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# Installation of switch and receptacle outlets below the Design Flood Elevation in Residential New Construction, and in Substantially Improved or Damaged structures

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**The Regulations:** For one and two family dwellings, the **International Residential Code** – 2021NJ ed. (IRC), Section R322.1.6 requires that electrical systems, equipment and components; heating, ventilating, air conditioning; plumbing appliances and plumbing fixtures; duct systems; and other service equipment be located at or above the **Design Flood Elevation** (DFE). However, under the following conditions, these systems and components are permitted below the DFE:

1. 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 DFE in accordance with **American Society of Civil Engineers 24** (2014) (ASCE 24); or,
2. Electrical wiring systems conform to the provisions of N.J.A.C. 5:23-3.16 (**National Electrical Code** -2020 NJ ed. (NEC) for wet locations.

For other than one and two family dwellings, the **International Building Code** – 2021 NJ ed. (IBC), Section 1612.2 requires that the design and construction of buildings and structures located in flood hazard areas be designed in accordance with ASCE 24.

ASCE 24 Chapter 7 requires that all electrical, plumbing, mechanical, HVAC, and other systems serving buildings and structures be located or elevated above the DFE. It should be noted that ASCE 24, Section 7.2.5 allows for the installation of a minimum number of lighting circuit switches, receptacles and lighting fixtures operating at a maximum of 120 volts to ground to be installed below the DFE, when it is determined that it is required to meet the life safety provisions of the code. If permitted below the DFE, the electrical wiring shall be suitable for submergence in water and only submersible type splices shall be used and switches, receptacles and fixtures must conform to the wet location requirements of the NEC.

Among other requirements, **Highlands Ordinance 21-123.1** mandates that all development and building work be located and constructed to minimize flood damage and have all mechanical, plumbing, and electrical systems above the DFE or meet the requirements of ASCE 24 Chapter 7 (as cited above).

**FEMA 348 Protecting Building Utility Systems from Flood Damage** (FEMA 2017), Section 4.2.2.2 (Mitigation of Secondary Components) states that as with the primary components of an electrical system, the mitigation of secondary components, such as switches and receptacles, requires they be placed above the DFE.

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**Summary:** Switch and receptacle outlets are **not** permitted below the DFE in residential structures located in flood hazard areas that are wet floodproofed (buildings that have flood vents), unless they meet the specific exemption requirements of the IRC, IBC, ASCE 24, or Municipal Ordinance. These areas include storage and access areas and garages located at grade level in residential structures. Commercial and mixed use buildings are not permitted to be wet floodproofed.

In certain instances, the NEC requires the installation of electrical receptacles, lights, and switches in these areas. Since NEC 210.52 (G)(1) requires a receptacle outlet no higher than 5-1/2 feet above the floor in garages, and NEC 210.70(A)(2) and 210.70(C) requires wall mount switch controlled lighting outlets in garages and storage and equipment areas, respectively, some allowance must be made for compliance purposes. Further, NEC 404.8 requires that all switches be mounted no higher than 6'7" above the floor, from the center of the grip. Because certain areas of the floodplain have a DFE above 5-1/2 feet, in those cases, the installation would be in violation of the NEC. Therefore, to make allowances for compliance with the relevant codes and FEMA regulations while complying with the intent of the Flood Damage Prevention Ordinance, the installation of switch and receptacle outlets for non-life safety installations below the DFE is permitted if the DFE is greater than 5-1/2 feet. So, by way of example, if the DFE is located 4 feet above the floor, then all switch and receptacle outlets must be located above 4 feet.

Keeping in mind the exceptions permitted under ASCE 24 (2014) 7.2.5, although switch and receptacle outlets could be installed below the DFE, it must meet the life safety threshold of the code and should be discussed with the Floodplain Administrator in advance of the installation.