" Perfection of Means and Confusion of Goals Seem to Characterize Our Age."
Albert Einstein

INTRODUCTION: FRAMING THE APPROACH

Our primary goal, no matter what our related discipline or approach, is to minimize the effects of natural hazards on our communities--to minimize the injuries and loss of life, the growing property and environmental damage, and the social, economic disruption caused by these extreme natural events. We want to keep hazards from becoming disasters.

Up to now, the surface has been barely scratched toward this goal. For all practical purposes, we have not been very successful, even though a great deal of effort has been made toward this end. I believe that to truly progress toward this goal, the reduction of natural disasters has to be seen as part of a larger picture, in a broader context and more integral to the way we think and actually do things in this society. We have tended to see it for the most part as an in-and-of-itself subject and I believe this has kept us from making the kind of progress that is necessary to make a real difference. And to begin to make a real difference has never been more important as we prepare to enter the 21st century.

There are a number of ways to achieve, or rather to work toward this goal, but in reality there is one that is by far the most important and the foundation for all the others. This is the process of creating disaster resistant communities. We can develop and implement the very best emergency management plan possible, the most efficient well planned preparedness plan, respond in the most efficient way possible after a disaster occurs, and execute a sound recovery. But as important and effective as each of these may be, none are nearly as important relative to achieving our primary goal as the process of creating disaster resistant communities. Neither can any of their functions and roles be optimized in their own right in an emergency management context without this process.

What is a disaster resistant community and what is the process of achieving such a creature? This paper will delve more deeply into this, particularly in the context of developing sustainable communities. But for our purpose here, the essential ingredient for reinventing our existing communities to be disaster resistant is mitigation. This process can then be defined as using and integrating the principles and techniques of mitigation into the day-to-day planning and development function of our communities. It is here in a sustainable community-planning context at the

local level where it belongs and where the maximum results can occur. I will call this approach Creating Sustainable and Disaster Resistant Communities.

Natural hazards, or extreme natural events--earthquakes, hurricanes and flooding--are very much a part of the natural workings of our earth and are not problems in-and-of-themselves. However, they become very serious problems when they impact our human settlements. It is here, at this point of interface that our concern begins. Still, even at this point, a natural hazard does not have to become a natural disaster. It is fair to say that many natural disasters are not natural, but are rather human-made disasters -- the result less of the extreme natural event, than of the inappropriate settlement patterns and poorly planned communities that we have built where these natural forces converge.

These inappropriately planned communities are the result of a traditional planning-development process that for the most part is no longer relevant for our present place in history, and must itself be greatly broadened and reinvented to serve our present and future needs. It must be reinvented to deal with the generic issues that are essential to us today: using resources more effectively; understanding the role of the built environment to achieve community goals; qualitative as well as quantitative growth management; the importance of sense of community; respecting and conserving our natural environment; creating a socially viable community; and generally considering such issues as climate change and global warming. These are just a few of the areas that community planning and growth management must begin to address more effectively.

This leads us to our primary emphasis, and the foundation for our approach to minimizing the damage and disruption from disasters: the relationship between how we manage growth, how we plan and develop our communities -- their neighborhoods, buildings, infrastructure, and other systems and components, how we relate development with the natural environment -- and their capacity to resist, to minimize the results of disasters. And thus, we begin to envision the concept of a disaster resistant community, actually the first step in developing sustainable communities.

Developing such communities can only occur by reinventing our existing communities, step by step, institutionalizing the appropriate principles and techniques into the daily actions that local governments are required to take as part of their ongoing planning and development responsibilities. This is the path, the only path that will make a sustained difference toward reducing the growing costs and terrible waste of resources from these events.

HUMANS MEET NATURE: THE ROLE OF THE COMMUNITY BUILT ENVIRONMENT

We can begin by using the many lessons that these natural disasters--the earthquakes, hurricanes and flooding--have taught us first hand over the past few decades. We have learned, for example, from our research and practical experience that there is an integral relationship between the way we plan and develop our communities– the form, configuration, function and use--and the ability of these communities to resist the forces of extreme natural events.

This relationship demands that we give more attention to the various built support systems and components of the community: where and how they are planned, how they relate to each other, and to the ecological and geological systems they are part of. This includes such considerations as community development patterns, transportation and utility design and configuration, relationship between the built and the natural environments, patterns of open space, housing and neighborhood design, and building group configuration and location.

Many of the principles and techniques that are needed are presently available to do this, waiting to be integrated into the day-to-day activities of our local governments. Such techniques will not only help create disaster resistant communities, but can also contribute to creating more viable, sustainable communities as well. The process of creating disaster resistant communities is but one, if not the first step in creating more sustainable communities; These steps provide a broader opportunity in the multi-benefits they foster--an even larger goal for all of us as we head into the 21st century.

Almost all property damage, loss of life, and socioeconomic disruption associated with natural disasters occur as a result of the built environment, or rather as a result of the failure of the built environment – structurally, functionally, environmentally and socially -- to resist the physical forces of natural disasters and to provide the functional support framework necessary for recovery. A variation on an old adage goes that earthquakes don't kill people, buildings kill people...as do collapsed freeways, ruptured gas lines, and other inadequate development and infrastructure. This adage reinforces the important role that the built environment plays, especially at the community scale and why we must give careful consideration to how we plan and manage it.

MITIGATION: THE MEANS FOR THE DISASTER RESISTANT COMMUNITY GOAL

In the context of mitigation today, it is an understatement to say that an ounce of prevention is worth a pound of cure. As we near the end of the 20th century, mitigation is indeed prevention and is worth many, many pounds of cure, in the context of the great costs associated with natural disasters.

Mitigation, with its goal of developing disaster resistant communities, is first and foremost a process, a process of the decisions made and actions taken at the local level to minimize the results of these extreme events on our human settlements. Mitigation, besides creating safer and healthier communities, is also good business and often has other associated benefits for these communities. It represents an investment in our communities, an investment that can make them more economically viable and provide a better quality of life in general for their citizens. It can help us create more efficient communities, save significant resources, provide more environmentally viable places to live and attract and keep progressive businesses.

Mitigation is concerned with keeping a hazard from becoming a disaster. A good mitigation process greatly supports and enhances the effectiveness of the preparedness, response and the recovery-reconstruction functions of emergency management. For example, whereas the preparedness function is concerned with pre-planning the response for after the event has occurred, mitigation is charged with planning and building the various systems and components of the built environment to minimize the loss of life and property damage from the actual event, and thus the subsequent socioeconomic disruption which occurs as a result of the damage. Such an approach therefore reduces the need to respond and to recover after the event.

Mitigation includes pre-event planning for post-disaster recovery, an important recovery component that assesses the vulnerability of a community before the event occurs. It ensures that the planning-development process is in place so that reconstruction and recovery can proceed without delay, and in a manner that the principles and techniques associated with a disaster resistant community are implemented. This contrasts with the all too common approach of building back as soon as possible without applicable improvements, thus creating the same built-in vulnerabilities that caused the disaster in the first place. Some activities associated with this concept are occurring, however sporadically, in the USA, particularly in the seismic planning-development process in California.

While mitigation is concerned with incorporating the best hazard resistant design available into the building back of businesses, housing and other facilities, it must also ensure that the very best economic, social and environmental principles of sustainable development be implemented at the same time. We must begin to make development decisions based on multi-goals, thus maximizing the available resources. We can no longer afford the alternative. This is not only good emergency management and mitigation, it is good business, an investment in the community. It is making an opportunity out of a potential problem.

THE LOCAL GOVERNMENT CONTEXT: WHERE THE RUBBER HITS THE ROAD

Local governments make many everyday decisions, based on the needs and priorities of their communities. Nearly every decision and resulting action at this level directly shapes, to one degree or another, the built form of the community, and thus, the process and capacity of that community to be sustainable and disaster resistant. This process has the potential to prevent a hazard from becoming a disaster.

FEMA's director, James Lee Witt has stated that "All mitigation is local." Mitigation, the process of creating disaster resistant communities, inherently must begin at the local level. The local level bears responsibility for public health, safety, and welfare. It also feels the effects of natural disasters more keenly than any other level. Local government administrators are the victims as well as the central responders in disasters. It is at the local level where the problem can most effectively be resolved, by utilizing the planning, development decision-making so integral to this process.

While mitigation is the foundation and essential first step toward effective disaster management, the local planning decision-making process is the foundation and essential first step toward mitigation and the primary vehicle for creating disaster resistant communities. Winston Churchill stated it best when, in the context of World War II Reconstruction, he said: "We shape our communities and then they shape us." This is the imperative for sustainable community development and for local government-- to shape disaster resistant communities.

More attention must therefore be given to assisting local officials and professionals to better understand and use the applicable principles and techniques. For local governments, the key to confronting disasters and emergencies, regardless of type, is an effective and workable Emergency Management Program. The key to the success

of such an Emergency Management Program, as well as a Disaster Resistant Community, is the process of mitigation.

While mitigation is only one of the four primary ingredients of an effective Emergency Management Program, it is essential if the effectiveness of the others--preparedness, response and recovery--are to be optimized. Only through mitigation can we truly confront disasters, and begin to minimize loss of life, property and environmental damage and the socioeconomic disruption from these events.

Local governments--municipalities, counties, and regional entities-- must therefore be integrally involved with developing their own mitigation strategy, educating themselves and their citizens about its importance, and the overall social, economic, and environmental benefits associated with it. They must develop and implement these programs according to their own particular characteristics, capacity and needs, but it is essential that the community as a whole-- businesses, neighborhood associations, builders, the media, etc.--be involved in this effort.

NEW DIMENSIONS FOR DISASTER RESISTANT PLANNING

Clearly, we must change the way we plan our communities in general, and in particular, the way we plan them to be disaster resistant. It is in our best interest -- economically, environmentally, and socially – to apply the principles and techniques of disaster resistant planning. This is particularly true in a time of limited resources, pressing environmental problems, and growing human needs. Disaster management, like other areas of problem solving, calls us to "do more with less." But careful planning can balance this equation, optimizing our resources and meeting our needs. There are three important related areas which can particularly influence and assist local governments practice effective disaster resistant planning in the late twentieth century and into the 21st century: sustainability, community investment, and pre-event planning.

Sustainable Development

Planning sustainable communities, is a concept that is growing in importance in the United States, as well as in many other parts of the world. It has evolved from the global-societal context we find ourselves in today and represents the foundation for planning disaster resistant communities: sustainable communities are disaster resistant and vice versa.

The most commonly accepted definition of sustainable development came from a 1987 report by the UN World Commission on Environment and Development (UNCED): it is development "that meets the needs of the present without compromising the ability of future generations to meet their own needs." This general definition has been used to identify more specific policies. William D. Ruckelshaus, former administrator of the Environmental Protection Agency, reinforced the integral relationship between economic development and resource conservation in a September 1989 article in *Scientific American*. He defined sustainability as "the emerging doctrine that economic growth and development must take place, and be maintained over time, within the limits set by ecology,....the interrelations of human beings and their works, the biosphere and the physical and chemical laws that govern it....It follows that environmental protection and economic development are complementary rather than antagonistic processes."

The concept and application of sustainability evolved further during UNCED's 1992 Earth Summit in Rio de Janeiro, where 120 nations agreed to an agenda for the actions needed to sustain global development into the twenty-first century. Agenda 21, as it was called, sparked the creation in 1993 of the President's Council on Sustainable Development (PCSD), whose work is intended in part to fulfill the United State's commitments.

The sustainable community is a model, an ideal set of goals to work toward. But it also is a philosophy for envisioning those goals and a practical problem-solving process for achieving them. Concern Inc. has defined a sustainable community as one that "uses its resources to meet current needs while ensuring that adequate resources are available for future generations. It seeks improved public health and a better quality of life for all its residents by limiting waste, preventing pollution, maximizing conservation and promoting efficiency, and developing local resources to revitalize the local economy."

A sustainable community formulates goals that are rooted in a respect for both the natural environment and human nature and that call for the use of technology in an appropriate way to serve both of these resources. Without this important principle, failure is guaranteed, and with that principle go the fundamental characteristics of a sustainable community.

Inherent to this approach is a holistic perspective on problem solving, as it relates to both planning in general and disaster resistant planning in particular. This approach calls for local governments to respect and learn from ecological and geological

systems and develop a built environment that complements these systems, rather than conflicts with them, as is so often the case today.

Sustainable community development and disaster resistant communities are natural partners, and therefore bridges must be built between them to help optimize the goals of each. By the nature of their missions, they must be concerned both with the workings of nature and this relationship between the built environment and the natural environment, as well as the associated social and economic implications. This must be the foundation and essential first step for creating sustainable communities as well as disaster resistant communities.

Community Investment

Disaster resistant communities are better communities in which to live and do business. We are seeing more clearly each day that we gain multiple benefits from disaster resistant communities. A disaster resistant, well-planned, well-built community is a viable community...an efficient community...a conserving and wise-use community...and an empowering community. It is a community that optimizes its resources – natural, technological, and human – much more effectively, and saves considerable money in the process.

Well-planned infrastructure and development patterns, for example, also enhance the functioning of a community. Better planning, then, can result in more efficient circulation for automobiles and public transportation, more effective natural and built open spaces, and better use of human and natural networks. This approach contributes to a more socially and culturally viable community.

We are also beginning to see in the United States that safer communities can attract more business and increase their tax base. These communities are more attractive to company employees and stockholders. Thus, to a society, which places increasing value on community safety, health, and quality of life, disaster resistant planning represents a solid community investment.

Pre-Event Planning

It is essential that we plan ahead for disasters and prepare those plans for not only response, but also recovery and reconstruction. Communities must be able to quickly activate the recovery process in order to respond to human needs, prioritize efficiently under pressure, optimize their planning tools, and avoid committing old planning mistakes. This process is known as "pre-event planning for post-event recovery." Los Angeles and other California communities are at the cutting edge of

pre-event planning, and have recently adopted legislation that requires communities to incorporate pre-event planning into their response and recovery plans.

Pre-event planning not only facilitates well-considered recovery but also presents a unique opportunity for re-thinking the old development patterns, and re-working them for more appropriately planned communities. Earthquakes, for example, when they occur, provide us with an opportunity to reconstruct the damaged or destroyed sections of a community in a way that will mitigate future earthquakes as well as improve housing and other elements of the neighborhood in general.

In pre-event planning, we mentally project ourselves into the potential disaster, and then go backward step by step through the escalation of the disaster, to ask ourselves how we got there and how we can improve our situation. There are two important insights that we gain from this perspective. First, we come closer to understanding what decisions were made during the planning process that, essentially, put us a risk of a disaster in the first place (i.e. did we build on a fault line, did we fail to use effective seismic safety codes, etc.). Second, we better understand how the built environment can actually aid in the response and recovery side of disaster management (i.e. does the community provide adequate open space for response staging areas, are evacuation routes appropriate for the population, etc.).

Mitigation, and the planning process for disaster resistant communities, gives us a means, a reference point, and a guide to integrate and enhance the effectiveness of the entire disaster management strategy. Through it, we can explore and maximize the reciprocal roles and relationships of planning, preparedness, response, and recovery.

APPLYING MITIGATION: WHERE COMMUNITY DESIGN MEETS EMERGENCY MANAGEMENT

The following examples are provided to give a better understanding of the role of mitigation in creating disaster resistant communities, as well as to distinguish between the functional relationship between mitigation and the other elements of the emergency management process--preparedness, response, recovery and reconstruction.

Preparedness and response are concerned with getting fire, police and medical vehicles to the places of need as quickly and efficiently as possible, after the event has occurred. Mitigation on the other hand, is concerned with seeing that the systems

and facilities of the community are planned and built in such a way before the event to minimize the need to have to respond afterwards. Mitigation is, therefore, concerned that the medical, police and fire facilities are designed and constructed appropriately, and located to ensure the best service possible. It is also concerned that roads are not destroyed or blocked by collapsed buildings that were inappropriately located, so that what ever response function is required can be carried out in the quickest, most efficient manner possible.

In a seismic context preparation and response are concerned with getting emergency equipment to the disaster site to evacuate and rescue people from buildings as quickly and efficiently as possible. Mitigation, on the other hand, is concerned with designing and locating buildings as part of the communities' normal development process before an event, therefore minimizing the impact from the event itself and the need for emergency equipment, rescue and evacuation functions, after the event.

A large part of hurricane preparedness and response is concerned with the warning function and evacuating people from harm's way, before the event. Mitigation is concerned with making planning-development policy and decisions that keeps development away from the most vulnerable areas of the coast, through effective land use planning, in the first place; mitigation is also concerned with planning and building transportation systems and shelter facilities required to make what evacuation is needed as effective as possible.

In urban wildfires, preparedness and response are concerned with using the existing transportation infrastructure to get emergency vehicles to the fire sites, keep the fire from spreading and to put it out. Mitigation, on the other hand is concerned with planning and building roads in those vulnerable areas (again, as part of the normal development function before an event) to be readily accessible, direct and wide enough to allow vehicles to get to the sites quickly and efficiently and without being blocked. Mitigation is also concerned with identifying vulnerable areas and planning for that vulnerability as the area is developed or upgraded. This may entail using building codes to ensure that roofs and other building materials do not add to the fire potential and that landscaping is planned in such a way so as not to add to the fire potential.

FIVE PROCESS STEPS TO A DISASTER RESISTANT COMMUNITY

Having discussed the importance and context of our subject, and some of the major issues impacting the field, we need to look at how local governments can begin to

apply this information to their own programs. Local governments must keep in mind five key steps in developing a program for their communities.

1. **Maintain a Comprehensive Perspective.** Local governments must account for the entire community in the disaster management strategy. In the past, community design theory tended to emphasize individual buildings or groups of buildings. While this is important, it is exceedingly important for mitigators to look beyond individual buildings to consider the entire built environment -- the block, neighborhood, and community; the streets, parks, and infrastructure that connect them; and other systems and components that unify and define this complex system.

2. **Conduct a Community Risk Analysis.** Local governments must understand the community's unique vulnerabilities, challenges, resources, and opportunities, with regard to natural disasters. With a well-documented risk analysis in hand, local authorities can document lessons learned, and translate those lessons into the development and design guidelines that are integrated into the community's unique planning and decision-making process.

3. **Integrate Planning into the Local Decision-making Process.** Local governments must ensure that at each step in the planning and decision-making process – from zoning and codes to capital budgeting, from transportation planning to facilities management, and from subdivisions to strategic plans -- the values and priorities of a disaster resistant community are reinforced and implemented. The necessary decision-makers must be involved in the process, discuss the ramifications of their decisions, create consensus around actions, and ready the necessary planning tools to implement those actions.

4. **Create and Utilize a Disaster Resource Network.** Local authorities must improve their access to state-of-the-art information resources useful in the planning process. This includes local, national, and international resources: research, literature, specialists, local experts and teams of experts, case studies across the globe, and useful methodologies. This information can be practically applied to augment their own planning efforts.

5. **Promote Public Awareness.** Finally, educating the public – through risk communication materials, media activity, and other means – will ensure that planning efforts go beyond the local authority to reach the entire community. When community members are involved in the visioning and decision-making process, they will feel empowered to participate fully in civic affairs, and will

become themselves additional resources to the local authority in the process of planning disaster resistant communities.

APPLYING THE COMMUNITY PLANNING AND DEVELOPMENT PROCESS

For our purposes, design/planning is the process of shaping and managing the community built environment as a means to accomplish a community goal or set of goals -- in this case, a disaster resistant community. Planning the built environment means designing and relating the various systems and components of the community to achieve the optimal results toward this end. This relationship demands that we give more attention to the various built support systems and components of the community: where and how they are planned, how they relate to each other, and to the ecological and geological systems they are part of. This includes such considerations as community development patterns, transportation and utility design and configuration, relationship between the built and the natural environments, patterns of open space, housing and neighborhood design, and building group configuration and location.

It becomes exceedingly important for local government officials and related professionals to look beyond individual buildings to consider the entire built environment-- the block, the neighborhood and the community as a whole; the streets, parks and other infrastructure that connect them; and other elements that unify and define this complex system. All the physical components and systems of a community are impacted to some degree by the forces of extreme natural events and therefore have an important role to play individually and as a part of the larger whole. How these components and systems are planned and developed can make a significant difference in a community's overall capacity to resist these forces.

The following are just some of the general design-planning considerations that local governments need to address in their decision-making process to develop disaster-resistant communities:

1. Building design and construction, (including plan and elevation form configuration, non-structural and structural design and their critical interface, and code considerations); building group design, (site layout, form continuity, pounding characteristics and construction type) and their relationship to transportation systems, open space and community facilities;

2. Spatial/functional location and design of safety/health facilities (fire, police, health) and their relationship to the elements of the community that need to serve (residential areas, schools, work places, commercial areas, etc.);

3. Relationship of development to the natural geographical, geological and ecological systems: floodplains, watersheds, beach and dune systems, seismic fault areas and soil systems;

4. Location and relationship between where people live and where they work and carry out their day-to-day activities, and the connecting public and private transportation systems in the context of potential social-economic disruption that could occur during a disaster;

5. Patterns, use and hierarchy of public and natural open space systems, for staging emergency functions, temporary housing, shelters, community gathering areas and for community fire-break design considerations (for earthquakes);

6. Scale, capacity and density of the community and its various parts use areas--residential, commercial, etc. as they relate to functioning and optimizing disaster management organization and service; also the pattern, capacity and hierarchy of transportation, utility and other infrastructure systems and their relationship to these uses.

7. Urban block design, configuration and form, (utilizing the lessons learned from the Mexico City urban earthquakes, 1985)--corner and middle buildings design, urban blocks functioning as a unit, building construction type and continuity considerations; 8. Form, Density, and Height of community development patterns, the importance of continuity considerations, and relationship to open space patterns.

9. Utilizing maintenance and up-keep of community systems and components as a mitigation vehicle.

10. The relationship between disaster resistant buildings and a disaster resistant community as a whole. Based on the premise that you can't have a safe building without having a safe community to put it in, it is important to use such an approach to analyze and plan for the community support characteristics and systems necessary to ensure safe buildings. This might include such considerations as: adequate fire, police and medical service; access to public and private transportation; relationship to and configuration of adjacent development; approximately to employees' homes, just to mention a few.

We must therefore learn more about and maximize the planning and management of the community built environment as an integral vehicle for mitigation and effective emergency management. While we have much to learn, we also have learned much about this discipline over the past decade. It represents an integrated, comprehensive approach to effective disaster management, rather than the all-to-often fragmented approach that has been utilized in the past. It also represents a subject and direction whose time has come, one that can assist local governments to be come more aware of and assess the related risks and vulnerabilities to their communities, and practically implement the lessons learned by integrating them into their own unique planning and decision-making process.

THE CONCLUSION: ASKING THE RIGHT QUESTIONS

I have attempted to frame the general conceptual foundation for this subject in the preceding material. As we continue to consider this imperative, there are a number of questions that must be addressed in much more depth: What are disaster resistant communities? ... What do they look like? ... How do they function? ... How do we reinvent our present-day communities to be disaster resistant? ... What are the costs and benefits? ... Are there multiple benefits -- economically, socially, and environmentally? ... What are the similarities among communities that are resistant to earthquakes, floods and hurricanes? ... What is the relationship between a safe building, a safe neighborhood, and a safe community? ... How do we achieve such communities? ... Who should take the leadership role in achieving them? ... How do such communities relate to sustainable communities? ... And, how do Disaster Resistant Communities assist comprehensive emergency management in general--preparedness, response, recovery and reconstruction?

These questions cover a lot of ground, but they represent the issues that need to be addressed if we are to make significant progress toward our goal of minimizing the impact of disasters on our society, our economy, our resources, and our communities.

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