

## **Housing Reconstruction and Community Recovery Following Disasters – No Easy Choices**

Dana Bres, P.E., M. ASCE<sup>1</sup> and Carlos Martín, Ph.D., M. ASCE<sup>2</sup>

<sup>1</sup> U.S. Department of Housing and Urban Development, Office of Policy Development and Research, 451 Seventh Street, SW, Washington, DC 20410; PH (202) 402-5919; FAX (202) 708-5873; email: dana.b.bres@hud.gov

<sup>2</sup> Abt Associates, 4550 Montgomery Ave, Suite 800 North, Bethesda, MD 20814; PH (301) 347-5761; FAX (301) 634-1801; email: carlos\_martin@abtassoc.com

### **ABSTRACT**

In the aftermath of a disaster, communities experience significant housing demands for the survivors. Although there will be many volunteer, local, state and federal organizations involved, a significant housing recovery challenge is the reality that everybody will be in charge. Property owners, investors, builders, community leaders, insurance providers, and various state and federal leaders all have a stake in the operation and success of the reconstruction effort, yet none have the absolute power necessary to direct the collective recovery. This reality is symptomatic both of the inherent chaos after disasters and of the current response system. Those involved in facilitating community recovery must understand the opportunities and constraints of the various courses of action available to leaders, residents and community advocates. This will enhance the ability to rapidly respond to the housing demands of the post disaster environment.

A community's long-term recovery is highly dependent on the availability and quality of physical housing units in the short- and mid-term, in particular. Housing supports the larger community recovery effort in numerous ways. However, housing responses are still among the most complex and disaggregated in disaster recovery. This paper first presents a comprehensive structure for conceptualizing the inputs and activities associated with housing responses through the "Seven Rs"; repair, rent, rebuild, remediate, replace, relocate and most importantly, resources. The authors argue that conscious consideration of these concepts will support more effective pre-disaster planning and efficient post-disaster assistance. Secondly, the paper argues that a glaring omission of past housing responses has been the involvement of the housing industry itself, including the expansive knowledge of technology, production efficiencies (or inefficiencies), and cost that can be brought to bear. The decisions that lead to programs for disaster response and recovery often are made quickly and frequently without analysis of or input from the residential design and construction industry and markets. Integrating these parties strategically will strengthen the process and speed the recovery.

## **INTRODUCTION**

Although the images we often see on the evening news following a disaster typically suggest vast destruction, those images belie the fact that the number of homes that are destroyed may be limited. Following a disaster, great efforts are targeted at cleanup and repair, and these typically provide great latitude for homeowner's decisions about repair and reconstruction. The challenges facing communities stem from the decisions made early in the process that may place families at risk from future disasters and can impact broader community or regional plans to improve the resilience of the area.

While there may be an urge to quickly begin repairs and reconstruction (often demanded as a "show" of community resilience or strength), a more prudent and potentially cost-effective approach might be to simply plan in an effective manner beforehand. For example, changing the land use or construction requirements for a risky location (from residential to open space or requiring elevation of the home) could be rendered moot by the rebuilding actions of a few property owners, decisions by insurers, or basic lack of knowledge among local builders and remodelers. As a consequence, the costs of later implementing the open space conversion (both financial as well as political) increase dramatically.

## **DISASTER RECOVERY FRAMEWORK**

As we are seeing with the aftermath of Superstorm Sandy in New York and New Jersey, many priorities are established by a host of parties, often advocating conflicting positions. Such conflicts can lead to wasted time, effort and community focus. In a perfect world, a comprehensive plan would be developed and that plan would be implemented throughout the community. Unfortunately, because of individual priorities and resources, that often does not happen. Property owners will, by virtue of their own priorities and resources, move at different rates. These owners may take actions much more quickly than the community and in others, much slower.

For effective housing recovery following a disaster, it is not enough to simply provide a temporary housing unit to a family and then declare community recovery complete. While expedient, those actions will just shift the costs and impacts of the disaster to a later time by not addressing the physical, economic, and social needs of the disaster's most needy victims. As the vast majority of the nation's housing stock is privately held by residents or investors, the burden of repair and replacement of housing will primarily fall on the private sector.

Those involved in the challenge of facilitating community recovery must understand the opportunities, constraints, and costs of the various courses of action available to leaders, residents and housing advocates. This will enhance the ability to rapidly respond to the housing demands of the post disaster environment. Absent the locations that present too great of an individual, community or societal risk for repair and reconstruction, it is likely that all damaged housing (or developable lots) will be ultimately returned to the community.

Because of the flexibility of action available to the disaster survivors and need for housing recovery, the choices and issues can be broadly characterized as falling into one of “Seven Rs”; repair, rent, rebuild, remediate, replace, relocate, and most importantly, resources. Virtually all housing programs will fall into one or more of these categories.

## **REPAIR**

Typically most of the housing that has experienced a disaster has not been destroyed, with a significant portion experiencing repairable damage. Although the media typically shows homes and buildings with the greatest damage in reports and stories, much of a community’s housing stock is often habitable or close to habitable.

With most disasters, the damage to housing, businesses and institutions follows a predictable continuum, where the vast majority of the structures are either undamaged or lightly damaged. In the recent analysis of preliminary damage on housing following Superstorm Sandy, FEMA inspectors noted 63.5% of the 468,643 units inspected in the 41 counties (in five states) declared for individual assistance had experienced no damage. Table 1 below shows a U.S. Department of Housing and Urban Development analysis of those homes that were received no flooding from an extract of FEMA property inspections (provided by FEMA on November 26, 2012). Examination of other disaster events suggests a similar distribution of damage.

**Table 1. Non-Flood Damage Observed**

<b>Classification of Damage</b>	<b>Number of Homes</b>	<b>Percentage of Total</b>
No damage	297,542	90.6%
Minor Damage Low	21,191	6.5%
Minor Damage High	6,041	1.8%
Major Damage Low	2,123	0.6%
Major Damage High	960	0.3%
Severe Damage	491	0.1%
Total Units	328,348	

For this analysis Minor-Low damage was estimated at under \$3,000, Minor-High at between \$3,000 and \$7,999, Major-Low between \$8,000 and \$14,999, Major-High at between \$15,000 and \$28,800 and Severe at over \$28,800 (or destroyed).

Among the units that experienced flooding, the depths observed are shown in Table 2. The depth classifications used by FEMA for flooding are not linear, with basement flooding up to a depth of 6-9 feet, the 1-4 foot depth representing a three foot range, and the flood depth over four feet has a wide depth range. This would account for the relatively small number of homes reported as receiving flooding to a depth of one foot.

**Table 2. Flood Depth Observed**

<b>Depth of Flooding</b>	<b>Number of Homes</b>	<b>Percentage of Total</b>
Flooding Limited to Basement	50,393	35.9%
Flooding to First Floor, Depth up to 1 Foot	21,984	15.7%
Flooding to First Floor, Depth 1 to 4 Feet	52,307	37.3%
Flooding to First Floor, Depth Over 4 Feet	15,611	11.1%
Total Units with Flooding	140,295	

The more quickly residents can return to their homes, the faster the community will recover. That said, it mustn't occur too quickly as the ability of the community to such a return is dependent on the availability of essential services which would include utilities and open transportation routes (which would support residents as well as emergency services). Reoccupancy before those services are operational stress the available emergency systems charged with delivering supplies such as food, fuel, water and services for responders and survivors.

After the essential services are available, families may be discouraged from returning to a disaster affected community because of the lack of businesses providing services (such as groceries, fuel, medical care, restaurants ) and those businesses are discouraged from reopening without a client base, a classic chicken-egg conundrum. Including the availability of schools and other public services adds an additional facet to the issue. Without attempting to resolve the conundrum, it is critical to get families back home. In addition to supporting the remainder of the community, returning to one's home can improve the emotional stability of the family while decreasing demand on temporary lodging which may be needed to support those who lost their homes.

As discussed above, if minor repairs can be rapidly accomplished, a significant number (possibly as many as two thirds) of the residences in the affected area might be quickly reoccupied. This presents opportunities for builders, remodelers, non-profit organizations and others with community links to help families in the least damaged homes return. While involving such organizations virtually assures a fairly relaxed organizational structure, homes with modest damage generally do not require much technical capacity. If temporary repairs are provided, follow up will be essential.

## **RENT**

In the event a property or neighborhood has received substantial damage or immediate repair is not possible, the residents of the affected homes will need temporary housing. In rare instances, property owners might immediately purchase a new residence with the intent of living in the new unit until the repairs are made to

their damaged home. In most cases, the property owners will need temporary housing in the form of rental properties, a trailer or some other temporary unit. Although the general desire of disaster survivors is to remain on or near their property, temporary housing sited on their property or rental housing in the immediate proximity is often not available.

For many families who must remain in the area affected by a disaster because of employment, reconstruction of their homes or other reasons; renting a home or apartment is often an effective alternative. Disaster-induced demand typically tightens the rental market and the increased rental costs may result in market decisions to bring units online or to develop new multi-family housing. Bringing units online may often be done for a relatively small investment for minor repairs, paint, carpeting and appliances. In some cases, the new market dynamic might result in investment decisions to construct new rental housing as a permanent addition to the local housing market.

In all but the tightest rental markets, there is likely a significant amount of rental housing. In most communities or metropolitan areas, the housing market often has enough vacancies to absorb a significant number of renters. In a normal housing market, housing which is both vacant and available is generally less than the actual vacancy rate by 3-5%, an estimate of the amount of housing in transition or out of service. The rental market that approaches that level of vacancy is largely saturated and bringing the vacancy rate below that level would require aggressive efforts and coordination. In the period since 2005 the rental vacancy rate has ranged from 8.6% to 11.1% nationally. In an analysis of the Washington, DC area (based on 2011 Census estimates) there are 1.64 million housing units with 495,000 rental units. The rental vacancy rate of 6.1% results in a total of 32,000 vacant rental units, with up to 16,000 available for rental.

As the housing markets tighten, the distance many renters are willing to travel typically increases, expanding the local housing supply to a regional housing supply. Property owners in New Orleans following Hurricane Katrina had moved to the outer suburbs across Lake Pontchartrain (about a one hour commute) and to Baton Rouge (about a two hour commute) where they lived and commuted into New Orleans for work and to manage their home repairs. While the commute distance one will accept is an individual decision, anything in excess of 100 miles would be logistically difficult (the 2011 American Community Survey reports a mean commuting time of 25.5 minutes with only 8.1% of commuters having commutes in excess of 60 minutes).

## **REBUILD**

For the small fraction of homes that are damaged and uninhabitable, the property owner is faced with decisions that must balance the personal needs for reconstruction with the available resources. Because homes which may be rebuilt occupy a narrow band between those lightly damaged and catastrophically destroyed, the property

owner may be faced with the challenges of repairing the disaster damage, complying with the new building code, and performing selective upgrades to satisfy both functional and aesthetic needs. This effort will be conducted during a time where the construction industry in the community is likely to be stressed with too much work. The strong competition for contractors are likely to increase labor and materials cost and will probably extend the construction period as well. Because of the demand, less experienced construction firms may enter the market and construction quality issues may increase.

Homes which are being significantly repaired or reconstructed generally will have to comply with current building codes. Homeowners may attempt to take actions that will allow them to avoid such code compliance, often by challenging assessments that estimate the severity of the damage. While such actions may result in reduced construction standards for the rebuilding effort, they may also prove to be a false economy (leading to an increased long-term liability) in the long run.

### **REMEDiate**

Allowing the reconstruction of the home may be delayed because it might be appropriate for the community to consider land use changes to heavily damaged areas before reconstruction. The community might elect to change construction requirements (building codes), flood maps might be changed (FEMA often reexamines flood maps following disasters) or the community might elect to change the land use. After Hurricane Katrina, Louisiana adopted a more modern building code. It is reasonable to expect that a community might identify construction requirements to reduce the threat of future disasters. In a flood zone, the community might change the requirements for construction in flood zones to increase the amount of freeboard required above the base flood elevation. This is a protective strategy that can be adopted by the community without the development of new flood maps. In some areas, it might be appropriate to change the land use, possibly changing zoning from single family housing to multifamily. Elevating multifamily housing will probably be more cost effective, as requirements such as elevators can be amortized across a number of units. Because of the public processes communities use to implement laws and policies often results in lengthy discussions, there may be some value in slowing the reconstruction process to allow for the implementation of revised planning, zoning or construction policies.

### **REPLACE**

In the event a home is completely destroyed, the only option is replacement. This provides the greatest opportunities for upgrading the homes or using products or processes that provide significant safety, performance and energy improvements. Although the personal and financial impacts to the families should not be minimized, replacement of housing is an opportunity to improve the future performance and disaster resistance of the homes that shouldn't be overlooked. To implement this, a

number of government and community organizations may be in a position to assist with planning, technical or financial assistance.

If significant amounts of housing require replacement, the local construction industry will likely be stressed and may have difficulty satisfying the demand. The sudden influx of construction workers places additional stresses on the rest of the community in that those workers require lodging, food, fuel and occasionally emergency services. In the immediate post-disaster period, the impact is greatest as many of those services are already operating at capacity. As a result, we should consider construction options that reduce the stress to that local market. Increasing the use of factory built components provides some relief by moving much of the construction off-site, where labor and support services are more available. Not only does this reduce the logistical demands on the impacted community but it can speed the construction process. In a coastal environment where the building codes may require significant elevation, factory built components can help eliminate significant labor associated with that elevation (coastal residential construction projects often have workers dedicated to passing materials from ground level to the work site).

## **RELOCATE**

In some locations, the specific risks of damage from repetitive disasters may present far too great a community and societal threat to allow reconstruction. In those cases, the prudent action would be to prevent the survivor's return to those locations. This would be most typically appropriate when the risk of flooding presents risks that cannot be tolerated. Relocation might be an option where risks are known and their location predictable, such from riverine or coastal flooding. Other disaster events, such as tornadoes, are more random in nature and relocation wouldn't change the risks significantly. Relocation is likely to involve great costs (financial as well as political) as in many situations; the homes that are undamaged or undergoing reconstruction when the relocation decision is made will suffer significant impacts to property value.

Although relocation often is seen as a complete movement of a community (such as the movement of Valmeyer, Illinois following the 1993 floods), in many cases it would look more like community land use planning where local decisions are made to select land uses that serve to minimize the risk to the residents and community. Following Hurricane Katrina, the town of Bayou La Batre, Alabama developed an area that was away from the coastal areas that were prone to flooding but still part of the town. Even in small communities, the risk often varies with location.

While some might argue whether it is relocation, vertical relocation might be worthy of consideration in coastal or riverine areas. Many features of homes that make elevation expensive can often be shared (structural design and construction, elevators, etc.) and locations where elevation is needed might lend themselves to multifamily housing. As project planners consider designs, mitigating disaster risk should be addressed just like any other environmental or site condition. While there are some

locations that shouldn't be developed (for environmental or public safety reasons), many other locations may be developed with appropriate safeguards and designs.

## **RESOURCES**

Resources include funding, time, capacity and a regulatory environment. This is similar to the meaning of the word in the corporate, institutional or government context.

FEMA and other federal agencies often provide support for property owners in a number of ways. They may provide temporary housing to the disaster survivor while the property owner must pay the cost of the repairs. Financing the permanent repair of the residence is typically the responsibility of the property owner, although there may be assistance in the form of loans or grants from a number of federal agencies. As is experienced in virtually every disaster, many homes are likely to be uninsured or underinsured (in a rental home that would include renters insurance for the contents of the home). This appears to be most evident with respect to homes owned without mortgages and homes without flood insurance. Without the financial resources to reconstruct or relocate, recovery becomes a drawn out process where the property owner attempts to muster the resources to reestablish their home and lives.

The challenge we face is that the funding streams for disaster reconstruction are often quite diverse. These might include individual savings, insurance proceeds, loans, private or government disaster assistance, local funds, assistance from philanthropic organizations, and federal assistance. Because each of these funding sources is likely to have a unique set of priorities and program requirements, "threading the needle" of these multiple programs is likely quite individualized. Some funding sources might be mutually exclusive, but many can be blended with others.

Some funding sources are designed to assist disaster survivors and other are adapted from ongoing programs. Because some non-disaster programs are regularly adapted to support the needs of communities after disasters, the planning efforts that are typically expected in advance must be performed on a compressed timeline. In some cases, reconstruction programs may be tailored to accommodate the funding program requirements. While this may increase the speed and flexibility of the program, it might also create opportunities for others with differing priorities to advance those agendas.

The virtual certainty in the process of identifying and providing resources for reconstruction is that those resources will be limited. As a result, it is imperative that the program decisions made allow property owners the flexibility necessary to complete reconstruction in an effective and affordable manner.

Because of the myriad sources funding that will be available to the survivors and the communities; there will be no dominant funding strategy. While it might be convenient to look at the funding as a single source that will be applied consistently,



that isn't the case. Property owners will favor funding sources that satisfy their individual goals and objectives, an approach that may result in conflicts with community or other priorities. As the funding becomes available, those receiving funding will make decisions that may restrict the ability to plan effectively. For example, in some neighborhoods along the Gulf Coast following Hurricane Katrina, survivors who began reconstruction early in the process of determining the most effective reconstruction strategy tied the hands of the community as a "critical mass" of housing had been reconstructed, virtually eliminating the possibility of not rebuilding the most risky areas.

Time is a resource which must be considered. The capacity of the community to rapidly develop and execute a recovery plan is likely to be viewed by most survivors as too slow. Based on studies of communities recovering from natural disasters, Kates et al (2005) identified four phases of disaster recovery: emergency, restoration, reconstruction, and commemorative or betterment reconstruction. Although there are overlaps in each phase (for example some restoration may be occurring while roads are being cleared or flood waters removed), the duration of the restoration and reconstruction phases have been shown to be 10 times longer than the earlier phase. In a disaster situation where the emergency phase lasts six weeks, the restoration phase would last about 60 weeks and the reconstruction phase about 600 weeks (11 years). Individuals displaced want to repair and return to their homes as soon as possible, as that is a critical step towards recovery. This desire is heightened by the fact many displaced residents may be living in temporary housing units or rental properties and they often see those arrangements as inadequate. At the community level, the public demand to return to normalcy will likely not reflect that long reconstruction timeline.

While some might view the regulatory environment as something other than a resource for reconstruction, regulations in place before the disaster (and those enacted in the immediate aftermath) serve to shape the decisions and housing in the post disaster environment. Regulations might prevent redevelopment of particularly risky locations or provide the necessary updates to the building codes for new (or reconstructed) buildings. Planners should consider such actions well in advance of a disaster, if only to understand the implementation requirements.

Perhaps the least studied resource in disaster recovery studies, however, is the cumulative knowledge, capacity, and efficiency of the local building and remodeling industry. In each of the respective stages (or "Rs") described in this paper, the industry may be a resource or a critical bottleneck. To date, no sufficient consideration is made in pre-disaster planning and mitigation to having constant monitoring of the industry's capacity—particularly with assessments immediately after a disaster—in a fashion similar to the inspections and needs assessments of the housing stock itself.

## **RECOMMENDATIONS**

It is essential that design and construction professionals join in the planning for and response to disasters in our communities. Absent such involvement, the communities will respond to disasters in a reactive mode that may not take advantage of the capabilities and expertise of the members of the design and construction industry.

Mitigation is clearly the best strategy to minimize losses. By working to implement building and land use requirements that reflect the threats, we can increase the number of homes that remain habitable following a disaster.

Because resources for reconstruction are often limited, it is critical communities encourage all property owners to carry appropriate levels of insurance on their properties. This will provide the necessary resources to help those residents repair or rebuild their homes and initiate the larger community recovery.

## **CONCLUSIONS**

The challenges facing our disaster affected communities demand we identify ways to effectively and inclusively develop strategies for post-disaster recovery. As we have seen in the Gulf Coast following Hurricane Katrina and more recently in New York and New Jersey, this is too important to be left to the federal government, local governments or our elected leaders. The skill sets of the housing design and construction industry are critical to the recovery process and we must get and stay involved.

## **DISCLAIMER**

This paper is the opinion of the authors and does not reflect the position or policy of the Federal Government or Abt Associates.

## **REFERENCES**

- Cantrell, R., Nahmens, I., Peavey, J., Bryant, K. and Stair, M. (2012) “Pre-Disaster Planning for Permanent Housing Recovery”, HUD,  
[www.huduser.org/portal/publications/pre\\_disasterplanning.html](http://www.huduser.org/portal/publications/pre_disasterplanning.html)
- Kates, R.W., Colten, C.E., Laska, S. and Leatherman, S.P. (2006), “Reconstruction of New Orleans after Hurricane Katrina: A research perspective”, Proceedings of the National Academy of Sciences, NAS, 103(40), 14653-14660.
- Turnham, J., Burnett, K., Martin, C., McCall, T., Juras, R. and Spader, J. (2011), “Housing Recovery on the Gulf Coast, Phase II: Results of Property Owner Survey in Louisiana, Mississippi, and Texas”  
[www.huduser.org/portal/publications/commdev/hsgrec\\_gulfcoast\\_phase2.html](http://www.huduser.org/portal/publications/commdev/hsgrec_gulfcoast_phase2.html)