Q: Where can I get a copy of American Society of Civil Engineers (ASCE) 24: Flood Resistant Design and Construction?

With permission from ASCE, FEMA has produced a document highlighting ASCE 24’s requirements, including a summary of elevation requirements (https://www.fema.gov/media-library/assets/documents/14983).

Q: How does ASCE 24 relate to ASCE 7: Minimum Design Loads and Associated Criteria for Buildings and Other Structures?
A: Chapter 5 (Flood Loads) of ASCE 7 lists ASCE 24 as a consensus standard and is considered part of ASCE 7 to the extent it is referenced in Chapter 5 (e.g., Section 5.3.3, Loads on Breakaway Walls). In ASCE 24, any building load requirements reference ASCE 7 for load calculation.

Q: Does maximum 10% increase apply to the footprint or to the total square footage of a structure?
A: Total square footage of a structure. “The square footage of the resulting structure shall be no more than 10 percent greater than that of the original structure” (FEMA’s 2015 Hazard Mitigation Assistance Guidance Addendum, Appendix D, Section D.3.1, Scope of Work, p. 63).

The Addendum provides details on mitigation reconstruction and is available at (https://www.fema.gov/media-library-data/1424983165449-38f5dfc69c0bd4ea8a161e8bb7b79553/HMA_Addendum_022715_508.pdf).

Q: Does ASCE 24 address flooding in dense urban areas?
A: Yes. ASCE 24 provides guidance on building design and construction for flood resistance in all flood hazard areas that are subject to building code requirements, including in dense urban areas.


Q: How many communities have adopted the International Building Codes (IBC)?
Based on the data in the report, FEMA has determined that as of December 31, 2014, the following percentages of communities had adopted the relevant disaster-resistant building codes: more than 68% in all hazard-prone areas, 71% in flood-prone areas, 74% in hurricane-prone areas, and 83% in seismic-prone areas.

Q: Are all 2017 flood disaster recovery programs required to adhere to ASCE 24-14?

Q: Are ASCE 24 and IBC, Appendix G (Flood-Resistant Construction), likely to be required in the future before mitigation monies can be obtained?
A: ASCE 24-14 is currently required as a condition of grant funding for mitigation reconstruction, elevation, and dry floodproofing projects under the FEMA Hazard Mitigation Assistance (HMA) programs.

Currently, the adoption of Appendix G of the IBC is not automatic with the adoption of the IBC; it is at the discretion of the Authority Having Jurisdiction. Appendix G is applicable only if it is specifically adopted. It is possible that Appendix G will be added to FEMA project requirements. Appendix G is intended to fulfill the floodplain management and administrative requirements of the National Flood Insurance Program (NFIP) that are not included in the body of the International Codes (I-Codes). Most communities are likely to have a floodplain management ordinance that contains requirements for buildings and requirements similar to those in Appendix G.

Q: Are all of these codes compliant with the Americans with Disabilities Act (ADA)?
A: IBC, Chapter 11, and International Residential Code, Section R320, both address accessibility. ASCE 24 should not prevent the incorporation of features into a building that will prevent ADA compliance.

Q: Has Building Sciences provided a value statement in the mitigation grants section that allows grantees to go above the minimum requirements using grant funds?
A: The HMA Guidance currently does not have any restrictions that prevent local jurisdictions from going above the minimum requirements for a given mitigation project. General grant award conditions indicate that projects must comply with all relevant State and local building codes, some of which may be more stringent than those identified as minimums by FEMA.

Q: Can HMA exceed code and FEMA regulations and the applicant still be reimbursed? Here is an example. In elevating heating, ventilation and air conditioning (HVAC) compressors above the Base Flood Elevation (BFE) if the flood line from the incident is greater than the BFE, can the applicant exceed the flood line? If so, how much can the flood line be exceeded? Let’s say current grade = 0.0 feet, BFE = 2 feet, and flood line = 5 feet.
A: Yes. There are currently no restrictions in the HMA Guidance that prevent going above the minimum elevation requirements for a mitigation project.
Q: Can an applicant elevate above the flood line and be fully reimbursed for a building that is not in a Special Flood Hazard Area (SFHA) but has been flooded?

A: Yes. There are currently no restrictions in the HMA Guidance that prevent going above the minimum elevation requirements for a mitigation project.

Q: Are the following still valid? Grant Applicant Quick Reference Guide to Mitigation eGrants System (March 2012), Highlights of ASCE 24-14 (July 2015), Highlights of ASCE 24-05 (December 2010), and the Disaster Reduction Minimum Codes and Standards Policy 204-078-2.

A: Yes. The Quick Reference Guide and the Highlights of ASCE 24-05 reference the 2012 I-Codes and ASCE 24-05 and are still valid for those code/standard editions, but there have been notable updates to subsequent code/standard editions. For a summary of changes to the flood provisions in the I-Codes, see Summary of Changes from the 2012 I-Codes (https://www.fema.gov/media-library/assets/documents/100537), Flood Resistant Provisions of the 2015 International Codes (https://www.fema.gov/media-library/assets/documents/100537), and the last page of Highlights of ASCE 24-14.

Q: Are you aware of any modern floor joist systems that are flood damage-resistant?

A: According to Technical Bulletin 2, Flood Damage-Resistant Materials Requirements (https://www.fema.gov/media-library/assets/documents/2655), dimensional lumber is considered flood damage-resistant. Floor trusses constructed of dimensional lumber (such as 2x4) and steel floor trusses are considered flood damage-resistant. I-joists are usually not considered flood damage-resistant based on the material composition.

For materials that are not listed as flood damage-resistant in Technical Bulletin 2, material and product literature can be submitted to the local building official for consideration. Acceptance of a material should be based on sufficient evidence supplied by the applicant that the material proposed for below the BFE will resist flood damage and only require cosmetic repair and cleaning following a flood event. See “Materials Not Listed” on page 5 of Technical Bulletin 2.

Q: Is dry floodproofing of condominiums allowed?

A: The answer depends on whether the building is outside or inside the Special Flood Hazard Area (SFHA) and when the building was constructed.

Buildings outside the SFHA can be dry floodproofed, but there are no flood insurance premium benefits.

Residential buildings inside the SFHA that were constructed prior to the community’s joining the NFIP are allowed to be dry floodproofed provided they have not previously been determined to be Substantially Improved or Substantially Damaged by a local building official. If dry floodproofing is allowed, no flood insurance premium discount will apply.

Residential buildings that were constructed after the community joined the NFIP are not allowed to be dry floodproofed.
For mixed-use buildings that were constructed after the community joined the NFIP, it is important to consult with the local floodplain administrator because there are allowances for commercial and other non-residential portions of the building. Any portion of the building that is used by residents is normally considered a residential area and is not allowed to be dry floodproofed.

**Q:** Does the community have to adopt Coastal A Zone requirements to enforce?

**A:** Yes. To fulfill HMA grant requirements or meet the intent of FEMA Policy 204-078-2, a community only needs to enforce ASCE 24 for the projects that FEMA is funding. There is no requirement for the community-wide adoption of ASCE-24 for projects funded by other means. If a community chooses to adopt the IBC and its referenced standards, such as ASCE-24, as its local building requirement, this code would need to be enforced for all relevant construction throughout the jurisdiction regardless of whether it is funded by FEMA grants.

**Q:** What is 60.3?

**A:** Title 44 Code of Federal Regulations Section Part 60.3 (44 CFR 60.3), Flood Plain Management Criteria for Flood-Prone Areas ([https://www.ecfr.gov/cgi-bin/text-idx?SID=9d2d9122abc8f539b686edf23e22e8fc&mc=true&node=se44.1.60_13&rgn=div8](https://www.ecfr.gov/cgi-bin/text-idx?SID=9d2d9122abc8f539b686edf23e22e8fc&mc=true&node=se44.1.60_13&rgn=div8)), which defines the regulation of SFHAs.

**Q:** When elevating a home in an SFHA - AE Zone, are basements below grade required to be filled in to grade?

**A:** Yes unless the community is currently listed by the NFIP as one with a recognized basement exception. If the building is in a community that is currently listed as having a basement exception, the FEMA Regional office should be contacted regarding the requirement to fill the basement. If there is no basement exception, basements should be filled in following the elevation of the home. For post-Flood Insurance Rate Map (FIRM) buildings, basements will be rated as the lowest floor for NFIP flood insurance rating purposes.

**Q:** Do you mean that ASCE 24 supersedes HMA 2015?

**A:** For disasters that use the HMA Guidance dated February 27, 2015, or later, communities are required to incorporate ASCE 24 for certain flood risk-reduction projects. This is discussed in Appendix F of the HMA Guidance and referenced in the other project-specific appendices. ASCE 24 applies to all projects located in the SFHA for disasters declared after September 6, 2016, or programs initiated after September 6, 2016.

**Q:** How much freeboard does ASCE-24 require for residential structures?

**A:** ASCE 24 designates freeboard by Flood Design Class rather than by building occupancy. Most residential structures are designated Flood Design Class 2, which requires 1 foot of freeboard or the Design Flood Elevation (DFE), whichever is higher as the *minimum* elevation requirement. More freeboard is allowable.
Q: Can a local building official adopt Substantial Damage (SD) provisions with a BFE assessed by the local government? Can the local floodplain manager extend SD requirements beyond the SFHA?

A: FEMA P-758, *Substantial Improvement/Substantial Damage Desk Reference* (https://www.fema.gov/media-library/assets/documents/18562) provides answers to many questions about SD provisions, and FEMA P-1080, *Answers to Questions about Increased Cost of Compliance* (https://www.fema.gov/media-library/assets/documents/142200) provides answers to many questions about Increased Cost of Compliance (ICC). Local jurisdictions have the option of adopting more stringent standards than those in NFIP regulations and the guidance documents cited here. The question of whether ICC funds are available for buildings deemed by a local official to be Substantially Damaged outside the SFHA is best answered by your insurance carrier.

Q: How does ASCE 24 address risk management for sea level change and extreme precipitation such as Hurricane Harvey?

A: ASCE 24 identifies minimum freeboard requirements based on the currently adopted BFE shown on the applicable FIRM. The community is allowed to adopt a DFE by adopting additional freeboard or by creating new community-specific flood maps. The community may elect to incorporate additional freeboard, which may address future conditions.

Q: You mentioned a High Flood Risk Hazard Area. Is that what is known as a floodway?

A: Chapter 3 of ASCE 24 covers High Risk Flood Areas. The conditions in High Risk Flood Areas that are discussed are alluvial fan flooding, flash flooding, mudslides, erosion, high-velocity flows, high-velocity wave action, breaking wave heights greater than or equal to 1.5 feet, and damage-causing ice or debris. Most development in floodways is addressed in Chapter 2, which covers basic requirements for flood hazard areas that are not identified as Coastal High Hazard Areas or Coastal A Zones. Section C2.2 addresses development in the floodway.

Q: Many of the rural government jurisdictions in our area do not enforce building codes or participate in the NFIP. Is there a mechanism in ASCE policies to require building codes for flood zones?

A: For disasters that use the HMA Guidance dated February 27, 2015, or later, communities are required to incorporate ASCE 24 for flood risk-reduction projects. This is discussed in Appendix F and referenced in the other project-specific appendix sections.

For disasters declared after September 6, 2016, or programs initiated after September 6, 2016, ASCE 24 applies to all projects in the SFHA. Communities are only required to enforce the flood provisions of the codes or ASCE 24 on projects using FEMA funds and are not required under the referenced guidance or memorandum to enforce these requirements community wide. However, enforcing the requirements is recommended because studies have indicated that adopting codes and standards reduces building damage due to natural hazards.

One option for communities that do not enforce community-wide building codes is for the community to require in its floodplain management ordinance that building design and construction be in accordance with ASCE 24. FEMA Building Science has developed draft model code-coordinated...
ordinances that may be adapted for this purpose (https://www.fema.gov/media-library/assets/documents/96224).

Q: If I have old maps or maps without a Limit of Moderate Wave Action (LiMWA), how can I obtain the LiMWA information?

A: ASCE 24, Section C4.1.1, provides a summary of the Coastal High Hazard Areas and Coastal A Zones. This section indicates what to do if the LiMWA is not identified on your FIRMs. With sufficient references in its regulations, a community can adopt additional maps to designate areas as Coastal A Zones as a way of delineating Coastal A Zones prior to inclusion on FIRMs. When FEMA funding is used, the best available data should be used. If preliminary maps or Advisory Base Flood Maps delineate the Coastal A Zone, those should be used for project enforcement.

Q: How do the NFIP and ASCE 24 requirements differ?

A: NFIP- 2015 I-Codes and ASCE 24 Checklist (https://www.fema.gov/media-library/assets/documents/100537) provides a comparison of NFIP regulatory requirements and sections of ASCE 24 that meet or exceed the NFIP but does not indicate when an ASCE 24 requirement is more restrictive than the NFIP. A description of many of the differences between the NFIP, I-Codes, and ASCE 24 is included in Chapter 3 of the 4th edition of Reducing Flood Losses Through the International Codes: Coordinating Building Codes and Floodplain Management Regulations (https://www.fema.gov/media-library/assets/documents/96634).

Q: Does ASCE-24 address cumulative Substantial Improvements (SI)/ SD?

A: No. SI/SD requirements are referenced in building codes and floodplain management regulations. ASCE 24 is an engineering design standard that is referenced in the building codes and mentions SI/SD requirements as they apply to implementation of the engineering standard. The International Code definition of SI/SD is not a cumulative definition. Detailed information on SI/SD requirements can be found in FEMA P-758, Substantial Improvement/Substantial Damage Desk Reference (https://www.fema.gov/media-library/assets/documents/18562).

Q: Mudflow. Any suggestions for rebuilding (e.g., Santa Barbara DR-4353)?

A: Section 3.4 of ASCE 24 prohibits new construction and SI in areas that are subject to mudslides. Section 3.4.1 provides restrictions on construction behind protective works. Determinations need to be made for buildings in areas that are not Substantially Damaged, and based on evaluations made at the Regional level, a determination must be made about how best to mitigate the buildings still subject to mudslide/mudflow risk. Section C3.4 provides commentary on Mudslide Areas. If buildings are to be mitigated in these areas, post-disaster assessments may indicate minimum foundation and elevation requirements. Then Guidance for Applying ASCE 24 Engineering Standards to Flood Retrofitting and Reconstruction Projects (https://www.fema.gov/media-library/assets/documents/93594) can be used to determine which sections of ASCE 24 should apply and which sections are insufficient and need to use higher freeboard requirements and more robust foundation requirements. Read Chapter 3 and Chapter C3 in their entirety to capture other flood hazard information.
Q: What is the link to Guidance for Applying ASCE 24 Engineering Standards to HMA Flood and Retrofitting and Reconstruction Projects (2013)?
A: [https://www.fema.gov/media-library/assets/documents/93594](https://www.fema.gov/media-library/assets/documents/93594)

Q: Should a community depend on an engineer to show that a project is near a water flow at or greater to 5 feet per second?
A: Yes. In most instances, it is the responsibility of the engineer to evaluate flow velocity. The RiskMap product called Flood Depth and Analysis Grids indicates the depth and velocity of floodwaters as well as the probability of an area being flooded over time. In riverine situations, dry floodproofing is not allowed within the floodway. In coastal situations, FEMA P-55, Coastal Construction Manual ([https://www.fema.gov/media-library/assets/documents/3293](https://www.fema.gov/media-library/assets/documents/3293)), provides formulas for calculating velocity in areas subject to coastal storm surge. The engineer needs to sign and seal the building plans so it is imperative that the engineer verify the velocity at the site, and it should be stated on the plans.