ACKNOWLEDGEMENTS

Many thanks are due to the City of Hoboken’s staff who have worked in cooperation with Michael Baker International, Inc. and LRK to produce the Resilient Building Design Guidelines Addendum.

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Joseph Quintero / Council-at-Large
Ruben Ramos Jr. / Council Member, 4th Ward
Michael Russo / City Council President, 3rd Ward
Dear Neighbors,

We developed this document as a support tool to help families, individuals, and businesses that have been impacted by heavy precipitation. We know you are grappling with difficult questions like “Why is this happening? How can we stop the flooding? What do we do next?”

In 2021 Hurricane’s Henri and Ida inflicted damage that required a shift in approach to managing floodwaters that do not fall squarely under existing policies, programs, codes, or standards or within the public-right-of-way.

The Resilient Building Design Guidelines Addendum does not supersede the original guidelines that were issued in the wake of Superstorm Sandy – it augments and supports them by providing you with strategies to safeguard your property from rainfall flooding. These are recommendations, not requirements and hopefully a starting point for you to reference when engaging with a licensed design professional.

While my administration has made investments to mitigate flooding caused by storm surge and heavy rainfall events, it is clear we have much more work to do. Within the next few years projects like Rebuild by Design (storm surge mitigation) and the Northwest Resiliency Park (rainfall flood mitigation) will be coming on line. The City has also procured the best available weather technology to track and predict storm impacts so that we can improve our messaging, timing, awareness, preparation, and emergency response.

This addendum provides guidance and technical resources on how to mitigate rainfall flooding impacts internal to a property. I hope you find this living document, which will be updated as technology advances, helpful as you prepare for future severe weather events.

Sincerely,

Ravinder S. Bhalla
Mayor

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SECTION 1.
INTRODUCTION
OVERVIEW

In September 2021, the remnants of Hurricane Ida hit Hoboken with over 6.5 inches of rain. During the height of the storm four inches of rain poured down in a single hour. The volume and intensity overwhelmed the infrastructure, flooded roadways, and entered residents’ homes. The amount and timing of the rain resulted in homes that had never flooded seeing significant damage as water poured in through basements drains and plumbing fixtures across the City.

The City of Hoboken and the North Hudson Sewerage Authority (NHSA) held public meetings in October following the storm where residents explained the impact of the storm on their homes. While the storm’s size and intensity set it apart from other recent events, flooding from rainfall is an increasingly common issue in urban communities. The sewer and stormwater infrastructure, which adequately meet the City’s needs in dry conditions and minor rain events, are no match for the volume of water that falls during modern intense rain storms. This challenge will be compounded by the impacts of climate change.

The City and the NHSA have, and will continue, investing significant resources into rainfall flood mitigation through green infrastructure to delay rainfall from entering the combined sewer system, resiliency parks to store water, and wet weather flood pumps to discharge water to the Hudson River. Since 2016, these investments have reduced the flooding events in Hoboken by 87.8% and prevented street flooding in 202 of 230 rain events where it would have otherwise flooded.

While both the City and the NHSA remain a resource to residents that own or live in flood-prone units, this non-regulatory guidance serves as a technical resource for residents and an addendum to the Resilient Building
INTRODUCTION

*Design Guidelines (2015).* The solutions presented in this Addendum may mitigate the risk of flooding, however they are not intended to solve the issue of flooding at the city-scale. The City of Hoboken created this guide to empower residents to take ownership at the building scale and provide a starting point as they work with a licensed professional to determine the best solution for their individual property.

The Resilient Building Guidelines Addendum is divided into the three sections:

**Why Hoboken Floods and How to Prepare**
This section describes Hoboken’s unique challenges as an urban coastal community with a high groundwater table and combined sewer system. This section also introduces representative building types throughout Hoboken which will help you to better understand the plumbing system in your own building and common entry points for stormwater, groundwater, wastewater, and backflow on your property.

**Strategies for Reducing Flood Risk to Your Home**
The Addendum describes over 30 flood risk reduction strategies for residential properties. What strategies make sense for your property depends on whether or not you live in the floodplain, whether or not you live in a condominium or a single-family home, and the plumbing systems that are within your property. Each strategy has its own fact sheet that contains a detailed description of how the strategy works, the benefits and the flood-related issue(s) it addresses, what materials are needed, what (if any) maintenance is required, and a link to additional resources.

**Permitting and Approval Process**
The final section of the Addendum provides information on obtaining the permits and approvals necessary for each strategy. Most of the strategies contained within this addendum require permits from the City. Where your property is located and the type of work that is necessary will impact the length and cost of the approval process. If you are unsure of the permits required for the project, please contact the City (see Key Contacts) to verify what standards and regulations may apply to the project.

KEY CONTACTS

- PSE&G Power Outage Reporting
- The NHSA Hotline: (866) 689-3970
- Hoboken Community Emergency Response Team
- Hoboken Department of Public Safety
- Hoboken Office of Emergency Management
- Hoboken Police Department
- Hoboken Fire Department
- Hoboken Volunteer Ambulance Corps
- Hoboken Construction Official
- Hoboken Floodplain Administrator

RESOURCES

- Hoboken Resilient Building Design Guidelines
- The NHSA Sewer Maps
- FEMA Start Your Recovery Process
- FEMA Mitigation for Homeowners Fact Sheet
- FEMA Reducing Flood Risk to Residential Buildings that Cannot Be Elevated
- FEMA Flood Damage-Resistant Materials Requirements
- FEMA Mold Remediation Fact Sheet
- NYS Backflow Prevention Fact Sheet
TOOLS AND RESOURCES FOR RESIDENTS

BEFORE THE STORM

• Remove vehicles from flood-prone intersections where the Office of Emergency Management has posted “No Parking Signs” as advisories.
• Secure all loose objects outside or bring them inside, especially on balconies. Outdoor tents should be taken down depending on wind load.
• Notify PSE&G if you know someone who relies on electricity to operate life-sustaining equipment. To learn more, visit pseg.com/life or call 1-800-436-7734.
• Monitor local forecasts for additional advisories, watches, and warnings; monitor the City's Twitter and Facebook or sign up for Nixle to receive email or text updates.

DURING THE STORM

• Stay home if possible.
• Do not drive or walk through floodwaters which may contain raw sewage.
• Do not move or drive around barricades near flooded or flood-prone areas.
• Report flooded intersections and clogged drain inlets by calling the NHSA Hotline at (866) 689-3970.
• Report power outages and downed wires to PSE&G.
• For suspected structural damage or foundation issues that are an immediate hazard contact the Construction Official (201-420-2066), the Community Emergency Response (CERT) Hotline (877-237-8411), or Hoboken Fire Department.

AFTER THE STORM

• Document damages caused by flooding prior to throwing out or discarding flooded items. Documentation can include receipts, photographs, records, credit card statements, etc. and will be needed to apply for any state or federal financial assistance.
• Apply for a permit for demolition and clean out of flood-damaged building materials. The permit application is available on the City's website.
• Separate flooded contents (furniture, carpets, etc.) from flood-damaged building materials which require separate garbage collection.
• Contact the City Floodplain Administrator if Substantial Damage is suspected (damages that exceed 50% of the value of the building, land not included).
• Contact your auto insurer for vehicles damaged by floodwaters. Keep a record of damages if the vehicle is not covered because additional financial assistance may be made available.
HOW TO USE THIS GUIDE

This Addendum includes several strategies that may reduce flood risk associated with rainfall events from affecting your property. These strategies are organized into the following four categories, located in Section 3. Depending on your property and risk, it may be appropriate to use more than one intervention to address the flood risk. Consult a licensed engineer and/or architect for advice on your unique situation.

Maintain Indoor & Outdoor Infrastructure – Strategies to repair and replace damaged or improper sewer and stormwater infrastructure.

Floodproofing Strategies: Prevent Flooding – Strategies to install flood barriers, seal openings, and install pumps and check valves to prevent stormwater entry in your home.

Water-Resistant Construction Strategies: Lessen the Effects of Flooding – Strategies include using water-resistant construction materials, floodproofing and elevating appliances, and elevating or filling in cellars and basements.

Alleviate the Burden on the Sanitary System: Reduce Water Use & Stormwater Runoff – Strategies to disconnect / redirect from the combined sewer system, retain stormwater, and decrease stormwater runoff.

The following are considered in each Strategy Fact Sheet:

• **Complexity**: Is this strategy easy (1), medium (2), or hard (3) to implement?
• **Cost**: Is this action affordable ($), moderately priced ($$), or expensive ($$$)?
• **Applicability**: Who might this strategy work for?
• **Longevity**: How long will this last?
• **Permits**: Are permits required?
• **Contractor**: Do you need a professional to install?
KEY FOR FACT SHEETS IN SECTION 3

STRATEGIES FOR REDUCING FLOOD RISK TO YOUR HOME
ALLEVIATE THE BURDEN ON THE SANITARY SYSTEM: REDUCE WATER USE & STORMWATER RUNOFF

**E DRY WELL**

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<th>APPLICABILITY</th>
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<td>1</td>
<td>1</td>
<td>ANY PROPERTY WITH YARD OR ROOF SPACE</td>
<td>30 YEARS</td>
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**OVERVIEW**
A dry well is an underground structure or hole that collects excess stormwater runoff, letting it slowly filter back into the ground. Dry wells collect stormwater runoff from gutter downspouts, roof valleys, and other areas where water concentrates and flows. They help infiltrate runoff and reduce erosion.

**HOW COULD THIS HELP?**
Dry wells control erosive runoff and reduces stormwater runoff and overall wear on your house by minimizing splashback. Reducing stormwater runoff reduces the risk of backflow onto your property and seepage into your foundation. Additionally, dry wells contain oxygen which aids in health of your landscape.

**MATERIALS & CONSIDERATIONS**
Required: measuring tape, shovel, crushed stone, non-woven geotextile fabric (not pictured)
Optional: perforated, open-bottom plastic barrel, gutter downspout extension (image)

Considerations for Installation:
- Call 811 or 800-272-1000 before you dig.
- Research the system and installation.
- Test your property to ensure a dry well system will work on your lot.
- Dig 15 feet away from foundation.

**MAINTENANCE**
Inspect each season and after large storms. Specifically check for clogging or water backup. Filter fabric will extend the life of the dry well but will clag over time. If this occurs, remove and wash or replace stone and fabric. Care for and maintain plants above dry well, if applicable.

**RESOURCES**
- How to Install a Dry Well by Roger Cook

Image: Roger Cook and Ryan Beryl, n.d.
SECTION 2.
WHY HOBOKEN FLOODS AND HOW TO PREPARE
UNDERSTANDING HOBOKEN’S FLOODING RISK

Similar to other urban areas across the country, the City of Hoboken is seeing increased flooding from rain events as storm patterns shift from the impacts of climate change. The *Resilient Buildings Design Guidelines* (2015) focused on flooding from coastal storm events in response to Hurricane Sandy. This Addendum expands the conversation to address intense rainfall events and the increased intensity of storms due to climate change.

Coastal flooding occurs when water rises over and above normal tide action. Hurricanes and tropical storms, severe storms, and Nor’easters generate strong winds and large waves. This was the primary cause of flooding in 2012 during Hurricane Sandy.

Intense rainfall events occur when the City receives more than 0.8 inches of rainfall per hour. As Hoboken experienced during Tropical Storm Ida in 2021, intense rainfall in a short period of time quickly pools in low-lying areas and causes flash flooding. Hoboken has the potential to experience both types of storm events. It is important to understand the difference between how the different types of storms may impact the City and its infrastructure.

Floods may become larger and more frequent due to climate change. According to the NJ DEP *2020 Scientific Report on Climate Change*, tropical storms that cause coastal floods may become more intense. Precipitation events are also anticipated to become more intense and frequent. For extreme rainfall projections for Hoboken in the 21st century, visit the New Jersey *Extreme Precipitation Projection Tool*.
HOW DO I KNOW IF MY PROPERTY IS IN A FLOOD ZONE?

The City of Hoboken regulates the design and use of buildings within the floodplain to reduce the risk of damage and public safety. The majority of the City of Hoboken lies within the regulatory floodplain, or Special Flood Hazard Area, as indicated by the map on the following page. This map illustrates the extent of the regulatory floodplain and the associated base flood elevation. Any modification or work done below the Base Flood Elevation (BFE) will need a floodplain permit. The best way to know if your property falls below the BFE is to obtain an elevation certificate. The City maintains a record of existing elevation certificates and can identify if one is on file for your unit.

It’s important to note that FEMA flood maps are based on models, do not show worst-case scenarios, and are often dated. An area may be prone to flooding that is outside the flood zones depicted on the flood maps. Many properties that flooded during 2021 were outside of the regulatory floodplain, but were still impacted by the intense rainfall. The regulatory floodplain in Hoboken is one indicator of potential flood risk that a property may face.
WHY HOBOKEF FLOODS AND HOW TO PREPARE

THE COMBINED SEWER SYSTEM

The majority of Hoboken is served by a combined sewer system (CSS), meaning both stormwater and wastewater flow through the same pipes. The NHSA owns and operates the combined sewer system in Hoboken and its surrounding communities. Combined systems are common in older urban areas, like Hudson County. In newer communities, or in some redevelopment areas, wastewater and stormwater are separated into different pipes.

WHAT HAPPENS WHEN IT RAINS?
In the City of Hoboken, most of the water that falls within the city limits during a storm event is directed into the combined sewer. If the volume from the combined sewage and stormwater exceeds the conveyance and treatment capacity of the system, a portion overflows into the Hudson River through the various outfalls located along Hoboken’s waterfront. This is known as a combined sewer overflow (CSO). During a heavy rain event, the CSS can be overwhelmed, and the flow cannot be discharged or treated fast enough, especially during high tide. When this happens, the combined sewage will begin to back up the collection system, and eventually the hydraulic grade line will rise above the roadway resulting in street flooding. The sewer can also back up into homes or businesses during these wet weather events.

WHAT CAN I DO?
Section 3 of this Addendum outlines strategies for residents to alleviate the burden on the sanitary sewer during a storm event, but it is important to recognize that the carrying capacity of the sewer system is large and the volume of water stored in a residential rain barrel, dry well, or green roof will have limited impact on the overall flood potential in the City. The strategies included in this guide may help reduce the potential for flooding on your property. The best action residents in Hoboken can take are to invest in long-term solutions to minimize the flood risk potential from sewer backups into their properties.

WHAT IS THE DIFFERENCE BETWEEN A CSS AND A CSO?

A combined sewer system (CSS) removes both sewage and stormwater to a wastewater treatment plant. However, during a wet weather storm event or heavy snow melt, the combined volume of sewage and large amounts of stormwater can be too great for the treatment plant to handle and discharges directly into nearby bodies of water with minimal treatment, known as combined sewer overflow (CSO).
ADDRESSING FLOODING IN HOBOKEN

The City of Hoboken and their state and federal partners are planning, designing, and constructing flood risk reduction projects in Hoboken and its surrounding cities and towns. For more information on the City of Hoboken’s comprehensive strategy for urban stormwater management and flood risk mitigation, visit the City’s Rainfall Flood Mitigation and Coastal Flood Mitigation Story Maps.

Prior to Hurricane Sandy, the NHSA commissioned studies to investigate options for flood risk reduction in their service area by improving the CSS. It was determined that separating the stormwater and sewer systems would be a multi-billion-dollar project that would cause major traffic disruptions throughout the city (roads would have to be closed when building the new sewer system).

Instead, the NHSA has invested in a number of automatic devices integrated throughout the CSS that are cost effective, practical to implement, and have shown flood risk reduction. These systems activate automatically when water levels reach a certain height. These systems include wet weather pump stations that pump CSO discharge into the Hudson River when a high tide would otherwise limit gravity overflow out to the river.

There are two wet weather pumps stations currently active within Hoboken in the H1 and H5 drainage areas. These large drainage areas are most susceptible to flooding due to their lower elevations. Since the H1 and H5 wet weather pump stations were put into service, the NHSA has seen a significant reduction in the number of flooding events, and a large reduction in recovery time after a rain event. A project is underway in the H6 and H7 drainage basins that includes a one-million-gallon storage tank, associated pump station, and new high level stormwater conveyance system that will further reduce the strain on the CSS.

Both the City and the NHSA continue to advance solutions to reduce the impacts of storms on the community but flooding in Hoboken is not an issue that the City of Hoboken and the NHSA can fix with infrastructure improvements alone. Hundreds of millions of gallons of storage, conveyance, and treatment are needed to manage the rainfall that enters the City’s CSS. The municipal budget cannot absorb the cost of these improvements. Further, the City is constrained to only making improvements within the public areas and right-of-way. Homeowners have the ability to reduce risk to their individual properties by implementing the strategies in this Addendum.
WHY HOBOKEN FLOODS AND HOW TO PREPARE

TYPICAL INTERNAL PLUMBING COMPONENTS
WHERE WATER MAY COME FROM
WHY HOBOKEF FLOODS AND HOW TO PREPARE

COMMON FLOODING ISSUES

STORMWATER

A. Saturated soils, sheet flow runoff from yards including neighboring yards, clogged yard drains, yards pitched to foundation walls.

B. High concentration of runoff from roof, leaky or clogged roof drainpipes, gutters, downspouts, splash blocks pitched to foundation walls.

C. Sheet flow runoff from street down the stairs into building, clogged exterior floor drains.

D. Stormwater overflow onto sidewalk due to clogged sewer inlet and/or add wave action from vehicles.

GROUNDWATER

E. Groundwater seepage through floor and walls, rising water table, unsealed/cracked floor, and walls.

F. Groundwater seepage, rising water table, malfunctioning sump pump.

WASTEWATER

G. Wastewater seepage through foundation or backing up due to leaky and clogged drainpipes.

BACKFLOW

H. Leaky, clogged or collapsed sewer laterals and/or house traps.

I. Combined sewer reverse flows from sewer main into sewer lateral.
WHY HOBOKEN FLOODS AND HOW TO PREPARE

HOUSING TYPES

In order to identify the potential solutions for homeowners across the City, it is important to understand how buildings in Hoboken were designed and have been modified over time.

For example, a building that does not have external downspouts that carry water from the rooftop to the ground will contain a pipe within the building that serves this function. This pipe connects into the main sewer lateral along with every sink, toilet, shower, and washing machine in the building. During a rain event, all of the water from the roof combines with the wastewater from each of the plumbing fixtures and may push water through one, or more, of these fixtures into the unit.

While this is an unpleasant scenario in any building, whether there is livable space on the lowest floor or not, the elevation of the internal plumbing components and how those fixtures connect into the combined sewer system will contribute to how the building might perform during a heavy rainfall.

Hoboken has many different building types, but for the purposes of this guide, three residential building types were considered: Cellar, Garden Apartment, and At Grade.

This Addendum includes diagrams of each building type and how the internal plumbing components connect to help illustrate common issues that may arise for your property. The diagrams also show how each building type’s plumbing system connects to the NHSAs’s overall CSS to help you understand common entry points for stormwater and sewer backups on your property. Using these pictures and diagrams, you can identify the condition most similar to your property.
“CELLAR”
LOWEST LEVEL OF BUILDING IS MOSTLY OR ENTIRELY SUBGRADE

The term “cellar,” also called “basement,” is used to describe a building in which the lowest level is located mostly or entirely below street level (also called subgrade). Although these spaces are the most likely to flood, as they are the deepest below grade and have the most potential for water infiltration, these spaces are often only used for storage or for spare rooms, thus the damage caused by flooding is not as serious.

These spaces may experience water infiltration from the street level as water flows into the cellar through windows or doors, from the sewer lines below the cellar should they back up or burst, or from the roof via leaky interior or exterior roof leaders.
“GARDEN APARTMENT”
LOWEST LEVEL OF BUILDING IS PARTIALLY SUBGRADE

“Garden Apartment” refers to a building in which the lowest level is located partially below street level. Homeowners or renters living in such conditions are the most likely to experience serious damage from flooding, so it is important to examine the solutions within this Addendum to find suitable options for improvements.

Because sewers depend on gravity to move wastewater away from your building and clean water into your building, these subgrade apartments are at a higher risk of flooding. Floodwater can come from several sources into your building, including from street-level and down your entry stairwell, from the roof via a leaky or overflowing interior drains, exterior roof leaders or overflowing gutters, or from backed up pipes below your home or backed up fixtures within your home.
The term “At Grade” refers to a building typology in which the lowest level of the building is even with the street level.

While this typology may experience less flooding compared to “Cellar” or “Garden Apartment” typologies, they can still experience flooding from the street level if the water is high enough, from the sewer lines below the apartments, or from interior or exterior roof leaders. These spaces may also experience seepage from the levels above if water enters from the roof of a toilet, sink, or bath on an upper-level overflows.
SECTION 3.
STRATEGIES FOR REDUCING FLOOD RISK TO YOUR HOME
OVERVIEW

Homeowners have the ability to reduce flood risks to their individual properties by implementing strategies to better maintain indoor and outdoor infrastructure, prevent flooding, lessen the effects of flooding, and reduce water use and stormwater runoff.

This Addendum catalogs over 30 flood risk reduction strategies available to residents. Strategies are divided into the following subsections:

- **Maintain Indoor & Outdoor Infrastructure** - Strategies to repair and replace damaged or improper sewer and stormwater infrastructure.

- **Floodproofing Strategies: Prevent Flooding** - Strategies to install flood barriers, seal openings, and install pumps and check valves to prevent stormwater entry in your home.

- **Water-Resistant Construction Strategies** - Strategies include using water-resistant construction materials, floodproofing and elevating appliances, and elevating or filling in cellars and basements.

- **Alleviate the Burden on the Sanitary System: Reduce Water Use & Stormwater Runoff** - Strategies to disconnect/redirect from the CSS, retain stormwater, and decrease stormwater runoff.
STRATEGIES FOR REDUCING FLOOD RISK TO YOUR HOME
MAINTAIN INDOOR & OUTDOOR INFRASTRUCTURE

A. SCOPE SEWER LATERAL WITH CAMERA
Hire a licensed plumber to locate blockage in your sewer lateral.

B. TREE ROOT TRACING AND REMOVAL
Hire a professional to locate and remove problematic tree roots that may grow into piping, foundations, or house walls.

C. REPAIR OR REPLACE HOUSE CONNECTION PIPING
If your house connection supply is leaking, you can tighten the nuts and bolts on the fixture itself to resolve the problem, or if that does not work, replace the fixture.

D. REPAIR OR REPLACE DEFECTIVE PLUMBING FIXTURES
Identify defective and/or leaking plumbing fixtures and if required, replace with low-flow fixtures to conserve water and save money.
**REPAIR OR REPLACE LATERAL HOUSE CONNECTION**

Pipes can be repaired with pipe lining or by feeding a cone shape through the existing lateral line.

**REPAIR OR REPLACE COLLAPSED HOUSE TRAPS**

Repair or replace the small trap of the main connection and each individual plumbing fixture.

**REHAB OR MODIFICATION OF REAR YARD**

If you are rehabilitating or modifying your rear yard, 50% of the yard area must remain previous. The installation of a drywell may also be required.
OVERVIEW
A sewer lateral is the pipe that connects your home’s plumbing to the main sewer line. If you are having issues with backed up pipes, slow drains, clogs, leaks, inconsistent water pressure, foul odors, or water collecting outside or inside your home, you may have an issue with your sewer lateral. Calling and scheduling a licensed plumber to scope your sewer lateral to determine the cause of the problem must be completed before attempting any other flood risk reduction methods. A scope may range from a simple cable used to clear a blockage to a photo or video instrument that will give the precise location of a leak, crack, or blockage. Typically, the plumber will diagnose the problem to the sewer lateral without having to dig up your yard to access the sewer pipes.

HOW COULD THIS HELP?
Repairing or replacing sewer laterals can reduce the risk of wastewater backflow into your house or wastewater seepage through your foundation. A sewer lateral inspection allows a plumber to pinpoint the exact location of the damaged or clogged pipe, which eliminates any guesswork. It is important to have your sewers scoped prior to attempting any mitigation strategies to prevent making the problem worse by attempting an incompatible or inefficient mitigation strategy.

MAINTENANCE
A sewer lateral scope should be completed once a year to have optimal sewer performance. Additionally, you can protect your sewer lateral by avoiding disposing grease or cooking oil down the drain, as it will harden and stick to the inside of sewer pipes, resulting in clogs and damage.

RESOURCES
- HomeGuide: How much does a sewer camera inspection cost?
TREE ROOT TRACING AND REMOVAL

OVERVIEW

Tree root tracing and removal is the process by which problematic tree roots are identified and removed from landscaped areas, hardscaped areas, or house foundations, walls, and piping. Tree roots can grow into piping, foundations, or house walls and cause moisture issues, which are exacerbated during heavy rain. Trees seek water, so it is common for their roots to grow into pipes which results in backups, mold, odors, slow drains, pests, or dips in your yard.

Tree roots are removed by a stump grinding machine, electrical power rodding, or hydro-jetting. If tree roots have bored into foundations, walls, or pipes they are typically removed by hand or with smaller hand tools so as not to damage your property.

HOW COULD THIS HELP?

Tree root tracing and removal reduces the risk of cracked or collapsed sewer piping which can cause leaks and therefore wastewater seepage through the foundation and/or wastewater backflow into your house. However, it can be quite laborious and may result in damages to your home, lawn, sidewalk, or piping in the process. Trees are an important part of our ecosystem, therefore the best-case scenario would be to leave them undisturbed.

RESOURCES

- [Stump Pros: Tree Root Removal](#)
- [LawnStarter: Tree Root Removal: A How-to Guide](#)
- [City of Hoboken Shade Tree Commission](#)

Any tree work in Hoboken requires a permit from the Hoboken Shade Tree Commission and must be completed by a LTE (Licensed Tree Expert) or LTCO (Licensed Tree Care Operator).
STRATEGIES FOR REDUCING FLOOD RISK TO YOUR HOME

CITY OF HOBEKN

C REPAIR OR REPLACE HOUSE CONNECTION SUPPLY

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OVERVIEW
Your house connection supply (also called water main tap or wet connection) connects your home’s water supply to the city water transmission main. This connection is what provides clean water to your home. Signs your piping may need to be replaced include a costly water bill, damp or muddy spots in your yard, or leaky fixtures. You can check if you have a leak by turning off all water supply for your home and checking your meter. If your meter is still active (spinning), then there is likely a leak. Toilets and faucets are the most common sources of leaks and are often due to old taps. If your tap is leaking, you can tighten the nuts and bolts on the fixture itself to resolve the problem. If repairs alone are not sufficient to stop leaking, then a replacement may be necessary. If you determine a pipe needs to be replaced, or if a repair is beyond your skill level, you should contact a licensed plumber to assist you to avoid further damage to your systems.

HOW COULD THIS HELP?
Repairing or replacing your house connection supply can reduce the risk of your pipes leaking or backing up, during storm events. Additionally, repairing or replacing your pipes can decrease your monthly water bill and address potential problems related to mold in your home.

RESOURCES
• Irrigation Tutorials - How to Replace Your House Water Supply Pipe

Image: Inch Calculator

MAINTENANCE
Monitoring your house connection piping can increase the lifespan and reduce the cost and frequency of replacement.
REPAIR OR REPLACE DEFECTIVE OR LEAKING PLUMBING FIXTURES

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OVERVIEW
It’s important to regularly inspect your household plumbing fixtures, such as sinks, toilets, showers, baths, and laundry machines, to make sure they are working properly and efficiently. Often it is possible to repair these fixtures yourself. If your fixtures are beyond repair, they will need to be replaced, which provides an opportunity to replace your fixtures with low-flow fixtures that conserve water and save money (see Install Low Flow Fixtures page for details). Common problems you may see with any fixture include clogging, leaking pipes, overflowing, continually running, or various cosmetic issues like chips, cracks, or cleanliness issues. Most functional and cosmetic problems you may encounter with sinks, toilets, showers, baths, or laundry machines can be fixed on your own, but do your research first before attempting any fixes yourself. Contract a licensed plumber if repairing or replacing a certain fixture seems beyond your abilities.

HOW COULD THIS HELP?
By repairing or replacing defective or leaking fixtures you reduce the risk of your pipes leaking, backing up, or flooding during storms. Improving the functioning of your fixtures can even save you money on your water bill. For example, if you fix a continually running toilet you can decrease your water waste and save on your monthly water bill. If you must replace a fixture, you can choose to upgrade it to a low-flow fixture which can reduce your water use and lessen your bill each month even more. Additionally, you will be helping your neighbors and the environment by conserving the valuable resource of water. Less water running through your fixtures also can help lessen the effects of flooding.

As a U.S. Environmental Protection Agency (EPA) WaterSense partner, the City of Hoboken can help you navigate what water conservation solutions work best for you.

RESOURCES
- Pratt Plumbing: 5 Practical Benefits of New Plumbing Fixtures
- WaterSense Products, United States Environmental Protection Agency
REPAIR OR REPLACE LATERAL HOUSE CONNECTION

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OVERVIEW
Your lateral house connection connects your home’s plumbing to the main sewer line. It may need to be repaired or replaced if you are experiencing leaky pipes, damp puddles in your yard, mold growth in your home, moisture in your walls or foundation, or backflow, clogging, or slow drainage in your pipes. These sorts of problems associated with the lateral house connection can be cause by various issues, including root intrusion (discussed on Tree Root Tracing and Removal page) or pipe breaks or cracks from age or prolonged stress. There are several techniques used for repairing and replacing the lateral house connection. Pipes can be repaired with pipe lining, which is an inflatable tube covered in epoxy. Once inflated, the epoxy presses against cracks and leaks, which are repaired as the epoxy cures (hardens). A second method is by feeding a cone shape through the existing lateral line. This cone destroys the existing pipe while immediately replacing it with new piping as it moves through. Neither technique should be attempted without a professional inspection or professional assistance.

HOW COULD THIS HELP?
Repairing a clogged or replacing a deficient lateral house connection can reduce the risk of wastewater backflow into your house or wastewater seepage through the foundation. You can reduce your property damage by getting your lateral repaired or replaced, which will improve drainage, decreasing risk of interior flooding or exterior water pooling, can help decrease risk of mold growth, and save you money by making your water system more efficient. If you work with a professional plumber, you will also alleviate risk of poorly done repairs, plus you can lengthen the lifespan of your lateral connection. Do not attempt any repairs without first completing an inspection by a professional.

RESOURCES
- Newflow Plumbing: How to Replace Sewer Line from House to Street
**REPAIR OR REPLACE COLLAPSED HOUSE TRAPS**

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**OVERVIEW**

A house trap is a J-shaped stretch of pipe that creates a barrier of water and air that blocks small pests and the smell of sewage from coming into your home. While the main connection utilizes a house trap that is difficult to access and repair, each individual plumbing fixture has a small trap that is easily accessible and can be repaired by the homeowner or resident. The process of repairing or replacing a trap will vary based on which type of trap you are repairing or replacing.

**HOW COULD THIS HELP?**

Repairing or replacing collapsed house traps can reduce the risk of wastewater backflow into your house or wastewater seepage through the foundation. If you are noticing the smell of sewage or small pests in your home, it may be time to repair or replace your sewer traps. Repairing or replacing your house traps or individual fixture traps will improve the indoor air quality of your home and improve the efficiency, health, and safety of your sewer system in general. It is best to inspect your house traps and fixture traps before replacing them to confirm they are collapsed.

**RESOURCES**

- Balkan Sewer & Water Main Service Tutorial on House Trap Replacement
STRA TEGIES FOR REDUCING FLOOD RISK TO YOUR HOME
MAINTAIN INDOOR & OUTDOOR INFRASTRUCTURE

G REHAB OR MODIFICATION OF REAR YARD

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OVERVIEW
The City's zoning code requires, on all yard rehabs, 50% of the yard area must remain pervious. If 30% or less of the yard is impervious, the City does not require stormwater detention. However, if the impervious or semi-pervious cover is between 30% and 50% of the yard area, the City requires the installation of a dry well. Additional information on installing a Dry Well is located on page 78 and additional information on Pervious Paving, Patios, & Walkways is located on page 80.

HOW COULD THIS HELP?
Stormwater runoff from hard surfaces quickly exceeds sewer system capacity and can cause backflow onto your property and seepage into your foundation. Increasing pervious surfaces allows more water to be absorbed into the ground and reduces sewer overflows. Dry wells control erosive runoff and reduces stormwater runoff and overall wear on your house by minimizing backsplash. Additionally, dry wells contain oxygen which aids in health of your landscape.

RESOURCES
- FEMA Protect Your Home from Flooding
- How to Install a Dry Well by Roger Cook
FLOOD BARRIER SYSTEMS:

A SANDBAGS & SAND-FILLED SYSTEMS
A homeowner can build a barrier to divert water away from entryways and around foundations.

B RESIDENTIAL FLOOD BARRIERS
Temporary barriers placed on doors, windows, and other wall openings before a storm.

DRAINS:

C BASEMENT PERIMETER DRAIN
A perforated pipe that is cut into the perimeter of the lowest floor and intercepts and removes water from the interior to a sump pit, which is then carried to the surface.
**STRATEGIES FOR REDUCING FLOOD RISK TO YOUR HOME**

**FLOODPROOFING STRATEGIES: PREVENT FLOODING**

**SEAL OPENINGS:**

- **D** WATERPROOF WINDOWS & DOORS
  
  Seal your windows yourself which can significantly reduce the risk of water entering your home through leaky windows.

- **E** SEAL BASEMENT SLAB
  
  Involves closing any foundation cracks with mortar and masonry caulk or hydraulic cement, which will expand to fill gaps.
FLOODPROOFING STRATEGIES: PREVENT FLOODING

PUMPS AND VALVES:

F  DRAIN BACKFLOW PREVENTER
A check valve at the base of various drains, which opens and closes depending on the flow of water.

G  ABANDON DRAINS/PIPES
An irreversible process of capping, filling, or otherwise isolating a portion of your home’s plumbing, resulting in the permanent discontinuation of its service.

H  NON-RETURN/CHECK VALVES
Check valves allow fluid to flow in one direction. They are fitted to prevent flow in the wrong direction caused by certain pressure conditions.
STRATEGIES FOR REDUCING FLOOD RISK TO YOUR HOME

FLOODPROOFING STRATEGIES: PREVENT FLOODING

PUMPS AND VALVES (cont.):

**I. SUMP PUMP**
Defends against basement seepage by drawing in groundwater from the basement and directing it away from your home through drainage pipes.

**J. EJECTOR PUMP**
The purpose of an ejector pump is to remove water from your home, different from a sump pump which removes excess water.
OVERVIEW
Sandbags and sand-filled systems are temporary barriers that can be quickly deployed to protect homes from floodwaters. Sandbags or sand-filled systems can become a barrier to divert water away from entryways and foundations. There are many options available on the market depending on your budget and specific needs, including traditional sandbags, self-inflating flood barriers, and fillable, multi-cell barrier systems. Self-inflating flood barriers are weather-activated, reusable bags that absorb water to create a barrier and deflate when dry. Sandbags and sand-filled systems can generally be stacked to any height. These temporary barriers also do not involve any retrofitting work to your property.

HOW COULD THIS HELP?
Traditional sandbags deflect water and protect your property from stormwater entering your home and foundation. Sand-filled systems are refillable and most options are relatively cost-effective and quickly deployable options to temporarily protect your property from floodwaters during a storm and can be used, stored, and reused throughout multiple storm events.

MATERIALS & CONSIDERATIONS
- Sandbag (burlap, polypropylene, polyethylene, nylon)
- Flood bag
- Sand
- Garden Hose (if pre-soaking flood bag)
- Shovel
- Tarp
- Work Gloves

Note that sandbags and sand-filled systems cannot be placed within the public right-of-way (beyond your property line). This solution may be more appropriate for houses with stairways leading up to an entryway, and not as appropriate for on-grade properties or for homes with doorways that open directly to the sidewalk (the public right-of-way).

MAINTENANCE
While self-inflating flood barriers can be placed in position prior to a storm, flash flooding may carry the barriers away prior to inflating. Property owners may want to consider pre-soaking and stacking flood bags prior to the storm.

RESOURCES
- Lowes: How to Use Sand Bags to Prevent Flooding
- Floodproofing.com
# RESIDENTIAL FLOOD BARRIERS

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**OVERVIEW**

Residential flood barriers (flood panels or flood shields barriers) are temporary barriers placed over doors, windows, and other wall openings prior to a storm. Flood barriers are often light enough to easily store during dry weather events and bolted into place during wet weather events. Property owners may also choose to keep flood barriers permanently installed on brackets or tracks for lighter shields, or on hinges or rollers for heavier shields (although uncommon for residential buildings).

There are also flood barriers available that do not require hardware, adhesives, or permanent fixtures; however, if selecting this option, use a built-in tube to seal the entryway. Property owners can place residential flood barriers in their doorframe, expand the panel to the width of the doorway, and inflate the built-in tube to create a watertight seal.

**HOW COULD THIS HELP?**

Lightweight flood barriers can reduce the risk of stormwater from entering your home through doors, windows, or other wall openings. Flood barriers can be less time- and labor-intensive to deploy than sandbags or sand-filled systems.

**MATERIALS & CONSIDERATIONS**

Depending on the size of the wall opening, flood barriers can be made of several materials. FEMA recommends using strong materials (e.g., heavy-gauge aluminum or steel plates) for openings wider than 3 feet and expected flood depths of 2 to 3 feet. Lighter materials can be used to cover smaller openings and to protect against lesser flood depths. All shields should have gaskets along their edges. Flood shields may not be effective in all cases. These systems do not protect against high-velocity flood flows and wave action. Most do not protect against floods deeper than 2 feet.

**MAINTENANCE**

Flood barrier gaskets should be stored indoors and checked periodically for damage to prevent gasket decay.

**RESOURCES**

- FEMA Homeowner’s Guide to Retrofitting
- Floodproofing.com
- Install Dry Floodproofing: Flood Shields

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*RESILIENT BUILDING DESIGN GUIDELINES ADDENDUM* 43

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**NOT** REQUIRED

**STRUCTURAL ENGINEER (FLOOD SHIELDS)**
BASEMENT PERIMETER DRAIN

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OVERVIEW
Basement perimeter drain, also referred to as a “French drain,” is a perforated pipe that is cut into the basement floor around the perimeter of the cellar or crawlspace. The pipe intercepts and removes water from the interior to a sump pit, which is then carried to the surface by gravity or a sump pump. The pipe is covered in a type of mesh and buried in concrete and a layer of gravel in order to keep soil and mud particles out of the drainage system.

HOW COULD THIS HELP?
One of the main benefits of basement perimeter basement drain is that it helps keep water off the floors, keeps excessive moisture from passing into the basement through walls and floors, and reduces the chances of groundwater sources affecting the foundation and interior of your home. While they help prevent minor ponding in the basement and relieve hydrostatic pressure on the foundation, they do not prevent water from entering the home and may not be effective against large storm events.

MATERIALS & CONSIDERATIONS
Considerations for Installation:
• Installing a basement perimeter drain in an existing home is a major construction project. It is most feasible if you are already renovating your basement.
• Installation must be done by a licensed contract professional.

MAINTENANCE
Perimeter drains should be inspected by a professional once a year in order for the system to last. Drains must be cleaned, for example, by using an electric sewer snake, which can be heavy and unwieldy for homeowners to operate. It is best to have a professional maintain the drain for you, particularly when flooding is common or before rain events.

RESOURCES
• All You Need to Know About Basement Drains
WATERPROOF WINDOWS & DOORS

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OVERVIEW
Property owners and residents can either waterproof existing windows and doors by improving the seal (following the content in Materials & Considerations below) or purchase floodproof windows and doors and have them installed by a professional. Additionally, you can purchase door flood barriers and deploy them before a flood to protect your home (see Residential Flood Barriers).

HOW COULD THIS HELP?
By floodproofing your windows and doors you can better prevent stormwater from entering your home through leaky windows or doors. Improving the seal on your windows also head to less air leakage and thus lower electric bills.

MATERIALS & CONSIDERATIONS
Required: putty knife; acrylic caulking sealant; several rags

Considerations for Installation:
- Remove all old sealant with putty knife.
- Wipe area where you will apply new sealant with a dry rag.
- Wait for the area to dry, which may take up to 24 hours.
- Apply a thin bead of caulk along the edges of the window frame.
- Keep window dry (with tarp/canopy) until sealant fully dries.

RESOURCES
- HomelyVille: Window Leaks When It Rains: How to Seal Windows from Water Leaks
- Floodproofing.com
SEAL BASEMENT SLAB

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OVERVIEW

Sealing a basement slab or foundation can involve a wide range of interventions. The easiest strategy is to close any foundation cracks with mortar and masonry caulk or hydraulic cement, which will expand to fill gaps. Additionally, you can seal your basement walls using waterproofing compounds to avoid seepage. Ensure your floor drains are clear of obstructions so water can drain if it penetrates through the seal. If repairing foundation cracks does not solve the problem of water seepage into your basement, you may have a larger foundational issue that might require a professional option.

HOW COULD THIS HELP?

Sealing your basement foundation helps protect your groundwater seepage and can help improve indoor air quality and the general health and safety of your home. A properly sealed basement foundation is not only important for keeping floodwater and water vapor out, it can also help remove water vapor if it gets in, control liquid flow due to groundwater and capillarity, and control soil gas.

MAINTENANCE

Regularly inspect your basement for signs of water seepage or damage. If you notice water pooling on the floor or water spots on your basement walls or ceiling, determine where the crack or gap is and seal immediately.

MATERIALS & CONSIDERATIONS

**Required:** sealant (caulk or hydraulic cement); waterproofing compounds

**Considerations for Installation:**
Fixing the crack with sealant alone may not solve the whole problem. There may be deeper issues causing your foundation to crack, meaning you may need to consult a contractor.

RESOURCES

- [FEMA: Protect Your Home from Flooding](#)
- [Building Science Corporation: Concrete Basement Foundations](#)
INSTALLING AN INTERIOR DRAIN TILE

Basement slabs can experience water infiltration due to hydrostatic pressure, or pressure created by rising water underground. As the soil beneath the slab becomes saturated, a water table is formed. As this water table rises, hydrostatic pressure is exerted on the slab, or on anything located above the soil, such as paving. To relieve the hydrostatic pressure, property owners can install exterior drain tiles, sump pumps, or interior drain tiles. Water beneath the slab is best captured using an interior drain tile, typically made of PVC or corrugated pipe with perforations. These relieve hydrostatic pressure from beneath the basement floor slab, which will help avoid cracking of the slab and water seepage. An interior drain tile alone will not significantly help with flooding. The best solution to resolve flooding issues is to install a system including an interior drain tile, an exterior drain tile, and a sump pump. Installing an interior drain tile is expensive, as it must go under a concrete slab that is already in place.

NEW WATERPROOFING AND A NEW SLAB

The goal of a basement foundation, aside from structuring a below-grade space, is to control liquid flow (due to groundwater and capillarity) and soil gas, in addition to keeping water vapor out. Basement foundations also must release water vapor if it does get into the foundation. Concrete has the tendency to dry towards the inside. Typically, a layer of coarse gravel topped with a polyethylene vapor control layer is placed under a concrete slab to prevent water vapor from the ground from getting into the slab and your home. However, this construction does not let water vapor dry to the exterior, and therefore if water vapor gets into the slab, it will go deeper into your home. To address this concern, interior insulation assemblies are constructed to be airtight but vapor permeable, which will prevent air with moisture from entering your building. It is important to not have a vapor barrier on the interior of internally insulated basement assemblies. You may be getting moisture and mold in your basement if this assembly is not functioning properly, at which point you may want to hire a contractor to come replace your vapor barrier and pour a new slab. Confirm with a professional if this is the right flood risk reduction strategy for your home, as this is expensive and invasive and should only be done if necessary.
DRain Backflow Preventer

Overview
A drain backflow preventer is essentially a check valve at the base of various drains, which opens and closes depending on the flow of water. The device typically includes a round, floating device that is pushed upward by backflow during heavy rain or flood events. The device seals the drain to prevent water from entering and falls again when the backflow begins moving away from the home.

How Could This Help?
The drain backflow preventer is a relatively simple and inexpensive way to keep sewer backflow from entering your home through floor drains, showers, tubs, toilets and sinks at the basement level. It can also serve to prevent sewer gas and pests from entering your home. While they can prevent minor backflow events, they can fail if there is excessive pressure on the device.

Materials & Considerations
Required: Device of your choice, string, and screwdriver

Considerations for Installation:
• These devices can be installed by the homeowner, but it is recommended that a licensed plumber be considered.
• There are several types of drain backflow preventers. Consult with a plumber to find the right one(s) for the size and pressure of the pipes in your home.

Maintenance
Have your drain backflow preventer inspected once a year. To minimize issues and ensure effectiveness during flood events, it is helpful for you to inspect the valve once every three to four months. While wearing protective gloves and eyewear, clean the valve and flush it with one gallon of water to remove debris and prevent clogging. Periodically place a few drops oil or grease on the float rod and check to ensure the pin moves freely.

Resources
• Drain Net: Drain Backflow Preventer
ABANDON DRAINS/PIPES

OVERVIEW
Abandonment is an irreversible process of capping, filling, or otherwise isolating a portion of your home’s plumbing, resulting in the permanent discontinuation of its service. This is not the same as “idled” or “inactive” piping, which could be brought back into service following a previous service discontinuation. Drain or pipe abandonment is also a cost-effective alternative to drain removal.

HOW COULD THIS HELP?
A drain cap will prevent the backflow of sewer into your home. Using permanent caps are a quick and simple way to abandon a drain but there are things to consider before doing so. For instance, if the drain has become inactive due to complications in the system and you are considering abandonment, then void filling can be a useful step to prevent later complications.

MATERIALS & CONSIDERATIONS
Required: A permanent pipe cap or plug; flowable fills (i.e., cellular concrete, sand/cement slurry, grout fill)

Considerations for Installation:
- As these processes are permanent and applicable at a wide range of scales, there are variables pertaining to its diameter, length, slope, and pipe condition.
- It should be noted that if your property has a floor drain and it is closed or otherwise inactive, abandoning the drain will effectively remove that outlet as an available drain after a flood event. Another mechanism to remove water will need to be considered.
- Additionally, abandoned drains or pipes mean that backflow will then move to the next lowest device, so other additional strategies may need to be considered.

RESOURCES
- United Utilities: Sewer Abandonment
- State of New Jersey Department of Transportation Abandoned Pipes, 2020
STRAATEGIES FOR REDUCING FLOOD RISK TO YOUR HOME
CITY OF HOBOKEN

NON-RETURN/CHECK VALVES

<table>
<thead>
<tr>
<th>COMPLEXITY</th>
<th>COST</th>
<th>APPLICABILITY</th>
<th>LONGEVITY</th>
<th>PERMITS</th>
<th>CONTRACTOR</th>
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<tbody>
<tr>
<td>1</td>
<td>$</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>2</td>
<td>$$</td>
<td>ALL HOMES</td>
<td>15 - 30 YEARS</td>
<td>NOT REQUIRED</td>
<td>RECOMMENDED</td>
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<tr>
<td>3</td>
<td>$$$</td>
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OVERVIEW

Non-return valves (also called check valves or backflow preventer valves) only allow fluid to flow in one direction: from your sewer lateral out to the main. They are fitted to prevent flow in the wrong direction caused by certain pressure conditions. There are different types of non-return valves; however this section focuses on non-return valves that prevent backflow in domestic water systems. There are only two openings, the inlet and the outlet, and they are separated by a closing member. The pressure from the inlet direction holds the closing member open, but if pressure builds up from the outlet direction the closing member is kept close, preventing backflow. The two openings work automatically and do not need power or external control.

HOW COULD THIS HELP?

By installing a non-return valve, you can prevent stormwater or wastewater that is backing up a drainpipe from flowing back into your home and flooding your home. Non-return valves will also help increase the effectiveness of other passive flood resiliency strategies, such as floodproofing building utilities and using dry floodproofing measures like flood walls on your home’s exterior.

MAINTENANCE

Several maintenance problems with non-return valves occur due to improper installation and therefore a contractor is highly recommended when installing a non-return valve. The plumber will consider installation aspects like the isolation of the non-return valve and its location to ensure it works properly and can be easily maintained. Depending on the type of non-return valve installed, maintenance techniques will differ and therefore it is important to consult with a plumber about the required maintenance.

MATERIALS & CONSIDERATIONS

Required: non-return valve of choice; discharge pipe

Considerations for Installation:
- These devices should be installed by a licensed plumber, regardless of which type you select.
- Non-return valves are always installed at the pump discharge piping.
- They can be used on various domestic systems such as sprinklers, heating systems, plumbing fixtures, drip irrigation systems, and rainwater harvesting systems.
- There are several types of non-return valves, consult with a plumber to find the right one(s) for your home.

RESOURCES

- FEMA: Protect Your Home from Flooding
- FEMA: Reducing Flood Risk to Residential Buildings That Cannot Be Elevated
- Anup Kumar Dey: What is a Non-Return Valve?
NON-RETURN/CHECK VALVES (cont.)

Non-Return Valve Diagram: Adamant Valves

Image: Freeflush Water Management

Image: Google Images
STRA TEGIES FOR REDUCING FLOOD RISK TO YOUR HOME

FLOODPROOFING STRATEGIES: PREVENT FLOODING

I SUMP PUMP

<table>
<thead>
<tr>
<th>COMPLEXITY</th>
<th>COST</th>
<th>APPLICABILITY</th>
<th>LONGEVITY</th>
<th>PERMITS</th>
<th>CONTRACTOR</th>
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<tr>
<td>1</td>
<td>$</td>
<td>ANY HOME WITH A BASEMENT OR CRAWLSPACE</td>
<td>7 - 10 YEARS</td>
<td>NOT REQUIRED</td>
<td>NOT REQUIRED</td>
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<tr>
<td>2</td>
<td>$$</td>
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OVERVIEW

Sump pumps draw in groundwater runoff and redirects it away from your home through drainage pipes. A sump is a pit carved below the surface of your basement floor. The sump pump is equipped with valves that sense escalating water levels. When the water gets too high, the system will pump the water out of the basement through a drainage pipe. See “Disconnect Sump Pump from CSS” pages for information about good drainage locations for your sump pump. There are multiple types of sump pumps, therefore it is best to research which is best for you. Sump pumps are necessary in homes with basements that are located in flood-prone areas.

HOW COULD THIS HELP?

Sump pumps defend against basement seepage and flooding by pumping groundwater away from your home. They also reduce interior moisture in the basement. Excess basement moisture can lead to mold which can cause respiratory infections, allergic reactions, and asthma complications. Basement moisture can also cause wood rot, wood-destroying insects, and electrical damage.

MATERIALS & CONSIDERATIONS

Required: sump pump; shovel; jackhammer; discharge pipe; check valve; gravel; concrete; drainage location

Optional: discharge hose

Considerations for Installation:

• Choose a device with a battery-operated backup, in case of electrical power failure.
• You can install your own sump pump, but it requires advanced knowledge and physical labor.
• Keep the drainage location 10 to 20 feet away from the foundation of your home.
• Carefully choose your sump pump location.

MAINTENANCE

It is important to keep the pit clean by removing any debris or solid particles that have accumulated. Regularly check the water level and ensure it has not risen above the pump’s intake level. If the water continues to rise, there may be a leak. Check the pumps once a month (more often if located within a flood-prone area) for any blockages. Be aware and prepared for severe weather events by making sure your sump pump is clean and functional prior to the storm. If your sump pump relies on electric power (not-battery operated), consider buying a generator for the sump pump in the event that your house loses power during a storm event.

RESOURCES

• FEMA: Protect Your Home from Flooding
• Fresh Water Systems: What is a Sump Pump and How Does It Work?
• Sump Pump Installation Guide: How To Install A Sump Pump?
• WikiHow: How to Install a Sump Pump
STRATEGIES FOR REDUCING FLOOD RISK TO YOUR HOME

FLOODPROOFING STRATEGIES: PREVENT FLOODING

SUMP PUMP (cont.)

Sump pumps discharge onto the ground into a drainage ditch or connection to the storm sewer.

Image: Sump Pump Guide

Image: Sump Pump Guide

Image: Ontime Service

Example Sump Pump Images: Google Images

DRAFT DELIBERATIVE
EJECTOR PUMP

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<thead>
<tr>
<th>COMPLEXITY</th>
<th>COST</th>
<th>APPLICABILITY</th>
<th>LONGEVITY</th>
<th>PERMITS</th>
<th>CONTRACTOR</th>
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<tr>
<td>1</td>
<td>$</td>
<td>HOMES WITH BASEMENT</td>
<td>10-15 YEARS</td>
<td>REQUIRED</td>
<td>REQUIRED</td>
</tr>
<tr>
<td>2</td>
<td>$$</td>
<td>LAUNDRY OR BATH ROOMS</td>
<td></td>
<td>REQUIRED</td>
<td>REQUIRED</td>
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<td>$$$</td>
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OVERVIEW
An ejector pump can be used when a plumbing fixture is located below the operating level of the main sewer or septic line flowing from a house. The drainage of wastewater depends on gravity, so when plumbing fixtures are located below the operating level of the main sewer line, a pump is needed to elevate the wastewater. Ejector pumps, like sump pumps, sit in a sump basin that is dug into the ground below grade. Drains from various basement fixtures lead downwards into the basin. Once the wastewater in the basin reaches a certain level, determined by a float, wastewater is pumped out of the basin, away from the house, and into the sewer line.

HOW COULD THIS HELP?
Ejector pumps defend against backflow of wastewater from a combined sewer. They maintain an even and consistent flow, necessary for the removal of waste. Ejector pumps minimize waste buildup in your pipes, which is useful during heavy storm events when waste is more likely to buildup and backflow into your home. Ejector pumps have a lid which seals tightly to minimize the risk of harmful gases or odors entering your home.

MATERIALS & CONSIDERATIONS
Required: ejector pump; vent (soil stack run through roof); outlet pipe connected to main sewer line; check valve.

Considerations for Installation:
- Check with your building department about local codes and guidelines regarding ejector pumps.
- There are a variety of ejector pump sizes and capacities to choose from, so be sure to research which one is appropriate for your home and needs.
- Rain and floodwater do not count as “wastewater,” thus installing an ejector pump will not remove floodwaters from your home. Although it will decrease the chance of wastewater backflow into your home during a storm.

MAINTENANCE
Proper ejector pump maintenance is important to function properly, increase the lifespan of the pump, and avoid pungent smells from entering your home. You can increase the lifespan of the pump by 10-15 years with proper care including cleaning debris from the pump, checking, and replacing the oil when necessary; inspecting and cleaning the impeller; inspecting and cleaning the vents; inspecting and tightening connecting elements; ensuring the seals are tight; and assessing bearing damage and replacing them when necessary.

RESOURCES
- The Spruce: How Sewage Ejector Pumps Work
- ServiceMaster Restore: Sump Pumps vs. Ejector Pumps
- Super: How To Maintain Your Ejector Pump
THE NHSA GRANT PROGRAM

The Authority is developing a grant program to assist eligible customers with alleviating backups into their basements/lower levels. The grant program will reimburse up to $5,000 of the cost of the design and installation of appropriate mitigation measures. The NHSA is establishing objective criteria that their engineering team will use to evaluate whether a customer is eligible for this grant program. For more information, contact info@nhudsonsa.com.
STRATEGIES FOR REDUCING FLOOD RISK TO YOUR HOME

FLOOD-RESISTANT CONSTRUCTION STRATEGIES: LESSEN THE EFFECTS OF FLOODING

A. WATER-RESISTANT MATERIALS
   Materials that are not damaged by water inundation and dry easily after getting wet.

B. INSTALL FLOOD ALERT SYSTEM/MOBILE APP
   Detects water in the home and alerts residents to these conditions.

C. ANCHOR FUEL TANKS
   All tubes should be above the 1% annual-chance flood level or surrounded by watertight floodwalls.

D. FLOODPROOF EQUIPMENT
   Use reusable flood covers to protect critical equipment that cannot be elevated.
ELEVATE EQUIPMENT

Relocate building utilities and service equipment such as water heater, HVAC, and washer/dryer above DFE.

FLOOD VENTS

Openings in the foundation wall located below the BFE to allow for water to automatically flow in and out.

RAISE CELLAR/BASEMENT

Elevate the lowest floor above the BFE; depending on the height of the BFE and height of floods, may require elevating all the floors.

FILL IN CELLAR/BASEMENT

Basement infill involves filling a basement that is located below the BFE.
STRATEGIES FOR REDUCING FLOOD RISK TO YOUR HOME
FLOOD-RESISTANT CONSTRUCTION STRATEGIES: LESSEN THE EFFECTS OF FLOODING

A WATER-RESISTANT MATERIALS

<table>
<thead>
<tr>
<th>COMPLEXITY</th>
<th>COST</th>
<th>APPLICABILITY</th>
<th>LONGEVITY</th>
<th>PERMITS</th>
<th>CONTRACTOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$</td>
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<tr>
<td>2</td>
<td>$$</td>
<td>ALL PROPERTIES</td>
<td>10-20 YEARS</td>
<td>VARIES</td>
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<td>3</td>
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OVERVIEW
Water-resistant materials are those that are not damaged by water inundation and dry easily after getting wet. Such materials include concrete, stone, masonry block, ceramic and clay tile, pressure-treated and naturally decay-resistant lumber, epoxy-based paints, and metal. These materials are also relatively easy to clean once floodwaters have receded. On the contrary, materials that are not water-resistant like wood, carpet, and other fibrous materials soak up water and do not dry easily.

HOW COULD IT HELP?
Water-resistant materials can withstand stormwater or groundwater inundation from for up to 72 hours and dry easily after the water has subsided. Materials that are easy to clean make it easier to return to the home after flooding has occurred because floodwater often contains many harmful contaminants. Water-resistant materials are helpful for flooding caused by stormwater or sewage back up. This measure is effective for slow moving riverine flooding. Installing the specified materials may increase the cost of renovation by 3-5% however, the use of these materials will reduce the time and expense of recovery from future flooding.

MAINTENANCE
Often floodwater will include contaminants, so cleaning flooded areas after floodwater recede is a key step to maintain safety in the home.

Water-Resistant Materials may increase the cost of renovation by 3-5%; however, the use of these materials will reduce the time and expense of recovery from future flooding.
**WATER-RESISTANT MATERIALS (cont.)**

### MATERIALS & CONSIDERATIONS

<table>
<thead>
<tr>
<th>Material Type</th>
<th>Materials to Use</th>
<th>Materials to Avoid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Structural Flooring Materials</td>
<td>• Concrete&lt;br&gt;• Steel&lt;br&gt;• Marine grade or preservative treated plywood&lt;br&gt;• Treated or naturally decay-resistant lumber</td>
<td>• Engineered wood or laminate flooring&lt;br&gt;• Oriented-strand board&lt;br&gt;• Exterior grade or edge-swell resistant headers and beams&lt;br&gt;• I-joists</td>
</tr>
<tr>
<td>Finish Flooring Materials</td>
<td>• Ceramic, porcelain, or clay tiles&lt;br&gt;• Terrazzo or terrazzo tiles&lt;br&gt;• Vinyl tile or sheets</td>
<td>• Engineered wood or laminate flooring&lt;br&gt;• Carpeting&lt;br&gt;• Wood flooring&lt;br&gt;• Cork</td>
</tr>
<tr>
<td>Structural Wall and Ceiling Materials</td>
<td>• Concrete&lt;br&gt;• Brick face&lt;br&gt;• Cement board, fiber-cement board&lt;br&gt;• Pressure-treated lumber&lt;br&gt;• Solid, standard, structural lumber&lt;br&gt;• Aluminum studs&lt;br&gt;• Closed cell insulation&lt;br&gt;• Paperless gypsum board</td>
<td>• Fiberglass insulation&lt;br&gt;• Paper-faced gypsum board&lt;br&gt;• Oriented-strand board&lt;br&gt;• Greenboard</td>
</tr>
<tr>
<td>Finish Wall and Ceiling Materials</td>
<td>• Glass&lt;br&gt;• Metal cabinets or doors&lt;br&gt;• PVC board and trim&lt;br&gt;• Latex or epoxy paint&lt;br&gt;• Stainless steel or galvanized steel hardware</td>
<td>• Wood cabinets and doors&lt;br&gt;• Particle board cabinets and doors&lt;br&gt;• Standard wood finish trim&lt;br&gt;• Non-latex paint&lt;br&gt;• Wallpaper&lt;br&gt;• Plaster&lt;br&gt;• Cork</td>
</tr>
</tbody>
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**RESOURCES**

- [ASCE 24-14 Flood Resistant Design and Construction](#)
- [Flood-Resistant Materials Requirements for Buildings Located in Special Flood Hazard Areas in accordance with the National Flood Insurance Program, FEMA (2008)](#)
- [Reducing Flood Risk to Residential Buildings That Cannot Be Elevated, FEMA (2015)](#)
- Building Science Insights (BSI)-105: Avoiding Mass Failures, Building Science Corporation
- Building Science Insights (BSI)-110: Keeping the Water Out of Basements, Building Science Corporation
- Building Science Insights (BSI)-128: Designing for Floods, Building Science Corporation
- Building Science Digests (BSD)-111: Flood and Hurricane Resistant Buildings
B INSTALL FLOOD ALERT SYSTEM/MOBILE APP

<table>
<thead>
<tr>
<th>COMPLEXITY</th>
<th>COST</th>
<th>APPLICABILITY</th>
<th>LONGEVITY</th>
<th>PERMITS</th>
<th>CONTRACTOR</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>$</td>
<td>ALL PROPERTIES</td>
<td>LIFE OF THE DEVISE</td>
<td>NOT REQUIRED</td>
<td>NOT REQUIRED</td>
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<tr>
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<td>$$$</td>
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**OVERVIEW**

Flood sensors and other early warning devices alert residents of upcoming strong storm events that pose a risk of flooding. Smart water-leak sensors alert residents when plumbing issues are detected. When placed in areas that water tends to pool (in a bathroom, basement, cellar, etc.), the devices will activate (through an alarm or alert to a smartphone) as soon as water breaches the device. If you have other internet-connected “smart” devices (smart speakers, etc.), water-leak sensors can also be linked to these devices.

In addition to flood sensors and early warning devices, there are a number of commercial, academic, and government-sponsored mobile applications that property owners can download for local, timely hazard notifications.

**HOW COULD THIS HELP?**

Residents can be alerted of any type of flooding event in time to turn on other flood protection devices, safeguard important belongings, and deploy temporary flood barriers. While non-smart water-leak sensors sound and alarm when water is detected, this alarm could be missed if in a remote part of a larger home or if you are away from home. Smart water-leak sensors send a notification, email, or text message to your smartphone so it won’t be missed.

**MATERIALS AND CONSIDERATIONS**

- Flood sensors: make sure to place device in areas that tend to pool water
- Wi-Fi Range: ensure the devices have a stable connection to Wi-Fi to alert your smartphone
- Alert Volume: make sure the device is at least 80 decibels loud so you can hear the alert

**MAINTENANCE**

No regular maintenance is required.

**RESOURCES**

- [FEMA Protect Your Home from Flooding](#)
- National Weather Service (NWS) Alerts
- [NY Times: The Best Smart Water-Leak Detector](#)
ANCHOR FUEL TANKS

<table>
<thead>
<tr>
<th>COMPLEXITY</th>
<th>COST</th>
<th>APPLICABILITY</th>
<th>LONGEVITY</th>
<th>PERMITS</th>
<th>CONTRACTOR</th>
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<tr>
<td>1</td>
<td>$</td>
<td>ALL PROPERTIES</td>
<td>LIFE OF THE GROUND</td>
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<td>NOT REQUIRED</td>
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<tr>
<td>2</td>
<td>$$</td>
<td>ALL PROPERTIES</td>
<td>GROUND ANCHORS</td>
<td>NOT REQUIRED</td>
<td>NOT REQUIRED</td>
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<tr>
<td>3</td>
<td>$$$</td>
<td>ALL PROPERTIES</td>
<td>LIFE OF THE GROUND</td>
<td>NOT REQUIRED</td>
<td>NOT REQUIRED</td>
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</table>

**OVERVIEW**
Fuel tanks should be properly anchored or removed because during flooding they can collapse or become dislodged. All tubes should be above the 1% annual chance so that flood waters do not enter the fuel tank. Equipment can also be surrounded by watertight floodwalls if flood waters are less than three feet deep.

**HOW COULD THIS HELP?**
Anchoring your fuel tanks mitigates the risk of the tank becoming dislodged due to heavy stormwater events which can injure people or damage property if swept away. If the fuel tank becomes dislodged, the supply line can tear free, and your basement can become contaminated by oil.

**MATERIALS AND CONSIDERATIONS**
Anchoring fuel tanks can be done by attaching securing the legs in a concrete slab or attaching the tank with straps. This can be used for indoor and outdoor tanks.

**MAINTENANCE**
Homeowners will need to ensure that the fuel tanks are properly anchored and that the anchoring remains in good condition.

**RESOURCES**
- [FEMA Protect Your Home from Flooding](https://www.fema.gov/flood-resistant-construction-strategies-lesser-effects-flooding)
OVERVIEW
Reusable flood covers can be used to protect utilities (hot water heaters, furnaces, etc.) from up to four feet of floodwater. Flood covers can be used in addition to elevating these utilities as well as if elevation is not feasible. Reusable flood covers can be deployed quickly.

HOW COULD THIS HELP?
Using flood covers is an inexpensive way to protect utilities and prevent water damage to costly, critical equipment. Losing utilities and other critical systems significantly lengthens recovery after a flood event.

MATERIALS & CONSIDERATIONS
• Reusable flood covers

Since advance warning is needed to deploy reusable flood covers prior to flooding, you may want to consider investing in flood alert systems to track future storm events.

MAINTENANCE
Covers must be maintained in good condition. Tears or other defects can result in the covers allowing water in during flooding. After the storm, you should roll the flood covers up for storage to prevent blocking proper airflow while the furnace or hot water heater is in use.

RESOURCES
• Floodproofing.com
ELEVATE EQUIPMENT

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<thead>
<tr>
<th>COMPLEXITY</th>
<th>COST</th>
<th>APPLICABILITY</th>
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<tr>
<td>2</td>
<td>$$$</td>
<td>ALL PROPERTIES</td>
<td>15-20 YEARS</td>
<td>REQUIRED</td>
<td>REQUIRED</td>
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<td>$$$$</td>
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</table>

OVERVIEW
Elevating equipment involves relocating building utilities and service equipment such as water heaters, HVAC system, or washer/dryer above the DFE to reduce the risk of utility damage during floods. Utilities can be moved to a floor above the DFE inside the home or elevated on platforms outside the home. If utilities are outside the home, they should be anchored to a platform that is attached at one side to the main structure.

HOW COULD THIS HELP?
Elevating utilities is an effective measure to reduce utility damage during a flooding event and help to smooth the recovery process. This measure is effective against both slow moving flooding and high-velocity coastal or riverine flooding.

MATERIALS AND CONSIDERATIONS
When elevating equipment, consider clearances required to allow for routine maintenance. Also consider space for venting, drainage, and measures to prevent freezing if required for the equipment.

When utilities are elevated for flood concerns, they may be at risk to damage from high winds or earthquakes. If these risks are concerns, there are typically simple solutions to protect utilities from this type of damage.

MAINTENANCE
Limited maintenance is required once the elevation is completed.

RESOURCES
STRATEGIES FOR REDUCING FLOOD RISK TO YOUR HOME
FLOOD-RESISTANT CONSTRUCTION STRATEGIES: LESSEN THE EFFECTS OF FLOODING

Flood Vents

<table>
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<th>COMPLEXITY</th>
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<th>APPLICABILITY</th>
<th>LONGEVITY</th>
<th>PERMITS</th>
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OVERVIEW
While floodproofing strategies prevent water from entering your home, flood vents allow water to safely pass through your home. Flood vents are openings in the foundation wall that are below the BFE to allow for water to automatically flow in and out during storm events. These vents allow flood waters to enter and exit the structure so that water rises and falls at the same rate inside and outside the building. Flood vents protect houses and buildings during floods by equalizing water pressure and keeping your home’s foundation safe during floods. When flood vents are used, water-resistant materials must be used below the BFE.

HOW COULD THIS HELP?
Flood vents are considered a highly effective measure to reduce flood damage. They are low-cost and have limited maintenance requirements. Additionally, properly installed and situated flood vents can pay for themselves by reducing your flood insurance premium.

MATERIALS & CONSIDERATIONS
Homeowners should ensure that the vent installed open automatically during a flood. Flood vents may be grilles, vents, or hinged panels that automatically open in both directions.

MAINTENANCE
Required maintenance is relatively limited.

RESOURCES
STRATEGIES FOR REDUCING FLOOD RISK TO YOUR HOME
FLOOD-RESISTANT CONSTRUCTION STRATEGIES: LESSEN THE EFFECTS OF FLOODING

RAISE CELLAR/BASEMENT FLOOR ABOVE BFE

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OVERVIEW
While attached homes in urban areas often cannot be raised easily, the living space can be moved up by raising the lowest floor above the BFE. This may be done without raising other floors depending on the height of the BFE and the height of the floors or it may require adjusting all the floors up. Flood vents are required if portions of the structure are still below the BFE to avoid damage to the foundation (see Flood Vents). If utilities are below the BFE, the utilities must also be raised (see Elevating Equipment).

HOW COULD THIS HELP?
Raising the lowest floor above the BFE is an effective method of limiting water damage to your home during weather events. Having the living area and utilities above the BFE can significantly shorten the time required to re-enter the home after flooding.

MATERIALS AND CONSIDERATIONS
Elevating the lowest floor and/or adjusting other floors to raise the living space may result in a decrease in livable space both due to moving the floors up and from relocating the utilities to be above the BFE.

MAINTENANCE
Little maintenance is required after the floors have been elevated other than maintaining the flood vents that allow automatic water entry and exit to the portion of the home below the BFE (see Flood Vents).

RESOURCES
OVERVIEW
Basement infill involves filling a basement that is located below the BFE. If any of the basement wall remains above ground level, homeowners must install flood vents that function automatically during a flood event (see Flood Vents). Basement infill must be done in coordination with elevating utilities located in the basement.

HOW COULD THIS HELP?
Cellar/basement infill is an effective measure of limiting water damage to your home during weather events. It is most effective when the BFE is below the level of the first floor. Because it must be done in coordination with elevating utilities, benefits associated with this measure will also be gained by filling in the basement (See Elevate Equipment). After basement infill is completed, flood insurance premiums will be determined using the new lowest floor level which may result in a decrease in the cost of flood insurance.

MATERIALS & CONSIDERATIONS
In urban areas where basements may have shared walls, consideration of the impact of adjacent properties is warranted. When filling the basement, consider how to encourage drying and prevent moisture from getting into the building after flooding.

One major consideration for this strategy is that it will generally result in a loss of livable space both due to the basement infill and due to relocation of utilities to elsewhere in the home if required. Homeowners can add an addition to compensate for this loss, however this may be financially infeasible for some homeowners or trigger a substantial improvement declaration which has additional requirements.

Fill must be compacted and should be designed to resist erosion during a flood. Fill must be resistant to water damage. Materials that can be used include compacted soil, crushed stone encased with a concrete slab, and flowable fill.

MAINTENANCE
Once completed, there is little to no maintenance needed other than ensuring that the flood opening remain in working order.

RESOURCES
4.3: FLOOD-RESISTANT CONSTRUCTION STRATEGIES: LESSEN THE EFFECTS OF FLOODING

DRAFT DELIBERATIVE
STRATEGIES FOR REDUCING FLOOD RISK TO YOUR HOME

ALLEVIATE THE BURDEN ON THE SANITARY SYSTEM: REDUCE WATER USE & STORMWATER RUNOFF

A. DISCONNECT OR REDIRECT DOWNSPOUTS

External downspouts lead from a roof gutter, down the side of your home, then discharge onto your property or into the CSS.

B. DISCONNECT SUMP PUMP

Disconnect from CSS and drain into a cistern, rain barrel, garden or green space, or planter box.
STRAATEGIES FOR REDUCING FLOOD RISK TO YOUR HOME
ALLEVIATE THE BURDEN ON THE SANITARY SYSTEM: REDUCE WATER USE & STORMWATER RUNOFF

**C** RAIN BARREL

Rain barrels collect rainwater via a connection to a gutter downspout that you can then use for your gardens and lawns.

**D** RAIN CISTERN

Capture rainwater for non-potable use; however, cisterns are typically underground whereas rain barrels are above ground.

**E** DRY WELL

A dry well is an underground structure or hole that collects excess stormwater runoff, letting it slowly filter back into the ground.

**F** BLUE ROOF

A blue roof is a non-vegetated water retention system made of stone and a sealed waterproof roof membrane.
STRATEGIES FOR REDUCING FLOOD RISK TO YOUR HOME

PERVIOUS WALKWAYS, PATIOS, PAVING

Pervious paving, patios, and walkways are made with pavers that look similar to traditional pavers but can absorb rainwater.

BIO-INFILTRATION

A rain garden or bioswale changes the landscape of your lot to decrease runoff and direct water away from your home.

DOWNSPOUT PLANTER

Downspout planters collect stormwater runoff from the roof via downspouts.

ALLEVIATE THE BURDEN ON THE SANITARY SYSTEM: REDUCE WATER USE & STORMWATER RUNOFF
GREEN ROOF

A green roof is a roof fully or partially covered in plants.
DISCONNECT & REDIRECT DOWNSPOUTS

OVERVIEW
External downspouts lead from a roof gutter, down the side of your home, then discharge onto your property or into the CSS. They can be redirected to discharge into grass, a garden, or a planter. External downspouts can be altered without permits or a contractor.

HOW COULD THIS HELP?
Redirecting your gutter downspouts helps reduce stormwater runoff from your property and can also decrease water pooling and flooding on your property. This lessens and slows the amount of water entering the CSS, thus decreasing the likelihood of backflow and seepage. Redirecting your downspout to green areas can also help conserve water by lessening the need for watering your plants with fresh or potable water. This not only conserves the previous resource of water, but it also can help you save money on your monthly water bills. Additionally, when water filters naturally through grass, plants, and gardens it helps keep out water supply clean, rather than if the water runs across hardscape, picking up debris from cars or people.

MATERIALS & CONSIDERATIONS
Materials: Dependent on the method you select solution.

Considerations:
- Direct downspouts away from home’s foundation.
- Cut the existing piping to sever it from the CSS then install a new downspout elbow with an extension to a green space.
- Redirect your downspout into grass, a garden or planter, or a rain barrel or cistern.
- Roof leaders must be separated from CSS in new construction and gut rehabilitation projects.

MAINTENANCE
Regularly check your system for clogging or cracks, then clean and repair accordingly. Check your system after storms to make sure it is working properly and is not causing pooling or flooding.

RESOURCES
- Rethink Runoff: Redirect Your Downspouts
- Wade: Control Flow Roof Drainage System
Redirect Downspout to Green Space
Materials: gutter elbow joint; downspout extension; sheet metal screws; cap for old standpipe; backsplash (optional); hacksaw; pliers; screwdriver; drill; grassy area, rain garden (ref: Rain Gardens & Bioswales), downspout planter (ref: Downspout Planter), or pervious paving (ref: Pervious Paving, Patios, and Walkways) to direct towards

Considerations for Implementation:
• Position extension at least 5 feet from your home’s foundation.
• Make sure the water that may overflow the green space during a storm is directed away from your home and towards either another green space or the CSS.

Redirect Downspout to Storage Area
Materials: Same as previous, except instead of a green area you will need either a rain barrel (ref: Rain Barrel), rain cistern (ref: Rain Cistern), or dry well (ref: DIY Dry Well).

Considerations for Implementation:
• Reference the specific pages about each method for more information.
• Otherwise, the considerations are the same as those for the green space downspout.
DISCONNECT SUMP PUMP FROM CSS

OVERVIEW
The goal of a sump pump is to move water out of your basement and away from your home in the event of flooding (see “Sump Pump” pages for more detail). Some sump pumps drain into a neighborhood drainage system, in this case the CSS. This is not ideal in Hoboken because the CSS can become easily overwhelmed during a flood, resulting in overflow that can flood your home. It is better to drain into a cistern, rain barrel, garden or green space, or planter box, as this gives stormwater a chance to infiltrate slowly before entering and overwhelming the CSS.

HOW COULD THIS HELP?
There are numerous benefits to a sump pump, such as reducing the risk of flooding from stormwater in your basement, reducing sewage backups, reducing humidity and mildew growth inside your basement, and improving indoor air quality. Disconnecting the sump pump from the CSS is beneficial not only to your home but also to your community. You can reduce flooding in your home and neighborhood by slowing the entry of stormwater into the CSS, which avoids overflow during storms. By combining the sump pump with other drainage strategies, such as rain gardens or rain barrels, you can increase your effect on flood reduction.

MAINTENANCE
Critical maintenance techniques include keeping the pit clean, checking the water level, regularly checking your pumps, and being aware of the weather so you can be prepared.

You will also have to maintain whatever system you choose to drain your sump pump into. See pages called “Rain Barrel”, “Rain Cistern”, “Dry Well”, “Bio-Infiltration: Rain Gardens & Bioswales”, and “Downspout Planter” for more details on what drainage options you have and how to maintain these various options.

RESOURCES
- Fresh Water Systems: What is a Sump Pump and How Does It Work?
- Sump Pump Guide: How To Install A Sump Pump?
DISCONNECT SUMP PUMP FROM CSS (cont.)

Sump Pump Connected to CSS

Sump Pump Connected to Outdoor Cisterns

Image: Bailey Brothers

Image: brian017 on Terry Love Forums

Sump Pump Connected to Green Area

Sump Pump Connected to Planter Box

You can connect your sump pump to an outdoor planter box via a hose extension, which allows water to infiltrate through your garden slowly rather than going directly to the CSS and causing it to overflow during a storm.

Image: Ontime Service

Image: Pinterest
STRAATEGIES FOR REDUCING FLOOD RISK TO YOUR HOME
ALLEViate THE BURDEN ON THE SANITARY SYSTEM: REDUCE WATER USE & STORMWATER RUNOFF

C RAIN BARREL

OVERVIEW
Rain barrels collect rainwater via a connection to a gutter downspout that you can then use to water your gardens, lawns, indoor plants, or to wash your car. It is important to note that rainwater is not safe to drink, as it may carry pollutants from your roof.

HOW COULD THIS HELP?
This system will not only prevent stormwater runoff (which reduces the risk of backflow into your property and groundwater foundation seepage) but also rain barrels allow natural infiltration, helps keep our water systems clean, and can save you money by reducing your water bills.

MATERIALS & CONSIDERATIONS
Required: food-grade, mosquito-proof rain barrel (you can also make your own); downspout diverter; shovel; cinder block/elevated base; level

Optional: soaker hose; crushed stone; mulch; splash guard

Considerations for Installation:
• Note roof runoff and calculate the amount of runoff you will need to account for.
• Be mindful of where overflow from the rain barrels will go during a storm.
• Choose a level area or level the ground where the barrel will be placed.

MAINTENANCE
Regularly clean and remove debris from the rain barrel, gutters, and downspouts. Rain barrels should be emptied and stored indoors during the winter months and downspouts returned to their normal function.

RESOURCES
• Rethink Runoff: How to Install a Rain Barrel
• New Hampshire Homeowner’s Guide to Stormwater Management
• Philadelphia Water Department: Cisterns & Rain Barrels

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<tr>
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<th>APPLICABILITY</th>
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RAIN CISTERN

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OVERVIEW
Cisterns, like rain barrels, capture rainwater for non-potable use. Unlike rain barrels, cisterns are typically underground. Cistern water, like rain barrel water, can be used for irrigation, toilet flushing, washing cars, or other industrial uses. Cisterns usually receive stormwater from multiple downspouts versus rain barrels which are only connected to one downspout.

HOW COULD THIS HELP?
Rain cisterns reduce stormwater runoff that can cause backflow into your property and groundwater seepage.

MATERIALS & CONSIDERATIONS
Required: shovel; level; cast-in-place or precast concrete cistern (cinderblocks are also acceptable), cement plaster

Optional: trench digger; cisterns can also be made from steel, brick and mortar, redwood, or fiberglass

Considerations for Installation:
- Cisterns should be located as close as possible to the point-of-use, either the house or your garden.
- Cisterns can be above ground but are recommended to be below ground in the Northeast.
- Avoid placing cisterns in low areas. Surface water should flow away from the cistern to avoid flooding.

MAINTENANCE
Construct the cistern to prevent entrance of pests and surface water runoff. Install gutter guards to prevent leaves and large debris from entering the cistern. Inspect the cistern annually for sediment, biofilm, debris, cracks, and breaks and clean and repair accordingly. Disinfect the cistern monthly with household bleach. Regularly clean roof and gutters to prevent debris from entering cistern.

RESOURCES
- Philadelphia Water Department: Cisterns & Rain Barrels
- Penn State Extension: Rainwater Cisterns: Design, Construction, and Treatment
DRY WELL

OVERVIEW
A dry well is an underground structure or hole that collects excess stormwater runoff, letting it slowly filter back into the ground. Dry wells collect stormwater runoff from gutter downspouts, roof valleys, and other areas where water concentrates and flows. They help infiltrate runoff and reduce erosion.

HOW COULD THIS HELP?
Dry wells control erosive runoff and reduce stormwater runoff and overall wear on your house by minimizing backsplash. Reducing stormwater runoff reduces the risk of backflow onto your property and seepage into your foundation. Additionally, dry wells contain oxygen which aids in health of your landscape.

MATERIALS & CONSIDERATIONS
Required: measuring tape, shovel, crushed stone, non-woven geotextile fabric (not pictured)

Optional: perforated, open-bottom plastic barrel, gutter downspout extension (Image)

Considerations for Installation:
• Call 811 or 800-272-1000 before you dig.
• Research the system and installation.
• Test your property to ensure a dry well system will work on your lot.
• Dig 15 feet away from foundation.

MAINTENANCE
Inspect each season and after large storms, specifically check for clogging or water backup. Filter fabric will extend the life of the dry well but will clog over time. If this occurs, remove, and wash or replace stone and fabric. Care for and maintain plants above dry well, if applicable.

RESOURCES
• New Hampshire Homeowner’s Guide to Stormwater Management
• How to Install a Dry Well by Roger Cook
OVERVIEW
A blue roof is a non-vegetated water retention system made of stone and a sealed waterproof roof membrane. It retains water above the waterproofing layer of a building’s roof. The collected stormwater slowly releases into roof drains or evaporates.

HOW COULD THIS HELP?
Blue roofs retain rooftop runoff onsite, thus reducing the risk of flooding by decreasing burden on the CSS. Specifically, blue roofs reduce the risk of backflow onto your property and seepage into your foundation by reducing the amount of stormwater runoff on your property. Blue roofs are effective and are often less costly than green roofs or subsurface storage systems. They improve insulation, reducing load on the cooling system and can be integrated with other rainwater harvesting strategies.

MATERIALS & CONSIDERATIONS
Required: sealed roof membrane, check dams/trays/modified roof drains, roof leader
Considerations for Installation:
• Determine applicable guidelines and restrictions.
• Determine, with an engineer, whether your roof can support the load of a blue roof.
• Confirm structural load capacity of building.
• Discuss design options.
• Determine waterproofing and construction methods.

MAINTENANCE
Regular maintenance varies by design so it should be discussed with your designer/contractor. It is also important to regularly check on your system to ensure it is working properly.

RESOURCES
• Philadelphia Water Department - Blue Roofs
• Massachusetts Clean Water Toolkit: Rooftop Detention (Blue Roofs)
PERVIOUS PAVING, PATIOS, & WALKWAYS

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<tr>
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OVERVIEW

Pervious paving, patios, and walkways are made with pavers that look similar to traditional pavers, but can absorb and filter rainwater filter into the ground. The goal of pervious paving is to reduce stormwater runoff from your property, thereby alleviating burden on the CSS.

HOW COULD THIS HELP?

Stormwater runoff from hard surfaces quickly exceeds sewer system capacity and can cause backflow onto your property and seepage into your foundation. Increasing pervious surfaces allows more water to be absorbed into the ground and reduces sewer overflows.

MAINTENANCE

Inspect pavers for clogging seasonally and after storms. If clogging occurs, remove and wash/replace pea stone and fabric. Remove vegetation between pavers that was not part of the design. For other cleaning and maintenance of pavers, refer to manufacturer instructions.

MATERIALS & CONSIDERATIONS

Required: measuring tape; shovel; rake; broom; crushed stone; pea stone; non-woven geotextile fabric; tamper; pervious pavers; level

Optional: grass/other plantings between pavers

Considerations for Installation:

• Pervious pavers work best on relatively flat land.
• Determine the ability of your soil to infiltrate water.
• You may need to rent equipment to remove the existing paving material. Existing material can be recycled in various ways.

RESOURCES

• FEMA Protect Your Home from Flooding
• New Hampshire Homeowner’s Guide to Stormwater Management
STRA TE GIES FOR REDUCING FLOOD RISK TO YOUR HOME
ALLEV IATE THE BURDEN ON THE SANITARY SYSTEM: REDUCE WATER USE & STORMWATER RUNOFF

BIO-INFILTRATION: RAIN GARDENS & BIOSWALES

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OVERVIEW
A rain garden or bioswale changes the landscape of your lot to decrease runoff and direct water away from your home. A rain garden (flat bottom) provides a natural place for rainwater to collect and soak into the ground. A bioswale (sloped bottom) is a vegetated channel that slows runoff and directs it to where it can infiltrate the soil.

HOW COULD THIS HELP?
Rain gardens decrease stormwater runoff and recharge groundwater, which decreases runoff into the CSS, thereby lessening flooding. Bioswales have similar functions and help stabilize your soil, reduce erosion, and slow and absorb runoff. Both increase biodiversity.

MATERIALS & CONSIDERATIONS
Rain Garden: stakes; shovel; level; woodchips; mulch; crushed stone; pavers; tarp; wheelbarrow; native plants
Bioswale: measuring tape; shovel; rake; native plants; mulch; wheelbarrow; stakes; string & string level

Considerations for Installation:
- Observe how water flows and accumulates around your home to identify trouble spots.
- Locate the project at least 10 feet away from the building and 15 feet away from a septic tank.
- Test the infiltration ability of your soil.
- Use native plantings.

MAINTENANCE
Inspect seasonally and after storms for erosion, sediment accumulation, and plant stress then clean the garden or swale and replace vegetation as needed. The plants will need regular watering for the first two growing seasons. Weed as needed (you may leave native and non-invasive weeds).

RESOURCES
- FEMA Protect Your Home from Flooding
- Philadelphia Water Department: Rain Gardens

INDEFINITELY WITH MAINTENANCE
NOT REQUIRED
NOT REQUIRED
STRA TE GIES FOR REDUCING FLOOD RISK TO YOUR HOME
CITY OF HOBOKEN

# DOWNSPOUT PLANTER

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## OVERVIEW
Downspout planters collect stormwater runoff from the roof via downspouts. The runoff is absorbed by the vegetation, which temporarily stores and filters sediment and pollution from the water as it infiltrates through the planter. Planters do not infiltrate water into the ground, they rely instead on evapotranspiration and water storage.

## HOW COULD THIS HELP?
By directing water into the planter, stormwater runoff is slowed which decreases the risk of backflow onto your property and seepage into your foundation.

## MATERIALS & CONSIDERATIONS
**Required:** gravel; soil; native plants; downspout diverter; planter box lined with waterproof material; overflow pipe; pervious pavers

**Optional:** the planter can be a standalone (without connection to a downspout), but it will be less effective

**Considerations for Installation:**
- Calculate your roof size and the amount of water each downspout receives, then determine your planter size and the diverter technique you need.
- Carefully arrange your planter plumbing and assemble your planter.

## MAINTENANCE
Ensure the system receives regular water for the first few weeks, depending on the native plants you selected. Regularly inspect the downspout, diverter, and overflow pipe and clear debris when necessary. Weed and maintain the plants in your planter and replace when necessary.

## RESOURCES
- Philadelphia Water Department: Downspout Planters
- Philly Watersheds: How to Build a Downspout Planter
GREEN ROOF

OVERVIEW
A green roof is a roof fully or partially covered in plants. They reduce stormwater runoff by absorbing stormwater into the planting medium. Slowly, excess water is released via roof leaders or evaporation. The system is built in layers and is suitable for many types of roofs, although green roofs work best on flat or almost flat roofs.

HOW COULD THIS HELP?
Green roofs reduce the volume and velocity of stormwater runoff from your roof, thus decreasing the likelihood of sewers flooding during a storm. They also add insulation to your roof which can decrease heating and cooling costs. Lastly, green roofs can support native wildlife and help restore biodiversity to city environments.

MATERIALS & CONSIDERATIONS
Required: Waterproofing layer; root barrier; drainage layer; filter fabric; growing medium; plants
Optional: Water retention layer

Considerations for Installation:
• It is important to select plants native to your region.
• Determine whether your roof can support an extensive (thinner, lighter weight) or intensive (deeper, heavier, and more complex) green roof.
• Decide whether you want a partial or full green roof.

MAINTENANCE
Extensive green roofs are nearly maintenance-free. They will require the occasional removal of weeds and the application of a sustainable fertilizer a few times a year. For the first 2-3 weeks the green roof should be watered regularly, after which regular watering should not be necessary. Regularly check to ensure the drainage system is functioning and if clogging occurs clear gutters.

RESOURCES
• Philadelphia Water Department: Green Roofs
• LiveRoof
• Ecogardens
• Sempergreen

<table>
<thead>
<tr>
<th>COMPLEXITY</th>
<th>COST</th>
<th>APPLICABILITY</th>
<th>LONGEVITY</th>
<th>PERMITS</th>
<th>CONTRACTOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$</td>
<td>FLAT-ROOFED</td>
<td>40 YEARS</td>
<td>REQUIRED</td>
<td>REQUIRED</td>
</tr>
<tr>
<td></td>
<td></td>
<td>HOMES OR</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>ROWHOUSES</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
SECTION 4.

PERMITTING & APPROVAL PROCESS
OVERVIEW

Once you have selected the flood risk reduction strategy or strategies for your property, it is important to understand the City’s permitting and review processes and approvals. This section provides details on how to apply for City permits for zoning, construction, tree removal, sidewalk, and road openings. Note that the NHSA also requires approval for some strategies.

Additionally, where you live may impact the types of reviews and permits you need. Properties need a floodplain permit for all improvements under the Design Flood Elevation (DFE). Those buildings within an historic district may need approval from the Historic Commission for projects that change the facade or character of the structure. If the project involves opening a County Road, the owner must secure a County Road Opening Permit, in addition to the City Permit.

The information contained in this section is for guidance purposes only and does not supersede any local, state, or federal regulation. The permitting information included is only for minor retrofitting of existing buildings and infrastructure. New construction, changes in use, or substantial improvements may be subject to additional regulations.

Please review the information outlined in this section carefully. For specific questions regarding permits or standards, please contact the department responsible for reviewing the relevant permit application.
### Table 4.1 - 1: Permit Matrix

<table>
<thead>
<tr>
<th>Flood Reduction Strategy</th>
<th>Type of Permit/Approval</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Zoning</td>
</tr>
<tr>
<td></td>
<td>Building</td>
</tr>
<tr>
<td>Maintain Indoor &amp; Outdoor Infrastructure</td>
<td></td>
</tr>
<tr>
<td>Scope Camera Down the Sewer Lateral</td>
<td></td>
</tr>
<tr>
<td>Tree Root Tracing and Removal</td>
<td></td>
</tr>
<tr>
<td>Repair or Replace House Connection Supply</td>
<td>✓</td>
</tr>
<tr>
<td>Repair or Replace Defective or Leaking Plumbing Fixtures</td>
<td></td>
</tr>
<tr>
<td>Repair or Replace Lateral House Connection</td>
<td>✓</td>
</tr>
<tr>
<td>Repair or Replace Collins House Traps</td>
<td>✓</td>
</tr>
<tr>
<td>Rehab or Modification of Rear Yard</td>
<td>✓</td>
</tr>
<tr>
<td>Floodproofing Strategies: Prevent Flooding</td>
<td></td>
</tr>
<tr>
<td>Flood Barrier System (Sand-filled Systems and Residential Flood Barriers)</td>
<td>✓</td>
</tr>
<tr>
<td>Seal Openings (Waterproof Windows &amp; Doors and Seal Basement Drains)</td>
<td>✓</td>
</tr>
<tr>
<td>Perimeter or Basement Drainage</td>
<td>✓</td>
</tr>
<tr>
<td>Drain Backflow Preventer</td>
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</tr>
<tr>
<td>Abandon Drains/Pipes</td>
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</tr>
<tr>
<td>Non-Return/Check Valves</td>
<td>✓</td>
</tr>
<tr>
<td>Sump Pump</td>
<td>✓</td>
</tr>
<tr>
<td>Ejector Pump</td>
<td>✓</td>
</tr>
<tr>
<td>Flood-Resistant Construction Strategies: Lessen the Effects of Flooding</td>
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<tr>
<td>Water-Resistant Materials</td>
<td>✓</td>
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<tr>
<td>Install Flood Alert System</td>
<td></td>
</tr>
<tr>
<td>Anchor Fuel Tanks</td>
<td>✓</td>
</tr>
<tr>
<td>Floodproof Equipment with Covers</td>
<td></td>
</tr>
<tr>
<td>Elevate Equipment</td>
<td>✓</td>
</tr>
<tr>
<td>Flood Vents</td>
<td>✓</td>
</tr>
<tr>
<td>Raise Cellar/Basement Floor above DFE</td>
<td>✓</td>
</tr>
<tr>
<td>Fill in Cellar/Basement</td>
<td>✓</td>
</tr>
<tr>
<td>Alleviate the Burden on the Sanitary System: Reduce Water Use &amp; Stormwater Runoff</td>
<td></td>
</tr>
<tr>
<td>Disconnect or Redirect Downspouts</td>
<td>✓</td>
</tr>
<tr>
<td>Disconnect Sump Pump from CSS</td>
<td>✓</td>
</tr>
<tr>
<td>Retain Stormwater (Rain Barrel, Rain Cistern, Dry Well, Blue Roof)</td>
<td>✓</td>
</tr>
<tr>
<td>Decrease Stormwater Runoff (Pervious Pavement, Bio-infiltration, Downspout Planter, Green Roof)</td>
<td>✓</td>
</tr>
</tbody>
</table>
TYPICAL TIMEFRAME:
10 days

LINKS TO FILLABLE APPLICATIONS:
• Zoning Permit Application

WHO TO CONTACT FOR QUESTIONS:
Ann Holtzman, CFM
New Jersey State Certified Zoning Officer
Phone: (201) 420-2000 x 3100
Email: aholtzman@hobokennj.gov

ZONING PERMIT

The Zoning Office is responsible for administering the zoning Code of the City of Hoboken, Hudson County, and the State of New Jersey. Zoning is the delineation of districts and the establishment of regulations governing land and buildings; uses; signage; historic preservation; related performance standards and conditions.

A zoning permit is required for: all new construction, alteration-modification of existing buildings; yards, stoops, and areaways alteration-modification; certification of use for all commercial enterprises; all signage; demolition/clean-out; any modification including repairs of a building’s exterior in the historic district, even painting and window replacement.

A zoning permit may be required even when a building permit is not. Check before starting any work.
CONSTRUCTION PERMIT

INCREASES BUILDING, ELECTRICAL, FIRE, AND/OR PLUMBING SUBCODE

The Hoboken Construction Code Official enforces and administers the New Jersey State Uniform Construction Code (UCC). The Construction Official processes permit applications, reviews to ensure projects comply with the UCC, conducts inspections, and may issue certificates of occupancy or approval.

A construction code permit is needed for any new construction work, additions to structures, renovations, or alterations affecting changes of use or egress. Permits are also needed for maintenance such as siding, roofing, window replacement where an opening size is changed, and replacement of decks and balconies. Construction work often requires approvals from other agencies before a Construction Code Permit may be issued. These prior approvals may include zoning, historic, or floodplain approvals. If your property is in the floodplain or historic district, proceed with those reviews before submitting for a construction permit.

Note: Plans are required for most projects and must be prepared, signed, and sealed by a licensed New Jersey Architect. However, for single family residences the resident homeowner may prepare plans for their own use. For some of the strategies included in this Addendum, homeowners must demonstrate the work was done by a licensed professional. See each strategy for more information.

For any intervention that changes the buildings connection to the NHSA combined sewer, the NHSA will review the design plans and specifications. This includes all ejector pumps, as well as alterations to the locations of connections between roof leaders and the sanitary sewer.
FLOODPLAIN PERMIT

Improvements to properties in the Special Flood Hazard Area as shown on the City’s Flood Hazard Area Map, or that have a lowest enclosed floor below the Design Flood Elevation (DFE) will be required to meet the requirements of the City’s Flood Damage Prevention Code. The 2015 Resilient Building Design Guidelines were developed to help homeowners and design professions navigate local and FEMA/NFIP requirements.

Use the map on page 15 to determine if your property is within a regulated flood zone and what the DFE is for that zone.

If your property is at or below the DFE, or if you are unsure of the elevation of your property within the regulated floodplain, obtain an Elevation Certificate (EC) or site survey with spot elevations from a licensed Professional Land Surveyor. The EC must be provided on FEMA Form OMB No. 1660-0008 or newer and a copy submitted to the City's Floodplain Administrator.

Once the Floodplain Permit and any other required approvals have been obtained, an application is made to the Construction Code Office for plan review and Building Permits.

EMERGENCY WORK

When an emergency threatens a structure or property with imminent destruction or emergency work is required to protect the health and safety of the occupants, the Construction Official or Floodplain Administrator can make an exception to the standard permit approval procedure. However, beyond basic stabilization, any work to demolish, repair or rehabilitate the structure or property will require permits that can only be secured through the approval process. All projects should review these guidelines for ways to minimize future damage.
HISTORIC PRESERVATION COMMISSION APPROVAL

For designated landmark sites and properties within designated historic districts, review by the Historic Preservation Commission (HPC) may be required. The HPC reviews and acts on applications for any exterior addition, renovation, or alteration visible to the public on buildings, structures, or property located within a locally designated historic district.

The Commission is also responsible for reviewing applications for development that include demolition or substantial deconstruction of an existing residential building when the application does not require approval by the Planning Board or Board of Adjustment. The Commission developed Historic Preservation Design Guidelines to assist property owners and design professions when planning restoration projects and alterations. For all flood mitigation measures, property owners are encouraged to select an adaptive treatment that minimizes impact to the historic nature of the building and respects the character of the block frontage, fenestration patterns, rhythm of stoops, and cornice line.

ADDITIONAL INFORMATION:
The Hoboken Historic Preservation Commission meets on the first Monday of each month, at 6:30 PM in the Conference Room of City Hall (ground floor) at 94 Washington Street. Meeting dates, agendas, and transcripts are available online at https://www.hobokennj.gov/municipal-boards/historic-preservation-commission.

ADDITIONAL RESOURCES:
• Historic Preservation Design Guidelines
• City of Hoboken Historic Preservation Ordinance (Chapter 42 of the Municipal Code)
• Fee Schedule
STREET & SIDEWALK OPENINGS PERMIT

Before opening the street or sidewalk to work underneath it, a resident/contractor must first obtain a permit from the Engineering Division. Fees vary based on type and location of the work being done.

If the street is on a County Road, you must apply for a Road Opening Permit from Hudson County.

ADDITIONAL INFORMATION:
To determine if your street is on a County Road, refer to the County Map and County Roads Index.

Additional Conditions for Road Opening Permits, Fee Schedule, and other supporting documents are available in the Hudson County Division of Engineering’s Permit Information Packet.

TYPICAL TIMEFRAME:
Up to 10 days

LINKS TO FILLABLE APPLICATIONS:
• City of Hoboken Street Opening/Sidewalk Permit Application
• Hudson County Street Opening and Excavations Permit Application

WHO TO CONTACT FOR QUESTIONS:
Olga Y. Garcia, PE, CME, City Engineer
Phone: (201) 420-2000 x1107
Email: engineering@hobokennj.gov

Thomas Malavasi, PE, PP, CME, CPWM, County Engineer
Hudson County Division of Engineering
Phone: 201-369-4340

TREE PERMIT

All tree work including pruning, removing, and planting a tree requires a tree permit and must be performed by a licensed professional. As per the “Tree Experts and Tree Care Operators Licensing Act,” tree work cannot be performed without the proper license or certification. One of the following is required to perform tree work: LTE (Licensed Tree Expert) or LTO (Licensed Tree Care Operator).

To obtain a permit, the professional performing the tree work should fill out a tree permit application and submit it to the Urban Forestry Coordinator, who will forward the permit to the Shade Tree Commission (STC) for review. The permit should not be submitted by the property owner. The STC will inspect the tree and site (a site visit with the property owner’s contractor may be required). If approved by the STC, the Urban Forestry Coordinator will sign the application and issue the permit.

ADDITIONAL INFORMATION:
• List of licensed tree professionals in Hudson County
• How to obtain a tree permit
• Shade Tree Commission tree planting specifications

TYPICAL TIMEFRAME:
Up to 10 days

LINKS TO FILLABLE APPLICATIONS:
• Tree Permit

WHO TO CONTACT FOR QUESTIONS:
Hoboken Shade Tree Commission
Email: kmjssbrenner.hstc@gmail.com
Phone: (201) 420-2000 x4004
ADDITIONAL RESOURCES
KEY TERMS AND ACRONYMS

COMMON ABBREVIATIONS USED IN THIS DOCUMENT:
BFE – Base Flood Elevation
DFE - Design Flood Elevation
CSO - Combined Sewer Overflow
CSS - Combined Sewer System
EC – Elevation Certificate
FEMA – Federal Emergency Management Agency
FIRM – Flood Insurance Rate Map
NFIP - National Flood Insurance Program
NHSA - North Hudson Sewerage Authority
NJDEP – New Jersey Department of Environmental Protection
SFHA – Special Flood Hazard Area
UCC – Uniform Construction Code

COMMON TERMS USED IN THIS DOCUMENT:
1-Percent Annual Chance Flood (base flood or 100-year flood) - a flood event having a 1-percent chance of being equaled or exceeded in any given year.

0.2-Percent Annual Chance Flood (500-year flood) - a flood event having a 0.2-percent chance of being equaled or exceeded in any given year.

Base Flood Elevation (BFE) – the water surface elevation resulting from a flood that has a 1-percent or greater chance of being equaled or exceeded in any given year.

Combined Sewer Overflow (CSO) - when the volume from the combined sewage and stormwater exceeds the conveyance capacity of the system and a portion overflows into the Hudson River through the various outfalls located along Hoboken's waterfront.

Combined Sewer System (CSS) - stormwater runoff enters the sewer system and flows through the same pipes as wastewater (sewage).

Design Flood Elevation (DFE) - the elevation to which construction is regulated in the City of Hoboken. It is calculated by taking the base flood elevation on the Adopted Regulatory Flood Maps and adding required freeboard. Freeboard is a specified height above the anticipated flood elevation, that accounts for future conditions and limitations in estimating flood elevations.

Ejector Pump - used to pump sewage away from your home in and into the sewer line when there is excess wastewater.

Flood Insurance Rate Map (FIRM) – the official map on which the Federal Emergency Management Agency has delineated both the areas of special flood hazards and the risk premium zones applicable to the community.
COMMON TERMS USED IN THIS DOCUMENT (cont.):

**Flood-Resistant Material** - any building product [material, component, or system] capable of withstanding direct and prolonged contact [72 hours] with floodwaters without sustaining significant damage. A comprehensive list of flood-resistant building materials can be found in ASCE-24-14, the American Society of Civil Engineers “Flood Resistant Design and Construction” guide.

**Floodproofing** – any combination of structural and nonstructural additions, changes, or adjustments to structures which reduce or eliminate flood damage to real estate or improved real property, water and sanitary facilities, structures, and their contents.

**House Connection** - a part of your house’s sewer that lies between the public sewer and the curb line. This connection is what provides clean water to your home.

**House Trap** - a J-shaped stretch of pipe that creates a barrier of water and air that blocks small critters and the smell of sewage from coming into your home.

**Non-return Valves (Check Valves or Backflow Preventer Valves)** - only allow fluid to flow in one direction. They are fitted to prevent flow in the wrong direction caused by certain pressure conditions.

**Sewer Lateral (Lateral House Connection)** - the pipe that connects your home’s piping to the main sewer line.

**Special Flood Hazard Area** – either the land in the floodplain within a community subject to a one percent or greater chance of flooding in any given year, shown on the FIRM as Zone V, VE, V1-3-, A, AO, A1-30, AE, A99, or AH; or as otherwise specified in the New Jersey Flood Hazard Area Control Act in N.J.A.C. 7:13, whichever is greater.

**Substantial Damage** – defined by FEMA as damage in which the costs of restoring the building/contents to its previous condition would equal or exceed 50% of the market value of the building/contents in its previous condition

**Substantial Improvement** - defined by FEMA as reconstruction, rehabilitation, addition, or other improvement, the cost of which equals or exceeds 50% of the market value of the building before the “start of construction” of the improvement. This excludes projects for the purpose of correcting local health, sanitary, or safety code violations identified by a code enforcement official as necessary to for safe living conditions or projects altering a “historic building”

**Sump** - a pit carved below the surface of your basement floor to hold a sump pump or ejector pump.

**Sump Pump** - draw in groundwater from the basement and direct it away from your home through drainage pipes.
The City of Hoboken hosted a public meeting on Tuesday June 7, 2022 to discuss the overview and intent of the Resilient Buildings Design Guidelines Addendum. The City launched a survey to gather additional public feedback for the final Resilient Buildings Design Guidelines Addendum, which was live until June 20, 2022. A summary of the survey results are included below.

**Question 1: Which of the following applies to you?**

- None of the above: 0
- I work in Hoboken: 6
- I own commercial property in Hoboken: 0
- I own residential property in Hoboken: 35
- I live in Hoboken: 48

Answered: 54  Skipped: 0

**Question 2: Which of the following have you experienced or are concerned...**

- My car(s): 18
- My utilities (water heater, electric panel, furnace) get wet when it floods: 10
- Water comes through doors or floors: 23
- Standing water in my yard after a storm: 14
- Flooding from my toilets, sinks, or appliances: 15
- Water in my storage area or crawlspace: 22

Answered: 48  Skipped: 6
SURVEY RESULTS (cont.)

Question 3: What is your interest in the Design Guidelines Addendum?

- General interest: 39
- Looking for specific information on permitting, funding: 18
- I have taken some measures to reduce flooding, but should do more: 16
- I am still deciding how to reduce flooding on my property: 15
- Other: 2

Answered: 54  Skipped: 0

Question 4: Which of these building types best reflects your property?

- Garden Apartment: 17
- Flush: 13
- Cellar: 13
- Unsure: 6
- Other: 6

Answered: 53  Skipped: 1
SURVEY RESULTS (cont.)

Question 5: Are there additional strategies that you would like included in the Resilient Buildings Design Guidelines Addendum?

- From a home buying standpoint, for people looking to move into or within Hoboken, is there guidance for how to assess if a property is prone to flooding in these new catastrophic events like Ida, where history of no flooding proved irrelevant?
- Enlarging the sewer system so that water may exit to the Hudson
- Most of these solutions are permanent rather than tactical. The city has been really slow in helping people sort long-term solutions. And it’s very difficult to find vendors in town that will do the work. You should definitely include things like portable utility pumps. Quick dam bags that will absorb water when activated. Water alarms/sensors that you can put near a drain to alert when water is present.
- it would be great to make a decision tree or something similar to help folks who cannot afford to hire an engineer. as far as i know, phil reeve is a great resource but has only recommended the ejector pump system. again, i do not have the full picture, but this is what i’ve heard from multiple people. some have the budget for it, but most do not. the latter group needs a way to get more tactical advice.
- I am not the person to reply to “strategy” - that is the job of professionals
- Any strategies need to recognize the significant investment that property owners have made in their Hoboken properties and not impose requirements that would be impractical or expensive. For instance, proposing that a multistory building fill in any levels below DFW in exchange for the right to build an additional level atop the building is impractical in instances where the lowest level of a building is owned separately from the uppermost level (as is common in many rowhouses divided into condos).
- Rain Gardens are helpful.
- Ensuring drains/grates are clear at street level (maybe every other week they need to be checked and remediated). Ensuring drain pipes are cleaned of debris so they can hold max runoff/rain, and sewage isn’t swelling up in a bad storm.
- More bio-swales at crosswalk bump-outs to absorb run-off rivers at the street curbs during downpours.
- ALL new construction and substantial renovation/reconstruction to have 24 hour 100% storm water retention on the property.
- No surface parking for new or substantial construction/reconstruction.
- Sidewalk replacements to be semi pervious/pervious.
- Dry wells
- Information and incentives for installing a green roof. Is it possible to retrofit a Victorian townhouse roof to be a green roof or is it too heavy for an older property.

Answered: 12  Skipped: 42
SURVEY RESULTS (cont.)

Question 6: Do you have additional questions about the Resilient Building Design Guidelines Addendum?

- Can you provide a list of contractors that will perform various flood remedies?
- Also, are there any grants available for flood remedies? How to access these?
- The NHSA grant process sounds expensive and time consuming, why does it cost significant funds even to even see if we qualify? Additionally it sounds like most of the grant funds will be eaten by the costs of extra requirements
- Will there be Resilient Building Design Guidelines specifically tailored to historic structures?
- As long as the buildings are NOT like the High school
- What is being done at the city-wide infrastructure level to avoid sewer system backups in Ida type events?
- Are there federal and state funding available so that infrastructure and property improvement costs do not fall all on the rate payer and property taxpayers?
- For future developments in flood prone areas, it would be beneficial to raise garage or first floor levels
- What effort is the city making to improve the sewerage system which is outdated and completely incapable of handling the capacity of extreme weather events?
- Also rain gardens and underground water storage systems are welcome but these projects seem to be on far too small a scale to have any meaningful impact long-term and protect the historic buildings in town. Has there ever been discussion or serious consideration of buying undeveloped land to ‘set aside’ to create grasslands /dykes / marsh areas that could absorb excess water in storm events? Why not create a grassland strip alongside the light rail as a natural buffer. This would have the added benefit of bringing nature into our densely populated town - improving the quality of life, air quality, and cooling the air temperature. Certainly steps should be taken to protect the greenery on the Palisade cliff between Hoboken and JC Heights and Union City (the UC construction on the Cliff side is appalling and irresponsible in many way.
- Yes, can we raise inlet of our sewage connection

Answered: 11  Skipped: 43
ADDITIONAL RESOURCES

NHSA SEWER FLOOD PROTECTION PROGRAM
DESIGN DETAILS

See next page for full detail.
NOTES:

1. THE DESIGN FOR EACH SITE IS CASE SPECIFIC. THEREFORE, THE DETAILS ON THIS SHEET ARE PRESENTED AS GUIDANCE AND SHOULD BE MODIFIED AS NEEDED BY THE DESIGN ENGINEER FOR SPECIFIC SITE CONDITIONS.

2. PROPERTY OWNER SEWER FLOOD PROTECTION DESIGN MAY INCLUDE THREE ALTERATIONS:
   A. SEPARATION OF STORMWATER DOWNSPOUTS FROM THE SANITARY DISCHARGE WITH INSTALLATION OF BACKFLOW PREVENTER ON THE SANITARY DISCHARGE LINE (WITHOUT PUMPING). GENERALLY, THIS OPTION IS ONLY RECOMMENDED FOR SINGLE FAMILY HOMES.
   B. INSTALLATION OF AN EJECTOR PUMP FOR SEPARATED SANITARY SEWER DISCHARGE PER THE BASEMENT PUMP DETAIL PROVIDED ON THIS SHEET.
   C. IN CASES WHERE SEPARATION OF STORMWATER DOWNSPOUTS AND SANITARY LINES ARE NOT FEASIBLE, INSTALLATION OF A LARGER PUMP FOR COMBINED SEWER DISCHARGE SIZED WITH GUIDANCE PROVIDED UNDER NOTE 3.

3. WHERE FEASIBLE, THE OWNER SHALL DISCONNECT ALL BUILDING STORMWATER DOWNSPOUTS AWAY FROM THE SUMP PIT AND DIRECT ALL STORMWATER TO CONNECT DOWNSTREAM OF THE CHECK VALVES.


5. THE PUMP DISCHARGE SIZE MINIMUM DIAMETER SHALL BE BASED ON THE DESIGN FLOW FOR THE PUMPING SYSTEM BASED ON THE FOLLOWING:

<table>
<thead>
<tr>
<th>DESIGN PUMP FLOW</th>
<th>MIN. PUMP DISCHARGE PIPE DIAMETER</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;100 GPM</td>
<td>2-INCH DISCHARGE PIPES</td>
</tr>
<tr>
<td>&lt;200 GPM</td>
<td>3-INCH DISCHARGE PIPES</td>
</tr>
<tr>
<td>&lt;400 GPM</td>
<td>4-INCH DISCHARGE PIPES</td>
</tr>
</tbody>
</table>

6. BACK-UP PUMPS AND BACK-UP POWER FOR ALL SYSTEMS IS RECOMMENDED. BACK-UP POWER MAY BE IN THE FORM OF A BATTERY BACK-UP SYSTEM OR GENERATOR.

FIGURE 1 - MINIMUM RECOMMENDED PUMPING RATE
(Applies for backup pumping with connected stormwater downsputs)