M & E CODE REQUIREMENTS

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OCTOBER 2021

AGENDA

- INTRODUCTION
- REGULATORY FRAMEWORK
- GUIDANCE
- QUESTIONS/OTHER RELATED TOPICS

REGULATIONS/GUIDANCE

NFIP REGULATIONS (44 CFR 60.3)

I – CODES

ASCE 24-14

MASS BUILDING CODE

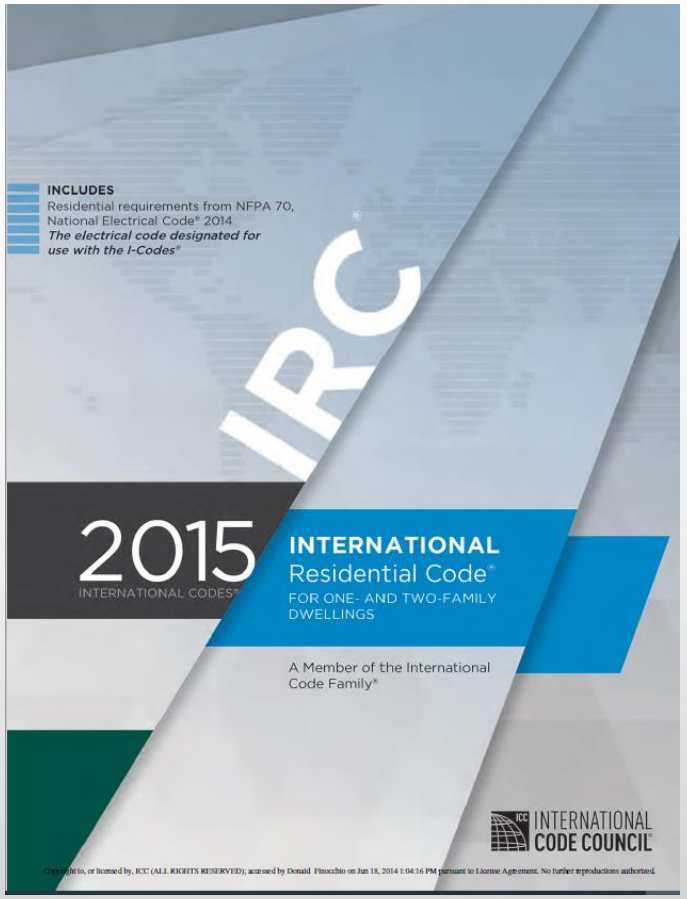
FEMA GUIDANCE DOCUMENTS

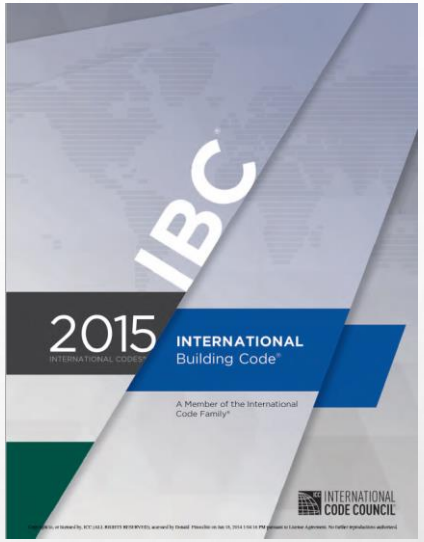
NFIP REGULATIONS (44 CFR 60.3, A, 3, IV)

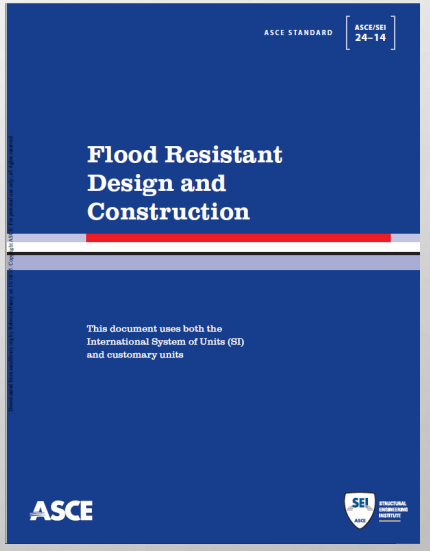
(3), (IV) BE CONSTRUCTED WITH ELECTRICAL, HEATING, VENTILATION, PLUMBING, AND AIR CONDITIONING EQUIPMENT AND OTHER SERVICE FACILITIES THAT ARE DESIGNED AND/OR LOCATED SO AS TO PREVENT WATER FROM ENTERING OR ACCUMULATING WITHIN THE COMPONENTS DURING CONDITIONS OF FLOODING.

STATE BUILDING CODE, 9TH ED

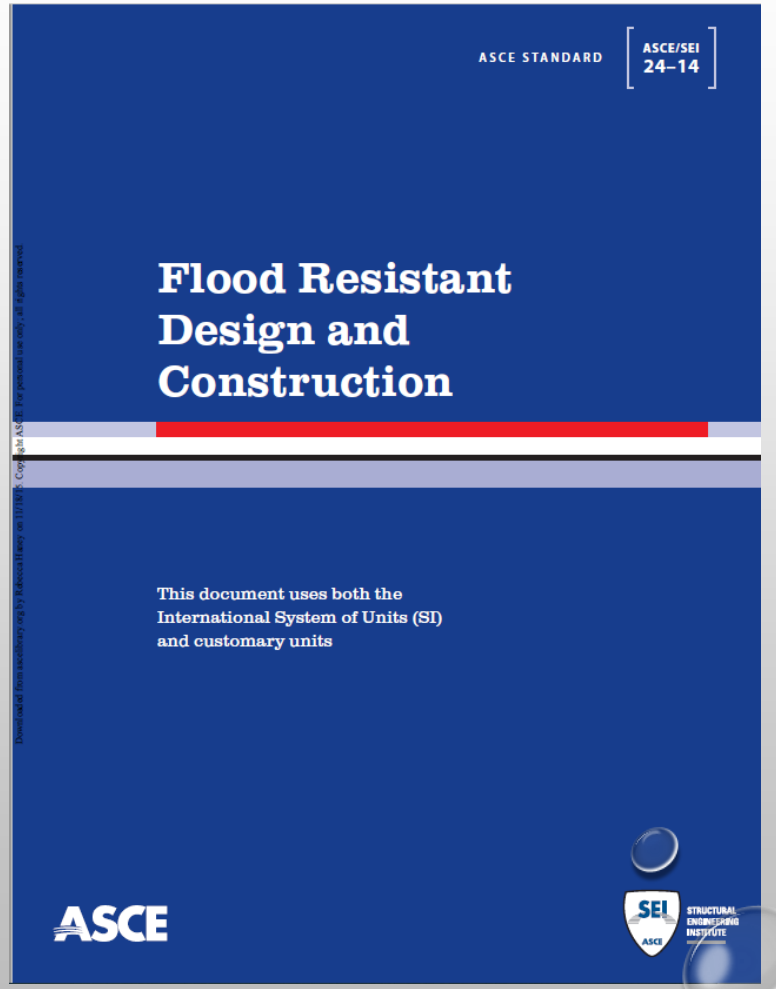
- 2015 IBC
- 2015 IRC
- ASCE 24-14
- FLOOD RESISTANT CONSTRUCTION





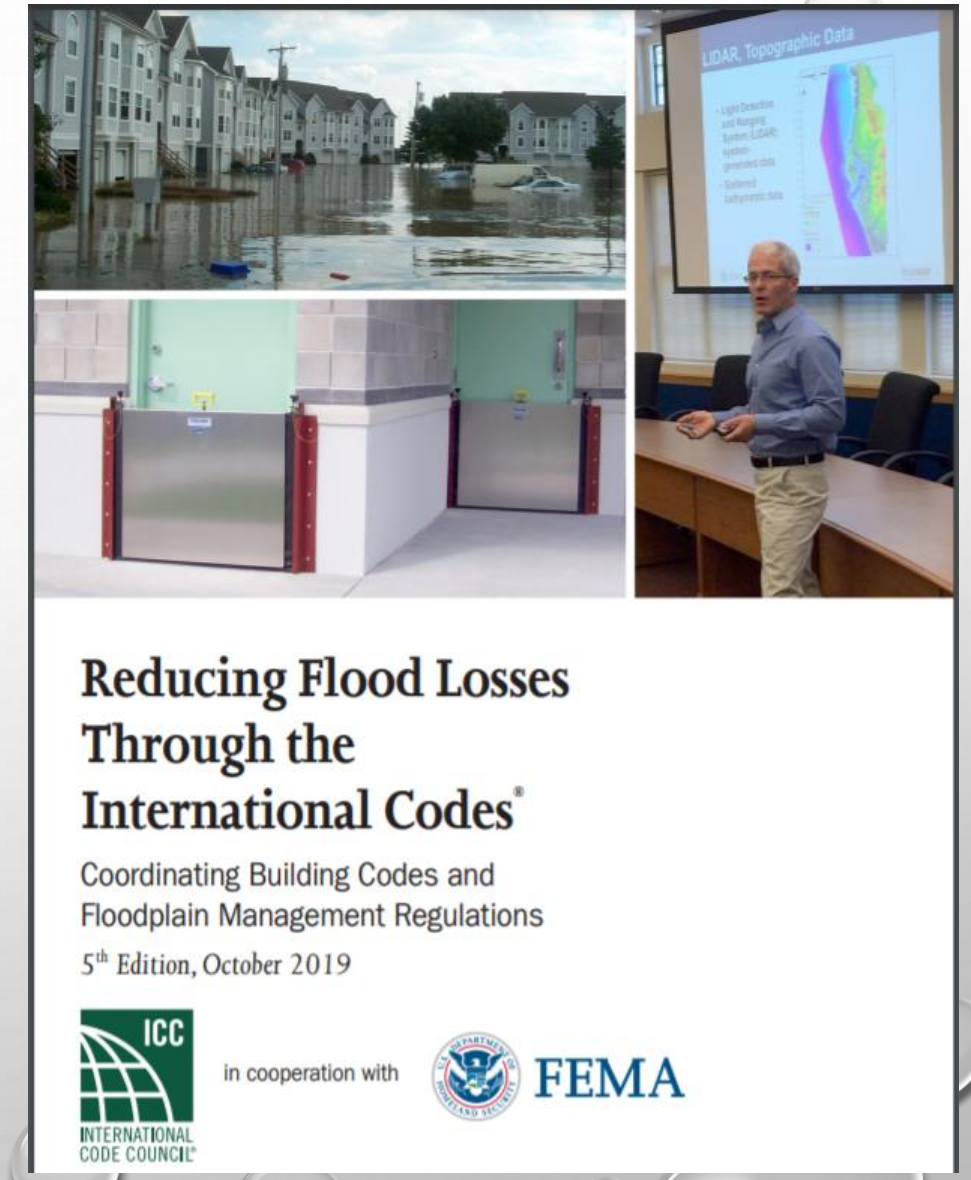


C 1.1 THE REQUIREMENTS OF THIS STANDARD ARE DEVELOPED THROUGH A RIGOROUS CONSENSUS PROCESS OF THE AMERICAN SOCIETY OF CIVIL ENGINEERS (ASCE) AND ARE INTENDED TO PROTECT PUBLIC SAFETY AND PROPERTY. THIS STANDARD IS, IN PART, BASED ON EXAMINATION OF DAMAGE AFTER FLOODS AND IS INTENDED TO MEET OR EXCEED THE REQUIREMENTS OF THE NATIONAL FLOOD INSURANCE PROGRAM (NFIP). ANY CONFLICTS OR DIFFERENCES BETWEEN THIS STANDARD AND OTHER APPLICABLE REGULATIONS SHOULD BE RESOLVED SUCH THAT COMPLIANCE WITH NFIP REQUIREMENTS IS EQUALED OR EXCEEDED. THIS STANDARD IS INTENDED FOR USE BY REGISTERED DESIGN PROFESSIONALS, AND DESIGNS BASED ON THIS STANDARD SHOULD BE SIGNED AND SEALED BY THE PROFESSIONAL WHO IS RESPONSIBLE FOR THE DESIGN.



1.2

The I-Codes and the NFIP This guide covers the I-Codes, a family of codes developed by the International Code Council. The flood provisions in each code in the series (2012 edition and later) either meet or exceed the NFIP requirements for the purpose of NFIP participation. Therefore, communities that participate in the NFIP can rely on the I-Codes to form the basis of their floodplain management practices related to buildings and structures.



Protecting Building Utility Systems From Flood Damage

Principles and Practices for the Design and Construction of Flood Resistant Building Utility Systems

FEMA P-348, Edition 2 / February 2017

FEMA P-348 PROTECTING UTILITY SYSTEMS

Home Builder's Guide to Coastal Construction

Technical Fact Sheet Series

FEMA P-499 / December 2010

FEMA

FEMA P-499 TECHNICAL FACT SHEET SERIES

9th Ed Residential Code

R322.1.6 Protection of Mechanical, Plumbing and Electrical Systems. Electrical systems, equipment and components; heating, ventilating, air conditioning; plumbing appliances and plumbing fixtures; duct systems; and other service equipment shall be located at or above the elevation required in section R322.2, R322.3 or R322.4. If replaced as part of a substantial improvement, electrical systems, equipment and components; heating, ventilating, air conditioning and plumbing appliances and plumbing fixtures; duct systems; and other service equipment shall meet the requirements of this section. Systems, fixtures, and equipment and components shall not be mounted on or penetrate through walls intended to break away under flood loads.

9th Ed Residential Code

- Exception: Locating electrical systems, equipment and components; heating, ventilating, air conditioning; plumbing appliances and plumbing fixtures; duct systems; and other service equipment only within flood hazard areas including A and AO Zones is permitted below the elevation required in section R322.2 provided that they are designed and installed to prevent water from entering or accumulating within the components and to resist hydrostatic and hydrodynamic loads and stresses, including the effects of buoyancy, during the occurrence of flooding to the design flood elevation in accordance with ASCE 24. Electrical wiring systems are permitted to be located below the required elevation provided that they conform to the provisions of the electrical part of 780 CMR 51.00: Massachusetts Residential Code for wet locations.

CRS Requirement

NFIP/CRS

NFIP/CRS UPDATE

June/July 2021

Elevation of Machinery & Equipment: The NFIP and the CRS Class 8 Requirement

Freeboard (additional height above the base flood elevation) for the lowest finished flood of buildings is important. Freeboard results in reduced flood losses, significantly lower flood insurance premiums, and more flood resilient property owners and communities. Also important is the elevation of machinery and equipment (M&E) associated with buildings. M&E being protected from flood damage means fewer National Flood Insurance Program (NFIP) claims. For some communities, M&E being protected can mean fewer future repetitive-loss properties.

Communities have asked for more information on the difference between the Community Rating System (CRS) Class 8 requirement and the minimum requirements included in the *2021 Addendum* to the *2017 CRS Coordinator's Manual*, and what should be in their ordinances or codes.

For the NFIP minimum requirements, 44CFR 60.3 says, "... all new construction and substantial improvements shall... be constructed with electrical, heating, ventilation, plumbing, and air conditioning equipment and other service facilities that are designed and/or located so as to prevent water from entering or accumulating within the components during conditions of flooding." The most common interpretation of this requirement is that either the M&E is elevated to the base flood elevation, or may be placed below the base flood elevation if floodproofed to the base flood elevation.

Also in this Issue

How to Recertify Successfully—Page 5

Candidates Wanted for 2021 CRS Award for Excellence—Page 4

Obtaining Repetitive Loss Data for the CRS—Page 5

Success with CRS: Harrison County, Mississippi—Page 6

Personnel Announcement—Page 7

Training Opportunities—Page 10

FEMA P-348 Table 3.1

Table 3-1. Summary of Mitigation Concepts for Building Utility Systems.

Mitigation Actions for Building Utility Systems	New Construction and SI/SD				Compliance or Conformance Not Required (not SI/SD) All Zones	Factors for Consideration		
	Residential		Nonresidential					
	Zone A	Zone V (CAZ[1])	Zone A	Zone V (CAZ[1])		Active or Passive[2]	Degree of Protection[3]	Relative Cost[4]
Elevation and Relocation								
Elevate on pedestal, or pier/post-supported platform	✓	Not permitted	✓	Not permitted	✓	Passive	High	$
Elevate on pile-supported or knee-braced platform	✓	✓	✓	✓	✓	Passive	High	$$
Relocate to required elevation (pedestal/platform), next higher floor, or roof	✓	✓	✓	✓	✓	Passive	High	$$
Relocate for component protection (dry-flood-proofed vault, machine room, flood barrier)	Not permitted	Not permitted	✓	Not permitted	✓	Active or Passive	Moderate	$$$
Component Protection								
Dry floodproof (building, portion of building, vault, machine room)	Not permitted	Not permitted	✓	Not permitted	✓	Active or Passive	Moderate	$$$
Flood barrier (outside or inside)	Not permitted	Not permitted	✓	Not permitted	✓	Active or Passive	Moderate	$$$
Specially designed equipment	✓	Not permitted	✓	Not permitted	✓	Active or Passive	Moderate	$$$
Partial Protection Measures								
Flood damage-resistant materials	Not permitted	Not permitted	Not permitted	Not permitted	✓	Passive	Low	$$
Facilitate replacement of below-BFE components	Not permitted	Not permitted	Not permitted	Not permitted	✓	Active	Low	$
Emergency measures	Not permitted	Not permitted	Not permitted	Not permitted	✓	Active	Low	$$
Quick-connect mechanisms for below-BFE equipment	Not permitted	Not permitted	Not permitted	Not permitted	✓	Active	Low	$

Mitigation Actions for Building Utility Systems	New Construction and SI/SD				Compliance or Conformance Not Required (not SI/SD) All Zones	Factors for Consideration		
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	Zone A	Zone V (CAZ[1])	Zone A	Zone V (CAZ[1])		Active or Passive[2]	Degree of Protection[3]	Relative Cost[4]
Elevation and Relocation								
Elevate on pedestal, or pier/post-supported platform	✓	Not permitted	✓	Not permitted	✓	Passive	High	$
Elevate on pile-supported or knee-braced platform	✓	✓	✓	✓	✓	Passive	High	$$
Relocate to required elevation (pedestal/ platform), next higher floor, or roof	✓	✓	✓	✓	✓	Passive	High	$$
Relocate for component protection (dry-flood-proofed vault, machine room, flood barrier)	Not permitted	Not permitted	✓	Not permitted	✓	Active or Passive	Moderate	$$$

Mitigation Actions for Building Utility Systems	New Construction and SI/SD				Compliance or Conformance Not Required (not SI/SD) All Zones	Factors for Consideration		
	Residential		Nonresidential					
	Zone A	Zone V (CAZ[1])	Zone A	Zone V (CAZ[1])		Active or Passive[2]	Degree of Protection[3]	Relative Cost[4]
Component Protection								
Dry floodproof (building, portion of building, vault, machine room)	Not permitted	Not permitted	✓	Not permitted	✓	Active or Passive	Moderate	$$$
Flood barrier (outside or inside)	Not permitted	Not permitted	✓	Not permitted	✓	Active or Passive	Moderate	$$$
Specially designed equipment	✓	Not permitted	✓	Not permitted	✓	Active or Passive	Moderate	$$$

Specially Designed Equipment

Although difficult to achieve, an alternative provided by NFIP regulations allows equipment to be located below the BFE, provided that the equipment is designed, constructed, and installed to "prevent water from entering or accumulating within the components during conditions of flooding." While not explicitly stated, the performance expectation is that equipment will be serviceable after flooding recedes, with only minor repair and cleaning so that buildings may be reoccupied quickly. To satisfy the expectation that flooded equipment will be serviceable, the equipment must be specially designed to withstand submersion in floodwater that may contain sediment, salts, and other contaminants (refer to Section 1.5.1). Regular maintenance should be performed according to manufacturer instructions. In addition, equipment permitted below the BFE must:

- Be anchored to resist flood loads during conditions as severe as the base flood;
- Be protected from flood-borne debris;
- Not act as a pathway for water to enter buildings; and
- Have connections designed to be submerged.

HVAC

- Install HVAC components (e.g., condensers, air handlers, ductwork, electrical components) above the DFE.
- Mount outdoor units on the leeward side of the building.
- Secure the unit so that it cannot move, vibrate, or be blown off its support.
- Protect the unit from damage by windborne debris.

Elevated air conditioning compressors.

Electrical

- Limit switches, wiring, and receptacles below the DFE to those items required for life safety. Substitute motion detectors above the DFE for below-DFE switches whenever possible. Use only ground-fault-protected electrical breakers below the DFE.

- Install service connections (e.g., electrical lines, panels, and meters; telephone junction boxes; cable junction boxes) above the DFE, on the landward side of interior piles or other vertical support members.

- Use drip loops to minimize water entry at penetrations. n

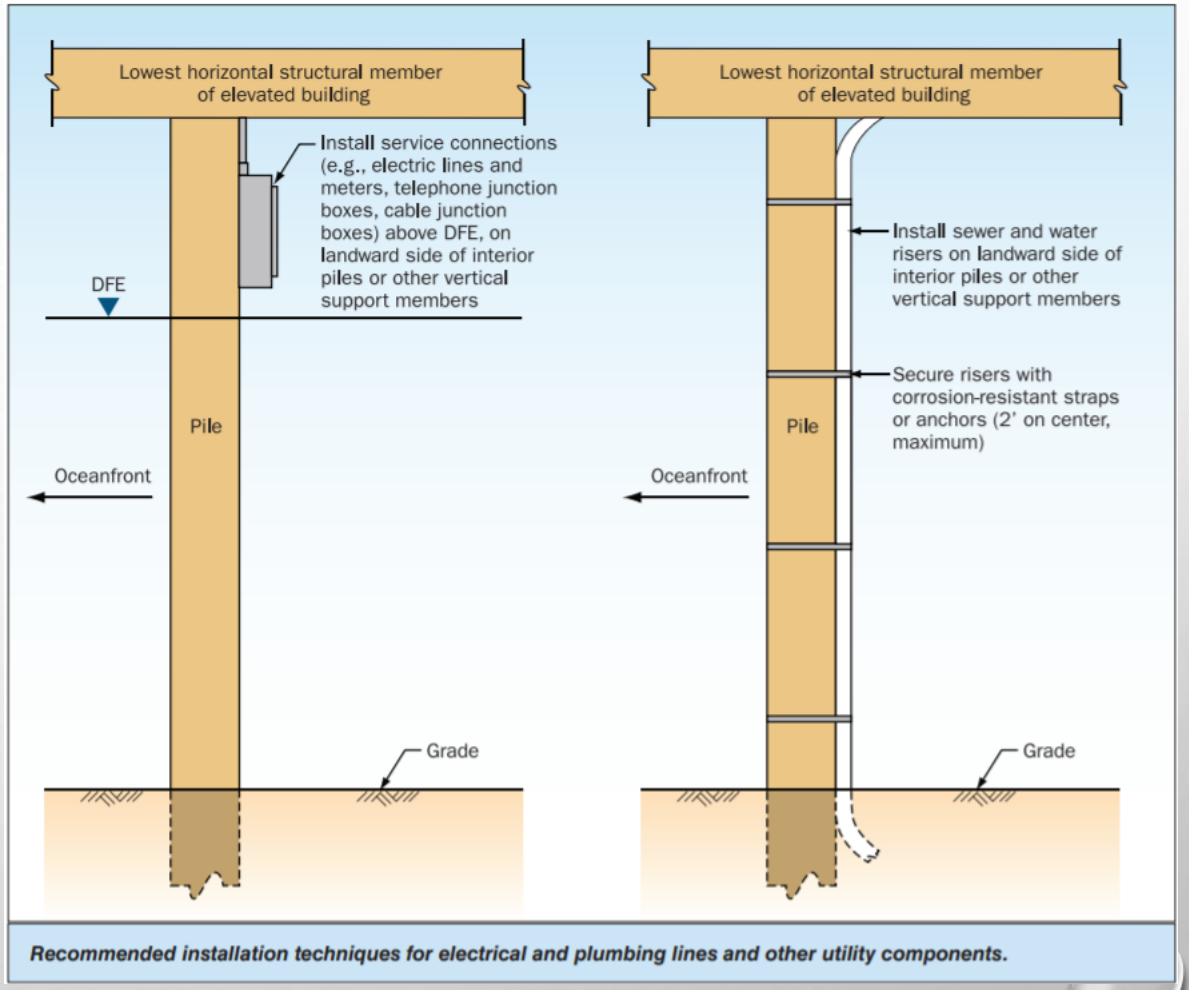
- Never attach electrical components to breakaway walls.

Water/Sewage

- Attach plumbing risers on the landward side of interior piles or other vertical support members.

- When possible, install plumbing runs inside joists for protection.

- Never attach plumbing runs to breakaway walls.



Recommended installation techniques for electrical and plumbing lines and other utility components.

TANKS

A ZONES. R322.2.4 TANKS. UNDERGROUND TANKS SHALL BE ANCHORED TO PREVENT FLOTATION, COLLAPSE AND LATERAL MOVEMENT UNDER CONDITIONS OF THE BASE FLOOD. ABOVE-GROUND TANKS SHALL BE INSTALLED AT OR ABOVE THE ELEVATION REQUIRED IN SECTION R322.2.1 OR SHALL BE ANCHORED TO PREVENT FLOTATION, COLLAPSE AND LATERAL MOVEMENT UNDER CONDITIONS OF THE BASE FLOOD

V ZONES. R322.3.7 TANKS. UNDERGROUND TANKS SHALL BE ANCHORED TO PREVENT FLOTATION, COLLAPSE AND LATERAL MOVEMENT UNDER CONDITIONS OF THE BASE FLOOD. ABOVE-GROUND TANKS SHALL BE INSTALLED AT OR ABOVE THE ELEVATION REQUIRED IN SECTION R322.3.2. WHERE ELEVATED ON PLATFORMS, THE PLATFORMS SHALL BE CANTILEVERED FROM OR KNEE BRACED TO THE BUILDING OR SHALL BE SUPPORTED ON FOUNDATIONS THAT CONFORM TO THE REQUIREMENTS OF SECTION R322.3

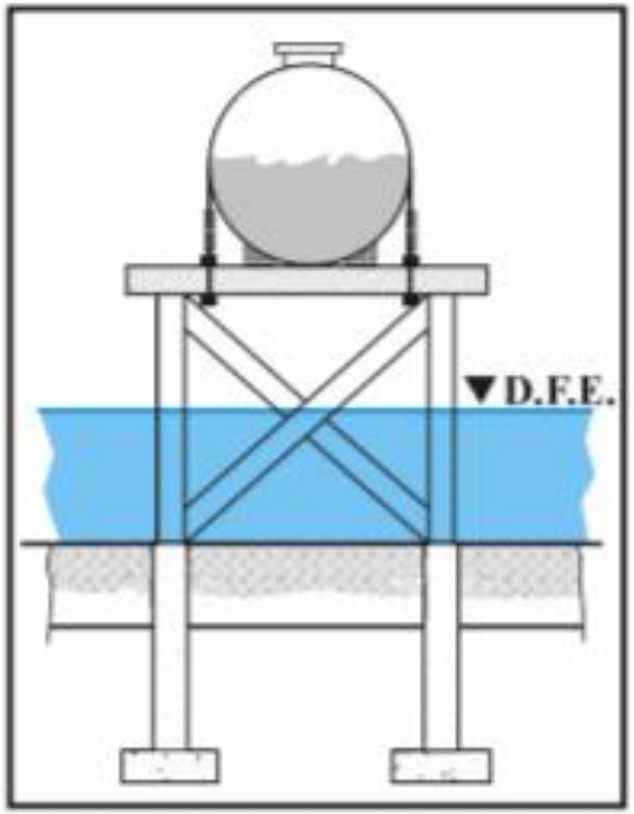
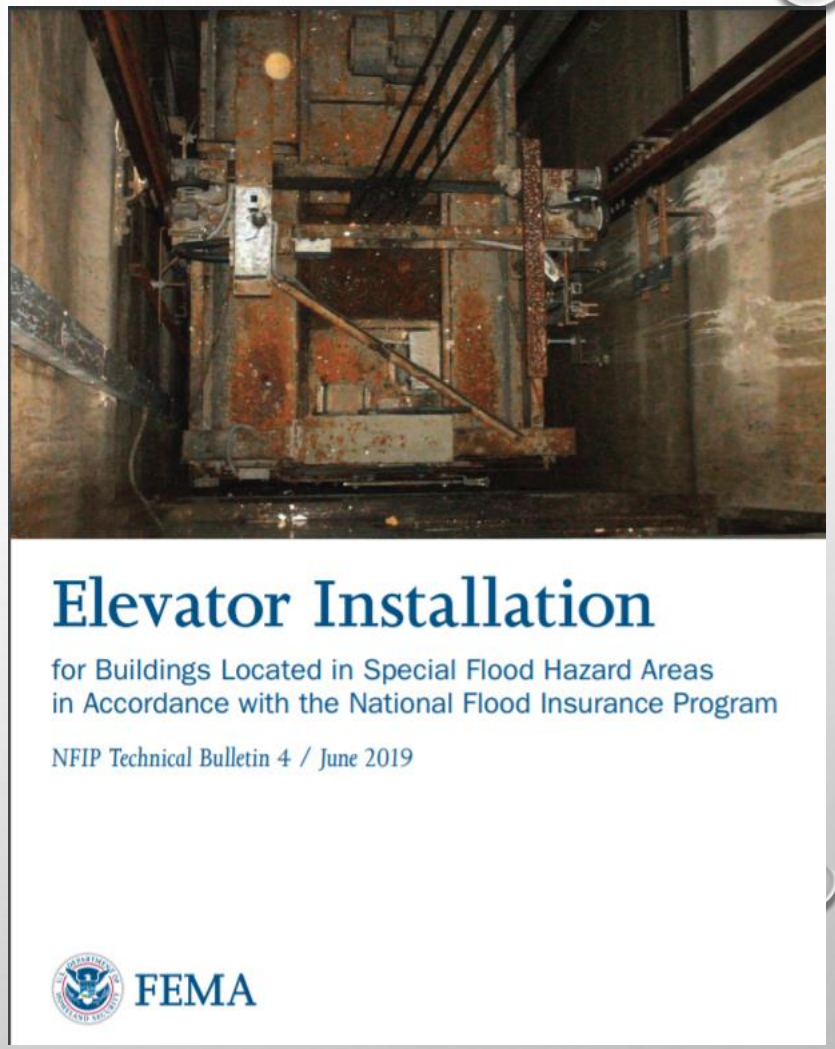


Figure 3.2.3A: A fuel tank elevated above the DFE on a platform in a velocity flow area

ELEVATOR INSTALLATION

FEMA TB-4

ASCE 24-14, Section 7.5



Topic	Summary of Select 2018 IBC/ASCE 24-14 Requirements and Changes from 2015 and 2012/ASCE 24-05	Comparison with NFIP Requirements
Elevators	**ASCE 24-14, Section 7.5 Elevators** • Elevator components must be located above the elevations required for buildings unless specifically permitted by this section. • Components below the required elevations must be composed of flood damage-resistant materials and capable of resisting physical damage due to flooding. • Hydraulic elevators are permitted below the required elevation, but electrical control panels, hydraulic pumps, and tanks must be elevated; drainage must be provided for the elevator pit; hydraulic lines, hydraulic cylinders, and buffer springs must be located to prevent physical damage due to flooding or painted or coated with galvanic or rust-preventive paint. • Traction elevator systems must have elevated machine rooms, and components in hoistways below the required elevation must be protected from physical damage due to flooding. • Elevators must be equipped with controls that prevent cabs from descending into floodwater. • Elevator shafts must resist flood loads. In Zone A, shafts are not required to have flood openings; in Zone V and Coastal A Zones, shafts are not required to have breakaway walls. Change from ASCE 24-05: Added subsection on elevator shafts.	Exceeds NFIP 44 CFR § 60.3(a)(3) with more specificity.

Questions?

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