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Critical Facilities and Flood Risk

This is a position paper prepared by the Association of State Floodplain Managers (ASFPM), a professional non-profit organization dedicated to reducing flood losses and protecting floodplain functions and resources in the United States, without causing adverse impacts to others.

Background

Both flood risk and flood damage are increasing in the United States, despite multiple decades and billions of dollars to first attempt to control floods and then to attempt to reduce flood damage by managing floodplains. This increase in damage has occurred for three very simple reasons: (1) communities, other governments and property owners continue to build in high flood-risk areas; (2) when structures are built in high-risk areas, it is often done with inadequate adjustments for either the flood hazard that exists and certainly not for the flood hazard that will exist in the near future; and (3) facilities that are flooded once are not mitigated when rebuilt, despite the provision of the disaster recovery public assistance law that provides funding for mitigation (Stafford Disaster Act). In an attempt to remedy this, there is an effort to shift the current focus to reducing development in flood risk areas in order to reduce consequences and flood risk and to manage flood risk that may be caused from watershed development or changing conditions due to climate or demographics. Historically, the consequences of floods were considered only from an economic damage perspective; but loss of life and human suffering, as well as environmental degradation along with community sustainability and resilience, are equally important factors to consider when making decisions to reduce and manage flood risk.

For the purposes of this paper, it is important to explain that “flood risk” is not just the probability (chance) that a flood will impact a facility, but rather is the result of that probability multiplied by the consequences of when a flood does happen. Thus, flood risk may actually increase behind a levee if more development or higher value structures are placed behind the levee where they will be damaged when the levee is overtopped or fails and the flood occurs.

What are Critical Facilities and Critical Actions?

Critical facilities are those that are essential to a community’s resiliency and sustainability— otherwise defined as its ability to quickly and efficiently respond to floods, recover from floods, meet the needs of its citizens, and rebuild after floods. Stated simply, critical facilities should never be flooded, and critical actions should never be conducted in floodplains if at all avoidable. The economic, social, and environmental impacts of the facility being flooded are so great that it should not be located in a flood hazard area. If there are no practical alternatives to locating the facility in a floodplain, federal guidelines should be followed requiring protection from the “500-year” flood event.

Critical facilities fall within the following categories:

1. **Governmental Facilities:** Essential for the delivery of critical services and crisis management, including data and communication centers, key government complexes, etc.
2. **Essential Facilities:** Those that are vital to health and welfare of entire populations, including hospitals and other medical facilities, retirement homes, police and fire departments, emergency operations centers, prisons, evacuation shelters, and schools, etc.
3. **Transportation Systems:** Those systems, and the supporting infrastructure, necessary for transport of people and resources (including airports, highways, railways, and waterways) during major disasters, including flood events up to the 500-year flood.
4. **Lifeline Utility Systems:** Those vital to public health and safety, including potable water, wastewater, oil, natural gas, electric power, communication systems, etc.
5. **High Potential Loss Facilities:** Failure or disruption of operations may have significant physical, social, environmental, and/or economic impact to neighboring communities, including nuclear power plants, high-hazard dams, urban levees, and military installations.
6. **Hazardous Material Facilities:** Involved in the production, storage, and/or transport of corrosives, explosives, flammable materials, radioactive materials, toxins, etc.

To further assist in determining if a facility is critical, the following questions should be asked:

1. If flooded, would the facility add another dimension to the disaster? (e.g., petroleum terminals, hazardous and toxic waste sites)
2. Based on the available flood warning time, would people be able to evacuate the facility/building without loss of life?
3. Would the facility be operable during an extreme flood event (e.g., 500-year flood)?
4. Would essential and irreplaceable records, utilities, and /or emergency services be lost or become inoperable?
5. If the services provided by the facility were disrupted by flood (e.g., police, fire, emergency services), would the flood disaster result in even more damages and loss of life?

If the answer to any of these or similar questions is “yes,” then the facility is considered critical, and the action to place the facility at risk of flooding would be a critical action.

The impacts of the loss of function of critical facilities could include:

- The inability to provide essential services, such as police, hospital, rescue and fire.
- Endangering large numbers of concentrated people, such as within emergency evacuation centers that cannot be accessed or serviced, or are otherwise at risk.
- Denying life-safety ingress and egress via critical streets and highways.
- Adding to the hazard of the flood water itself, such as by pollutants from flooded wastewater treatment plants or toxic materials.

Critical actions support facilities, and their activities, for which even a slight chance of flooding would be too great. Critical actions include but are not limited to:

- Providing financing assistance and/or construction of critical facilities

- Acquiring, managing, and disposing of lands for critical facilities
- Conducting programs and activities affecting land use for critical facilities

Minimum federal floodplain management standards for federal activities related to critical facilities come from Executive Order 11988, which guidance identifies the 500-year flood elevation as the minimum standard. The American Society of Civil Engineers (ASCE) Standard 24-05, and the International Building Code also provide minimum standards for some Category structures. Those standards, depending on the type of flood exposure, require protection to the 100-year flood elevation, plus up to three feet of freeboard or the “design flood elevation,” whichever is higher. Therefore, the “design flood elevation” for critical facilities, as referred to in this paper, is the higher of the 500-year flood elevation, or the elevation required by applicable codes and standards.

Extent of the Problem

When critical facilities in the United States are flooded, they not only sustain costly flood damage, but may also become inoperative and unable to fulfill their function in response and recovery. This can result in greater loss of life and human suffering, and means that it takes longer for the community to get back to pre-flood levels of functionality. Two examples from recent floods illustrate this problem.

New Orleans and Hurricane Katrina, 2005: The frequency of flooding was reduced in the Greater New Orleans area after Hurricane Betsy in 1965 when the federal government began to build structural levees/floodwalls. In the short term, the levees/floodwalls decreased flood risk; however, the reduced frequency of flooding altered the New Orleans style of construction. Traditionally, residents had avoided placing buildings in the lowest areas, instead opting for elevating buildings such as houses with enough space to park a car beneath them. After the levees/floodwalls were in place, the trend shifted to wholesale construction of “slab on grade” buildings, including critical facilities throughout the area. The result was that the levee/floodwall system actually increased long-term flood risk, because the consequences of flooding from levee failure increased greatly. Many, if not most, critical facilities in the area were built with first floors at elevations ranging from several feet below sea level to just a few feet above sea level.

When Hurricane Katrina struck, deaths resulted not only from direct floodwater, but also because of the inability to evacuate once the levees failed or overtopped. Additionally, many critical facilities were unable to continue in operation due to the lack of supplies and resources, such as power, potable water, food, sanitation, and medications. Critical facilities such as neighborhood schools and auditoriums that could have served as emergency evacuation centers were also flooded. Because of the distance and the need to traverse floodwater, many people were unable to evacuate to the Superdome. When the floodwaters arrived at St. Rita’s Nursing Home 35 residents died while trying to evacuate from this home which was built 20 years previously in an area considered “protected” by the levee/floodwall system. Transportation infrastructure to provide access to the facility was inoperable during the flood. Critical facilities could have been located at the highest locations in the city, elevated or flood proofed, with accessibility, in order to achieve operability, maximum flood risk reduction and community resiliency.

Cedar Rapids, Iowa, and the Floods of 2008: When Cedar Rapids experienced a major flood in 2008, the city had levees and floodwalls in place, but these structural measures were overwhelmed by the

flood. Critical facilities such as the city hall, county courthouse, county detention complex, county sheriff's headquarters, police headquarters, and medical center were all located in areas that flooded when such measures were overwhelmed. The city hall, county courthouse, and county detention complex were actually located on an island in the Cedar River, and evacuation of the detention complex did not occur until floodwater had inundated the complex and all evacuation routes were flooded. Much of the city lies above the elevation of any flood event, and all of these facilities could have, and should have, been constructed at locations with very low flood risk. As in New Orleans, the location of critical facilities in flood prone areas not only added to cost of the flood damage, but it also hindered flood response and prolonged flood recovery, thus negatively impacting the city's economy, resiliency and sustainability.

Examples like these exist nationwide in many communities that are subject to flooding, in areas with or without levees. These results will continue to occur unless communities use long-term planning to: (1) locate or build critical facilities at locations above projected high flood levels, (2) relocate their existing critical facilities, or (3) flood proof their critical facilities. While normal structures may suffer damage in flooding and can be repaired later, critical facilities are exactly that, critically needed by the community and its citizens during and immediately after the event for life-safety purposes.

In many locations, critical facilities have been located in areas considered "protected" by levees, floodwalls, or dams that reduce flood frequency but do not eliminate flood risk. Furthermore, because of the misconception that a floodplain does not exist if a property is "protected" by a levee, floodwall, or dam accredited for purposes of the National Flood Insurance Program (NFIP), it is common for critical facilities to be constructed using "slab on grade" construction in these "protected" areas and to have no operability or access during major disasters.

Many levees and floodwalls, specifically those built after passage of the Water Resources Development Act of 1986 (WRDA) and after full implementation of the NFIP, were built to only provide "protection" from the 100-year flood. This has occurred for two reasons:

- (1) the NFIP currently does not require flood insurance purchase or floodplain regulation in areas "protected" by levees and floodwalls that are accredited as providing a minimum of 100-year flood "protection," and
- (2), the WRDA required construction cost sharing by a local sponsor with the Corps of Engineers, so communities generally opt to pay for only the minimum levee or floodwall, in order to remove them from the designated 100-year floodplain

Development and construction in areas behind a levee or floodwall, or in the failure zone below dams, can proceed as if no flood risk exists. Then, when a flood event occurs that exceeds the "protection" level provided, such as the 2005 or 2008 events described above, critical facilities are flooded—sometimes to depths greater than would have been the case had the levee, floodwall or dam never been built. This can be due to entrapment of the water within the overtopped or breached levee or floodwall and/or that no other mitigation, such as elevation above ground level, is performed.

Why the Problem Persists

Why are so many critical facilities vulnerable to damage and operational shutdown because of floods? It is important to recognize that critical facilities may be viewed or addressed differently depending on

whether they already exist (and may be substantially damaged by an event and need rebuilding), or if they are being planned and the location for them is more open to discussion and decision. If there is any federal involvement (most cases), the guidance on the Federal Executive Order directs that any at risk area be avoided if at all possible, followed by a construction decision, requiring mitigation and elevation above the 500-year flood (if a flood hazard area absolutely cannot be avoided). Factors contributing to the problem include:

- Federal agencies have contributed to the problem by directly building critical facilities or by funding states and localities (via grant programs) to build such facilities in flood hazard areas. This is true even though the guidance for Executive Order (11988, Floodplain Management, issued May 24, 1977) directed agencies of the federal government to give special consideration to, and avoid supporting critical facilities and critical actions in, flood-prone areas. Examination of the implementing guidelines to federal agencies published by the U.S. Water Resources Council (WRC) and codified into federal regulation February 10, 1978, includes specific reference to critical actions and critical facilities. The Order states that even a slight chance of flooding is too great for critical facilities and actions, so they should not be located in flood hazard areas if alternatives exist. The guidelines state that, “The minimum floodplain of concern for certain critical actions is the area subject to inundation from a flood having a 0.2 % chance of occurrence”, also known as the 500-year flood. The Order faces challenges in implementation as a result of local and political pressure to develop in flood risk areas for short-term economic gain.

A current example of this is in East St. Louis, Illinois—an area that has been considered “protected” by a levee that has been accredited by the NFIP as providing 100-year “protection”, and which many considered to have 500-year protection. As a result, all development behind the levee over the years has been built essentially at-grade. This includes critical facilities, even though the EO guidance and a subsequent state executive order require that critical facilities either not be built in a 500-year floodplain or be flood-proofed to be functional during a 500-year flood. The State of Illinois is requiring a state-funded nursing home, proposed for the area, to comply with 500-year standards of both the federal and the state executive orders. The reaction to these efforts, to consider life and safety for these critical facilities, has been a demand for change in both state and federal executive orders from the local community officials, the developers, and the area Congressional delegation. The state legislature in Illinois actually passed and the governor signed a law declaring that the area behind this levee is not a floodplain!

- Not all states have recognized the need for additional regulation relative to critical facilities and critical actions. Those that have recognized the need have generally followed the federal guidelines for implementing the EO. However, the state interest in protecting critical facilities often disappears when those facilities are (to be) located in areas that are “protected” to the minimum 100 year flood level by structural measures such as levees, floodwalls, or dams.
- Critical facilities are reconstructed after a disaster without being mitigated. Too often, public assistance (PA) funds from FEMA, or federal monies from other agencies such as DOT, HUD, EDA, etc, are used to reconstruct critical facilities after a disaster, but mitigation is not performed despite the use of federal dollars.

- A disconnect exists between land use decisions and flood risk costs. Land use decisions are made by communities and tend to be based on local short-term economic factors in the form of community growth and resultant increases in the local tax base. These decisions often favor using floodplains for economic development, with the fact that the area is subject to flooding being a much lower priority in the decision. Local communities gain the “benefits” of the tax base growth but can then “externalize” the costs incurred during and after a flood to others, usually federal and state taxpayers. When a flood disaster occurs these same communities turn immediately to the state, which turns to the federal government for funds to respond, recover, and rebuild. When making land use decisions about critical facilities, communities usually place highest priority on getting the lowest-cost facility that meets the primary objective of the facility. The need for the facility to be fully functional during and after floods is often not a consideration. If flood risk is considered, it is usually from the perspective that the cost to rebuild after a flood will be largely paid for by a state or federal taxpayer recovery program, and thus not a local responsibility.
- Community acceptance of shared responsibility for flooding is lacking. The lack of responsibility for flooding results in unwise land use decisions by communities and by property owners because over the decades, people and communities have been “taught”, over the decades, that flood disasters are a federal responsibility. This is reinforced by the ever-increasing prevalence of Presidential disaster declarations for floods and the resultant federal funding that goes principally to those communities and people that have taken the least amount of responsibility—thus rewarding unwise development in flood risk areas.

An example of the lack of shared responsibility can be seen by a simple comparison of two types of disasters: fire and flood. In both cases, insurance is available for purchase by property owners. In the case of flood, most people try hard to avoid the requirement to buy flood insurance, and many communities base land use decisions not on flood risk, but on short-term economic growth. Communities also attempt to reduce the extent of the identified floodplain on the NFIP flood maps, even urging their members of Congress to delay flood maps or exempt their citizens in identified flood hazard areas from the mandatory purchase of flood insurance. With floods, the perception is that the taxpayer, via the federal government, will pay the cost of the response, recovery, and rebuilding. In the case of fire, quite the opposite occurs. With fire, it is understood that the individual is wholly responsible for fire damage and if any broader support comes, it generally stops at the local community level. Because flood disasters are generally large and devastating, the individual and local community’s lack of responsibility in managing flood risk is rewarded flood after flood with large amounts of funding borne mostly by the federal and state taxpayers. Critical facilities that are damaged or destroyed by floods are often the first recipients of federal rebuilding funds because of the urgency to restore the services they provide. Furthermore, communities often argue strongly to be allowed to rebuild the critical facility in the same flood risk area where it was destroyed.

- Many communities do not know what critical facilities exist in their area or what constitutes a critical facility. In addition, communities may not have evaluated which critical facilities may be floodprone and which ones will be needed during response and recovery. Each community should have an inventory of all existing critical facilities, evaluated mitigation measures for these facilities,

and implement mitigation measures for the most vulnerable critical facilities, including a list of the actions to be taken if that facility is damaged or must be rebuilt.

- It may not be clear if critical facilities are in flood risk areas. Many communities have inadequate or inaccurate floodplain information. FEMA has recently undertaken an initiative to modernize flood maps and to update many flood maps across the nation. While this has resulted in good information, some communities are still operating with maps that simply digitized decades-old information. In addition, watersheds and floodplains are dynamic, and today's best information may be inaccurate tomorrow due to physical changes in the floodplain or watershed brought about by human development, climate change, flood events, or other factors. Without accurate and current floodplain mapping, proper location and/or construction and operability of critical facilities is difficult to achieve.
- Lack of community understanding about where flood risk exists. There is a common misunderstanding that flood risk only exists in the shaded 100-year floodplain area on the NFIP maps. This is highly inaccurate, but is reinforced by the fact that the 100-year floodplain is the only flood risk area with any relevance on the NFIP flood maps, therefore it has become the de facto "recognized" flood risk area throughout the nation. The 100-year floodplain on NFIP maps exists primarily for flood insurance purchase, not to show flood risk. According to public misconception, if a facility is within the 100-year floodplain on the NFIP maps, it has a flood exposure; if it is not within the 100-year floodplain it does not have, and will never have, a flood problem. This is one of the greatest misconceptions people and communities have, supported by the federal flood maps and policies. This fallacy must be addressed at the local community level by educating the public about the "nature's" floodplain and that flood risk is a continuum throughout the community, not an "in or out" concept. Communities must take necessary steps to have critical facilities accessible and functional in all flood events, no matter how large the event.
- Flood maps do not reflect future flood conditions. NFIP flood mapping reflects only the flood that will occur based on existing, not future conditions. FEMA claims this is because the NFIP maps must reflect current risks for insurance rating purposes. The focus on existing watershed and floodplain conditions, rather than on future conditions, has resulted in critical facilities being located in what will be high flood risk areas after the watershed is developed, storms intensify, or sea level rises. Thus, critical facilities are placed in areas inappropriate to support community resiliency and sustainability.

Recommendations

The following actions for change are recommended by ASFPM:

Recommendation 1

Reconnect land use decisions and flood risk responsibility and cost. A disconnect between land use decisions and flood risk cost is a problem across all categories of buildings and structures, not just critical facilities. The actions below should address the differences between existing and new critical facilities:

Action item: Grant funds should not be available from any federal agency to construct any critical facility that does not meet the flood risk process/standards of the Floodplain Management Executive Order 11988. This would connect community land use decisions to the flood risk cost and exposure of the federal taxpayers; meaning the facilities must be built in accordance with the Executive Order guidance or federal support is not available.

Action item: Post disaster funds from any federal agency should only be available for post-flood rebuilding of a critical facility if the facility is protected from and operable in the 500-year flood, (or the funds can be used toward relocating the facility). This action should be undertaken by the federal and state agencies responsible for the funding, permitting, rebuilding and location decisions of critical facilities in the post disaster setting.

Action item: When providing funding for disaster relief, including critical facilities, federal assistance should use a “sliding” cost share policy. Thus, under federal policy, those communities that do the poorest job of managing flood risk would either receive the same or less funds as those communities that do the best job.

Action item: Communication and education on the importance of flood risk and appropriate land use decisions by local communities is extremely important. Flood risk communication and education to inform local land use decision makers, as well as local citizens, on current flood risk and on effective flood risk management, must be instituted at least annually in all communities. This need is especially important for critical facilities. Citizens in that community should be able to access those facilities during major flood events.

Action item: The NFIP regulations should include standards for critical facilities that are required for a community ordinance in order to be compliant and to participate in the NFIP.

Recommendation 2

Ensure that communities are aware of the critical facilities within their jurisdictions. Many communities may not know what role certain facilities should play during disasters/emergencies.

Action item: Communities are required to identify and maintain, in their hazard mitigation plan, a list of facilities that are essential to reducing and preventing human suffering and death during and after floods or other disasters. This action is the responsibility of each community with support and oversight from each state’s mitigation and floodplain management office. The community mitigation plan should identify the actions the community will take when a facility is damaged or rebuilt. To assist this effort a critical facility “tool kit” focused on identifying critical facilities, as well as location or flood-proofing of existing critical facilities, should be developed by the Federal Interagency Floodplain Management Task Force. Floodplain management experts such as states and ASFPM Chapters could provide this to communities and others.

Recommendation 3

When addressing flood risk management a shift in thinking, from “short term” to “long term” must occur in locating critical facilities and how they are protected. The level of flood risk considered acceptable and sustainable must be established nationwide and at the state and local level. Any short-

term objectives must be supportive of, and not negate, the long-term objectives. Requiring those who build and live at risk to pay the full cost of adding to that risk is key, and other actions can support this.

Action item: All communities should be required to have a flood hazard mitigation plan that focuses on maximum reduction of flood risk for critical facilities by 2050. Measurable and implementable actions must be adopted that are achievable short-term, but that also continually move the community and its critical facilities toward this flood risk objective. This could be a further requirement of the present flood hazard mitigation plan for community eligibility for FEMA Mitigation funding as well as for USACE water resources projects. This would be a FEMA and USACE action, with strong support from state floodplain management and mitigation programs and from ASFP. Congressional action may be needed to update the DMA 2000 requirements for a community to adopt an all-hazards mitigation plan.

Recommendation 4

Issue an updated federal executive order on floodplain management to replace the 30 year old EO 11988. The updated executive order should not be just a restatement of the 1977 EO, but also require that each federal agency take active leadership to promote a national focus on long-term sustainability and resilience for the nation's communities. The agencies must ensure that any federal investment or action does not add to flood risk, and has no adverse impact on other properties, communities or the environment. Essentially, the nation should be moving to a "no, or minimal flood risk" environment. The updated EO should require an annual national "rollup" of flood risk-related damage and death information and analyze trends in order to measure success or failure in reducing flood risk. The EO must explicitly address critical facilities and require that each federal agency provide leadership in flood risk management to achieve the goal of minimal flood risk by 2050. The new EO must also address the need to protect data that is essential to community sustainability and resilience, and shall link the National Infrastructure Protection Plan to these requirements, to provide for continuity of functions the facilities provide.

Action item: The Federal Interagency Floodplain Management Task Force should promote the adoption of an updated executive order within the next year.

Action item: The FEMA mitigation grant guidelines should direct that all community and state hazard mitigation plans identify and assess their critical facilities for action steps needed to comply with the requirements.

Action item: The Administration must assign oversight of federal agency compliance with the existing and updated EO to some entity of the Administration, perhaps OMB or CEQ, with adequate authority to accomplish the task.

Recommendation 5

Accurate floodplain information is essential if communities are to ensure that their critical facilities are not located in flood risk areas or are flood proofed and operable to and during the 500-year flood minimum standard. Funding for accurate floodplain mapping information must be a high priority within communities and within agencies at the state and federal level. Within this context, the nation must have information that reflects future conditions, which must provide enough information to effectively expose and finally eliminate the myth that flood risk does not exist beyond the 100-year floodplain.

Action item: FEMA’s floodplain mapping program of the NFIP is the nationally recognized source for floodplain information. If sufficient funding is not available for this task, flood insurance rates within the NFIP should be increased to provide adequate funding, or Congress must increase funding for floodplain mapping, recognizing the key role this information plays in community resilience and security.

Action item: Ultimately, it is the responsibility of every community to ensure that they are locating their critical facilities properly. Communities can develop floodplain information and verify the accuracy of existing information through a number of sources, such as investigation of historic flood information, review of basic topographic maps to determine elevations relative to flood sources, and hydraulic studies to determine flood information. Floodplain management organizations such as ASFPM and NASFMA should instill in membership what communities can do themselves to ensure the best information and decision making.

Action item: Since the flood insurance rate map of the NFIP has become the national de facto source for floodplain information, the mapped floodplains should also reflect future conditions. This is a FEMA action item. FEMA can also require NFIP communities adopt freeboard in the ordinances to require elevation of structures above the 100-year flood level by 1 or 2 feet. Currently nearly half of NFIP communities require freeboard.

Action item: A national flood risk communication and education campaign must be initiated that will address the public misperception that flood risk exists only in mapped 100 year floodplains. The public and communities must understand that flood risk is a continuum from high to low, with few areas having minimal flood risk. This is an action item that should be discussed and developed by the Federal Interagency Floodplain Management Task Force and the Intergovernmental Flood Risk Management Committee. This will require collaboration with organizations representing the key state and local partners that work with the federal government to reduce flood risk and protect lives and property from flooding through flood risk management measures and protecting the natural resource and functions of floodplains.

Recommendation 6

All states should adopt or update their state regulations or executive order on floodplain management dealing with critical facilities, if they currently do not require critical facilities be either located out of and if needed, operable, to at least the 500-year flood level. If location outside that area is not possible, the facility must to be protected to the 500 year level.

Action item: FEMA and the ASFPM and its Chapters should engage in dialogue with State Mitigation staff and Floodplain Managers to facilitate appropriate implementation and provide information on the need for such action to the governors of each state.

Recommendation 7

A shift in the understanding of who pays for “at-risk” development is needed in order to support good community decision making. This is especially the case for critical facilities, to ensure that critical facilities be located and built with flood risk in mind. It must become politically “safe” and acceptable to support the implementation of 500-year (or higher) minimum standards for critical facilities, because

that supports community resilience; rather than oppose implementation of such standards based on local short-term economic gain at the long-term expense of federal and state taxpayers.

Action item: Fully implement the concepts of “No Adverse Impact” so those who are adversely impacted by a development, including critical facilities, have a voice in community development decisions. This same approach can be linked to community infrastructure and the need for that infrastructure to be operable during disasters so the community is secure. This can be initiated by such agencies and entities as FEMA, Corps of Engineers, other federal and State agencies, and by ASFPM, NEMA and NASFMA.

Recommendation 8

Higher minimum standards should be considered for critical facilities. The current 500-year minimum standard for critical facilities may be insufficient in the 21st Century, just as the 100-year minimum standard is no longer sufficient for general flood risk management involving structural measures in urban areas. This could mean moving to a higher standard, such as the 1,000-year standard or to a no flood risk criteria for critical facilities. This may involve a variable standard depending on the type of facility and changing local risk conditions, such as those outlined in ASCE 24.

Action item: Leading floodplain and flood risk management organizations, such as ASFPM, NASFMA, Army Corps of Engineers, and FEMA, acting through the Federal Interagency Floodplain Management Task force, should debate and determine the appropriate standard for critical facilities.

Resources

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