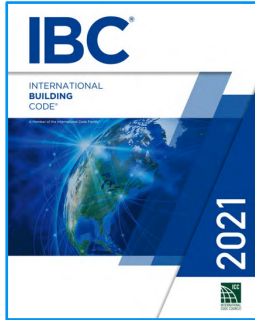


Code Enhancements

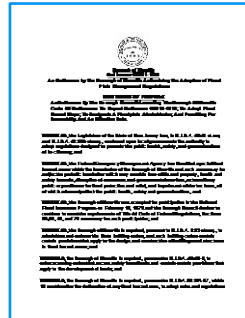
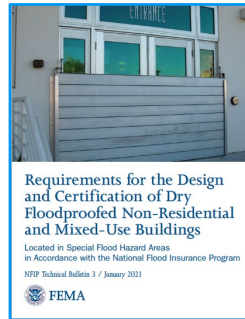
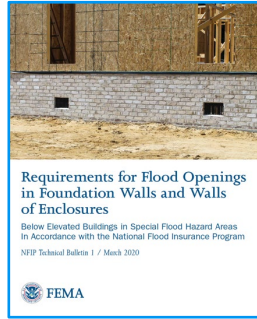


Floodplain Design and Construction

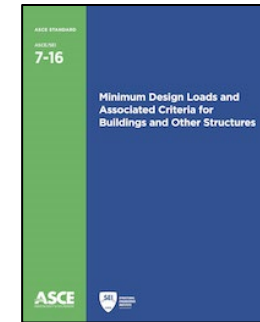
Codes: National & State



Regulations: FEMA, NFIP, Local Floodplain Ordinances



Standards: ASCE



FEMA Technical Bulletin 1 – March 2020



Requirements for Flood Openings in Foundation Walls and Walls of Enclosures

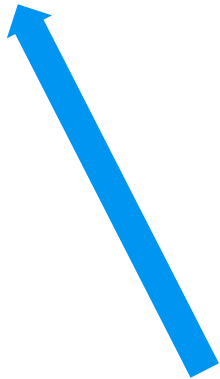
Below Elevated Buildings in Special Flood Hazard Areas
In Accordance with the National Flood Insurance Program

NFIP Technical Bulletin 1 / March 2020



9.2 Non-Engineered Flood Openings

Flood openings without moving parts are non-engineered openings, while those with moving parts should be certified as engineered openings (see Section 9.3). Non-engineered openings are used to provide 1 square inch of net open area for each square foot of enclosed area. The size of an enclosed



Types of Flood Openings

Non-Engineered Openings



Engineered Openings (ICC-ES Certified)



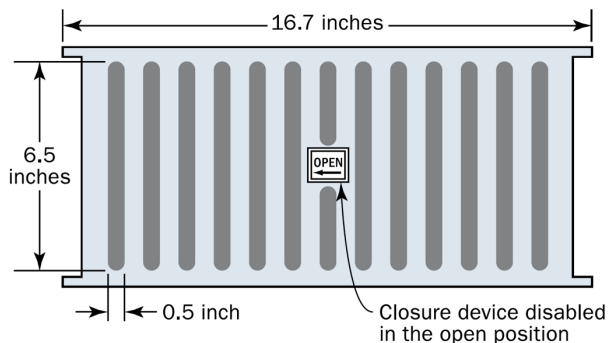
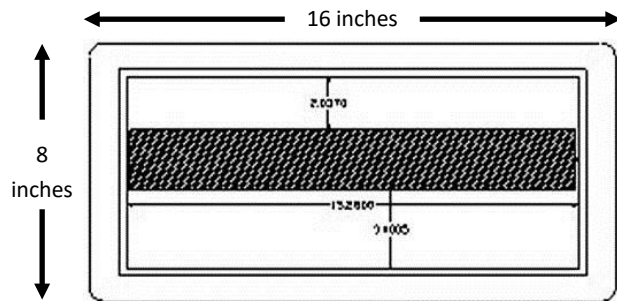
“Flood openings **without moving parts** are **non-engineered openings**, while those **with moving parts** should be certified as **engineered openings**.” FEMA TB-1

Non-Engineered Openings

- **“Not designed”** flood openings.
- Come equipped with obstructions to flow as there is a minimum screen requirement per code.
- Should provide **1 sq. in. of NET open area for every 1 sq. ft. of enclosed area.**
- A 16-in. x 8-in. hole with air vent device inserted does NOT provide 128 sq. in. of open area.
- You must **account for obstructions to flow.** Deducts from the coverage area calculation.
- Liability rests with design professional, contractor, surveyor, construction official specifying and allowing a product for it’s unintended use.



Engineered Flood Vent vs. Non-Engineered



- Example of an Engineered Flood Vent:
(shown with flood door in the open position)

It has **200 sq. ft. of rated flood protection.**



- Example of a Non-Engineered Opening:

It has **42 sq. in. net open area,** if ***permanently disabled*** in the open position.

Flood Opening Coverage Formula: FEMA TB1 pg 34 or ASCE 24 pg 10

$$A_o = 0.033 [1/c] R A_e$$

Where: A_o = total net area of openings required (in²)

0.033 = coefficient corresponding to a factor of safety of 5.0 (in² • hr/ft³)

c = opening coefficient (non-dimensional; see ASCE 24, Table 2-2)

R = worst case rate of rise and fall (ft/hr)

A_e = total enclosed area (ft²)

Figure 25: Equation used to determine total net area of engineered openings (ASCE 24-14; used with permission)

ASCE 24-14 Standards Further Clarify

Table 2-2 Flood Opening Coefficient of Discharge^a

Opening Shape and Condition	<i>c</i>
All shapes, partially obstructed during design flood ^b	0.20
Circular, unobstructed during design flood	0.60
Rectangular, long axis horizontal, short axis vertical, unobstructed during design flood	0.40 ^c
Square, unobstructed during design flood	0.35
Rectangular, short axis horizontal, long axis vertical, unobstructed during design flood	0.25 ^d
Other shapes, unobstructed during design flood	0.30

^a Different coefficients of discharge shall be permitted: (1) where a designer has performed detailed, opening-specific calculations, a coefficient of discharge up to 10% different than given in Table 2-2 shall be permitted; or (2) where laboratory testing or numerical modeling of flow through the opening has been conducted, the resulting coefficient of discharge shall be permitted. In no case shall a coefficient of discharge > 0.60 be permitted.

^b Openings shall be classified as partially obstructed if louvers, blades, screens, grilles, faceplates, or other covers or devices are present during the design flood.

^c When the horizontal dimension is twice or more the vertical dimension, use 0.4; as the dimensions approach a square, interpolate from 0.4 to 0.35.

^d When the horizontal dimension is half or less the vertical dimension, use 0.25; as the dimensions approach a square, interpolate from 0.25 to 0.35.

- This covering and other louvers, blades, grilles and faceplates put air vents into a partially obstructed category which carries a coefficient of discharge of 0.20.
- Using 0.20 in the calculations yields A = 0.83 sq. in. for every 1 sq. ft. of area which is rounded to 1 sq. in. of net open area for every 1 sq. ft. of enclosed space.



Section 9.3.5 NFIP Elevation Certificate and Documentation of Engineered Openings for Flood Insurance - Page 39

NFIP Elevation Certificate must be completed carefully

To complete the NFIP Elevation Certificate with information required for proper rating of NFIP flood insurance policies for buildings with engineered openings, Item A8.c, “Total net area of flood openings in A8.b,” must be filled in with the total coverage or rated area of engineered openings. **The total coverage or rated area is the number of engineered openings identified in Item A8.b multiplied by the “coverage” area, “rated” area, or “enclosed area coverage” identified in the ICC-ES Evaluation Report, equivalent report, or individual certifications.** When engineered openings are used in attached garages, Item A9.c must be completed in the same manner.

NEW
language

The coverage or rated area usually is given in square feet of enclosed area for which an engineered opening can provide automatic inflow and outflow of floodwater, **which is, in effect, equivalent to the performance that would be provided by that number of square inches of non-engineered openings.**

Also, in Section D, “Check here if attachments” must be selected, and a copy of the certification report must be attached to the NFIP Elevation Certificate (see Figure 26). **Notes must be added in the Section D comment section to identify the manufacturer and the manufacturer’s model number of the engineered opening.**

Section 9.3.5 NFIP Elevation Certificate and Documentation of Engineered Openings for Flood Insurance - Page 40

NFIP Elevation Certificate must be completed carefully

A8. For a building with a crawlspace or enclosure(s):	
a) Square footage of crawlspace or enclosure(s) <u>1,675</u> sq ft	
b) Number of permanent flood openings in the crawlspace or enclosure(s) within 1.0 foot above adjacent grade <u>9</u>	
c) Total net area of flood openings in A8.b <u>1,800</u> sq in	<div style="border: 1px solid red; padding: 5px;">Insert coverage/rated area times number of engineering openings in A8.b and A9.b. Add comments to identify engineering openings and attach copy of Evaluation Report or certification</div>
d) Engineered flood openings? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
A9. For a building with an attached garage:	
a) Square footage of attached garage <u>350</u> sq ft	
b) Number of permanent flood openings in the attached garage within 1.0 foot above adjacent grade <u>2</u>	
c) Total net area of flood openings in A9.b <u>400</u> sq in	
d) Engineered flood openings? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
Comments (including type of equipment and location, per C2(e), if applicable)	
<p><i>A8 and A9 – Engineered openings manufactured by XXX Company, Inc., model number XX-XXX, ICC-ES Report No. XXXX (attached). Rated 200 sq in per unit.</i></p>	
FEMA Form 086-0-33 (7/15)	Replaces all previous editions.
	Form Page 1 of 6

Figure 26: Completing the NFIP Elevation Certificate when engineered openings are used

FEMA Technical Bulletin 3 - January 2021



Requirements for the Design and Certification of Dry Floodproofed Non-Residential and Mixed-Use Buildings

Located in Special Flood Hazard Areas
in Accordance with the National Flood Insurance Program


NFIP Technical Bulletin 3 / January 2021



FEMA TB-3: Flood Insurance

4 NFIP Flood Insurance Implications

Careful attention to compliance with the NFIP requirements, local building codes and standards, and floodplain management regulations is important during design, plan review, construction, and inspection. Compliance influences both vulnerability to flood damage and the cost of NFIP flood insurance.



An insurance agent with NFIP experience should be consulted during the design phase of buildings with dry floodproofing to estimate the cost of NFIP flood insurance. The consultation is particularly important when considering whether to include dry floodproofing of non-residential portions of mixed-use buildings or dry floodproofing of below-grade parking areas under non-residential and mixed-use buildings (see NFIP

Technical Bulletin 6, *Requirements for Dry Floodproofed Below-Grade Parking Areas Under Non-Residential and Mixed-Use Buildings*).

Designers should pay particular attention to the flood protection level (level to which buildings will be dry floodproofed). The NFIP regulations applicable to non-residential structures in Zone A require the lowest floor (including basement) to be elevated to or above the BFE or the structures may be dry floodproofed below the

NFIP FLOOD INSURANCE FOR DRY FLOODPROOFED BUILDINGS

While current owners and developers who are considering constructing dry floodproofed non-residential buildings may not intend to purchase NFIP flood insurance coverage, the cost of the coverage may be a factor for future owners.

FEMA TB-3: Glass Curtain Wall Requirements

ASCE INTERPRETATION OF ASCE 24-14 FLOOD SHIELD REQUIREMENTS AND FEMA POSITION ON WHETHER A FLOOD SHIELD CONFIGURATION MEETS NFIP DRY FLOODPROOFING REQUIREMENTS

In November 2016, ASCE issued a formal interpretation of whether a specific configuration of flood shields meets the dry floodproofing requirements of ASCE 24-14.¹ The configuration is described as a building that is supported by an impermeable reinforced concrete stem wall (foundation) with permeable exterior walls such as glass curtain walls. The question was whether the use of removable flood shields as a component of the exterior building façade would render the exterior walls impermeable along the entire length of the façade. Diagrams included in the request for the interpretation show flood shields attached at the base to the impermeable foundation stem wall and attached to vertical, structural columns between spans of the glass curtain wall system.

The ASCE interpretation determined that the flood shield configuration described and shown in the request meets the dry floodproofing requirements of ASCE 24-14 provided the building and shields meet all other dry floodproofing requirements, provided the flood shields are “close to and attached to the building façade,” and provided the shield attachment is “via guides, fasteners or supports that are permanent parts of the building façade.”²

The FEMA position is that the ASCE interpretation is contrary to the NFIP requirements because exterior wall sections that are neither substantially impermeable nor able to resist flood loads will not meet the intent of 44 CFR § 60.3(c)(3) that walls must be “substantially impermeable to the passage of water and with structural components having the capability of resisting hydrostatic and hydrodynamic loads and effects of buoyancy.” Therefore, any temporarily installed means of flood protection that cover such walls would not be considered compliant.

¹ Jonathan C. Esslinger, Director, Technical Advancement and Codes & Standards, ASCE, written communication, November 29, 2016.

² Ibid, Page 5.

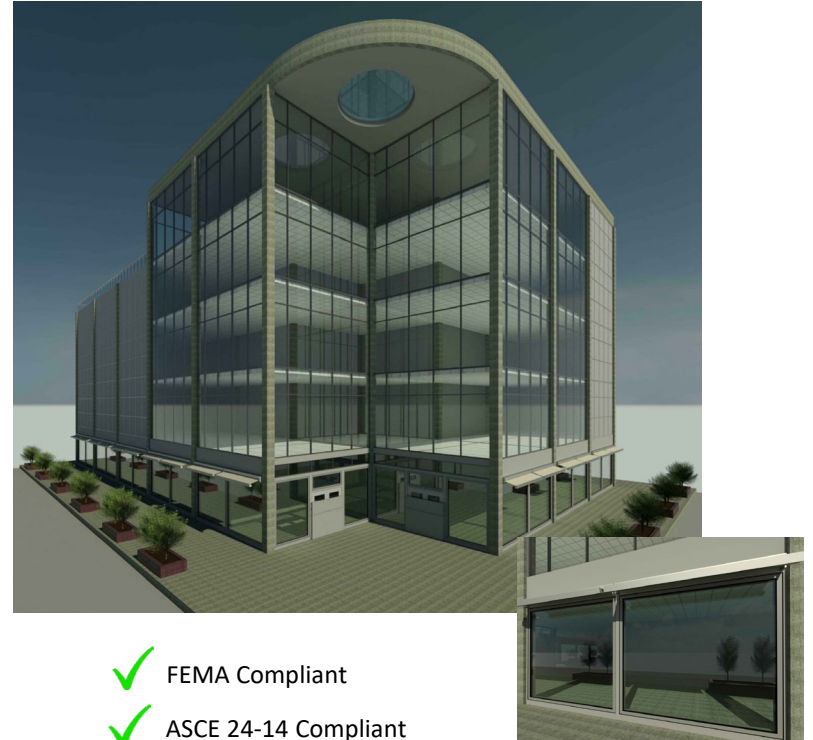
- ASCE 24-14 allows you to have glass curtain walls or window walls protected by deployable flood barriers as long as they bolt back into the structural and substantially impermeable elements of the building, including the building facade.
- FEMA identifies a glass curtain wall or window wall as a “wall”, therefore a deployable flood barrier system over a glass curtain wall or window wall, that is not structural and substantially impermeable, **would not be compliant** and does meet the CFR, in their eyes.
- NFIP participating communities always have to meet the minimum FEMA requirements. The CFR states walls need to be substantially impermeable. A community not enforcing FEMA’s stance on glass wall systems is technically not meeting the minimum requirements.
- A CAV performed by FEMA could put a town on probation due to non-compliance, if these FEMA standards are not met.

FEMA TB-3: Glass Curtain Wall Requirements

Non-floodproof Window and Wall System with Deployable Flood Barriers



Floodproof Window and Wall System



**GLAZING SYSTEMS FOR DRY FLOODPROOFING***Construction Code Requirements***highlights**

PHOTO SOURCE: Sonoma State Flood Coastal



PHOTO SOURCE: Frame Flood Windows

Flood-resistant glazing systems used for flood-proofing non-residential buildings in special flood hazard areas must meet established acceptance criteria. They must be substantially impermeable and resist loading requirements.

PROCESS OVERVIEW

- The Applicant of Record, a Registered Design Professional, prepares documents with all the submission requirements listed in the Buildings Bulletin to DCB's Office of Technical Certification & Research (OTCR) for review and approval (use the OTCR2 Site-specific application form). Flood-resistant glazing systems must be tested and evaluated in accordance with FM2510 or equivalent.
- OTCR approval on the Flood-resistant Glazing Systems must be submitted to Plan Examination as a Technical Requirements item, **Alternative Materials** as part of the plan review.
- Only the OTCR approved glazing system can be installed. Any substitution would require separate testing and review by the Department.
- Special Inspections are performed at the job site as per the 2014 NYC Building Code.

Read the full [Bulletin](#) for more details on the requirements.

background**What is a flood-resistant glazing system?**

Flood-resistant glazing systems are used to dry floodproof to the design flood elevation for nonresidential applications. Flood-resistant glazing systems may include, but are not limited to, aluminum and protected steel framing, steel reinforcing, water stop gaskets, laminated glass, insulated laminated glass and sealants.

How do I get approval to install them?

Acceptable flood-resistant glazing systems that comply with the conditions of this bulletin and approved by OTCR can be installed for dry-floodproofing non-residential buildings.

Send questions to constructioncodes@buildings.nyc.gov

buildings
2020-021
bulletin
OTCRISSUANCE DATE
October 22, 2020ISSUER: **Alan Price, P.E.**
Alan Price
Director, Office of Technical Certification and Research

EFFECTIVE DATE: Immediately to applications submitted after issuance date

PURPOSE: This document establishes evaluation criteria for glazing systems used for dry floodproofing in special flood hazard areas ("flood-resistant glazing systems") designed to meet the definition of "substantially impermeable" and to resist site-specific loads pursuant to ASCE 24.

SUBJECT(S): Special flood hazard areas, dry floodproofing, glazing systems; Substantially impermeable

RELATED CODE SECTIONS: BC G104.5.1, BC G304.1.2(2), BC G105.3, BC G501.1, BC G106.4

I. Background

Section G304.1.2 of Appendix G of the 2014 NYC Building Code and ASCE 24 Section 6.2 allow post-FIRM new structures and substantial improvements that are nonresidential (for flood zone purposes) to be dry floodproofed, provided the structures are dry floodproofed to the design flood elevation specified in ASCE 24, Table 6-1 as modified by Appendix G.

The NYC Construction Codes do not prescribe evaluation criteria for glazing systems for dry floodproofing in special flood hazard areas.

This bulletin establishes acceptance criteria for flood resistant glazing systems that are designed to meet the requirements of dry floodproofing. Acceptable flood-resistant glazing systems must comply with the conditions of this bulletin.

II. Description

Flood-resistant glazing systems may include, but are not limited to, aluminum and protected steel framing, steel reinforcing, water stop gaskets, laminated glass, insulated laminated glass and sealants.

This Buildings Bulletin is not intended to address the following systems: temporary flood shields, flood walls, emergency measures and opening barriers.

III. Uses

Flood-resistant glazing systems are used for dry floodproofing nonresidential (for flood zone purposes) applications up to the design flood elevation. Applications include storefronts at-grade or below the design flood elevation, where solid masonry or concrete impermeable walls are undesirable.

Restriction: Dry floodproofing is not a permitted option for residential (for flood zone purposes) buildings or for structures in the V-Zones.

IV. Evaluation Scope

NYC Construction Codes:

Flood-Resistance Glazing Systems

Floodproof Glazing

Hoboken, NJ encourages floodproof glazing for any storefront window system over 50 linear feet.



Denver Public Works
 Right-of-Way Engineering Services
 Engineering, Regulatory & Analytics Office
 201 W Colfax Ave, Dept. 507
 Denver, CO 80202
 720-865-3003
 www.denvergov.org

**City and County of Denver
 NON-RESIDENTIAL DRY FLOODPROOFING REQUIREMENTS (Feb. 2016 v1.4)**

This document is a reference for dry floodproofing projects located in the regulatory floodplain in the City and County of Denver. This document provides detailed information that is intended to ensure the success of dry floodproofing projects by meeting the documentation requirements for both regulatory and flood insurance purposes.

Any new or substantially improved (i.e. construction cost ≥ 50% market value of the existing building only) building is required to comply with FEMA and the City and County of Denver floodplain regulations. This compliance typically involves elevation of the lowest floor, together with attendant utilities and all associated machinery and equipment, to the minimum Flood Protection Elevation (FPE). The FPE is 1.5 feet above the Base Flood Elevation (BFE), or 1.5 feet plus depth of flooding above the existing Highest Adjacent Grade (HAG) in an AO Zone. When elevation is not feasible, the owner has the option of dry floodproofing the building. Dry floodproofing is only allowed for non-residential structures. *The City and County of Denver highly recommends elevation instead of dry floodproofing whenever possible due to complex design considerations, cost implications, construction and testing difficulties, long term maintenance responsibilities, and potential flood insurance ramifications.* Elevation of a structure is the preferred method of flood protection.

Floodproofed buildings are rated differently for flood insurance than elevated structures; therefore, the City and County of Denver recommends consulting a flood insurance agent prior to initiating floodproofing activities. The insurance agent can help determine if providing flood protection to a higher elevation than Denver requires would be cost effective from a flood insurance standpoint. Typically, a dry floodproofed building must be protected one (1) foot higher compared to an elevated building to secure a similar flood insurance premium. Additional flood insurance information can be found at <https://www.floodsmart.gov>.

The purpose of dry floodproofing is to make a building watertight to floods of limited duration, velocity, depth, and debris. Dry floodproofing works best for slab-on-grade construction. A basement or crawlspace makes dry floodproofing more complex. Portions of the building exposed to floodwaters below the FPE must be constructed with materials resistant to flood damage. Flood Damage-Resistant Materials shall conform to FEMA's Technical Bulletin 2, "Flood Damage-Resistant Materials Requirements" (<http://www.fema.gov/library/viewRecord.do?id=1580>).

Dry floodproofing shall also be in compliance with the following documents:

1. ASCE 24-14, "Flood Resistant Design and Construction": <http://www.asce.org/templates/publications/book-detail.aspx?id=6963>
2. FEMA's P-936 "Floodproofing Non-Residential Buildings": <http://www.fema.gov/media-library/assets/documents/34270>
3. FEMA's Technical Bulletin 3, "Non-Residential Floodproofing-Requirements and Certification": <http://www.fema.gov/library/viewRecord.do?id=1716>
4. FEMA's P-348, "Protecting Building Utilities from Flood Damage": <http://www.fema.gov/library/viewRecord.do?id=1750>

To obtain a floodplain permit for dry floodproofing work in the City and County of Denver, the applicant shall satisfy the following requirements:

1. Due to flash flooding type events in this region, **ALL FLOODPROOFING MEASURES MUST BE EFFECTIVE WITHOUT HUMAN INTERVENTION.** These are often referred to as "passive" or "automatic" systems.

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 DenverGov.org | 311

Protecting the Present & Building the Future
 Accountability, Innovation, Empowerment, Performance, Integrity
 Diversity, Teamwork, Respect, Excellence, Safety

Exterior man doors shall have automatic closing mechanisms, and are closed and locked during business hours. (Other than for the entrance/exit of humans), have automatic closing mechanisms, and are closed and locked during business hours.

Dry floodproofing shall typically be limited to areas with flood velocities adjacent to the structure less than or equal to 8 mph for a 100-year flood event. Dry floodproofing MAY be considered in areas of higher velocities if it can be shown that the dry floodproofing measures can withstand the associated hydrostatic, hydrodynamic, buoyancy, and impact loading due to flood conditions and all safety concerns are addressed to the satisfaction of the City and County of Denver.

At least one exit door or emergency escape/rescue opening capable of providing human ingress and egress must be provided for each structure. (See Section 24.4, Section 24.5, Section 24.6, Section 24.7, Section 24.8, Section 24.9, Section 24.10, Section 24.11, Section 24.12, Section 24.13, Section 24.14, Section 24.15, Section 24.16, Section 24.17, Section 24.18, Section 24.19, Section 24.20, Section 24.21, Section 24.22, Section 24.23, Section 24.24, Section 24.25, Section 24.26, Section 24.27, Section 24.28, Section 24.29, Section 24.30, Section 24.31, Section 24.32, Section 24.33, Section 24.34, Section 24.35, Section 24.36, Section 24.37, Section 24.38, Section 24.39, Section 24.40, Section 24.41, Section 24.42, Section 24.43, Section 24.44, Section 24.45, Section 24.46, Section 24.47, Section 24.48, Section 24.49, Section 24.50, Section 24.51, Section 24.52, Section 24.53, Section 24.54, Section 24.55, Section 24.56, Section 24.57, Section 24.58, Section 24.59, Section 24.60, Section 24.61, Section 24.62, Section 24.63, Section 24.64, Section 24.65, Section 24.66, Section 24.67, Section 24.68, Section 24.69, Section 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25.134, Section 25.135, Section 25.136, Section 25.137, Section 25.138, Section 25.139, Section 25.140, Section 25.141, Section 25.142, Section 25.143, Section 25.144, Section 25.145, Section 25.146, Section 25.147, Section 25.148, Section 25.149, Section 25.150, Section 25.151, Section 25.152, Section 25.153, Section 25.154, Section 25.155, Section 25.156, Section 25.157, Section 25.158, Section 25.159, Section 25.160, Section 25.161, Section 25.162, Section 25.163, Section 25.164, Section 25.165, Section 25.166, Section 25.167, Section 25.168, Section 25.169, Section 25.170, Section 25.171, Section 25.172, Section 25.173, Section 25.174, Section 25.175, Section 25.176, Section 25.177, Section 25.178, Section 25.179, Section 25.180, Section 25.18

More Communities other than Houston, TX Regulating SFHA Zone X to Zone A Standards

Ventnor, NJ Ordinance – Sec. 126-17

- (3) Require within any X Zone on the municipality's FIRM that all new construction and substantial improvement of any residential structure shall have the lowest floor, including basement, elevated at or above the base flood elevation from the best available data, plus three feet. The base flood elevation shall be determined in accordance with §126-14B.
- B. Nonresidential construction. In an area of special flood hazard, all new construction and substantial improvement of any commercial, industrial or other nonresidential structure located in an A or AE Zone or X Zone shall either have the lowest floor, including basement, together with the attendant utilities and sanitary facilities as well as all electrical, heating, ventilating, air-conditioning and other service equipment:
 - (1) Elevated to or above the base flood elevation (published FIS/FIRM), the best available flood hazard data elevation, or as required by ASCE/SEI 24-14, Table 2-1, whichever is more restrictive, plus three feet; and
 - (2) Require within any AO Zone on the municipality's effective FIRM that all new construction and substantial improvement of any commercial, industrial or other nonresidential structure shall have the lowest floor, including basement, elevated above the highest adjacent grade three feet above the depth number specified in feet or at or above the best available flood hazard data elevation plus two feet, whichever is more restrictive, and require adequate drainage paths around structures on slopes to guide floodwaters around and away from proposed structures; or
 - (3) Be floodproofed so that below the base flood level plus three feet, the best available flood hazard data elevation plus three feet, or as required by ASCE/SEI 24-14, Table 6-1 (whichever is more restrictive), or pursuant to §126-14B for structures in the X Zone, the structure is watertight with walls substantially impermeable to the passage of water;

Ventnor, NJ now regulates structures located in X Zones to be regulated as A zone standards, plus 3-ft.



**FREEBOARD
REQUIREMENTS**

Communities Adopting Flood Re-inspections into Ordinance

Cape May, NJ Ordinance – Page 13

§ 199-6.

- A. The purpose of this section is to require an inspection of buildings, structures, or units prior to the transfer of title to determine compliance with City Code Section 258-17E (Flood Damage Prevention), but only with respect to the minimum number of flood vents.

Flood Vent inspections with every home sold in the SFHA can help to get pre-existing homes that do not meet current standards up to code.

At the time of a real estate transaction in Cape May, a flood vent inspection is triggered.

If the house fails, Cape May requires a retrofit into compliance.

Non-Conversion Agreements & Flood Ventilation Compliance Checks

The Property Owner acknowledges and agrees to the following:

1. That s/he is a new owner of the above property,
2. That the enclosed area, if permitted, shall be used solely for parking of vehicles, limited storage, or access to the building and will never be used for human habitation without first becoming fully compliant with the Floodplain Management Ordinance in effect at the time of conversion,
3. That all interior walls, ceilings, and floors below the Flood Protection Elevation shall be unfinished or constructed of flood resistant materials,
4. That mechanical, electrical, or plumbing devices shall not be installed below the Flood Protection Elevation,
- 5. [At the time of inspection this property required _____ square inches of venting. Requiring _____ vents and _____ crawl space access door(s) used to meet the flood venting requirements of the City of Sea Isle City,]
6. That this **Non-conversion Agreement** becomes part of Permit Number _____ and grants the City of Sea Isle City the ability to inspect and enforce the provisions of this **Agreement** at any time.

Sea Isle City, NJ implements Non-Conversion Agreements and Flood Ventilation Compliance Checks to ensure that inhabitable spaces do not get converted to habitable, finished spaces in the future.

FMIA Leverage



Create A More Resilient Community ORDINANCE ENHANCEMENT AREAS



1. Regulate Shaded X Zones
2. Enforce a No Fill in the Floodplain requirement
3. Increase freeboard requirements
4. Require floodplain inspections at point of sale for homes
5. Non-Conversion agreements and flood vent affidavit
6. Flood openings with fixed screens, grills, & louvers shouldn't be acceptable to FMO
7. Reference TB-1 2020 in flood opening sections
8. Require owners to conduct annual flood drills & maintenance on dry floodproofing designs
9. Reference TB- 3 2021 in dry floodproofing section
10. Use passive wet and/or dry floodproofing measures in flash flood areas
11. Annual public outreach to educate the public on flood insurance & mitigation efforts

REACH OUT TO THE FMIA
FOR SUPPORT

info@floodmitigationindustry.org



Periodic Drills & Deployments

Where removable shields are to be used, a flood emergency plan shall be approved by the authority having jurisdiction and shall specify, at a minimum, the following information: storage locations of the shields, the method of installation, conditions activating installation, maintenance of shields and attachment devices, **periodic practice of installing shields**, testing sump pumps and other drainage measures, and inspecting necessary material and equipment to activate or implement floodproofing. The flood emergency plan shall be posted permanently in at least two conspicuous locations within the structure.

ASCE 24-14 (Section 6.2.3 pg. 21)

PERIODIC PLAN REVIEWS, DRILLS, AND INSPECTIONS

An annual review of flood emergency operations plans, with exercises for personnel to practice installing and deploying measures that require human intervention, is critical for success when flooding occurs.

Some communities conduct periodic inspections of dry floodproofed buildings, and some require the submission of reports documenting third-party inspections.

FEMA TB-3 (pg. 16)

- Flood Emergency Plan that includes:
 - > Chain of command;
 - > Notification procedures;
 - > Personnel duties;
 - > Location of floodproofing components, install procedures, repair procedures;
 - > Evacuation procedures for building occupants;
 - > Component maintenance procedures during flooding event;
 - > **Drill and training program (at least once a year);**
 - > Regular review/update of Flood Emergency Plan; and

NFIP FLOOD INSURANCE MANUAL
APRIL 2020 (pg. 70)

6.2.3 Limits on Human Intervention Dry floodproofing measures that require human intervention to activate or implement prior to or during a flood shall be permitted only when all of the following conditions are satisfied:

1. The flood warning time (alerting potential flood victims of a pending flood situation) shall be a minimum of 12 h unless the community operates a flood warning system and implements an emergency plan to ensure safe evacuation of flood hazard areas, in which case human intervention is allowed only if the community can provide a minimum flood warning time equal to or longer than the cumulative time
 - (a) to notify persons responsible for installation of floodproofing measures,
 - (b) for responsible persons to travel to structures to be floodproofed,
 - (c) to install, activate, or implement floodproofing measures, and
 - (d) to evacuate all occupants from the flood hazard area.

ASCE 24-14 (Section 6.2.3 pg. 21)

- ASCE 24-14, FEMA TB-3, & NFIP FLOOD INSURANCE MANUAL require flood emergency and inspection plans approved by authority having jurisdiction.
- Calls for a periodic and annual deployment of shields and barriers.
- Just like a fire drill we need to practice to ensure the system will work.
- Calls for the flood warning time to be a minimum of 12 hours. Floodproofing measures should be installed within the warning time.

NYC 2022 Construction Codes

(effective November 7, 2022)



§28-324.2 Annual Inspection of Covered Dry Floodproofing System

An annual inspection of the covered dry floodproofing system shall be conducted by a person designated by the building owner.

§28-324.2.1 Scope of Annual Inspection

The annual inspection shall include, at a minimum, visual confirmation that all covered systems are in their stored locations and ready for deployment, and that any gaskets do not appear damaged or brittle.

§28-324.2.2 Records

Such inspection shall be documented and such documentation shall be maintained on the premises and provided to the department upon request.



§28-324.3 Triennial Full-Scale Deployment Inspection

A full-scale deployment inspection initiated by the owner shall be conducted every three years in the presence of a special inspection agency that is qualified to perform flood zone compliance special inspections.

§28-324.3.1 Scope of Inspection

The special inspector shall observe, inspect and document the components in their deployed state. Any defects shall be noted. The special inspector shall also review all annual inspection documentation for the preceding three years to confirm its completeness.

§28-324.3.3 Reports

The owner shall submit a written report prepared and certified by the special inspection agency that witnessed the deployment required by section 28-324.3 to the commissioner within 60 days of completing such deployment. The report shall clearly document the condition of the dry floodproofing system and related egress components and appurtenances thereof and shall include a record of all defects, including any significant deterioration, unsafe conditions and missing or defective components and outline any corrective action necessary to address such defects. Such report shall be submitted to the department on such forms and in such manner as required by the commissioner.

§28-324.3.4 Repair

All defects as found in such inspection shall be documented, noted in inspection reports, and corrected. Where missing or incomplete annual inspection records are the defect in question the owner shall provide a narrative of steps taken to ensure future records will be compliant. An affirmation of correction shall be filed by the owner within 60 days of the date of correction.

FEMA Floodproofing Certificate

FEMA “DRY” FLOODPROOFING CERTIFICATE

U.S. DEPARTMENT OF HOMELAND SECURITY FEDERAL EMERGENCY MANAGEMENT AGENCY National Flood Insurance Program		FLOODPROOFING CERTIFICATE FOR NON-RESIDENTIAL STRUCTURES		FEMA NO. 1-062 (2005) Form (Rev. 11-2011)	
<p>The floodproofing of non-residential buildings may be permitted as an alternative to elevating to or above the Base Flood Elevation; however, a floodproofing design certificate is required. This form is to be used for that certification. Floodproofing of a residential building does not alter a community's floodplain management elevation requirements or affect the insurance rating unless the community has been issued an exception by FEMA to allow floodproofed residential assessments. The permitting of a floodproofed residential assessment requires a separate certification specifying that the design complies with the local floodplain management ordinance.</p>					
BUILDING OWNER'S NAME		FIRM INSURANCE COMPANY USE			
STREET ADDRESS (including Apt., Unit, Suite, and/or Bldg. Number) (If F.G. Route and Box Number)		POLICY NUMBER			
ORDER DESCRIPTION (if and Box Numbers, etc.)		CONTRACT FILE NUMBER			
CITY	STATE	ZIP CODE			
SECTION I—FLOOD INSURANCE RATE MAP (FIRM) INFORMATION					
Provide the following from the proper FIRM:					
COMMUNITY NUMBER	FIRM NUMBER	DATE	DATE OF FIRM REISSUE	FIRM CODE	DATE FIRM CANCELLED (If so, Date, Year/Day)
SECTION II—FLOODPROOFING INFORMATION (By a Registered Professional Engineer or Architect)					
Floodproofing Design Elevation Information:					
Building is floodproofed to an elevation of _____ feet NCVD. (Elevation datum used must be the same as that on the FIRM.)					
Height of floodproofing on the building above the lowest adjacent grade is _____ feet.					
(NOTE: For insurance rating purposes, the building's floodproofed design elevation must be at least one foot above the Base Flood Elevation to receive rating credit. If the building is floodproofed only to the Base Flood Elevation, then the building's insurance rating will result in a higher premium.)					
SECTION III—CERTIFICATION (By a Registered Professional Engineer or Architect)					
Non-Residential Floodproofed Construction Certification:					
I certify that, based upon development and/or review of structural design, specifications, and plans for construction, the design and methods of construction are in accordance with accepted standards or practice for meeting the following provisions:					
The structure, together with attendant utilities and sanitary facilities, is watertight to the floodproofing design elevation indicated above, with walls that are substantially impermeable to the passage of water.					
All structural components are capable of resisting hydrostatic and hydrodynamic flood forces, including the effects of buoyancy, and anticipated debris impact forces.					
I certify that the information on this certificate represents my best efforts to interpret the data available. I understand that any false statement may be punishable by fine or imprisonment under 18 U.S. Code, Section 1001.					
CERTIFIER'S NAME	LICENSE NUMBER (if applicable)				
TITLE	COMPANY NAME				
ADDRESS	CITY	STATE	ZIP CODE		
SIGNATURE	DATE	PHONE			
Copies should be made of this Certificate for: 1) community official, 2) insurance agent/company, and 3) building owner.					
FEMA Form 01-05, Rev. 09		REPLACES ALL PREVIOUS EDITIONS		F-054 (2/08)	

Planning: What to consider?

- Warning time, Safety & Access
- Flood Velocities, Depths, and Debris
- Frequency
- Cost & Liability

Emergency Operation Plan

- Establish the chain of command & responsibilities
- Procedure for notifying necessary parties
- A list of specific duties & location of all dry floodproofing materials
- Evacuation plan with and without duties
- Annual training drills with community officials
- The plan is required to ensure that the floodproofing components will operate properly under all conditions, including a power failure which is often seen during floods.

Inspection & Maintenance Plan

- Mechanical equipment, sump pumps & generators
- Inspect & test all flood shields (check gaskets)
- Inspect foundation walls for cracks

NON-RESIDENTIAL
Flood Insurance Checklist
 Steps That May Lead To Significant Flood Insurance Discount

NFIP Dry Floodproofing Credit Checklist



Floodproofing.com is your resource for wet & dry floodproofing products for your non-residential structure
 800-507-0865 | info@floodproofing.com



Risk Reduction Plus Group can assist with any questions & provide the flood coverage your property needs
 866-599-7067 | info@riskreductionplus.com


General Notes

To be eligible for a Non-Residential Floodproofing credit, your building must be floodproofed to +1' above the Base Flood Elevation

All information must be site specific (reflect names, contacts, locations & plans custom to the site)

These documents must be completed correctly & submitted:

1. Flood Insurance Application
Contact Risk Reduction Plus Group for a Flood Insurance Application
2. Elevation Certificate
3. Floodproofing Certificate
Many are rejected for false panel heights listed
4. Photos of the components used to provide floodproofing protection
5. Flood Emergency Plan (Details on other side)
6. Inspection and Maintenance Plan (Details on other side)



Flood Emergency Plan

For more info, reference FEMA Technical Bulletin 3, Pages 16 & 17

- Chain of Command** – Names and phone numbers of who is responsible for: Notification, Deployment, Maintenance, and Inspection
- Notification Procedures** – Who's responsible for notifying the deployment team when they are required. List a contact & describe of how they'll notify the team
- Personnel Duties** – List of duties each person on deployment team is responsible for
- Location of Floodproofing Components** – Exact Location i.e., in the garage on the left side wall
- Install & Repair Procedures** – Provide specs of floodproofing product and deployment instructions
- Evacuation Procedures For Building Occupants** – Brief description of the evacuation plan in the event of a flood
- Maintenance Procedures During Flooding Event** – Instructions for any maintenance that may be required. Be sure to include components other than flood panels (sump pump, generator to power the sump pump, fuel tank to power the generator, fuel pump to fuel the generator, etc.)
- Drill & Training Program** – Confirm this will be completed at least once a year and provide names of who will complete it. Include a plan to confirm you will be deploying and operating all components (installing shields, running sump pumps, running emergency generator, using evacuation egress point). The building does not need to be evacuated nor does it mean a test pit with water against the building needs to be done each year
- Regular Review** - Review Flood Emergency Plan annually & update if necessary

Inspection & Maintenance Plan

For more info, reference Technical Bulletin 3, Pages 17 & 18

- Wall systems** – Name the waterproofing sealant brand that was used
- Floor slab** - Confirm how the floor slabs were designed in order to resist loads. Also confirm that they will be included in the annual inspection, especially at joints
- Openings** – Photos of the openings being protected with deployed flood panel
- Floodproofing components** (panels & gaskets) - Assessment that shows panel sizes, heights & quantity
- Valve operation** – Address the backflow and shut off valves
- Drainage/pump systems** - Sump Pump regulated– photo of the one being used & a brief description of it
- Equipment/tools required to engage floodproofing measures** - If panels require transportation or equipment to install include this information
- Perform Cadence of Inspection & Maintenance Plan** - List frequency at which you plan to perform inspections & update your maintenance plan. Once annually recommended