



Building Codes 101

Cost Smart Council

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Annapolis



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Fear the Turtle

What is a building code?

A building code is the minimum acceptable standard used to regulate the design, construction and maintenance of buildings.

Insurance Institute for Business & Home Safety's

Building Code Resources

Why are building codes needed?

Enhanced codes promote the building of safe and durable structures, safeguarded from incidents such as fires and electrical malfunctions, as well as natural disasters.

- **Statewide building codes – and adequate enforcement – play a vital role in public safety and loss prevention, which can reduce the need for public disaster aid and increase a community’s viability.**
- **Codes establish predictable and consistent minimum standards that are applied to the quality and durability of construction materials.**

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What is the value of a building code?

- **Losses from Hurricane Andrew, which struck south Florida in 1992 and caused more than \$20 billion in insured damage, would have been reduced by 50 percent for residential and by 40 percent for commercial properties if they were built in accordance with Florida's 2004 statewide building code. (IBHS)**
- **Modern building codes reduced the severity of 2004 Hurricane Charley losses by 42 percent and loss frequency by 60 percent. (IBHS)**
- **Cost/ benefit studies conducted by the National Science Foundation and Texas A&M University have shown a long-term savings of \$3-\$16 for every dollar added to construction costs associated with the adoption of stronger minimum code provisions for wind and seismic protections**

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Who sets modern building code standards?

Modern codes are consensus documents based on established scientific and engineering principles, drafted through input from leading technical experts, construction professionals, enforcement personnel and the products industries.

- The International Code Council (ICC) has developed the most widely adopted set of codes to unify the U.S. building regulatory system.
- The ICC was created by a merger of the Building Officials and Code Administrators International, Inc.; International Conference of Building Officials; and Southern Building Code Congress International, Inc.

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Building Code Resources



2012 INTERNATIONAL BUILDING CODE®

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IBC

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A REPORT TO THE GOVERNOR AND THE
MARYLAND GENERAL ASSEMBLY:
A Review of Current Statewide Building Codes and
Recommendations for Enhancement in Coastal Regions of Maryland

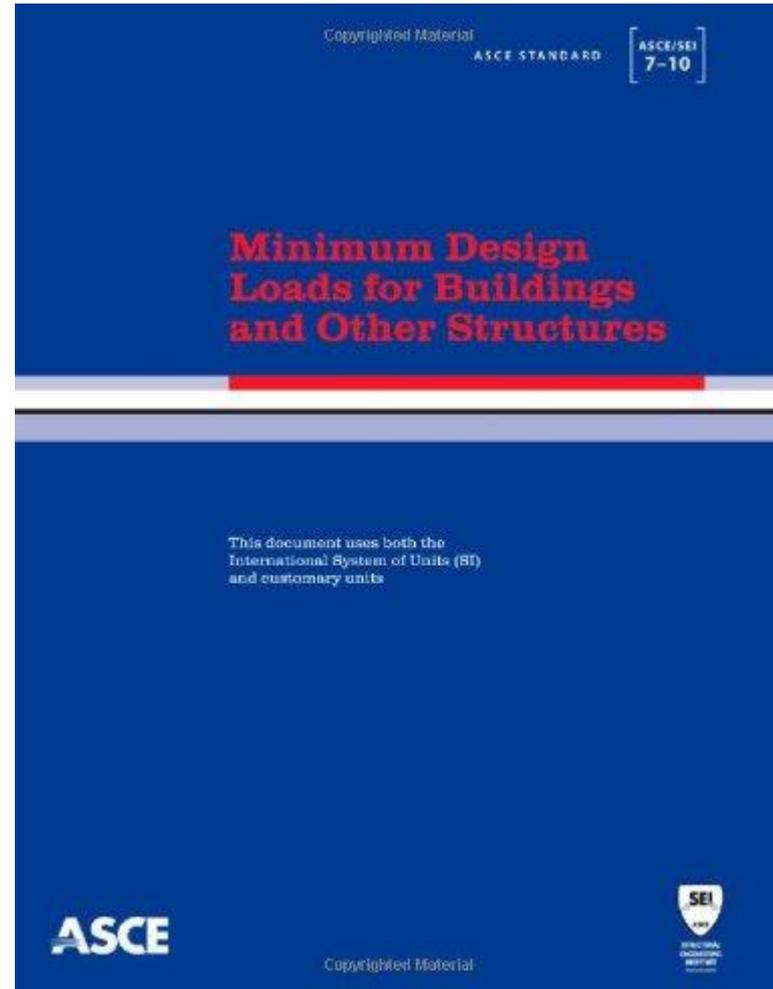
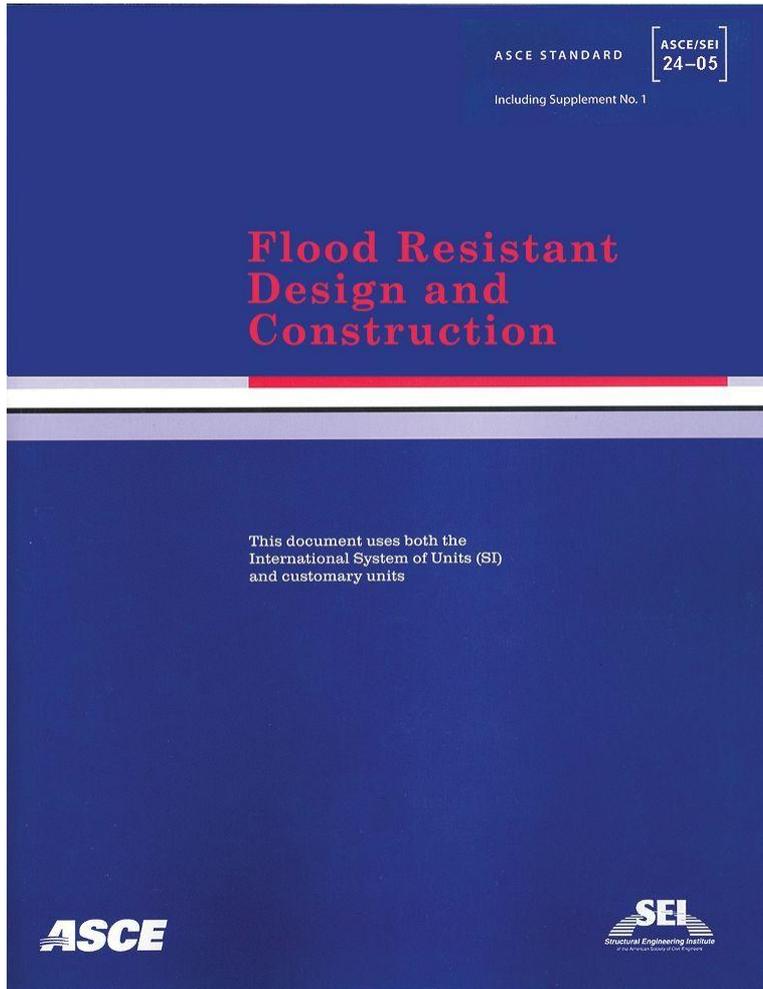
Prepared by

*Maryland Department of Housing and Community Development
in accordance with Section 2 of the Omnibus Coastal Property Insurance
Reform Act of 2008 (Act), Chapter 540 (House Bill 1353)*

Conclusions

- The International Code Council (ICC) has been working with coastal communities for many years to develop and enhance their building codes to provide the best protection for residential and commercial properties. It is evident from our review of Maryland and other states' building codes that the International Codes (I-Codes) published by the ICC will mitigate damages where adopted and implemented.
- 1) Therefore, DHCD strongly recommends that Maryland coastal communities adopt the 2010 MBPS, which includes the latest versions of the International Building Code (2009 IBC) and International Residential Code (2009 IRC).
- 2) DHCD further recommends that coastal communities follow the ICC nationally-developed code recommendations provided in the IBC and IRC chapters in order to establish wind and flood design loads specific to their local conditions.

ASCE Design Manuals



Flood Resistant Design and Construction**Building Performance**

Freeboard is required as a function of the nature of occupancy and the flood zone (see table below). Dwellings and most other buildings have 1-foot of freeboard; certain essential facilities have 2-3 feet; only agricultural facilities, temporary facilities and minor storage facilities are allowed to have their lowest floors at the BFE.

Flood loads and other loads are those specified in ASCE 7.

Performance of foundations exposed to flood loads and load combinations is specified; soil characteristics and underlying strata, including soil consolidation, expansion or movement, erosion and scour, liquefaction and subsidence must be considered.

Fill is required to be stable under conditions of flooding, including rapid rise and rapid drawdown, prolonged inundation, and erosion and scour; structural fill compaction is specified or an engineering report is required, side slopes are required to be no steeper than 1:1.5.

Specifications for slabs-on-grade are listed depending on the purpose and location of the slabs.

HIGHLIGHTS OF ASCE 24-05

See next page for description of Categories →

		Category I	Category II	Category III	Category IV
Elevation of Lowest Floor (A Zone: Table 2-1)	All A Zones not identified as Coastal A Zones: elevation of lowest floor	DFE	BFE +1 ft or DFE, whichever is higher	BFE +1 ft or DFE, whichever is higher	BFE +2 ft or DFE, whichever is higher
Elevation of Bottom of Lowest Horizontal Structural Member (V Zone: Table 4-1)	All V Zones and Coastal A Zones: where the lowest horizontal structural member is parallel to direction of wave approach	DFE	DFE	BFE +1 ft or DFE, whichever is higher	BFE +1 ft or DFE, whichever is higher
	All V Zones and Coastal A Zones: where the lowest horizontal structural member is perpendicular to direction of wave approach	DFE	BFE +1 ft or DFE, whichever is higher	BFE +2 ft or DFE, whichever is higher	BFE +2 ft or DFE, whichever is higher
Elevation Below Which Flood-Damage-Resistant Materials Shall be Used (Table 5-1)	All A Zones not identified as Coastal A Zones	DFE	BFE +1 ft or DFE, whichever is higher	BFE +1 ft or DFE, whichever is higher	BFE +2 ft or DFE, whichever is higher
	All V Zones and Coastal A Zones: where the lowest horizontal structural member is parallel to direction of wave approach	DFE	BFE +1 ft or DFE, whichever is higher	BFE +2 ft or DFE, whichever is higher	BFE +2 ft or DFE, whichever is higher
	All V Zones and Coastal A Zones: where the lowest horizontal structural member is perpendicular to direction of wave approach	DFE	BFE +2 ft or DFE, whichever is higher	BFE +3 ft or DFE, whichever is higher	BFE +3 ft or DFE, whichever is higher



FLOOD

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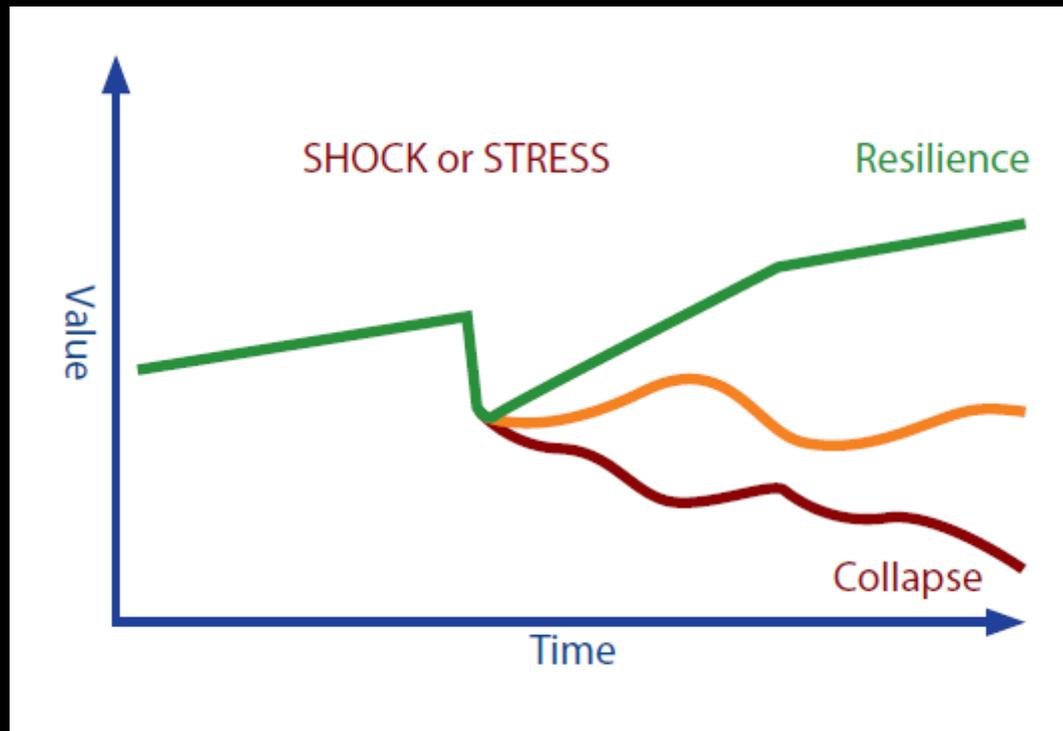
Guidelines

One of the most important steps ensuring flood damage is minimized after the flood has receded from buildings is to quickly clean up the damage the flood has created. In order to accomplish a fast cleanup, power, heating, and air conditioning has to be restored quickly. Therefore, when designing the location or selecting equipment for power and HVAC systems, consider the following:

- Electrical equipment, particularly dry-type transformers, high-voltage air circuit breakers, and modern control equipment that uses semi-conductor circuitry are highly susceptible to water damage.
- Boilers, furnaces, and ovens will sustain extensive damage. If flood waters rise while the unit is firing or still hot, the unit is susceptible to considerable permanent deflection. Fine silt will penetrate combustion, air, and gaseous fuel piping as well as burner assemblies.
- Tanks can sustain major damage. Below-floor along with elevated tanks may be hydrostatically damaging the tank, building floor and surrounding equipment. Released contents may contaminate other areas.

Resilience

The ability to prepare and plan for, absorb, recover from or more successfully adapt to actual or potential adverse events.

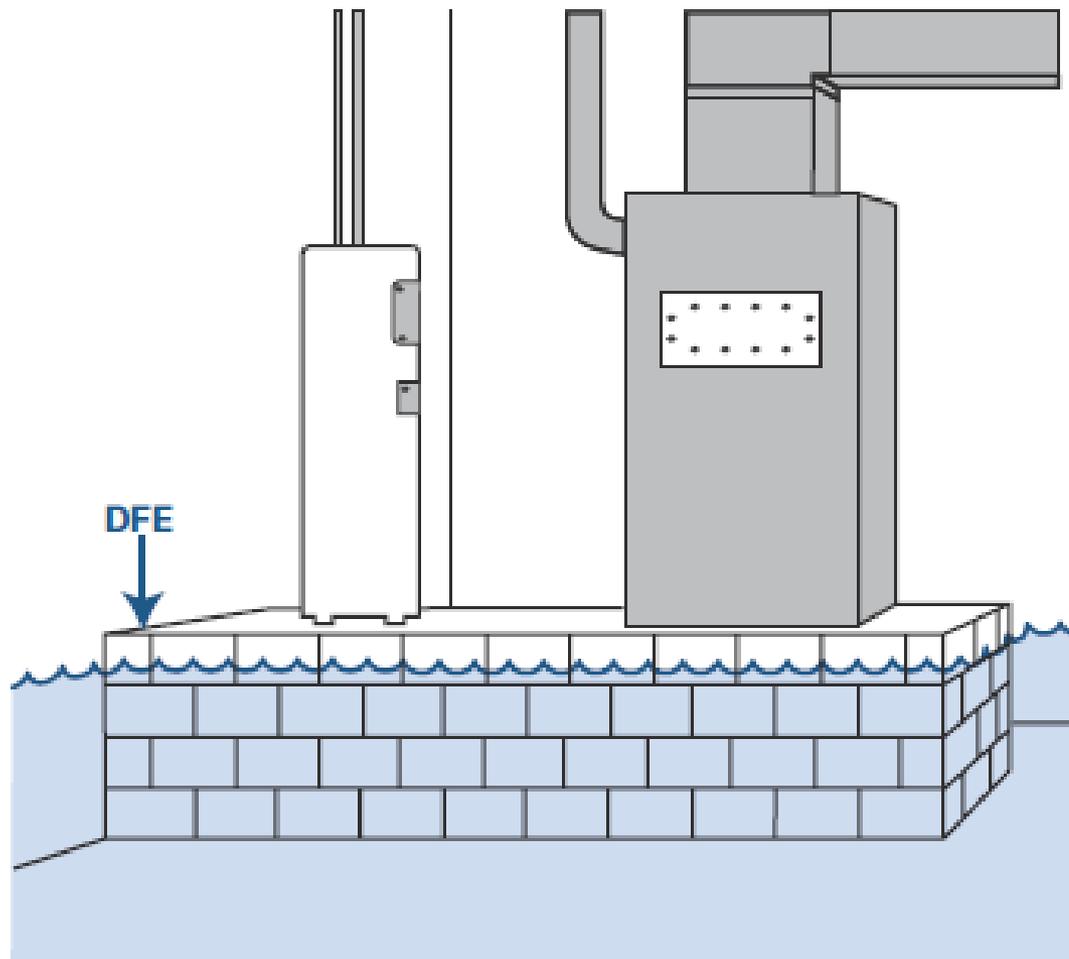




City Agencies That Regulate New York's Building Stock

Agency	Regulatory Role	Applicable Regulations
Department of Buildings (DOB)	<ul style="list-style-type: none"> Regulates construction standards to ensure safe and lawful building use 	<ul style="list-style-type: none"> Construction Codes (of which the Building Code is a part) Electrical Code Zoning Resolution New York State Multiple Dwelling Law
Department of City Planning (DCP)	<ul style="list-style-type: none"> Regulates building uses, density, and bulk through the Zoning Resolution Initiates planning and zoning changes for individual neighborhoods, as well as citywide changes, subject to the approval of the City Planning Commission and the City Council 	<ul style="list-style-type: none"> Zoning Resolution
Fire Department of New York (FDNY)	<ul style="list-style-type: none"> Regulates the maintenance and safe use of buildings with regard to fire hazards 	<ul style="list-style-type: none"> Fire Code
Department of Housing Preservation and Development (HPD)	<ul style="list-style-type: none"> Maintains and administers basic standards for the safety and habitability of housing 	<ul style="list-style-type: none"> Housing Maintenance Code
Board of Standards and Appeals (BSA)	<ul style="list-style-type: none"> Adjudicates appeals of interpretations of the Zoning Resolution, as well as variances and certain special permits 	<ul style="list-style-type: none"> Zoning Resolution

Flood Protection of Building Systems



Example of a building hot water heater and furnace elevated above the minimum flood protection level via a platform.

Rating the States

*An Assessment of Residential Building Code and Enforcement Systems
for Life Safety and Property Protection in Hurricane-Prone Regions*



NOTABLE CHANGES

Some notable changes featured in this update (both positive and negative) are summarized below.

Positive Action



MARYLAND

Maryland, which lost points in the original report because it allowed local jurisdictions to weaken the statewide code, enacted two new laws to address this problem. In 2012, the state prohibited local jurisdictions from removing residential sprinkler requirements in the state code, making Maryland a leader in life safety protections for homeowners and firefighters. This was followed in 2013 by enactment of a law preventing local jurisdictions from weakening statewide wind design and wind-borne debris requirements – provisions that get to the heart of hurricane wind protection in a state that experienced Hurricane Sandy.

Negative Action



NORTH CAROLINA

North Carolina has taken legislative and regulatory actions to weaken building code protection requirements. In 2012, the state passed a law that lengthens the adoption cycle of code changes from every three years to every six years. This will result in a significant gap between the time when safety improvements and new technologies are incorporated by experts into the ICC code, and when they are applied in North Carolina. The same legislation weakens local enforcement of the code, while separate action by the North Carolina Building Code Commission will weaken wall bracing provisions in coastal hurricane-prone regions.



FEMA

Hazard Mitigation

- FEMA P-55 - Coastal Construction Manual (3 Volumes).
- FEMA 320 - Taking Shelter From The Storm.
- FEMA 321 - Public Assistance Policy Digest.
- FEMA 361 - Design and Construction Guidance for Community Shelters.
- FEMA 499 - Home Builder's Guide to Coastal Construction (Technical Fact Sheet Series).
- FEMA 550 - Recommended Residential Construction for the Gulf Coast.
- FEMA P-762 - Local Officials Guide for Coastal Construction.

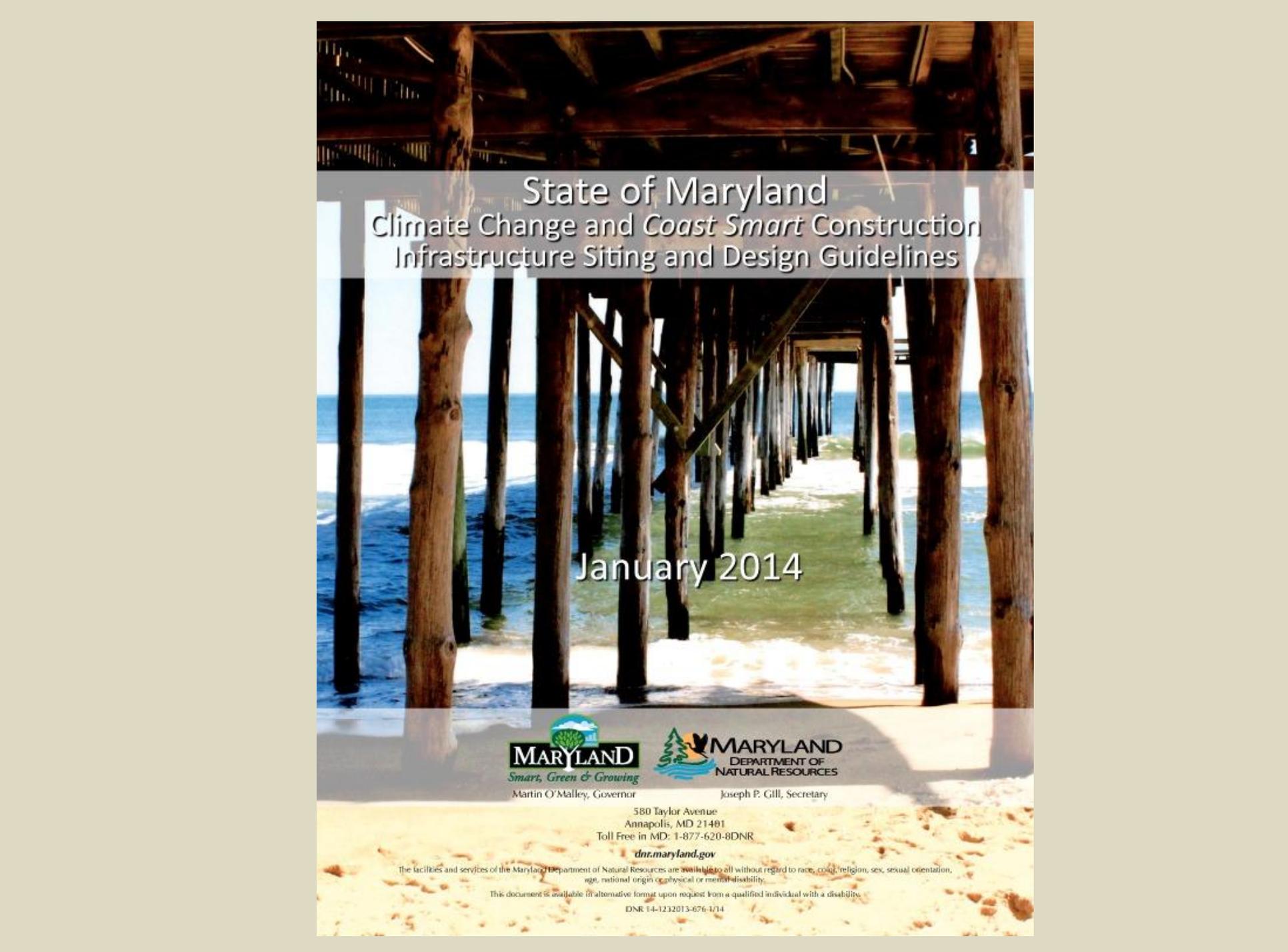


FEMA

Critical Facility

Typical critical facilities include hospitals, fire stations, police stations, storage of critical records, and similar facilities. A critical facility should not be located in a floodplain if at all possible.

Under Executive Order 11988, Floodplain Management, Federal agencies funding and/or permitting critical facilities are required to avoid the 0.2% (500-year) floodplain or protect the facilities to the 0.2% chance flood level.



State of Maryland Climate Change and *Coast Smart* Construction Infrastructure Siting and Design Guidelines

January 2014



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dnr.maryland.gov

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COAST SMART CONSTRUCTION PRACTICES

- New State structures, the reconstruction of substantially damaged State structures, and/or other new major infrastructure projects should be avoided within areas likely to be inundated by sea level rise within the next 50-years.
- New State "critical or essential facilities" shall not be located within Special Flood Hazard Areas designated under the NFIP and should be protected from damage and loss of access as a result of a 500-year flood.
- Ecological features that may serve to buffer a project from the impacts of future sea level rise, coastal flooding or storm surge or that support general climate adaptation practices, shall be identified, protected and maintained.

Exceptions to these guidelines may be considered, provided that it can be demonstrated that projects have been designed to increase resiliency to future impacts.

SITING GUIDELINES

- State structures serving transportation purposes that are not water dependent or dependent on integral infrastructure shall be constructed with a minimum of two (2) feet of freeboard above the 100-year base flood elevation, as defined by the NFIP.
- Flooding potential should be considered when choosing building materials for all structural projects, including minor improvements or maintenance and repair.
- Structures and infrastructure proposed within a Limit of Moderate Wave Action boundary as mapped under the NFIP, shall be designed in compliance with construction standards applicable for V Zones.

Exceptions to these guidelines may be warranted based on consideration of certain factors.

DESIGN GUIDELINES

- New State structures, the reconstruction of substantially damaged State structures, and/or other new major infrastructure projects shall be designed to avoid or minimize future impacts over the anticipated design life of a project.
- New State structures and the reconstruction or rehabilitation of substantially damaged State structures located in Special Flood Hazard Areas shall be constructed with a minimum of two (2) feet of freeboard above the 100-year base flood elevation, as defined by NFIP.



Issues

- Guidelines vs Codes vs Recommendation
- Enforcement
- Older Buildings (Grandfathering)
- Innovation
- Siting