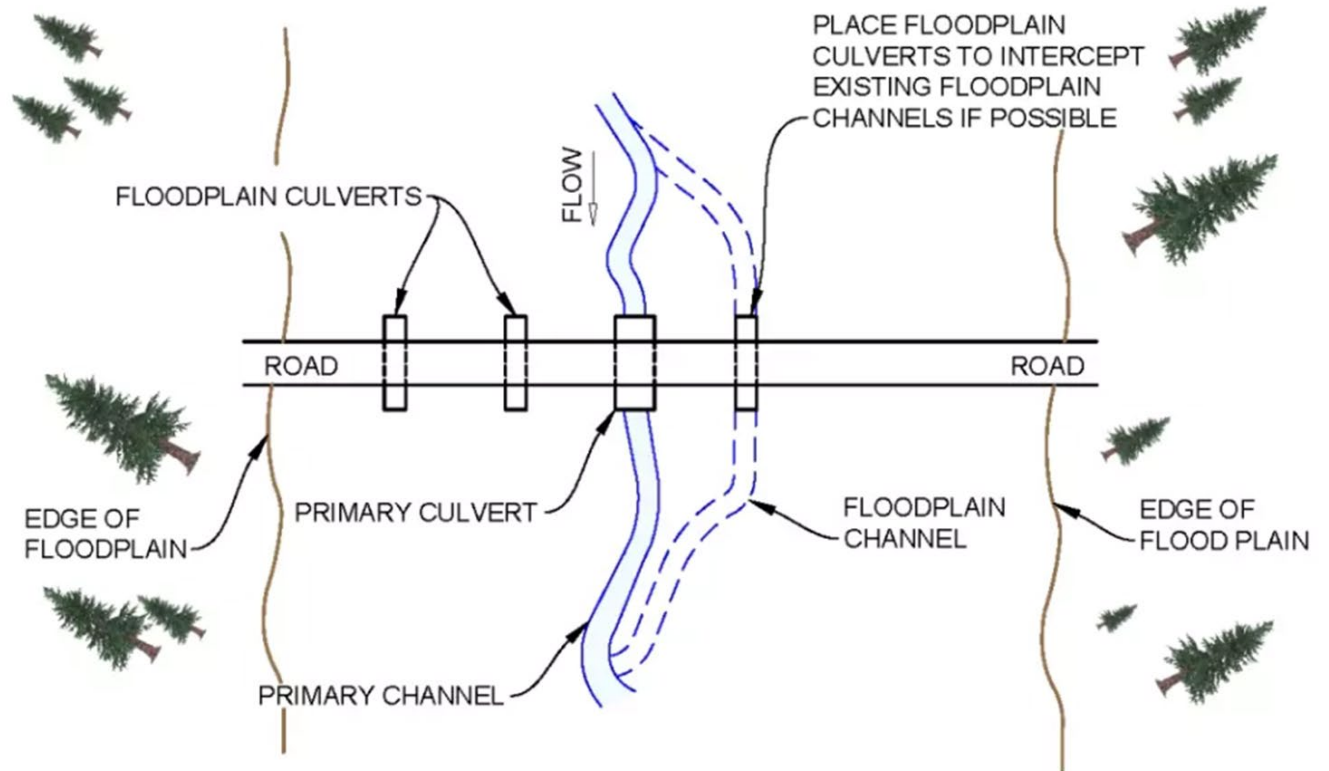
[Image Details](#)

Figure 2-3. Example culvert placement relative to geomorphic channel features.

Why are stormwater culverts important?



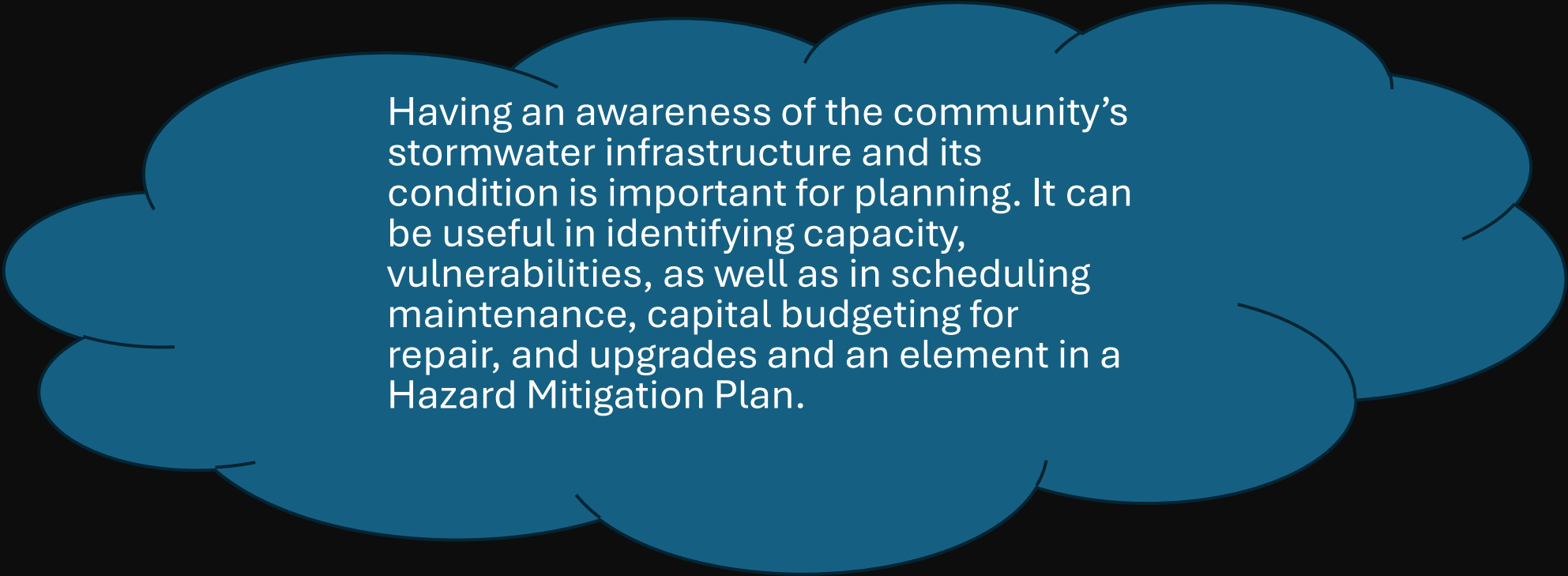
U.S. Fish & Wildlife Service



What is Culverts & Closed Drainage Systems (CCDS?)

- CCDS is a maintainable condition assessment program facilitated by the Statewide Asset Data Exchange System (SADES), through the UNH Technology Transfer Center and is used by NH Department of Environmental Services, Fish & Game and Regional Planning Commissions.
- Digitalizes location, condition and size of culvert and closed drainage structure inventories.
- LRPC staff attends biannual trainings to become certified on how to identify and collect all necessary data as well as the usage of the statewide database

Goals of CCDS



Having an awareness of the community's stormwater infrastructure and its condition is important for planning. It can be useful in identifying capacity, vulnerabilities, as well as in scheduling maintenance, capital budgeting for repair, and upgrades and an element in a Hazard Mitigation Plan.

The Data

Culverts

Inlets & Outlets

- End treatment type
- End treatment material
- Inlet & Outlet condition
- Needs maintenance
- Inspector comments

Pipes

- Material Type
- Condition
- Shape
- Dimensions
- Height of Fill
- Category type (Roadway, Driveway, Underdrain)
- Connects to other system
- Rehabilitation status
- Needs maintenance
- Inspector comments

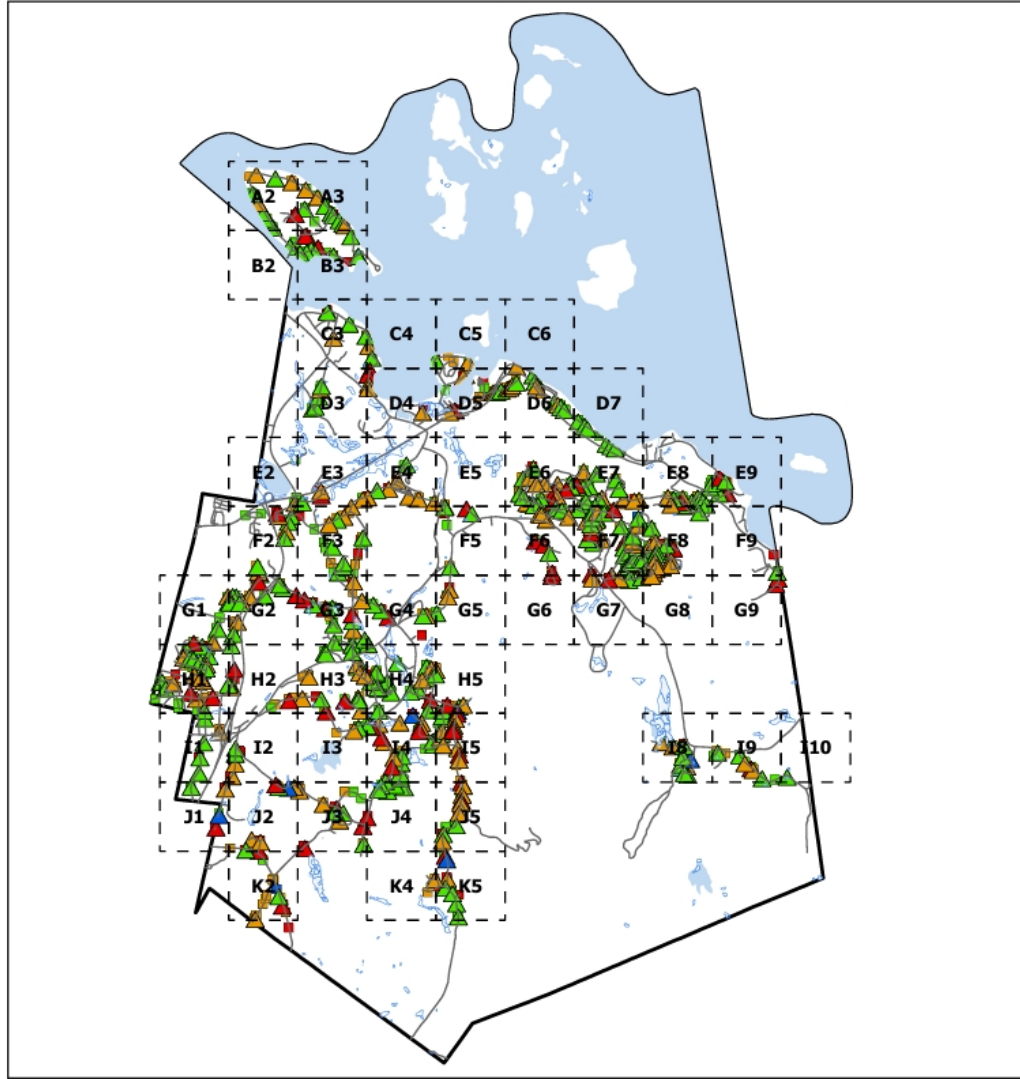
Drainage Structures

- Drainage structure type
- Material type
- Condition
- Needs maintenance
- Inspector comments

Lakes Region Planning Commission CCDS

In addition to adding municipal data to the public statewide database the service LRPC offers include:

- Preliminary meetings with DPW to tailor the project to address specific Municipal needs.
- A detailed summary report of findings with graphed data and photos.
- Several poster sized maps indicating condition and categorized by:
 - Inlet & Outlets
 - Pipes
 - Drainage Structures
- Smaller Indexed maps that can be used for DPW field work.
- ArcGIS Dataset & a file of corresponding pictures.



Gilford Culvert & Closed Drainage Systems Assessment Inlets & Outlets

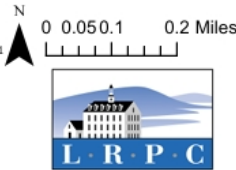
- Inlets**
- Good
 - Fair
 - Poor
 - No Rating
 - Wetland

- Outlets**
- Good
 - Fair
 - Poor
 - No Rating
 - Water

Digital data layers used in this map were acquired through NH GRANIT, New Hampshire's Statewide GIS Clearinghouse. Other information used was gathered through municipal websites and officials as well as NH Department of Environmental Services (NHDES) 2021 facility reports.

NH GRANIT represents the efforts of contributing agencies to record information from cited source materials. Complex Systems Research Center (CSRC), under the contract to the NH Office of Strategic Initiatives (OSI), and in consultation with cooperating agencies, maintains a continuing program to identify and correct errors in these data. NHDES, OSI, and LRPC make no claim to the validity or reliability or to any implied uses of these data.

For planning purposes only



Gilford Culvert & Closed Drainage Systems Assessment Index Name: E6

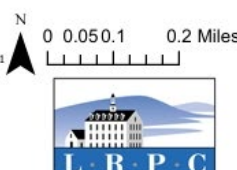
- Inlets**
- Good
 - Fair
 - Poor
 - No Rating

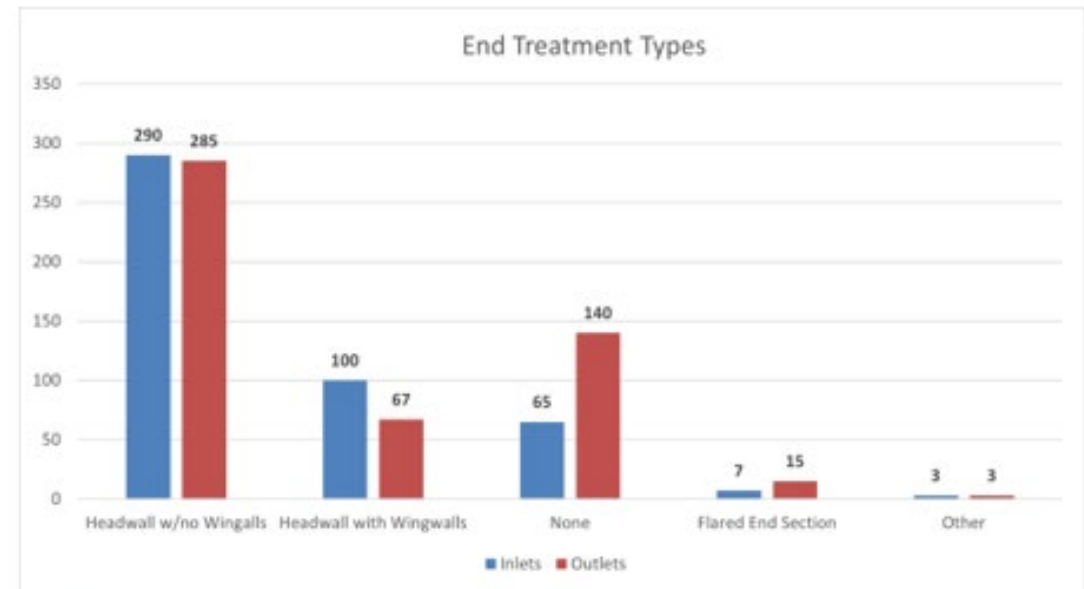
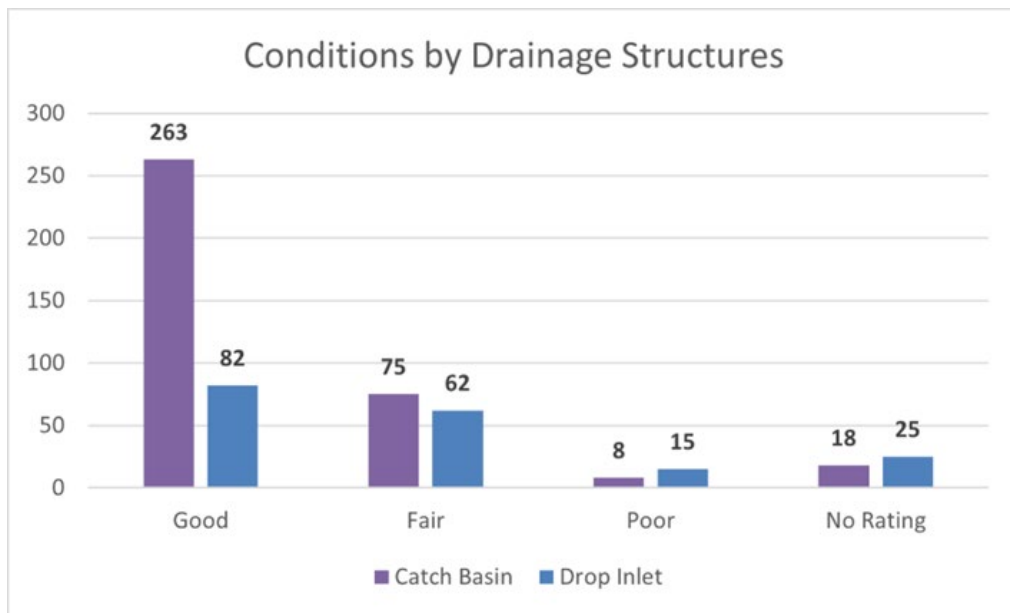
- Outlets**
- Good
 - Fair
 - Poor
 - No Rating

Digital data layers used in this map were acquired through NH GRANIT, New Hampshire's Statewide GIS Clearinghouse. Other information used was gathered through municipal websites and officials as well as NH Department of Environmental Services (NHDES) 2021 facility reports.

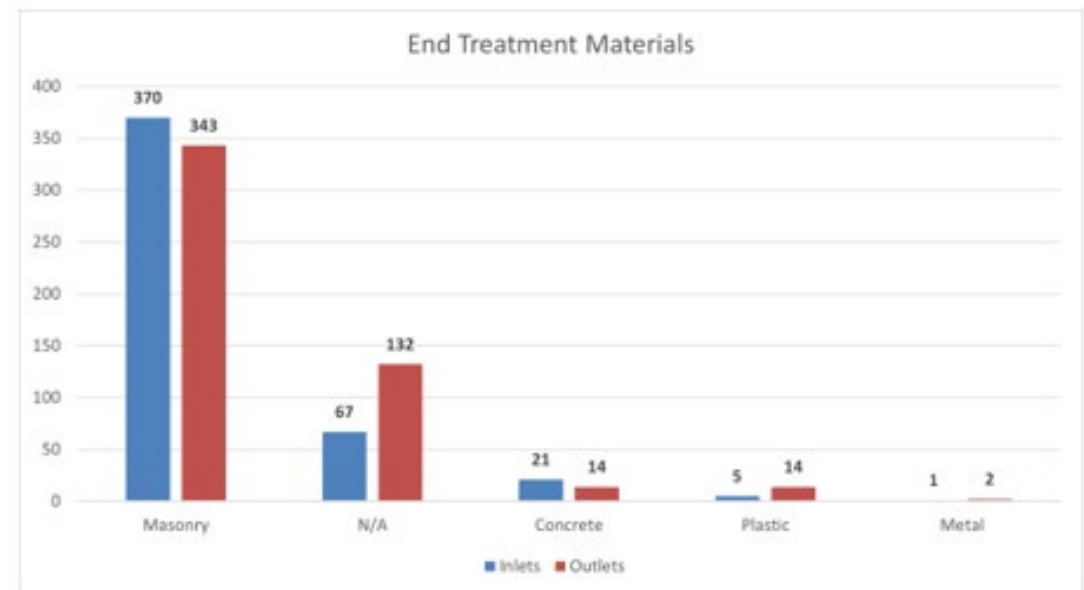
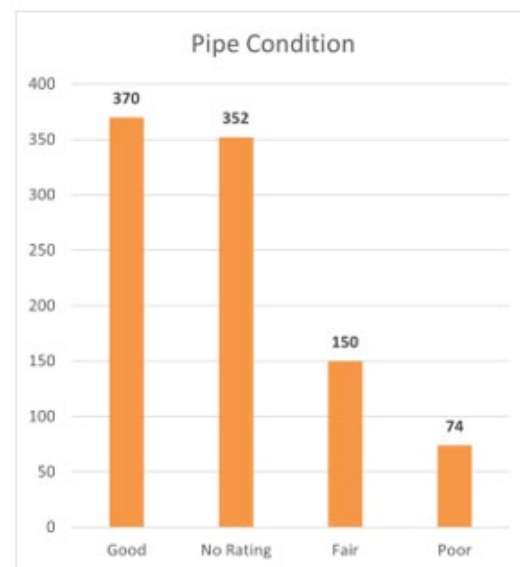
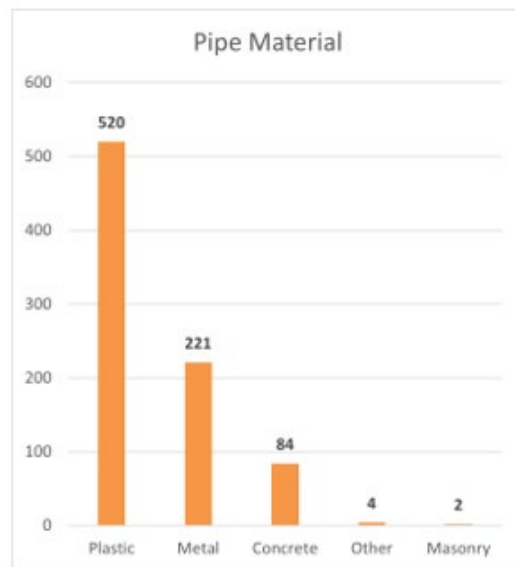
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Graph 1: End Treatment types (ArcGIS dataset)



Headwall with Wingwalls

Good

Fair

Poor

Concrete



Potter Hill Road



Farmview Lane



Farmview Lane

Masonry



Aviation Way



Potter Hill Road



Sagamore Road

Headwall no Wingwalls

Good

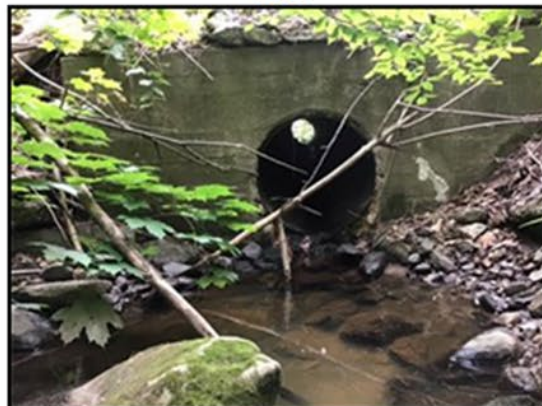
Fair

Poor

Concrete



Belknap Point Road



Old Lakeshore Drive

N/A

Masonry



Linda Lane



Dockham Shore Road



Belknap Point Road

Pipes

Good



School House Hill Road

Fair



Wild Acres Road

Poor



Dockham Shore Road

Drainage Structure Types

Catch Basin



Cotton Hill Road

Drop Inlet



Country Club Road

Cost Matrix



Round trip (hours) from office to town	1		from Good
x number of round trips	10		(@ 4 culverts)
	travel hrs	10	
+ Estimated number of Culverts/Closed Drainage Structures	250		
x Hrs per Dry Culvert	0.25	62.5	
+ Estimated number of Stream Crossings	0		
x Hrs per Wet Culvert	0.75	0	
	data collection hrs	62.5	
Intern 1 hourly rate *2.6304			= Intern 1
x Intern 1 data collection (hours) & cost	62.50	\$3,288.00	(Culverts)
+ Intern 2 hourly rate *2.6304			= Intern 2
x Intern 2 data collection (hours) & cost	62.50	\$3,288.00	(Culverts)
+ Planner hourly rate *2.6304			= Planner
x Planner data collection cost	0	\$0.00	(Culverts)
	data collection cost	\$6,576.00	(with 4 hrs)
	Travel cost	\$1,011.69	
Planner Preparation of Deliverables (hrs)	40		Deliverables
x RP hourly rate * 2.6304		\$3,156.48	
Plan. Mgr. Review	3		
x PM hourly rate * 2.6304		\$260.41	= Planning
+ Printing cost	\$50.50		1 ArchD r
+ Delivery	\$10.00		Shipping
	prep. of deliverables	\$3,477.39	
	round trip mileage	24	Google/
x	round trips	10	231 miles
x	current rate	\$0.670	
	mileage cost	\$154.62	
	Total Cost	\$11,219.70	

Note: Current/Anticipated ICR is 1.6304

Questions?
