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December 15, 2016

The Community Resilience Indicators Subcommittee  
The Mitigation Framework Leadership Group  
In Care of the Federal Emergency Management Agency  
Washington, D.C.

Via e-mail to: [FEMA-communityresilience@fema.dhs.gov](mailto:FEMA-communityresilience@fema.dhs.gov).

Ladies and Sirs:

The following are the comments of the Natural Hazard Mitigation Association on the Community Resilience Indicators draft report of June, 2016. We thank you for your diligence and leadership on this fine work.

The NHMA membership includes a diverse group of practitioners, academics, government officials and students. The NHMA is intended to be a catalyst for societal change by elevating the value of hazard mitigation so that natural hazards do not cause disasters, and suffering and misery to people, property, the environment and taxpayers. Our organization promotes education, policies and activities that mitigate current and future disaster losses, costs and human suffering caused by unsafe development practices.

The NHMA is managed by a 13-member Board of Directors and has eleven committees that focus on the areas of disaster reduction, hazard mitigation planning and education, among others.

We've included general comments first, followed by more point-specific comments.

Again, we thank you for your success and your consideration, and hope that we can contribute to improvement.

## I Introduction

**The current version of the Draft Interagency Concept for Community Resilience Indicators and National-Level Measures represents a great deal of effort and all involved should be commended.**

As Pete Thomas of Willis Re observed during his extraordinary presentation at the 2014 National Council for Science and The Environment: Building Climate Solutions Workshop in Washington DC, when the United States first began, about a hundred years ago, to seriously attempt to codify and evaluate measures to reduce the risks and consequences of urban fires there were about a dozen indicators in the insurance schedule then developed. Now we have huge books of standards on how to reduce the risk of urban fire, we have established organizations such as the underwriters Laboratory, the Institute of Business and Home Safety and established codes & standards measuring and objectively evaluating individual community's ability to deal with the risk of urban fire. Those measures are working to reduce the risks and consequences of fire throughout the nation. Communities which are doing a good job receive a better fire risk rate, which translates into an economic reward of lower casualty insurance rates.

NHMA observes that the current effort to establish a system measuring and evaluating community measures to increase resilience by measuring a community's capability to deal with the risks and consequences of all disasters has many parallels to the origins of the United States systems of dealing with the reduction of urban fire risk. As indicated in the FEMA Publication *America at Risk: America Burning Recommissioned II* (FA-223/June 2002) which discusses fire loss in urban portions of the United States:

"Today, the threat of fires is still with us. But we have done a lot to address the risk, minimize the incidence and severity of losses, and prevent fires from spreading. Our states and localities have an improving system of codes and standards; most of us are aware of the risks; we have accomplished a lot, but we have much more to do."

"As the... report (FA-223/June 2002) very clearly indicates, the success of America's fire services over the past 100 years is instructive for the strength and sustainability of America's communities for the next 100 years as well. **Today, we must not only continue and reinvigorate our successes, but also expand them to include the natural and man-made threats that each of our counties, cities, towns and villages face every day – floods, earthquakes, hurricanes, hazardous material spills, highway accidents, acts of terrorism, and so much more.**" [Emphasis added]

In addition, the FEMA National Flood Insurance Program (NFIP) Community Rating System (CRS), has also successfully provided incentives for communities to exceed floodplain standards. The lessons drawn from the establishment and enhancement of the CRS show that the first step is to identify the most important and meaningful activities that earn incentives. By definition, these would be activities that represent best practices and can demonstrate measurable improvement.

## **II Looking at the Huge Concept of Community Resilience Especially from the Perspective of Disaster Risk Reduction**

We as a Nation must, state-by-state and community-by-community, establish the ability to quantify and measure standards designed to reduce the risks and consequences of disasters. Then we need to develop a system which rewards communities with higher community development, preparedness, response and recovery standards which are designed to make a community more resilient to reduce future risk. While these types of efforts are sometimes associated with upfront higher costs, a careful and reasonably constructed program will actually have the potential to save vastly more costs in the long run and lead to a more resilient, just, equitable and prosperous community. We also should strongly support the investment and commitment of individual states, tribes and local governments to enact and implement natural hazard mitigation measures.

The savings of disaster damage risk reduction (used interchangeably in this paper with the terms “hazard mitigation” and adaptation) are well-documented including the 4 to 1 dollar return on investment stated in the 2005 Multihazard Mitigation Council’s (MMC) of the National Institute of Building Sciences “Natural Hazard Mitigation Saves: An Independent Study to Assess the Future Savings from Mitigation Activities”. Other studies from the Wharton School at the University of Pennsylvania and the large insurance company Swiss Re indicate that higher design standards have a far greater payback than 4 to 1. More specifically, Swiss Re reports that “Evidence suggests that every dollar spent on disaster risk reduction has a ten-to-one cost benefit ratio, and our own studies show that we can avert up to 65% of climate risks using cost effective measures.”

In any case, those higher standards place the cost of the development on those who develop and use the development, rather than permitting those costs to be improperly externalized to society as a whole. This basic philosophy has been affirmed all the way up to the Supreme Court with Justice Samuel Alito observing in the *Koontz v. St Johns River Water Management District* case: “Insisting that landowners internalize the negative externalities of their conduct is a hallmark of responsible land-use policy, and we have long sustained such regulations against constitutional attack.” For more information on legal perspective regarding externalities, see, *Turning Koontz into an Opportunity for More Resilient Communities*, by Edward A. Thomas Esq., and Lynsey R. Johnson J.D., in National Wetlands Newsletter, March/April 2014, vol.36, no.2. Located on the American Bar Association Website  
[http://www.americanbar.org/content/dam/aba/administrative/state\\_local\\_government/land\\_use.authcheckdam.pdf](http://www.americanbar.org/content/dam/aba/administrative/state_local_government/land_use.authcheckdam.pdf))

We believe that safe design and zoning standards, which protect the property and rights of all in the community, have an even greater payback to the community than traditional building codes, which are normally based narrowly on life safety. Such building codes typically only consider disaster damage risk reduction, building functionality, and operability, essential components to avoiding major costs and disruption, only when “where practicable to do so.” For example, the National Earthquake Hazards Reduction Program Provision’s objective states that ordinary buildings in earthquakes will:

“Avoid serious injury and life loss due to structural collapse, failure of nonstructural components or systems, and release of hazardous materials... and reduce structural and nonstructural repair costs where practicable to do so.” [from the in-progress draft as of summer 2014]

At the 2016 Building Innovation Conference and Expo, sponsored by the National Institute of Building Sciences, Dr. Keith Porter suggested that if the goal of building codes were to be resilience, costs would increase about 1%; the savings in areas prone to earthquakes would be many multiples of the extra costs. In following the earthquake example in the above paragraph, earthquake codes could be modified as Dr. Porter suggests from current standards to a more holistic one: “Ordinary buildings in earthquakes will: ‘Avoid serious injury and life loss due to structural collapse, substantial damage to nonstructural components and systems, and release of hazardous materials, and be **largely habitable or functional.**’” [*Emphasis added*] The codes should be modified for other foreseeable natural hazards as well to incorporate resilient standards into our development practices and avoid the costly scenario of losses and future retrofits.

Especially important concepts missing from the Draft Community Resilience Indicators are a clear explanation and understanding of the implications of the concepts of economic externality and moral hazard; as well as a clear understanding of the vital role of zoning and land use in community resilience and Disaster Risk Reduction.

There was a great story told by Patrick Otellini the SF Chief Resilience Officer, at a National Institute of Standards and Technology (NIST ) Workshop in San Diego about profound misunderstanding about purpose of EQ aspects of building code by both the Mayors of San Francisco and Napa. Essentially, a newly constructed building in Napa collapsed, in an earthquake and was a total loss. The Mayors both thought the building must have been built in violation of current code. It had to be explained to them that the building worked as designed, the folks were able to escape, no loss of life.

**As mentioned by several building code experts at the NIST San Diego Workshop, if we wish to achieve resilience or at least a lessening of disaster losses, we simply need higher building code standards which consider: post- event operability, based on the required time to return to functionality, life safety and Disaster Risk Reduction.**

This is an extremely complicated issue as the codes and standards typically put forth by agencies such as the International Codes Council (ICC) are the basement level of protection and, in our opinion, don't lead to resilience nor are they supposed to. They protect single structures and don't take into the systems, community, existing infrastructure or interdependencies, which is imperative to resilience. The codes are rarely designed to provide anything much beyond life safety. Understanding that systematic interdependencies are the key to resilience and the codes do not currently take this reality into account.

States and communities adopt these codes and standards based on what they feel they can enforce and very rarely do so based on the idea of resilience or taking into account the future risks and costs.

Generally speaking, the codes as currently designed are not up to par for resilience for the community. Increased adoption of most codes will not necessarily result in Disaster Risk Reduction and therefore will not lead to Community Resilience.

Noted Demographer Dr. Arthur C. (Chris) Nelson has once more affirmed in his plenary presentation at the Rocky Mountain Land Use Institute last April that fully one half (50%!!) of the square footage of improved property which will exist in this Nation in 2050 does not yet exist today.

As a Nation we have a choice to make now with respect to standards much higher than those currently in existence for Disaster Risk Reduction. We can adopt much higher standards which reflect the uncertainty of flood heights and storms of the future, as contemplated by the President's Executive Orders on Flood Risk Standards and the Executive Orders relating to extreme weather events and climate Change. Such higher standards for building code and zoning standards & enforcement can work to transform our current community development practices so that we begin to see a gradual reduction in Disaster Risk and concomitant misery; or we can once more miss the opportunity we have to transform ourselves into good stewards of the environment and continue on a path towards even more misery and destruction.

The fiscal consequences of failing to apply what we know about economically efficient risk reduction are estimated to be potentially very high, depending on the conditions studied, but there has been no credible literature we know of that suggests that hazard mitigation is not a very good investment based on cost-benefit analysis. And in fact, many CBA studies may have underestimated the benefits, given the difficulties of non-market valuations for quality of life and security of investments, and the opportunity costs of lost investments for betterment rather than recovery.

**There should be a strong recommendation in the Community Resilience White Paper that Disaster Damage Risk Reduction take a prominent place in building codes together with life safety concerns should help in that transformation.**

Regarding the effectiveness of planning, codes and enforcement: adequate requirements without implementation may have little or no effect, as demonstrated by Hurricane Andrew and subsequent investigations of causes of loss that revealed widespread violations of codes. Inquiry should result in a metric of the effectiveness of planning (e.g. extent of variance and non-conforming uses), and effectiveness of enforcement (e.g. indicators of capacity and history of inspection, indicator of inspections without permit-seeking, for commercial or public-access properties), and whether codes are adequate and properly oriented, as noted above.

Currently, the White Paper generally misses discussion of zoning, especially zoning to prevent construction in severely hazardous areas; and does not demonstrate an understanding of the role the courts play in establishing what is a Standard of Care. Nor is there any clear linkage to the role of economics [like local real estate taxes] in development decision-making.

Lastly, NHMA encourages FEMA to use its existing authority under Section 323 of the Stafford Act (PL 93-288), which can require safe land use and construction practices, to help achieve the implementation of a more resilience in communities.

The following are more specific comments on the draft:

P 2 – The need for continuity and maintenance of observation series should be emphasized here and in the later discussions of data access and qualities. This is essential for all users, including business, public sector operations, policy-making and analysis.

P 3 – Regarding Intrinsic Community Functions – The metrics should include recognition of the immense role of a great deal of “informal economy”, such as under-the-radar child care which involves barter and exchange of services to enable working poor to hold jobs in many places. Much of the informal economy is highly vulnerable to infrastructure failures in transit as well as basic services.

P 4 - Re Disaster recovery and redevelopment: Higher standards ahead of disaster are more cost-effective as well as effective in other measures such as well-being.

P 5 and P 7 – Additional recognition of combined and cascading hazards is warranted, as noted elsewhere. Communities must evaluate risks from such linkages as fire-flood, and others including hazardous materials.

P 8 and elsewhere: How does this relate to other frameworks? FEMA can seek comparability discussions with other groups. FEMA might ask Dr. Susan Cutter to host a workshop at FEMA expense to provide a sample urban area and then then applying different frameworks, comparing results, and testing against recent history, using SHELDUS.

P 9 – Re building codes: please note the importance of service to users, rather than non-lethality alone.

P 9 – Re Housing affordability – We must move to life-cycle costing, including energy efficiency and renewable compatibility, which may be very cost-effective even with full subsidy. Building codes and real estate inspections should include R values, safety of wiring and plumbing, and hazard resistance capacity. Poor construction and un-renovated buildings are a liability at best and a disaster at worst.

P 11 – Issues of levee and dam safety are increasing from increasing fire hazards reducing storage capacity as well as water quality, and changed seasonality affecting the flood storage and safety capacity. We refer also to the periodic ASCE report card, calling for very significant investments in the safety of infrastructure.

American Society of Civil Engineers, 2016, Failure to Act: Closing the Infrastructure Investment Gap for America's Economic Future; Update. [Of 2013 Report Card on infrastructure needs.] Reston, VA: American Society of Civil Engineers. <[reportcard@asce.org](mailto:reportcard@asce.org)>; [www.ace.org/failuretoact](http://www.ace.org/failuretoact)

P 12 – Wetlands also help stabilize streambanks and maintain flood terraces, reducing flood pulses, as well as providing water quality benefits.

P 12 – Urban forests are also critical for cooling against heat islands, air quality, and quality of life. Forest also provide streambank stabilization, and stream thermal protection.

P 13 – The lack of technically accurate data is not a rationale for failure to act on best available sources such as qualified professional judgement.

P 13 – Assessment of risks and hazards is normal, not episodic.

P 14 – Another appendix in the final draft might add the specific best practices known in each hazard, or sources for them, and their up-dating.

P 14 – Collaboration can also include economies of scale, as in the most efficient use of specialized equipment or training, and finding complementary capacity (e.g. labor-intensive work match to under-employed population). A regional vision is needed.

P 15 – Please see comment above regarding orientation of building codes. Also, there are strong reasons for considering amortization of non-conforming uses defined by failure to meet or be able economically reasonably to meet safety requirements for occupants and the community. The higher standards should apply in renovation of poor quality stock.

P 17 – Housing condition should include indoor infrastructure such as plumbing safety, wiring safety and energy efficiency.

P 17 – Repetitive flooding issues for water facilities may demonstrate lack of long-term economics. FEMA could wisely call for examination of all significantly damaged water facilities for compliance with all standards for projected remaining life of facility.

P 17 – Rights-of-way deserve particular attention for floodways and transportation alternatives as well as recreational uses and forestry.

P 17 – The changing risks of dams and levees include effects of changing land uses, changing weather extremes and seasonality, and changing exposures of lives, assets and property to spills and levee failures.

P 17 – Wetlands restoration has been highly beneficial in hazard management as well as other provision of benefits, as shown in Charlotte-Mecklenburg.

P 18 – Forest conservation metrics should also include forest health, explicitly (e.g. levels of infestation, fuel loads, penetration of residential developments and units. Habitat quality is being studied very usefully by NGOs such as The Nature Conservancy, Conservation Science Partners, Inc., and Earth Economics.

P 20 – Please add into the vulnerability reduction discussion an emphasis on building codes and building stock quality upgrades or lack, and please mention some specific best practice items such as freeboard applications and flood-proofing, wind-strapping, and earthquake resistance.

P 25 – Dam safety data and levee safety data: We urge review by USACE, BOR and States of the effects of weather extremes, land use changes, and shifting seasonality, as they affect timing of fill and need for flood storage space being temporally shifted, perhaps increased in volume.

P 27 – We urge continued support for studies of the quality and implementation of Stafford Act hazard mitigation plans, and post-event review of their effects on disasters.

Thank you for your consideration. NHMA will be pleased to answer any questions and to assist in the further refinement of this important work.