



HURRICANE HARVEY: TEXAS AT RISK



**TEXAS GENERAL
LAND OFFICE**

George P. Bush,
Commissioner



Acknowledgements

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He is the author of three books: *U.S. Foreign Policy and the Four Horsemen of the Apocalypse* (1997); *The Great North Korean Famine* (2001); and his latest book, *Sudan, South Sudan and Darfur: What Everyone Needs to Know*, published in 2012 by Oxford University Press. He has contributed to thirteen other books. He has published numerous articles in *Foreign Affairs*, the *New York Times*, *Washington Post*, *Washington Quarterly*, *Foreign Service Journal*, and *Wall Street Journal*.

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PURPOSE

The purpose of this report is to capture lessons learned from the General Land Office (GLO) response to Hurricane Harvey, with a focus on housing, which require policy changes or administrative action. GLO several administrative lessons learned for the temporary housing program within existing federal temporary housing programs may be found in the appendix to this report. GLO is in the process of implementing many of these administrative changes as this report is being prepared.

Prevention and mitigation are the best remedies to address the threats posed by natural disasters, and there is a heavy emphasis on policy proposals focused on protecting homes and businesses against future disaster risk. A great academic and policy literature exists analyzing natural disasters and how to address the challenges they present to societies vulnerable to them. This report does not attempt to repeat the findings from this research, unless it directly or indirectly affects housing and requires specific policy changes. Nor does this report address the infrastructure needs of Texas (except for the Coastal Spine plan), which is the purview of the Rebuild Texas Commission or the Texas emergency response system which is among the best run in the United States. Specific recommendations are proposed for state and federal regulatory, operational, and statutory reforms to make the people, their homes and small businesses more resilient in the face of continuing threats from natural disaster, particularly hurricanes and floods. These reforms will better protect both the safety of the people of Texas and taxpayers who have been asked repeatedly to fund emergency response, reconstruction, and recovery efforts.

The analysis and recommendations in this report were taken from formal GLO interviews and informal conversations with state, city, and county staff and officials in hurricane-affected areas of Texas—the very people who must lead the response and who see the strengths and weaknesses of the current system. Most importantly, the GLO staff has talked with the people whose lives were disrupted by the storm, and how the government, at all levels, succeeded and failed to respond to their needs. We also interviewed scholars (or read their studies) who have published important research on these issues and met with coalitions of members of the business community whose operations have been affected by storms.

EXECUTIVE SUMMARY

This report will make 18 policy recommendations at all levels of government with the primary objective being to better protect Texans when the next disaster strikes and to improve subsequent recovery efforts. Below is a summary of these recommendations which are described in much more depth in the body of the report.

Recommendation #1

The State of Texas should create a Business Advisory Council on Disaster Recovery and Mitigation to access private business expertise and as a conduit for problems they have in disaster recovery. The Council would not have the authority to spend money or write regulations but would provide much-needed private sector advice and expertise.

Recommendation #2

The Texas Water Development Board's statutory authority should be substantially expanded to cover flood control and have directive control over the state River Authorities in carrying out these duties. The same Board should have directive control over drainage districts to ensure they are keeping drainage ditches and waterways in a continuous state of repair.

Recommendation #3

The State of Texas should establish a permanent disaster recovery training center for local government officials focused on recovery, disaster fortification, and resilience.

Recommendation #4

The state legislature should establish by state statute a Regional Building Code District (RBCD) with standard-setting authority in the high-risk hurricane region of Southeast Texas which would replace the existing weak and uneven building code system. The Commission would have oversight over building codes in the RBCD which will be composed of the following ten Councils of Government or regional planning areas: Lower Rio Grande Valley, Coastal Bend, Golden Crescent Regional Planning Commission, Houston-Galveston Area, Central Texas, Alamo Area, Brazos Valley, Capital Area, Deep East Texas, and South East Texas. These are the areas historically most at risk of hurricane flooding and wind damage.

Recommendation #5

The state should fund at least 75% of the salary costs of building code enforcement (local inspectors and third-party contractors working for cities and counties) with 25% funded by building permit fees in this new Regional Building Code District. The same capacity strengthening salary program should be extended by the State of Texas for city and county recovery managers.

Recommendation #6

This report recommends that a large reserve account be established using federal funding initially before the next hurricane season later funded by state, city, and county resources to accelerate the existing housing buyback programs for homes which repeatedly flood. Counties and cities participating in these programs would then take the homes out of use and the property used for green space. This fund would be used in the weeks following a hurricane or flooding event before private companies purchase the properties that have a repeated history of flooding. The state legislature should also require rental units or houses for purchase which have repeatedly flooded to disclose this in rental or purchase documents and title registrations.

Recommendation #7

This report endorses the efforts of city and regional planning groups in Texas buying land at market prices without the use

of eminent domain to reduce the risk of flooding and preserve reservoir water recharge. This report recommends the state legislature create a commission to study this land purchase program and report on what might be done by the state to support these efforts in the future.

Recommendation #8

Texas should continue to support private philanthropic programs after major disaster and develop a system to integrate public and private sector efforts to help survivors of natural disasters without endangering the independence of the private social service groups.

Recommendation #9

The GLO should implement a saturation Public Information Campaign before and during every hurricane season to ensure the local officials and the public understands what FEMA's temporary housing programs will provide and what it will not provide under existing federal law in the event of a major hurricane or flooding event.

Recommendation #10

The federal government should consolidate funding for all temporary FEMA housing programs into one block grant to states with a high risk of natural disasters.

Recommendation #11

The GLO should bid out indefinite quantity contracts (IQCs) for information management, construction, and other engineering construction services under the Federal Acquisition Regulation (FAR) procedures before the annual hurricane season each year, so contracts are in place to be used within a week of a major disaster.

Recommendation #12

Congress should grant "notwithstanding authority" to those high disaster risk states which have demonstrated competency in disaster response and recovery for one year following a major disaster. This would allow the waiver of most federal procedural regulations and speed contracting and program management.

Recommendation #13

Congress should expand the definition of what is eligible for reconstruction using FEMA temporary housing funds under the Stafford Act so that damaged housing can be rebuilt to be more resilient and fortified to withstand disasters in the future. In the absence of the phase out of RVs and mobile housing units by FEMA, the state legislature should give the Governor the authority to waive city and county prohibitions of their use for one year after a Presidential disaster declaration.

Recommendation #14

Should the federal government expand the definition of what is permissible for reconstruction funding within FEMA programs, the GLO should investigate and consider using new technologies for housing construction which are less expensive, more resilient, and can be implemented faster than traditional housing construction techniques.

Recommendation #15

Congress should enact legislation to consolidate disaster housing programs of FEMA, HUD, and the SBA into one agency or department to eliminate competing missions and business systems which slow down the temporary housing response.

Recommendation #16

Congress should amend the privacy act to give state and local officials managing disaster response and recovery efforts full access to survivor information generated by FEMA if they have applied for and are qualified for assistance. An

integrated database should be built from the beginning with full access by state and local recovery and housing response administrators. In the absence of such a change in law, we urge FEMA to amend their benefits application form to allow people to voluntarily make their data available to state and local government agencies in order to provide them services.

Recommendation #17

HUD should rewrite the formula for the allocation of funding to municipal and county governments directing aid to low- and moderate-income people so that all people in these categories are assisted.

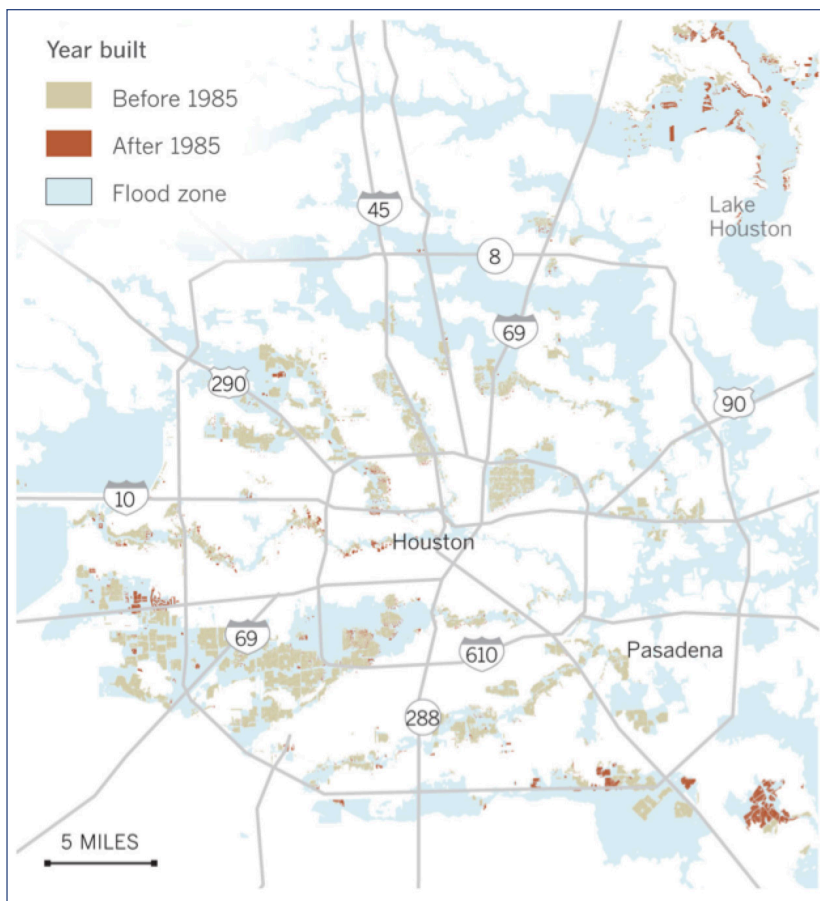
Recommendation #18

This report endorses acceleration of the studies needed to advance the Texas Coastal Barrier System and Upper Texas Coastal Levee system, and the funding of these projects by the U.S. government.

INTRODUCTION

The Hurricane Harvey struck Texas on August 25, 2017 and was the most economically destructive hurricane in the state's history with damage estimated at \$125 billion (including damage in Louisiana). The hurricane was the second most destructive in American history (Hurricane Katrina being the worst in inflation adjusted numbers, at \$161 billion). Three hurricanes struck American territory in 2017—Harvey, Irma, and Maria—which in total incurred \$265 billion in damage. More than 750,000 people evacuated their homes and a total of 30% of the population of Texas was directly impacted by Harvey.¹ It was also among the most traumatic events in Texas history for families whose life possessions, homes, furniture, historical family memories, and inheritance from relatives were all destroyed in the great flood during the storm and its aftermath when five feet of rain fell over four days. Put another way, Harvey dumped 27 trillion gallons of water on Texas and Louisiana in four days. Over the duration of the storm,

approximately 60 inches of rain fell in and around the city of Houston alone. Throughout the affected 41 counties receiving federal assistance, 80,000 homes had at least 18 inches or more of water inside and 23,000 of that 80,000 had more than five feet of water inside.² In total, in Houston alone 204,000 homes and apartments flooded. Making matters worse, 83% of the homes impacted by Hurricane Harvey did not have flood insurance. Hurricane Harvey was soon followed by Hurricanes Irma and Maria that had their own devastating impacts but spared Texas, putting further demand on already limited federal resources. The clay soils in Southeastern Texas do not absorb water efficiently, and the rapid growth in population over the past four decades (and the development that has been part of that population growth) has meant that the construction of buildings, parking lots, highways, and driveways has increased flooding risk. There are increasingly fewer and fewer places for the water to go when there are storm surges or torrential rains.



Sources: Harris County Appraisal District, FEMA, Times analysis. In Ralph Vartbedian and Ben Walsh, "How Houston's newest homes survived Hurricane Harvey," *Los Angeles Times*, November 8, 2017, accessed August 16, 2018, <http://www.latimes.com/projects/la-na-houston-harvey-home-survivors/>.

¹ U.S. Department of Homeland Security, Federal Emergency Management Agency, *2017 Hurricane Season FEMA After-Action Report*, July 12, 2018, accessed August 12, 2018, p. 2, <https://reliefweb.int/sites/reliefweb.int/files/resources/2017FEMAHurricaneAAR.PDF>.

² U.S. Department of Homeland Security, Federal Emergency Management Agency, *2017 Hurricane Season FEMA After-Action Report*, July 12, 2018, accessed August 12, 2018, p. 39, <https://reliefweb.int/sites/reliefweb.int/files/resources/2017FEMAHurricaneAAR.PDF>.

Hurricane Harvey killed 106 Americans, 82 in Texas, a very low rate compared with other major hurricanes. By comparison, Hurricane Katrina in 2006 killed 1,836 people, of which 1,577 were in Louisiana. The risk of hurricane damage to homes and businesses is an economic and social issue of enormous consequence to Texas, but it is also a public safety issue. While it would appear self-evident that the stronger the hurricane the greater the risk of catastrophic flooding, in reality the opposite is the case. The weaker the hurricane, the more efficient it is in creating heavy rains and disastrous flooding events, particularly if the storm remains stationary. Hurricane damage may come from high winds which collapse poorly constructed buildings, but historically even more damage is caused by flooding. Thus, the greatest hurricane risk for Texas is flooding and storm surge, and to a lesser degree high winds. This was certainly the case with Hurricane Harvey. In 2001, Tropical Storm Allison, which brought to Greater Houston winds up to 60 miles per hour and 36 inches of rain, caused 55 fatalities, \$8.5 billion in damage (in 2001 dollars),³ and left approximately 70,000 homes flooded and 2,744 destroyed.⁴ Tropical Storm Allison is an example of how a relatively weak storm in terms of wind speeds can still be destructive and fatal.

Hurricane Harvey encompassed three separate events: the hurricane event near Rockport, Texas in the Coastal Bend region, a wind event as the storm moved toward Greater Houston, and finally another flooding event as the storm made a second landfall in Southeast Texas.

Shortly after Hurricane Harvey dissipated and left the region, federal and state agencies began planning their recovery efforts:⁵

Following the placement of the first housing unit, FEMA and the GLO began the joint implementation of temporary housing programs, Direct Assistance for Limited Home Repair (DALHR) and Partial Repair and Essential Power for Sheltering (PREPS), through which thousands of homes in Texas have been rebuilt. By May 2018 15,000 homes had been partially reconstructed under the PREPS program for basic functions such as the kitchen and bathroom so that families could move back into their homes, though additional work would have to be completed by the owners at a later date. By August 2018 529 homes had been reconstructed under the DALHR program. While GLO implemented these programs with FEMA, they are federal programs, funded and regulated by Washington.

August 25, 2017: Governor Greg Abbott requested a federal disaster declaration

September 7, 2017: The State of Texas requested a Direct Housing Mission

September 14, 2017: Governor Greg Abbott asked the GLO to take on the administration of this mission and work on an Inter-Governmental Service Agreement (IGSA) draft with FEMA

September 22, 2017: Final version of IGSA was signed by all parties, and the GLO began to work with FEMA to develop implementation plans and management plans

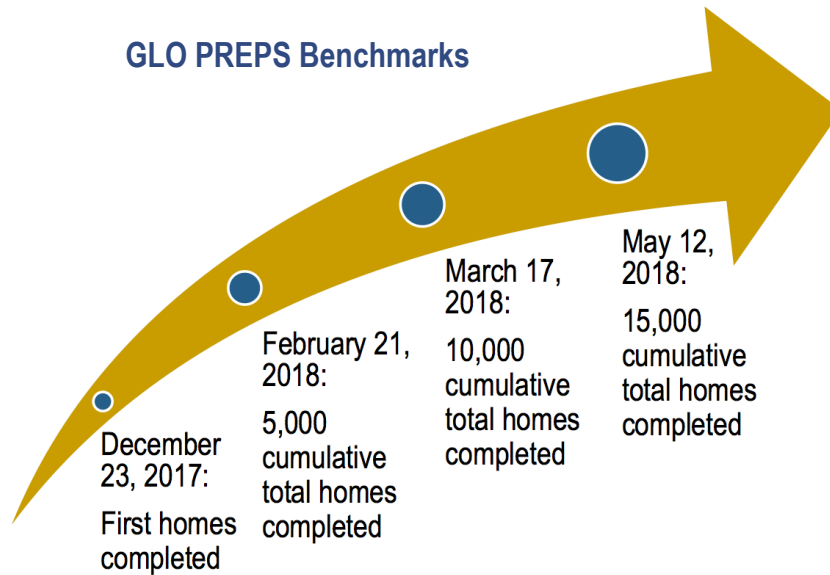
October 7, 2017: First housing unit was placed

³ Stacy R. Stewart, National Hurricane Center, *Tropical Storm Allison Tropical Cyclone Report*, November 28, 2001, accessed August 7, 2018, https://www.nhc.noaa.gov/data/tcr/AL012001_Allison.pdf.

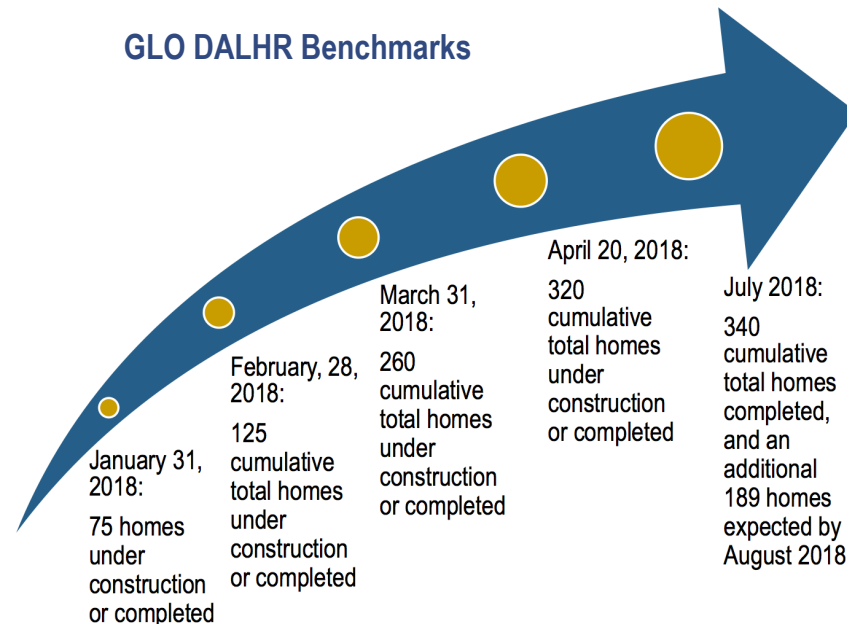
⁴ Risk Management Solutions Staff, *Tropical Storm Allison, June 2001: RMS Event Report*, December 17, 2001, accessed August 7, 2018, https://forms2.rms.com/rs/729-DJX-565/images/tc_2001_tropical_storm_allison.pdf.

⁵ U.S. Department of Homeland Security, Federal Emergency Management Agency, *2017 Hurricane Season FEMA After-Action Report*, July 12, 2018, accessed August 12, 2018, p. 46, <https://reliefweb.int/sites/reliefweb.int/files/resources/2017FEMAHurricaneAAR.PDF>.

GLO PREPS Benchmarks



GLO DALHR Benchmarks



The Economic Consequences

Protecting Texas taxpayers is one of several purposes behind the reforms proposed in this report. As described above, Harvey incurred an estimated \$125 billion in damage for which taxpayers, survivors, and businesses will eventually foot the bill in federal taxes, increased insurance premiums, increased personal and national debt, and the use of people's individual savings to rebuild when neither federal aid nor insurance will pay for reconstruction. Taxpayers have been asked repeatedly over many years to provide government aid to disaster survivors, while at the same time measures have not been taken which would reduce future damage from the inevitable hurricanes. The Kinder Institute at Rice University, in a new report published in July 2018, argues that FEMA spends only 5% of its budget on mitigating the effects of disasters.⁶

⁶ Carlos Villegas, Kateryna Wowk, and Kyle Shelton, Rice University Kinder Institute for Urban Research and Harte Research Institute for Gulf of Mexico Studies, *Rethinking Disaster Recovery and Mitigation Funding in the Wake of Hurricane Harvey*, July 2018. <https://kinder.rice.edu/sites/g/files/bxs1676/f/documents/KI%202018%20Research%20Report-Disaster%20Funding%202.pdf>

FEMA, of course, cannot appropriate its own budget, that is the responsibility of the U.S. Congress who have chosen to focus on repairing the damage from disaster focusing limited funds on disaster response rather than on prevention and mitigation. Rigorous academic research has shown that for every single dollar invested in disaster mitigation, fortification of buildings, and resilience, four dollars are saved in the reduced need for hurricane response and recovery funding. More recent research has shown the savings to be even higher. Fortifying Texas against future disasters also protects the economy of the state given that many small and medium-sized businesses do not have the financial reserves or the disaster insurance to rebuild after the damage done by hurricanes and flooding.

Another motivating purpose of this report is to protect public safety. People die during hurricanes, but survivors also suffer severe injuries. These reforms are meant to create and enforce standards that would strengthen people's homes and small businesses (and their livelihoods) to reduce deaths and injuries in the wake of the hurricane's destruction.

Historical Frequency of Hurricanes and Other Disasters in Texas

Texas is one of the most hurricane-prone states in the United States for major disasters. According to the National Weather Service, between 1850 and 2010, Texas was hit by 64 hurricanes and 56 tropical storms, for a total of 120. Historically, these storms have occurred between June 2 and November 4 each year, with August and September being the highest risk months. The 1900 hurricane in Galveston killed between 6,000 and 8,000 people, which was the most devastating in recorded Texas history.⁷ While none of the death rates since 1900 have approached the Galveston catastrophe, many have done far more economic damage to homes, businesses, and public infrastructure.

According to the National Oceanic and Atmospheric Administration (NOAA), 203 natural disasters in the United States caused more than one billion dollars (each) in damage between 1980 and 2016. Of these 203 disasters, 84 took place in Texas—by far the most of any state. Put another way, during this 36-year period, 41% of major disasters in the United States, costing more than \$1 billion each, occurred in the State of Texas, which represents only 8.5% of the population of the country and approximately 7.6% of the land area of the United States. Texas is extraordinarily vulnerable to high-damage natural disasters. During the same period, Texas experienced 54 disaster declarations of major floods, the greatest number of any state for any period in American history.⁸ This data explains why Texas has had more Presidential-declared disasters than any other state since the passage of the 1974 law which created the federal emergency management response system. Many of the major (over a billion dollars of damage) 84 disasters that struck Texas since 1980 were flood or wind events caused by tornadoes, hurricanes, and tropical storms, or floods caused by torrential rains (Texas also suffers from severe hailstorms and wildfires).

The indisputable fact remains that the State of Texas is and will continue to be at high risk for natural disasters, particularly hurricanes and floods. It is not a matter of “if” Texas will be devastated by another hurricane; it is a matter of “when.”

Why is Texas so Vulnerable to Disasters?

Why have the severity of hurricanes and flooding, judged by property damage alone, grown more acute in recent years?

⁷ David Roth, National Weather Service, *Texas Hurricane History*, January 10, 2017, accessed August 12, 2018, <https://www.weather.gov/media/lch/events/txhurricanehistory.pdf>.

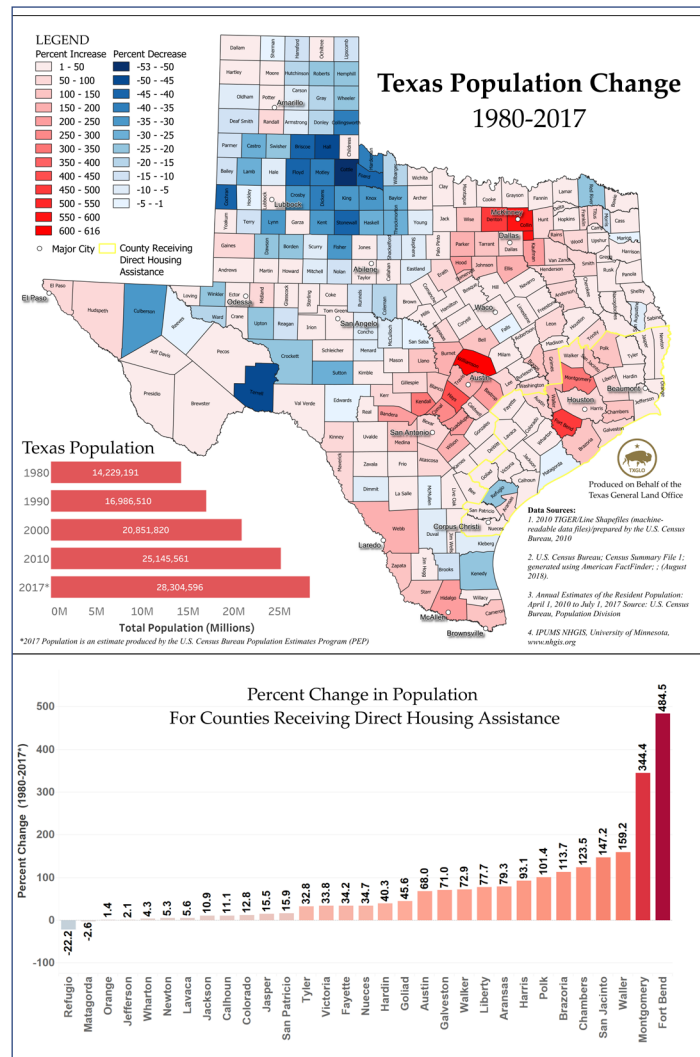
⁸ Leslie Chapman-Henderson, Audrey K. Rierson, Michael Rimoldi, and Albert Betts Jr., Federal Alliance for Safe Homes (FLASH), *The Status of Texas Residential Building Codes*, March 10, 2017, pp. 2–3, <http://newsroom.flash.org/commentary/the-status-texas-residential-building-codes-commentary-for-more-resilient-future.htm>.

First, between 1980 and 2018 the population of Texas nearly doubled, from 14 million to 28 million people, an astonishing level of growth. The only other highly populated state which has grown slightly faster than Texas is Florida.⁹ This rapid population growth should not be surprising, as people and businesses have been attracted by Texas' business-friendly policies, robust job market, low taxes, remarkable medical complexes and university systems, and natural resources. This extraordinarily rapid growth has many desirable consequences, but it also has some downsides. Population density has profound consequences during and after major natural disasters. The more people, the more potential damage to the buildings in which they live and work. Therefore, growth increases the exposure to disaster risk, unless building construction is done in a way and in areas that reduce this risk.

According to the Office of the State Demographer, at the rate of growth between 2000 and 2010, Texas will continue to see sustained population growth over the next several decades. The Office estimates that over 26 million more people will be added to the state's population between 2010 and 2050, and it will rise from 28 million today to 54.4 million in 2050. Even if population migration into Texas increased, **at**

half the rate experienced between 2000 and 2010, the population will grow from 28 million to over 40 million in 2050. Greater Houston will remain one of the fastest growing regions of Texas under either of these scenarios. Thus, the problems associated with high rates of growth in disaster vulnerable areas will grow, not diminish, over time.¹⁰

Disasters that take place in low population regions or empty geographic space do limited damage, if any at all, simply because of the absence of buildings. For example, the Haiti earthquake with a 7.0 on the Richter Scale that took place on January 12, 2010, in the capital city, Port-au-Prince, killed between 100,000 and 160,000 people. On May 19, 1990, South Sudan was struck by a 7.5 earthquake on the Richter scale, which was a massive earthquake in intensity, but did little damage and killed only 19 people because most of the population of South Sudan were herders who moved with their animals or lived in internally displaced persons or refugee camps (because of the ongoing civil war) where people lived under very simple tent shelters. Proportionately few people lived in South Sudan in constructed homes and virtually none in multi-story buildings, so the damage and mortality rates were remarkably low. Of course, soil conditions also affect the



⁹ U.S. Bureau of the Census, *Resident Population of Texas [TXPOP] and Resident Population of Florida [FLPOP]*, retrieved from FRED, Federal Reserve Bank of St. Louis, <https://fred.stlouisfed.org/series/TXPOP> and <https://fred.stlouisfed.org/series/FLPOP>.

¹⁰ Lloyd B. Potter and Nazrul Hoque, Texas, Office of the State Demographer, *Texas Population Projections, 2010 to 2050*, November 2014, http://demographics.texas.gov/Resources/Publications/2014/2014-11_ProjectionBrief.pdf.

destructive effect of these earthquakes (and other disasters), as does whether buildings are built to earthquake building code standards.

Second, geography and soil conditions make Southeast Texas one of the most vulnerable in the United States to hurricanes. Some scientists argue these storms are a function of climate change, when in fact vulnerability of the state to hurricanes predates the effects of climate change. A National Weather Service history of hurricanes and tropical storms in Texas showed that the state has suffered from storms for at least the 400 years for which there are records; since 1850, 120 storms have struck Texas. ***The simple fact is the geographic location of Texas makes it to vulnerable hurricanes which form in the Atlantic Ocean and Caribbean Sea.***

Some of Hurricane Harvey's massive economic losses and housing stock destruction were a function of the population growth in highly vulnerable coastal areas and greater Houston. But this population growth was further complicated by the land on which the housing was built. The highest quality land is often built upon first and the more marginal land more at risk of flooding is built on after the higher quality land is taken. Thus, much of the housing construction to accommodate this doubling of population took place on land which has a higher level of disaster vulnerability, given the Greater Houston area and the coastal regions disproportionately experienced this growth. Lower income people are often forced, because of their limited income, to live in less expensive housing built on more marginal land, and this housing tends to be of lower quality and more vulnerable to disaster damage. Low income families are much more at risk during major disaster events. Since Texas has a weak building code system, housing constructed in the state has not always complied with rigorous standards of the latest construction techniques, it is the poor who suffer the most from this failure.¹¹

Third, to add to the geography vulnerability, Houston is one of a few major cities in the United States that is sinking.¹² This subsidence phenomenon, as scientists call it, has been occurring over decades and scientists estimate that parts of the city have subsided by eight to ten feet: this in a city which is flat and just above sea level to begin with (downtown Houston is about 50 feet above sea level). Professor Samuel Brody at Texas A&M University, Corpus Christi, and Professor Philip Bedient at Rice University, who are among the leading national experts on this issue, have proposed various infrastructure solutions to remedy this problem. This report does not focus on infrastructure responses (with the exception of the Coastal Spine Project which will be addressed later in this report) to Hurricane Harvey as this is the purview of the Rebuild Texas Commission, but these issues must be addressed if Houston is to be resilient for a prosperous future.

Fourth, Texas, like most other states and the U.S. government, has taken an incremental approach to disaster management. Each time a major disaster takes place new reforms are proposed, but most have been limited in nature and scope. And most in keeping with Texas history this approach has taken a minimalist and decentralized approach to disaster management, mitigation, preparedness, and recovery. Given Texas' remarkable geographic size and demographic complexity, a decentralized approach to emergency response has made sense, particularly for the emergency response phase. It is in the next stage of disaster response—known as “recovery”—that Texas has more vulnerabilities. The question remains as to whether the State of Texas has given county and city officials all of the legal authorities, technical support, and funding needed to put in place rigorous disaster protection systems to limit damage from future hurricanes and flooding.

¹¹ Insurance Institute for Business & Home Safety, *Rating the States: 2018: An Assessment of Residential Building Code and Enforcement Systems for Life Safety and Property Protection in Hurricane-Prone Regions*, March 2018.

¹² Ralph Vartabedian, “For years, engineers have warned that Houston was a flood disaster in the making. What didn’t somebody do something?” *Los Angeles Times*, August 29, 2017, accessed August 18, 2018, <http://www.latimes.com/nation/la-na-harvey-engineering-20170828-story.html>.

A minimalist strategy appears to be inadequate at the recovery and reconstruction stage in a state with the imbedded geographic and demographic vulnerability to disasters Texans face. It is one of the central principles of this report that government is best run when it is closest to the people, but only if local government has the legal authority, funding, and technical capacity to carry out its duties.

ALTERNATE SCHOOLS OF U.S. DISASTER MANAGEMENT

Community Development Soft-Approach

Community development soft-approach emphasizes local planning, extensive data collection, maximum local public participation, and non-structural approaches to disaster mitigation and recovery such as flood plain and coastal zoning and disaster risk-based building codes. This school of thought emphasizes planning, and protection of the natural environment and local culture. It is hostile to development in high vulnerability areas. These advocates focus on the equity issues in disaster management because they argue lower income people are disproportionately affected by natural disasters. They believe that infrastructure solutions which protect vulnerable areas create incentives for more development in high-risk areas, and so they tend to oppose infrastructure solutions, or at least see them as the last option. This approach ignores the problem of existing vulnerable structures and neighborhoods since building codes and disaster vulnerability zoning cannot be enforced retroactively, except at a high expense.

Flood control and Hard Infrastructure Approaches

Flood control and hard infrastructure approaches emphasize disaster engineering of public buildings, highways, dams, and housing, flood control levees, water catchment areas, diking systems, storm surge barriers along the coast, and drainage systems. These proponents tend to be silent or less enthusiastic about land using planning solutions, building codes, coastal zoning regulation, and other policies which could restrict development and growth. The Corps of Engineers (USACE) is the embodiment of this approach to disaster management. This approach, narrowly defined, does tend to ignore the perverse incentives which encourage development in vulnerable geographic areas.

Technocratic Approaches

Technocratic approaches of professional public administrators and city managers focus on the buyout of damaged homes after disasters if they are in high-risk areas, and then conversion of the land to green areas on which no future development is allowed. This approach supports strong building codes or requiring the elevation of built or rebuilt homes above base flood elevation during recovery and reconstruction. Technocratic approaches tend to be city and county planners and managers who generally embrace any practical mechanisms, regardless of ideology, that have proven to work in the past whether community-based or infrastructure-based.

Minimalist Approaches Which Favor Letting the Market Forces Drive Decisions by People and Businesses

Minimalist approaches which favor letting the market forces drive decisions by people and businesses tend to oppose increases in the size of state or local public-sector bureaucracies to do land use planning, disaster mitigation, or capacity building of country or city officials to prepare for disasters. This approach tends to oppose disaster vulnerability zoning, coastal zoning, or disaster-risk building codes as an intrusion into the free market. They also oppose large scale infrastructure approaches which are quite expensive (unless the federal government assumes the cost). Those supporting this approach do not publicly suggest it, but implicit in its approach is that market forces, if left alone, without insurance companies or the government intervening to rebuild housing, will eventually lead to less development in disaster prone areas and more public demand expressed through the market place for better constructed homes and building. This would also result in the abandonment or depopulation of coastal communities and poor and vulnerable urban neighborhoods which are at high disaster risk. Texas has taken a minimalist approach historically with some notable local exceptions, such as Galveston and Harris County, to the extent that state law allows these local governments to implement disaster mitigation measures.

In the case of disaster risk, the free market has not resulted in lower levels of development in high-risk disaster-prone areas; in fact the opposite is the case. The most disaster-prone areas have experienced the highest level of growth because the U.S. government and Texas state government have provided insurance facilities to help families recover from these hurricanes. The Kinder Institute at Rice University published a study in July 2018 which argues that U.S. government and Texas policies have unintentionally encouraged people to ignore future hurricane and flooding risk by providing government bailouts after each disaster event without insisting on housing resiliency and fortification efforts to protect homes and businesses in the future.¹³

Advocates of each of these approaches tend to oppose the other approaches, though not universally. Academics, advocates, and community development organizers tend to be less enthusiastic about infrastructure-based approaches because they are expensive, outside the control of local community groups, and most importantly they argue that they provide an incentive to avoid more proactive approaches, such as zoning and building codes. They also have consistently argued the poor are most disadvantaged by natural disasters, and should be the recipients of the bulk of disaster response and recovery funding. Large-scale flood control infrastructure projects spread out their benefits to everyone rather than only the poor. They further argue infrastructure approaches to disaster mitigation create counterproductive incentives to build in high-risk areas. Infrastructure advocates and minimalists often oppose coastal and flood plain zoning and building code disaster mitigation measures because they could, they argue, impinge on the property rights of individuals and businesses.

This report does not reject any single approach, but takes a pragmatic view embracing those policies which have worked in practice based on hard evidence, borrowing ideas from each school.

Because of the extraordinary devastation in property damage and economic losses caused by Hurricane Harvey, the question must be addressed as to whether a more aggressive approach to fortifying the state against the next disaster should be considered by policymakers, particularly the U.S. Congress and Texas Legislature.

Texas policymakers should keep in mind that more than 90% of the \$12 billion in government emergency and recovery funding in response to Hurricane Harvey between September 2017 and May 2018 has come from the federal government through FEMA, HUD, DOD—more particularly the Corps of Engineers, and the SBA. The federal government drives policy on disaster response and recovery in Texas because it controls the funds.¹⁴

According to the Texas Legislative Budget Board, \$460.1 million in state funds in general revenue, general revenue-dedicated, and institutional and other funds have been spent on Hurricane Harvey through the end of April 2018.¹⁵ On January 23, 2018, the Texas Department of Insurance released a report explaining that private insurers, the Texas Wind Insurance Association (TWIA), and the Texas Fair Access to Insurance Requirements (FAIR) Plan had reported a total of approximately \$4.5 billion

¹³ Carlos Villegas, Kateryna Wowk, and Kyle Shelton, Rice University Kinder Institute for Urban Research and Harte Research Institute for Gulf of Mexico Studies, *Rethinking Disaster Recovery and Mitigation Funding in the Wake of Hurricane Harvey*, July 2018.

¹⁴ For a full accounting of public sector expenditures for Hurricane Harvey in Texas see the 2018 GLO HUD Community Development Block Grant for Disaster Recovery (CDBG-DR) grant document which may be found on the GLO website.

¹⁵ Texas, Legislative Budget Board, *Updated Hurricane Harvey's Fiscal Impact on State Agencies: Presented to Senate Finance Committee*, May 24, 2018, accessed August 2, 2018, http://www.lbb.state.tx.us/Documents/Publications/Presentation/5264_HAC_Harvey.pdf.

in losses paid by mid to late October of 2017. Moreover, those insurers predicted that losses paid would eventually total to about \$15.7 billion.¹⁶ Of that \$15.7 billion estimate, TWIA expects its ultimate loss and loss adjustment expenses related to Hurricane Harvey to reach \$1.61 billion, meanwhile the deficit of the Association is over \$500 million based on data from March 31, 2018.¹⁷ In August 2018, the National Flood Insurance Program (NFIP), a program managed by FEMA, reported disbursements for Hurricane Harvey of approximately \$8 billion. This is in addition to the HUD and FEMA funding of nearly \$12 billion.

Much of the frustration Texas policymakers and administrators have understandably felt with the existing disaster response system are a function of federal law and policy. Governor Greg Abbott, Chancellor John Sharp, Commissioner of the Governor's Commission to Rebuild Texas, and the Texas Congressional delegation have played key roles in working with the General Land Office to facilitate the arrival of these funds and in encouraging federal officials to interpret law and policy in a more flexible manner.

However, federal departments cannot go beyond a certain point in this interpretation before they get into serious legal problems with the various U.S. Inspector General's offices, the General Accounting Office, the Office of Management and the Budget, and the federal courts in spending U.S. government taxpayer dollars. Flexibility has limits. Where federal policy and law have been violated in past disasters, federal auditors have required FEMA to send bills to states which were recipients of these funds demanding the recoupment of billions of dollars spent inappropriately. If Texas relies on the federal government for funding, federal agencies will call the shots on policy and programs in disaster response and recovery. While this report will recommend major reforms in federal statutes and policy for future disasters, obtaining common agreement within the legislative and executive branches on what these changes should be may be difficult. Without statutory relief, however, the U.S. disaster response and recovery systems will remain as they are now and proposals for reform will never reach fruition unless the state decides to take control of its own future. This will require public sector investment at the state level.

¹⁶ Texas, Department of Insurance, *Hurricane Harvey Data Call: Presentation to the Senate Business and Commerce Committee*, January 23, 2018, accessed July 30, 2018, <http://www.tdi.texas.gov/reports/documents/Harvey-20180123.pdf>.

¹⁷ Texas Windstorm Insurance Association, "TWIA Ultimate Losses from Harvey," October 12, 2017, accessed August 16, 2018, <https://www.twia.org/news-and-announcements/twia-ultimate-losses-harvey/>.

DISASTER RESPONSE VERSUS DISASTER RECOVERY

Disaster response may be classified into many sub-categories, but the two most important are: the immediate emergency response and long-term recovery. Immediate emergency response involves police, firefighters, emergency medical technicians (EMTs), local charities, local disaster management officials, and military personnel.

The Texas Department of Emergency Management is regarded by disaster managers as one of the top such state agencies in the United States. Texas immediate emergency response system is well run by the cities and counties with strong support from the Texas Department of Emergency Management (TDEM). Texas serves as a leader in disaster response throughout the United States, though any system can be improved upon. TDEM under Chief Nim Kidd's leadership is now focused on improving the first responder capacity of city and county governments, but these improvements will be incremental in nature because the system works well as it is presently constituted. Perhaps the leading emergency response training school in the United States is located at "Disaster City" at Texas A&M University. The immediate emergency response system is not the principal problem with the Texas disaster management system, rather it is the recovery system—or the absence of a fully empowered, comprehensive one—which could make Texans less vulnerable to disasters in the future if a high-functioning system was created.

This report does not propose changes to the emergency response system of the State of Texas which is beyond its purview, but instead focuses on post-disaster housing policy, recovery, mitigation, and resilience measures.

Historically, the long-term recovery structure for disasters in Texas has never been robust. GLO is not an immediate response agency except for the temporary housing program, oil spill response, and orphaned vessels on state-owned lands and waters, and while the federal government and the State of Texas have pursued recovery missions, comprehensive recovery systems are not centralized in one organizational entity as is the immediate disaster response function.

Disaster recovery and reconstruction provides the greatest opportunity to build resilience, fortify homes and small businesses. And the greatest challenge when this is not done properly. The

skills required to accomplish this mission competently are very different than those of disaster response. Immediate disaster response requires a skill set which includes logistics, communications, warehousing, transportation management systems, emergency medical care, debris removal, and the provision of temporary shelter and food chains. Recovery, on the other hand, requires economists, urban planners, economic development experts, engineers, construction and project managers, building inspectors and appraisers, and federal or state law contracting specialists. At the national level, FEMA is the designated federal emergency response agency with support at times from the U.S. military. The latter set of recovery skills is spread out among many federal and state agencies, or does not exist in the public sector such as the technologies and systems needed to protect the petrochemical industry in Southeast Texas. This expertise exists in private industry which has the most advanced disaster mitigation expertise on these issues.

In theory, recovery should be fundamentally a set of local decisions made by the public through their elected city and county officials, not by the federal government or even the state government. The problem remains whether some of the

smaller and poorer counties and cities have the technical staff needed to carry out recovery duties. Some do, and some do not. While the disaster response system of FEMA and state and local governments tries to minimize politics in decision-making, that would be difficult in the case of recovery and reconstruction since it includes, by definition, the allocation of scarce financial resources and land use planning decisions which affect property rights.

The Texas Department of Emergency Management does have a recovery mission in its legal mandate, Texas Government Code Chapter 418, and has approximately 60 of its 300 (20%) staff focused on recovery. This means the great majority of its efforts, staff, and funding are focused on the emergency response phase. Most of the TDEM response and recovery staff are funded with federal dollars which means they are potentially subject to cuts outside the immediate control of Texas state government, putting the high-functioning Texas emergency response system at risk.

In general, Texans prefer government run at the local level; but state statutes discriminate between the actual devolution of authority to these units of local governments. Elected county officials such as the county judges and commissioners have very circumscribed legal authorities and may only do what the state legislature specifically allows them to do by law and no more. Many counties, for example, have limited legal authority or technically trained staff to enforce the voluntary state building code for unincorporated areas. For example, as of 2016 the current enforcement system permitted by the state allows counties for unincorporated areas to ask builders to file a certification by a third-party vendor (hired and employed by the builder) that the state building code provisions are being met, but do not have the authority to hire building inspectors who work for the county who can review construction at various stages and grant occupancy permits.

Texas has adopted the widely accepted, privately developed residential building code standard from 2000 and a similar commercial building code standard from 2003. These are relatively old national standards and have been superseded by several newer codes which are based on the latest research on safe, disaster-resistant engineering techniques. For municipalities, Texas Local Government Code Section 214.212 codified this standard for residential structures and Section 214.216 for commercial structures. In unincorporated county areas, the building code standard defined in the Texas Local Government Code Section 233.153 is even weaker, as it only applies to new construction after September 1, 2009. Generally, these building code standards are updated every three years based on this research, though once again Texas is covered by a code which is 15 years out of date for residential construction. Updating this provision of state statute to the newest codes should be a priority of the state legislature.

TRADEOFFS IN DISASTER MANAGEMENT

People who were directly affected by Hurricane Harvey understandably demanded rapid response by federal and state agencies to meet their housing and other needs, particularly since many were homeless and suffering severe financial hardships and the loss of their homes, household possessions, and disruption of their livelihoods. For entirely understandable reasons they put pressure on their elected government officials at all levels for immediate action. Four factors conflict with the ability of government agencies and departments to provide immediate housing assistance.

First, complex accountability systems by the federal government must be put in place to avoid corruption and ensure both fairness and quality services. The risk of abuse rises exponentially in a disaster as conditions are often chaotic and some unscrupulous people try to take advantage of the chaos to defraud both survivors and government agencies. These accountability systems slow down disaster response and require more paperwork and more bureaucracy to ensure the federal law and rules are being followed. Federal auditors and Inspectors General require everything be documented in writing, so they can audit the books to determine if any abuse took place. This is the cause of all the mountains of paperwork and record keeping the federal government requires the GLO, TDEM, and other state agencies, and county and city offices to maintain.

Policymakers and news media's demand for speed, a visible response that can be seen, and metrics to measure results work against longer-term efforts to build resilience into any recovery and reconstruction program to avoid a repetition of the same disaster again in the future.

Second, coordination takes time and effort within the federal system with six levels of government—federal, state, regional planning councils, special districts, counties, and city government—and then multiple agencies and departments at each level. At the federal level for example, FEMA in its 2017 Hurricane Season After-Action Report dated July 12, 2017, stated that the federal response system is too complex and must be simplified. Brock Long, the Administrator of FEMA, wrote in the introduction to his Agency's analysis of the Hurricane Harvey response, "Collectively, we must continue to simplify our processes and leverage new approaches and technology to reduce complexity and increase efficiency and focus on outcome-based recovery."¹⁸ They are correct, and much of the public administration research on government at all levels in the United States make the same point.

FEMA has initiated a process for rewriting the National Disaster Response Plan, and particularly their temporary housing programs. At present, a remarkable number of federal departments and agencies participate in major disaster responses. For Hurricane Harvey, FEMA, HUD, DOD, SBA, and the National Flood Insurance program (a separate entity within FEMA) all played roles in funding and operations for disaster shelter and housing programs. These agencies had conflicting authorizing legislation on critical issues. For example, FEMA is required by law to give assistance to everyone eligible under the Stafford Act, while HUD requires that its funding through the Community Development Block Grant (CDBG) program be concentrated on people of moderate to low income. So two of the most important federal agencies in disaster response

¹⁸ U.S. Department of Homeland Security, Federal Emergency Management Agency, 2017 Hurricane Season FEMA After-Action Report, July 12, 2018, accessed August 12, 2018, <https://reliefweb.int/sites/reliefweb.int/files/resources/2017FEMAHurricaneAAR.PDF>.

and recovery have dueling missions with very different standards of eligibility.

Third, virtually all the academic and technical research that has been done on disaster response argues for maximum local participation, but maximizing this participation slows down the response.¹⁹ The more people who should be consulted and participate in disaster response and recovery, the more the number of other government agencies and departments who should be involved in decision-making—all this naturally results in a slower response. Consultation and participation take time and it is a deliberative process. The FEMA national policy formulation on disaster response is summarized in its first principle as described by Brock Long in his Congressional testimony: “U.S. disaster response is federally supported, state managed, and locally executed.” This decentralized FEMA policy formulation is as much in theory as in practice, which varies widely across the country but also within states, depending on how much technical and management capacity there is at the local and regional level to undertake these programs. The less management and technical capacity at state and local level, the more decisions and operations are run by the federal government, which slows operations. Disaster recovery managers face a series of tradeoffs between speed of execution and deliberative participation.

Fourth, the demand for rapid action in housing programs often conflicts with efforts to fortify homes, businesses, and public infrastructure while they are being reconstructed. It is this fortified resilience that will reduce the impact of future disasters on homes and businesses. For example, many homes in highly vulnerable flood plain areas which have flooded repeatedly probably should not be rebuilt. These damaged homes should be bought back at a fair price by the counties and city governments and permanently taken out of use. But the federal funding for buyback programs generally becomes available much later in a housing response rather than earlier. If the GLO waits for the determination to be made for the eligibility of a home for the buyback program, it slows down housing reconstruction. Many city and county officials are understandably reluctant to participate in the housing buyback program because these homes are taken off the tax rolls and reduce government revenues which translates into reduced public services and more pressure on remaining taxpayers. There is no easy answer to this dilemma, but what is clear is that using taxpayer funds to reconstruct the same houses which flood over and over is expensive and unfair to taxpayers in non-flood-prone areas. Only a systematic and concerted effort can accomplish this, which is one of the objectives of this report.

The GLO has established a system of regional field officers to act as the liaisons with regional, county, and city governments which has improved this participatory process and communications with these levels of government.

Over the long term local participation and management should be the priority, but this requires continuous consultation and takes time.

¹⁹ Daniel Aldrich, “Some communities are destroyed by tragedy and disaster. Others spring back. Here’s what makes the difference,” *The Washington Post*, December 9, 2015, accessed August 14, 2018, https://www.washingtonpost.com/news/monkey-cage/wp/2015/12/09/some-communities-are-destroyed-by-tragedy-and-disaster-others-spring-back-heres-what-makes-the-difference/?noredirect=on&utm_term=.2df332385487.

THE U.S. FEDERAL SYSTEM: MANAGING COMPLEXITY

While the public most affected by a major disaster expects immediate action by government agencies and departments at all levels, the nature of the federal system works against immediate action. The current structure of disaster management in the United States involves at least six levels of government, and then in the case of Texas numerous agencies, bureaus, and departments at each level, many of which work at cross purposes or are overtly in conflict with each other: the federal government, Texas state government, county government, city government, regional planning commissions (also called Councils of Governments or COGs), and special purpose districts such as those for sewers, irrigation, drainage, flood control, and schools.

Federalism is America's greatest strength, but in times of major crisis it may also be a weakness. Without a federal system, the United States—with 320 million people, ranked the third largest in the history of the world by land area and by population—would be ungovernable. As of 1997, the United States had 87,504 independent units of government, one of which is the largest and most powerful—the federal government—and then there are the 50 states, the other 87,453 are counties, cities, towns, regional and special district governments. The federal disaster management system must include to some degree these other levels of government or it will fail. The question is to what degree will they include them, and how can such a complex system be simplified to speed up the response?

One of the classic works on public administration called *Implementation*, published in 1973, written by Jeffrey Pressman and Aaron Wildavsky, and argued famously that simplicity of program design and implementation is essential for success in the government programs, particularly in a federal system. "Simplicity in policies is much to be desired. Simplicity can be ignored only at the peril of breakdown." The federal system for administering disaster assistance is anything but simple. It is very complex both in design and implementation, which explains many people's frustration with the system, apparently including the staff of FEMA. In their 2018 After-Action Report on Hurricane Harvey, they have called for reforms of the system through the simplification of their programs.

DISASTER HOUSING RECOVERY REFORMS GUIDING PRINCIPLES

Simplify

Any reform should simplify the structure of the system and the number of decision points, not make it more complicated.

Do No Harm

In all stages of the disaster response and recovery, avoid unintentionally making people more vulnerable to future disasters.

Fortify from the beginning

Start disaster recovery and mitigation as soon as possible following the disaster, building in resilience measures to fortify survivors' homes and small businesses against future events.

Decentralize

Make as many decisions at the local and regional level, rather than by the federal or state government.

Ensure Accountability

Build in monitoring and accountability systems into program management from the first day following the disaster to avoid abuse and protect the taxpayer and to measure progress.

TEXAS STATE AND LOCAL GOVERNMENT REFORMS

Engaging the Business Community

Over many decades, the Texas private sector has developed out of necessity a remarkable level of expertise in disaster recovery, mitigation, and resilience efforts which could be of considerable value to state and local recovery managers if a formal mechanism could be created for seeking the input of the business community on disaster recovery, particularly on housing issues. A Business Advisory Council on Disaster Recovery and Mitigation (BACDREM) should be created by law to obtain input on a regular and systemic basis on disaster housing recovery and mitigation as it affects their industry. This Council would not be a new state agency, nor would it be authorized to spend money, write regulations, or implement programs. It would be an advisory mechanism for private sector expertise to be channeled to state officials addressing temporary housing and recovery issues. To protect their infrastructure and stockholder investments, many U.S. businesses have highly advanced technological systems of disaster construction engineering and other innovative solutions for addressing the risks their industry faces from hurricanes and floods. Making lessons learned from their innovative solutions available to state policymakers for consideration would make great sense.

Texas policymakers should be aware of the significant potential for the banking and insurance industry in the state, because of heavy losses from Hurricane Harvey, imposing draconian requirements before they will approve mortgages and ensure homes in Southeast Texas in or outside flood plain zones. These requirements could profoundly affect housing construction in southeast Texas. This Council would be a place for these concerns of the banking and insurance industry to be addressed formally earlier rather than later after a major disaster. Among the members of this Advisory Council by law should be, among others, representatives of:

- ◆ the banking and insurance industries which provide mortgage lending and insurance for homeowners and businesses;
- ◆ the construction industry for commercial, industrial, and residential building;
- ◆ the manufacturing industries which produce construction materials;
- ◆ the oil and gas refining and processing industry whose major industrial infrastructure is in a vulnerable area between Corpus Christi and Beaumont/Port Arthur/Orange;
- ◆ the tourist and hospitality industry which is affected by hurricane damage and whose workforce may be compromised by the destruction of their homes; and
- ◆ small businesses in the hurricane affected areas which are profoundly affected by the loss of customers and workers and may have limited insurance protection.

Recommendation #1

The State of Texas should create a Business Advisory Council on Disaster Recovery and Mitigation to access private business expertise and as a conduit for problems they have in disaster recovery. The Council would not have the authority to spend money, implement programs, or write regulations but would provide much-needed private sector advice and expertise.

Texas River Systems Flood Control Mitigation

One approach to reducing flooding in Texas is to undertake much more deliberate flood control planning focused on the state river systems. The very mixed record of the Corps of Engineers in protecting Texas from flooding, both because of its

highly bureaucratic approach to its work and its funding gaps, suggests Texans would be better served to have the principal responsibility to accomplish this vested in a Texas state government agency rather than the federal government. State takeover of this function will not completely eliminate flooding, but it can substantially reduce it. As pointed out earlier in this report, the population of Texas has more than doubled since 1980, with most of the growth flowing into the population triangle of Dallas to San Antonio, Greater Houston, and back up to Dallas. While this concentrated growth has fueled the Texas economy, it is not without its drawbacks. The geography of the state is such that these growth centers are located on confluences of major rivers, where the terrain levels out after moving over escarpments, causing a slowdown in stream flow, or on level terrain where rivers flow into the Gulf of Mexico. This has caused a drastic increase in flooding events which greatly affect heavily populated areas. Current mitigation efforts are scattered at all four levels of government. There is no agency that is tasked with and empowered to coordinate and direct flood control efforts. ***This must change, as it is impossible for a city or county to prevent or mitigate flooding when they have no authority in upstream areas of the watershed or the ability to pull together and force cooperation of multiple stakeholders.***

Texas continues to experience rapid growth in the population triangle. In these developing areas, the addition of many new roads and buildings has covered thousands of square miles of soil that originally absorbed the first half inch or so of rainfall, which has increased the amount and velocity of runoff. This creates ever increasing flooding problems as the water flows downstream.

The northern portion of the triangle is the Dallas–Fort Worth metroplex which is located on the north Texas prairie where the branches of the Trinity River come together and proceed through flood-prone areas of east Texas to the Gulf of Mexico in Galveston Bay (Houston metropolitan area). This is a distance of 710 miles with 31 reservoirs (29 of which are owned or administered by the Trinity River Authority) and numerous levee systems. Floods are still a common occurrence on the lower Trinity River and repeatedly affect the southeast portion of the state.

The Brazos River system begins on the High Plains of eastern New Mexico and the Texas Panhandle, moves west of the Dallas–Fort Worth area, through central Texas, and flows into the Gulf of Mexico in Brazoria County (Houston Metropolitan area), approximately 1,280 miles. There are 19 major reservoirs in the system; three are managed by the Brazos River Authority and many of the remainder are owned and managed by the Army Corps of Engineers. None of the reservoirs are south of Lake Somerville, in Burleson County in Central Texas, offering no water control for the heavily populated Brazoria and Fort Bend Counties. These counties have suffered three severe floods in three years.

The Colorado River system begins on the high plains of Eastern New Mexico and the Texas Panhandle, moves through central Texas, including the city of Austin, descends the Balcones Escarpment near Austin, and flows into the Gulf of Mexico in Matagorda Bay, west of the Houston metropolitan area. The system covers a distance of 862 miles. There are 11 major reservoirs on the Colorado, with seven owned and operated by the Lower Colorado River Authority and most of the remainder operated by the Colorado River Municipal Water District and one county water improvement district. None of these reservoirs are below Austin. This offers no protection to the often-flooded Waller and Matagorda counties. Consequently, flooding on the Colorado often affects the Houston metropolitan area. Three times in the past three years, significant flooding has caused the Colorado and Brazos Rivers to merge together into one massive flood in Brazoria County.

Texas has numerous other rivers, most of which flow from northwest to southeast. A number of large rivers, such as the Red, Pecos, Rio Grande, Nueces, Angelina, Neches, Sabine, and others, do not directly impact the Texas population triangle;

however, the Beaumont–Port Arthur–Orange area, of immense value to the economy of the state and nation due to its concentration of petrochemical processing and import/export facilities, is often heavily flooded. It has catastrophically flooded three times since 2015. There are also smaller rivers such as the San Antonio, Buffalo Bayou, San Jacinto, and Dickinson Bayou which have repeatedly flooded in the past five years.

A common thread with these rivers is there is no overriding authority to coordinate flood control efforts for their entire length and across jurisdictions. For instance, in the frequently flooded Fort Bend County, there are 20 Levee Improvement Districts, 17 cities, and numerous drainage districts, The Army Corps of Engineers, and the Brazos River Authority, all share some responsibility for flood control. This makes it difficult to predict a threat to their 600,000 citizens, or ideally, prevent a threat from occurring. Several local officials told the GLO in formal and informal meetings that the Army Corps of Engineers was excessively process-bound and bureaucratic. A frequently cited example is debris in tributaries of major rivers that needs to be cleared. As the tributaries are navigable, the responsibility for this debris clearance falls to the Corps. However, they seem to be caught in a cycle where the required studies are never finally completed, causing the blockages to get bigger and flood more homes with each flood event. This inertia has repeatedly caused destruction of people's homes and businesses. Part of the Corps' problems, beyond its bureaucratic inertia, is its funding limitations which can only be addressed by Congress and OMB—unless the state takes control. That will take public funds.

No one single federal or state entity maintains an adequate system of flood water measurement to provide scientists and water planners the necessary data to recommend to policymakers for flood control. Either the State of Texas, through one of the state university research centers, or the federal government should provide substantially increased funding to the National Weather Service or to state agencies to carry out hydrologic and hydraulic modeling of all watersheds throughout Texas to better analyze flood risk and provide improved total water level forecasting. Texas also needs more rainfall and river gauges to monitor accurately real-time observations and provide early warning notification to communities. In addition, the increase in stream gauging and improved modeling capability, in conjunction with light detection and ranging (LiDAR) technology, will help in the development of inundation mapping. Inundation mapping will ultimately influence development and building codes, as well as provide valuable information for the protection of life and property in our communities. Recently, the Texas Water Development Board has taken the decision to install some of this equipment through the state river authorities and drainage district system, but more data collection is needed so that decisions on flood control are made based on hard evidence, not unproven assumptions.

The GLO applied for and has received funding to conduct these studies as a result of the CDBG-DR \$5.024 billion grant approved by HUD. The problem with the federal funding under this HUD grant is it will end and with it this critical research. If Texas wishes to seize control of the management of its river systems, it must use state funds over the long term to do this or leave control with FEMA, HUD, and the Corps of Engineers.

Flood damage prevention to homes is generally thought to be regulated by FEMA-sponsored flood zone maps. However, this is not the case. These maps are not completely scientifically based; they are actually insurance rating tools, not flood probability prediction tools, and cannot be relied on to predict if an area is in danger of flooding. Sadly, this misperception causes many Texans to assume that they have no need for flood insurance when that is far from the case. For example, in Harris County, 55% of the homes which flooded during Hurricane Harvey were outside FEMA's flood zone maps. As pointed out repeatedly in this report, 83% of the houses that flooded in Texas had no flood insurance.²⁰ Flood damage is running into the billions of dollars for each major flood event and millions of dollars for the numerous minor events. This is a huge

financial and economic drain on the federal and state governments, not to mention the toll on our citizens who live in these flood-prone areas, which house Texas' growing population. While the federal and state governments have put in place mitigation requirements for flood plain and wind damage areas within the flood and window damage insurance programs, they do not cover many of vulnerable areas. Hurricane Harvey has shown the current regulatory schemes are inadequate and must be reconsidered.

Texas has a pressing need for a state commission to manage flood control on the watersheds affecting the population triangle and the Beaumont–Port Arthur–Orange area. While some of the existing river authorities have the statutory power to undertake flood control, they do not exercise it. This entity should have authority to:

- ◆ Prioritize and oversee the flood control efforts in their watershed;
- ◆ Manage the federal funding for flood mitigation infrastructure;
- ◆ Serve as the contact point with the Army Corps of Engineers;
- ◆ Own the data inputs and develop comprehensive flood predicting and monitoring tools to oversee a watershed wide emergency notification system;
- ◆ Provide the science behind prioritization of projects;
- ◆ Facilitate the completion of stalled reservoir projects;
- ◆ Access and coordinate funding for large and small-scale reservoirs (to include runoff buffering type structures such as the former Soil Conservation Service flood control lake program);
- ◆ Have authority over railroad and highway construction design as they affect flooding risk;
- ◆ Ensure that levee and drainage projects and districts are integrated across jurisdictional lines.

These river authorities would be required to execute these duties, not just permitted to, under state law. State funding would be required to carry out these responsibilities.

In most cases, there would be no need to create a new agency to serve as this coordinating entity. They already exist, but lack the authority and funding to begin the task of comprehensive mitigation. For instance, the Brazos River Authority is the perfect choice for the Brazos river system. The Trinity River Authority has a long history of this very function in the Dallas–Fort Worth area, their focus needs to shift to the entire river. The Colorado River is more complex with at least three entities: the Lower Colorado River Authority, the Upper Colorado River Authority, and the Brown County Water Improvement District. The legislation should name one as the overall authority and the other two would be the sub-coordinators for their area. Coordination and dispute resolution between the river authorities can be accomplished through the Texas Water Development Board.

While this reform would involve greater public expenditures, it is not anywhere near as expensive as paying for the financial, economic, environmental, and human damage that occurs, not only from acute flooding events, but also from the river channel remodeling that is rapidly occurring on the southern portions of these rivers as the increasing frequency and volume of floods shifts the banks and destroys homes, governmental infrastructure, and agricultural land. Once again, the expenditure of a relatively small amount of public funding will result in much greater savings in preventing flood damage later.

²⁰ Heather Long, "Where Harvey is hitting hardest, 80 percent lack flood insurance," *The Washington Post*, August 29, 2017, accessed August 12, 2018, https://www.washingtonpost.com/news/wnk/wp/2017/08/29/where-harvey-is-hitting-hardest-four-out-of-five-homeowners-lack-flood-insurance/?utm_term=.92ad9e7493c1.

Recommendation #2

The Texas Water Development Board's statutory authority should be substantially expanded to cover flood control and have directive control over the state River Authorities in carrying out these duties. The same Board should have directive control over drainage districts to ensure they are keeping drainage ditches and waterways in a continuous state of repair.

Establish a Permanent Training Center for Disaster Mitigation and Recovery

To increase the capacity of cities and counties to manage disaster recovery, we recommend the establishment of a permanent Texas Training Center for Disaster Mitigation and Recovery within the General Land Office in conjunction with TDEM. Over the long term, this would institutionalize capacity building working jointly with the ICC—the private professional organization of building code development and training—for building inspectors and code enforcers, and recovery and reconstruction managers at the COG, county, and city level. Private builders would also be encouraged to access the same training programs, which should be allowed in any future law creating this institute, to ensure building code enforcers and builders are trained in the same code requirements and new construction technologies. The skills capacity building, in addition to code enforcement and construction technologies, of this Institute would include urban and rural planning, cost benefit analysis, community participation mechanisms, neighborhood disaster vulnerability social-economic analytical techniques, and other recovery skills.

Recommendation #3

The State of Texas should establish a permanent disaster recovery training center for local government officials and staff focused on recovery, disaster fortification, and resilience.

Improving the Texas Building Code System

In one study completed by the Insurance Institute for Business and Home Safety, which rates states based on the quality of the building codes and how rigorously they are enforced, Texas receives one of the lowest ratings—at 34—for high hurricane risk East Coast or Gulf Coast states. Florida, the highest ranked state, received a 95. Only Delaware, Mississippi, and Alabama received lower ratings than Texas.²¹

Some officials and citizens we interviewed said that a category 4 hurricane is an act of God with such massive force that all we can do is to get out of the way and accept the consequences as inevitable. Other people claim their homes had been built to code but that the codes cannot and do not protect against category 4 hurricanes because of their intensity. These perceptions are in fact incorrect. Building codes properly written and enforced can ensure the integrity of a home or business even in 150 mile-per-hour hurricanes and sustain minimal damage. A home built properly on piers above the maximum storm surges and flood levels will survive with limited damage. If this is combined with roof construction, the framing of the home and the use of proper building materials so the home is tied together in an integrated fashion with the foundation, then it can withstand very high winds.

The evidence from numerous studies and interviews with local officials proves irrefutably that properly written and rigorously enforced disaster-focused building codes significantly reduce wind and flooding damage caused by hurricanes

²¹ Insurance Institute for Business & Home Safety, *Rating the States: 2018: An Assessment of Residential Building Code and Enforcement Systems for Life Safety and Property Protection in Hurricane-Prone Regions*, March 2018.

and tornadoes. Extensive interviews conducted by the GLO with Harris County engineers and flood control district managers provide stark evidence of this protection. As reported earlier, 55% of the homes that flooded in Harris County were outside the flood plain and 83% of the flooded homes in Texas generally were not insured under the National Flood Insurance Program. Beginning in 1973, the Texas legislature created flood control districts which could enforce regulations to prevent flood damage by requiring slab foundations to be engineered in a certain way and elevated to a certain level above the high point of predicted flooding. While 6% of all homes in Harris County sustained flood damage during Hurricane Harvey and its aftermath, Harris County engineers reported that only 2% of the homes built since 2000 flooded, while less than 1% of the homes flooded were built since 2009. Before both 2000 and 2009, the slab elevation standards were raised by Harris County Court and rigorously enforced. After Hurricane Harvey the Harris County flood district voted to increase the elevation to two feet above base flood elevation. Several months later the City Council of Houston took similar action. The city of Galveston voted in 2018 to raise the elevation to 18 inches above base flood elevation (Galveston, Texas, Ordinance No. 18-032).

A national association of engineers, architects, code enforcers, and construction experts exist which have developed scientifically-based building codes by experts through a consensus process to protect the public and industry from severe damage in natural disasters. These standards are updated every three years to integrate the latest technological innovations and research, so that codes are not a static set of bureaucratic rules unrelated to industry standards, but an evolving set of best practices to aid the construction industry to ensure the public, the homeowner, small businesses, and the taxpayer are protected from these catastrophes. Well written and properly enforced building codes save public funds by reducing disaster damage which is often repaired using taxpayer funds from the public treasury either through subsidized public hazard insurance or direct assistance from government. ***The federal and state flood and wind damage insurance programs are chronically bankrupt and do not produce anywhere near enough reserves from premiums to pay for storm damage, they must be heavily subsidized from the public treasury.***

All regional and local authorities in Texas whose jurisdictions have a high risk of flooding should implement similar requirements to raise the slab elevation standards with aggressive administrative measures to ensure the higher standards are actually implemented in practice.

After examining insured-loss records from 2001–2010, Dr. Kevin Simmons, of Austin College, showed that building codes reduced windstorm losses by up to 72% and that for every \$1 in construction costs from disaster mitigation engineering up to \$8 was saved.²² Historically Texas has chosen not to enact and enforce aggressive policies to protect taxpayers and homeowners using disaster-focused building codes. And yet the evidence clearly shows homes and businesses built according to robust disaster building code standards have survived hurricanes, floods, and tornadoes where others have been destroyed or severely damaged.

Congress in the past has responded to natural disasters with generous funding, funding the survivors from major disasters have come to expect. Even in 2017 and 2018, in an era where there are seldom consensus votes in Congress on any appropriations, the vote on \$36.5 billion in disaster relief for Hurricane Harvey, Irma, and Maria and wildfires was approved

²² Jeffery Czajkowski, Kevin Simmons, and James Done, "Building for Disaster," *The Regulatory Review*, October 16, 2017, accessed August 12, 2018, <https://www.theregreview.org/2017/10/16/czajkowski-simmons-done-building-disaster/>.



Source: Smiley N. Pool, Staff, September 14, 2008. In "Worst hurricanes to hit Texas coast," *Houston Chronicle*, August 20, 2014, accessed August 16, 2018, <https://www.chron.com/news/houston-weather/hurricanes/slideshow/Worst-hurricanes-to-hit-Texas-coast-91996/photo-6669021.php>.

353 to 69 in the House of Representatives, and the Senate 82 to 17. The taxpayer has historically paid for these disasters as private insurers have often withdrawn from the highest disaster risk areas because insurance premiums are simply too high for the private market to absorb. The public treasury, in other words, the American taxpayer, has been the first and last resort for funding the reconstruction of disaster damage. Building codes protect the taxpayer by saving money during reconstruction so when hurricanes and floods strike they cause far less, if any, damage.

Texas faces several challenges in creating a high-functioning building code system to protect the public safety and taxpayers. First, Texas is an enormous state with a remarkable geographic diversity and highly variable natural disaster risk. Hurricanes do not affect the entire state at the same level of intensity and probability; this risk is heavily concentrated in southeast Texas. Wildfires are a higher risk in west Texas, while the Panhandle and north Texas in general face higher risk from tornadoes. These broadly accepted privately-developed building codes are intentionally designed to meet geographic needs, so the enforcement of these codes will generally mitigate against local conditions which threaten public safety and building integrity.

In theory Texas law currently endorses a building code for one- and two-family dwellings and another for all other commercial and industrial structures. However, the existing law in practice provides widely variable levels of protection to homeowners and small business people depending on where they live or work. Cities in Texas have the authority to adopt a building code for one- and two-family dwellings and another for all other structures but may change the codes if they find them too onerous for their local levels of risk.

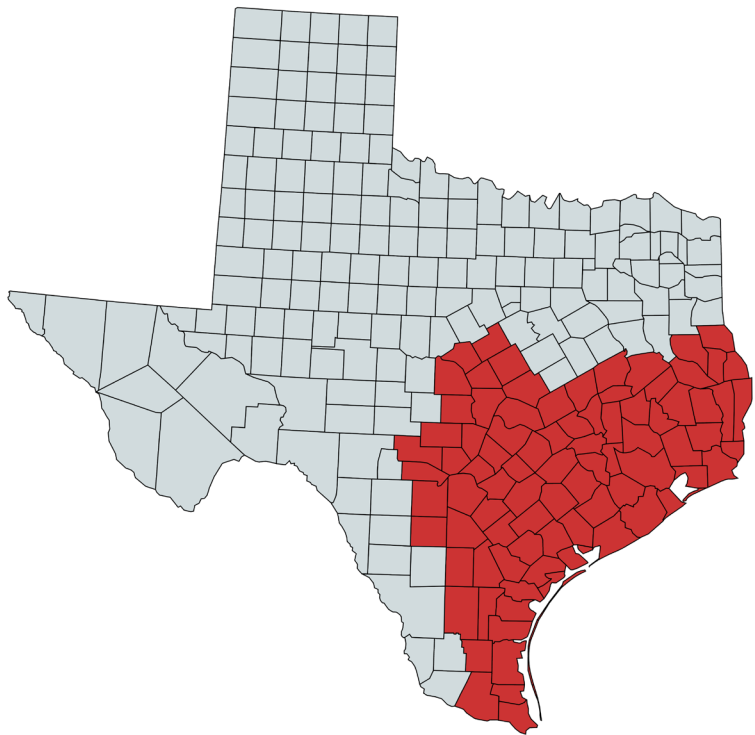
Second, Texas citizens are not all treated equally in the level of protection by well written and enforced building codes. Cities may hire professional building code enforcers who inspect buildings at various stages of construction to ensure compliance or hire third party vendors (who work for the city government) to do the inspections if they cannot afford full time staff. Unincorporated areas within counties do not have the same protection. The existing enforcement mechanism allows builders to hire a third-party vendor of their choice whom they pay to certify that the building code has been complied with. This certification is then filed with the county. Depending on whether they live in cities with an effective building code system or unincorporated counties without such systems, Texas homeowners have very different levels of protection to ensure disaster resilient housing in high risk areas.

Third, this system is undesirable for builders as well as for the public. Builders must become experts in the confusing array of building codes which may be different in each city. Building inspectors should be enforcing the same common standards everywhere which would facilitate construction, not impede it, particularly if the code is reasonably written and based on the latest engineering research.

Fourth, building codes in Texas have grandfather clauses which make the codes applicable to new construction and cannot be made retroactive as the cost would be prohibitive. But the rebuilding of housing using federal or state subsidized insurance funds could be an opportunity to apply new updated building codes to grandfathered homes in the process of reconstruction.

Some critics claim that building codes substantially increase the cost of homes. Extensive national research by the National Homebuilders Association proves otherwise. The major factor driving up home construction costs is the site preparation required by zoning and subdivision rules, roads and utilities in subdivisions, and wetland protection, not building codes which are a relatively small part of construction costs. The study shows that the cost of building code updates over the past ten years are responsible, according to a survey of builders themselves, for only 7.2% of regulatory costs of construction of multifamily dwellings.²³

This report proposes the creation of a Regional Building Code District (RBCD) by state law for the ten Councils of Governments/Regional Planning Commissions most vulnerable to hurricanes: Lower Rio Grande Valley, Coastal Bend, Golden Crescent, Houston-Galveston Area, Central Texas, Alamo Area, Brazos Valley, Capital Area, Deep East Texas, and South East Texas which historically are the most at risk of hurricane flooding and wind damage. The RBCD would be responsible for the (1) review, amendment, and adoption of a standardized building code for the region after a public hearing updated every three years, (2) qualifications and certification requirements for hiring building code inspectors and third-party providers who work for smaller counties or small cities to enforce building codes, and (3) ensuring training is accessible for both builders and code inspectors. The actual enforcement of the residential and commercial codes adopted by the RBCD would remain with the cities and counties for unincorporated areas. Cities and counties in unincorporated areas would have the same enforcement authority. The current system of builders in unincorporated areas of hiring third party vendors to self-regulate and conduct inspections would be abolished.



The county commissioners, county judges, and city mayors which make up the voting members would select ten members to serve on the new Regional Building Code Commission (RBCC) from their ranks, which would include additionally two members of the building and construction industry working in the region, one of which would have expertise

²³ Paul Emrath and Caitlin Walter, *Multifamily Cost of Regulation: 2018 Special Study*, June 12, 2018, accessed August 14, 2018, http://www.nahbclassic.org/fileUpload_details.aspx?contentTypeID=3&contentID=262391&subContentID=712894

²⁴ North Central Texas Council of Governments, *Building Codes Overview: Environment & Development*, accessed July 16, 2018, <https://www.nctcog.org>.

in commercial and industrial construction and the other in residential construction. The Chair of the Commission, who would be the thirteenth member, would be selected by the Governor. All members would serve for three-year terms. The RBCC would review, amend, and adopt common, standardized Residential and Commercial Building Codes for the entire district after a public hearing.

The RBCD would cover approximately half the population of Texas, which would protect both future homes and businesses and those being rebuilt after a hurricane or flooding.

Builders must be included so it does not become an adversarial process, and builders can give their input in the practicality of various provisions of the code. In some states local ordinances and codes are highly bureaucratic and create a “gotcha” adversarial culture where the builders are the enemy instead of partners.

Since 1967, the North Central Texas Council of Governments has actively promoted the standardization of model construction codes in an effort to simplify the construction process, advance the safety of building systems, promote common code interpretation, facilitate the mobility of contractors, and reduce training and construction costs through a Regional Codes Coordinating Committee and five advisory boards.²⁴ Unfortunately, this model has not spread to other regions of the state nor has it been attempted for multiple councils of government in the most hurricane and flood-prone areas in Southeast Texas. Thus, there is a need for state legislative action.

Recommendation #4

The state legislature should establish by state statute a Regional Building Code District (RBCD) with standard-setting authority in the high-risk hurricane region of Southeast Texas which would replace the existing weak and uneven building code system. The Commission would have oversight over building codes in the RBCD which will be composed of the following ten Councils of Government: Lower Rio Grande Valley, Coastal Bend, Golden Crescent Regional Planning Commission, Houston-Galveston Area, Central Texas, Alamo Area, Brazos Valley, Capital Area, Deep East Texas, and South East Texas. These are the areas historically most at risk of hurricane flooding and wind damage.

State Support for Building Code Enforcement and Disaster Recovery

To avoid this new building code enforcement system being an unfunded state mandate, the State of Texas or the GLO, initially using CDBG-DR money from HUD, should fund 75% of the salaries of building code inspectors under the new law for the first few years of this new system. The remaining 25% could be paid out of a modest fee system for building permits which many cities employ now as a funding mechanism to pay for salaries. After the first few years the state revenues should be used to fund this program as federal funds are depleted.

The same program should fund disaster recovery staff in high-risk areas of Texas such as those in the Southeast region who engage in recovery, reconstruction, and planning activities. Several coastal counties have been supported by the Sid Richardson Foundation to fund this hiring of recovery planners, and the GLO has included in the CDBG-DR HUD grant funding to continue this support for local capacity building in recovery and resilience. This report commends the Sid Richardson foundation for its support for these innovative grants to local governments. Other counties and cities should consider similar planning efforts using this model, until a permanent state-supported system can be created.

Recommendation #5

The state should fund at least 75% of the salary costs of building code enforcement (local inspectors and third-party contractors working for cities and counties) with 25% funded by building permit fees in this new Regional Building Code District. The same capacity strengthening salary program should be extended by the State of Texas for city and county recovery managers.

Accelerated Housing Buyback Programs

In the wake of Hurricane Harvey, real estate investors both small and large have purchased storm-damaged homes at enormous discounts in search of higher returns. Thousands of these homes have already been purchased and are quickly being renovated to be put on the rental market. Despite the opportunities this has created for developers and realtors, the rapid purchase of homes by private investors has prevented the city of Houston and Harris County from purchasing these homes at reasonable prices. Harris County has already selected approximately 3,300 homes which have repeatedly flooded that it wishes to purchase but cannot compete with private investors willing to pay cash. This is problematic because many of these homes have been repeatedly flooded, and Texas law does not require landlords of rental properties to disclose whether a home has flooded or sits in a flood plain.²⁵ The difference, of course, is that Harris County will buyback the homes and turn them into green space where no one can live, and the private investors are rebuilding the homes knowing they will be flooded again and can take advantage of federal or state bailouts. Moreover, these investors are taking advantage of heavily subsidized insurance through the National Flood Insurance Program, which would effectively pass along the costs of the next major flooding event to U.S. taxpayers. In the absence of regional building codes, investors are not required to upgrade these homes to prepare for the next major flooding event; the changes are almost entirely cosmetic.

To break the cycle of flooding in coastal areas, local governments and state government should establish a fund specifically for the acquisition of properties that have been repeatedly flooded in cash in order to compete against investors willing to put returns ahead of public safety. Evidence shows that after six months people often change their minds about selling repeatedly flooded homes which is why private companies acted so quickly after Hurricane Harvey. Under the current buyback program, funding does not become available from federal sources for at least a year following a major hurricane. According to a 2013 study, before the massive damage of Hurricane Harvey, the Texas state government spent \$1.8 billion in repetitive losses from flooding of the same homes. This cycle must be stopped to protect the taxpayers.²⁶

Recommendation #6

This report recommends that a large reserve account be established using federal funding initially before the next hurricane season—later to be funded by state, city, and county resources—to accelerate the existing housing buyback programs for homes which repeatedly flood. This fund would be used in the weeks following a hurricane or flooding event before private companies purchase the properties that have a repeated history of flooding. The state legislature should also require rental units or houses for purchase which have repeatedly flooded to disclose this in rental or purchase documents and title registrations.

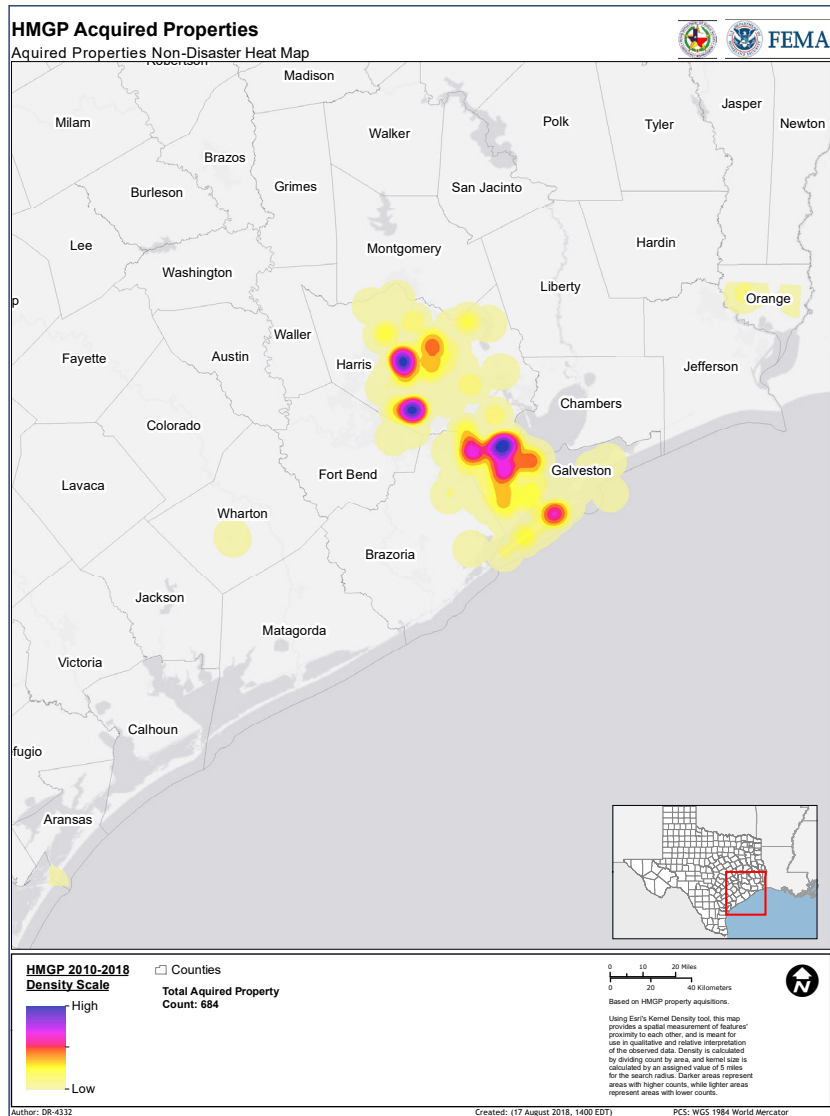
²⁵ David Hunn and Matt Dempsey, "In Houston's flooded neighborhoods, real estate investors see an opportunity," *Houston Chronicle*, accessed July 30, 2018, <https://www.houstonchronicle.com/news/houston-texas/houston/article/houston-harvey-flood-homes-real-estate-investor-12901718.php>.

²⁶ Ruth Simon, "One House, 22 Floods: Repeated Claims Drain Federal Insurance Program," *The Wall Street Journal* <https://www.wsj.com/articles/one-house-22-floods-repeated-claims-drain-federal-insurance-program-1505467830>.

Land Acquisition Programs

In central Texas, major cities like Austin and San Antonio have been experimenting with land acquisition over aquifers to prevent rainwater runoff away from reservoirs which reduces flooding risk. Proponents have argued that these public acquisitions amid a major building boom prevent the replacement of the natural porous limestone of aquifers with concrete, asphalt, and other industrial surfaces, leading to water contamination and faster runoff that is less likely to be captured by a reservoir. The Edwards Aquifer, one of the most prolific aquifers in the world, supplied water to about 1.2 million people in San Antonio and 700,000 people in Austin as of 2006. These numbers have likely increased dramatically as both cities have grown and continue to do so. Since the late 1990s, Austin and San Antonio have raised hundreds of millions of dollars to purchase tens of thousands of acres of land for the better management of water resources, which will also have the ancillary effect of reducing flooding risk. Despite the costs, acquisition of land for preservation is often

less expensive than water treatment plants. There is debate among developers in the region about public land acquisition, some in support and others in opposition. Those in opposition feel that it is unfair that cities take property out of circulation so that it cannot be developed. On the other hand, many developers support public land acquisition because the process involves paying willing sellers fair market prices for their land rather than forcefully taking land via eminent domain, which would set a dangerous precedent for builders and developers.²⁷



Recommendation #7

This report endorses the efforts of city and regional planning groups in Texas buying land at market prices without the use of eminent domain to reduce the risk of flooding and preserve reservoir water recharge. We recommend the state legislature create a commission to study this land purchase program and report on what might be done by the state to support these efforts in the future.

²⁷ Jim Carlton, "Cities Spend Millions on Land to Protect Water," *Wall Street Journal*, January 4, 2006, accessed July 30, 2018, <https://www.wsj.com/articles/SB113633981179637132>.

²⁸ One America Appeal, *One America Appeal Raises Over \$41 Million for Hurricane Harvey Relief*, January 24, 2018, accessed August 12, 2018, <https://www.oneamericaappeal.org/files/2018-01-24-Wrap.pdf>.

Private Disaster Philanthropy

Texas has a long tradition of generous private philanthropy and foundation support for problems facing the people of the state. That tradition rapidly geared up in a major effort during the Hurricane Harvey crisis. The programs of the Salvation Army, Mennonite farm carpentry teams, and other religious group were particularly commendable. We do not have a full accounting of all the funding raised given how decentralized the effort was (and should be). Perhaps the largest and most successful effort was initiated by Judge Ed Emmett in Harris County and city of Houston officials who created a fund for the relief of victims of Hurricane Harvey. The fund raised more than \$120 million in a very short period of time with very low fundraising or overhead cost. The lessons learned from the experience should be replicated in other areas of Texas. Most importantly, the fund did not implement aid programs directly, but rather provided funding to experienced local community groups and direct-delivery-of-services charities in the greater Houston area with a reputation for accountability and effectiveness. Under the charter of the fund, no one who sat on the board of directors could receive any funding under the grant program, which prevented intrigue and friction among the groups receiving grants.

The Bush Foundation in College Station acted as the fiscal agent for an effort of five former presidents—Carter, Bush (41), Clinton, Bush (43), and Obama—for Hurricane relief called One America Appeal (OAA). More than 100,000 people gave \$42 million which was distributed on an equal basis to the funds established by the governors and other elected officials in Texas, Florida, Puerto Rico, and the American Virgin Islands which had suffered severe losses from the 2017 hurricane season. OAA was promoted through over 9,000 billboards and NFL games were contributed by businesses and by television advertising where the former presidents made appeals to the public. A concert was held at College Station where the five Presidents appeared, which raised \$3 million of the \$42 million.²⁸

In the coastal area of Texas, a number of local funds were created at the county and city level which raised millions of dollars, but we do not have a comprehensive description of all these efforts.

The usefulness of this private philanthropy cannot be overestimated as private grants do not suffer from the excessive paperwork requirements of government agencies. This private funding filled many gaps for people ineligible or unreachable by government programs. In future disasters, these efforts should continue to be strongly supported by state and local officials. A stronger effort should be made by public sector agencies to coordinate the public and private sector programs, so they are more integrated without endangering the independence of the private charities.

Recommendation #8

Texas should continue to support private philanthropic programs after major disaster and develop a system to integrate public and private sector efforts to help survivors of natural disasters without endangering the independence of the private social service groups.

FEDERAL GOVERNMENT RECOMMENDATIONS

Information Gap

The GLO's conversations with mayors, city councilors, the county court, county judges, city managers, police and fire chiefs, and the directors of municipal planning all uncovered a serious gap between what they and the public believe about federal disaster assistance, and the reality of what the Stafford Act, which governs federal disaster management programs, actually says. Several county and city officials in interviews told the GLO they had assumed FEMA or other federal agencies would pay for all or most of recovery and reconstruction costs from Hurricane Harvey. Then they read the Stafford Act which suggests the federal government supplement state and local funding, private insurance, and people's own efforts to help themselves. It will not be the principal funder of reconstruction. The problem has been many officials and the general public have not read or understood the Stafford Act, and therefore expect more from the federal programs than they can legally deliver. The misperception of the federal role is widespread. Because many Texans in high-risk areas believe that the federal government will rescue them, they have no insurance, particularly if they live outside the flood plain. As reported earlier, 83% of the people whose homes flooded many did not maintain flood insurance. Current outdated and inaccurate flood plain mapping has exacerbated the under-insurance problem.

In Harris County (one of the largest counties in the United States at 4.2 million people) alone, 55% of the homes which flooded were outside the flood plain. Flood plain maps are not an accurate predictor of flooding risk as many people have discovered to their detriment. Private insurance companies have gradually withdrawn from insuring homes and businesses in high-risk areas of wind and flooding damage because their insurance reserves could not profitably market policy requiring such extraordinarily high premiums given the risk. Consequently, a large gap exists between the damage hurricanes do, and the financial resources available for housing recovery in particular, and the public's knowledge of what they can expect from the federal and state government.

A comprehensive Texas public information campaign through multiple mechanisms should be implemented before, during, and after major disasters to explain to the public what the federal and state government's programs can assistance them during a major disaster, but also **what they will not do under federal and state law**. This comprehensive campaign should be the responsibility of one Texas state government agency, properly funded, to coordinate this education campaign through local charities, public schools, the business community, and local government using electronic messaging as well as traditional media. GLO should undertake this for housing programs.

Recommendation #9

The GLO should implement a saturation Public Information Campaign before and during every hurricane season to ensure the local officials and the public understand what temporary housing programs it will provide and what it will not provide in the event of a major hurricane or flooding event.

FEMA Block Grant for Temporary Housing

FEMA has created an array of temporary housing programs to deal with the needs of disaster survivors whose homes were severely damaged or destroyed by a natural disaster, although this is only one option within the overall Individual Assistance and Households Program. Each of these programs has been created with the support of the U.S. Congress to address gaps

in housing for a group of survivors and particular situations; these have often been layered one on top of another. The result is a complex list of programs which most of the survivors who apply for federal benefits do not comprehend, even after it is explained to them or after they read the FEMA webpage.

There is an overall application for Individual Assistance programs, but FEMA requires everyone who applies for these programs to apply for an SBA loan first, even if they know they do not qualify for the program, do not want a loan, or cannot take on a second mortgage. This adds frustration for the applicant on top of the trauma they have already experienced, many of whom do not have much experience in dealing with the complex federal bureaucracy and are confused by all the forms they must fill out, many of which ask the same questions over and over. One solution to the array of temporary housing programs managed by FEMA would be to consolidate these programs into a single Disaster Housing Response and Recovery Block Grant, a program that would be available to states with a high frequency of natural disasters.

These block grants would be similar, but not the same as, HUD Community Development Block Grants for disaster recovery or CDBG-DR. HUD block grants require a lengthy process which would not be appropriate for temporary and permanent housing programs that should be initiated within days of a disaster. The designation eligibility would have to be made well ahead of the disasters, so that states can prepare for the new responsibilities well in advance. The FEMA block grants would be submitted by eligible high-frequency states and be approved before hurricane season each year, and then activated with a task order within a couple of weeks of a disaster.

It is not only the view of the GLO that a FEMA block grant system would be more effective, it is also the view of the leadership of FEMA. Brock Long, the current Administrator of FEMA—a professional career emergency manager and former director of the Georgia state disaster management agency from 2008–2011—testified before the House Committee on Homeland Security on March 15, 2018 and argued, “FEMA should be a block grant agency.”²⁹ This report endorses his views on this subject.

A FEMA block grant for temporary housing assistance would have several advantages:

- ◆ It would speed the approval process by eliminating one level of government (the federal) from individual housing decisions once the block grant was approved, which would simplify the process for every currently shared individual bureaucratic action;
- ◆ It would save taxpayer funding by reducing sometimes redundant bureaucracies;
- ◆ It would make clear which agency at the state level was responsible for managing the program, which under the current system, allows for the dispersion of responsibility, spread out among the local, state, and federal government agencies;
- ◆ A block grant system would also reduce the risk to survivors, of staff and managerial limitations of FEMA such as when multiple disasters took place simultaneously in 2017 when three hurricanes struck the U.S. (Texas, Florida, and Puerto Rico), at the same time there were widespread forest fires in California and floods in New Mexico;
- ◆ It would mean the program would be managed closer to the people it is serving, designed for the needs of people locally;
- ◆ Concerns about fraud can be addressed through periodic audits of the grantee while the program progresses and at its conclusion.

²⁹ U.S. Congress, House, Committee on Homeland Security, Preparedness, Response, and Rebuilding: Lessons from the 2017 Disasters, 115th Cong., 2nd sess., March 15, 2018.

Recommendation #10

The federal government should consolidate funding for FEMA housing programs into one block grant to states with a high risk of natural disasters

Develop Pre-Event Contracting for Temporary Housing Recovery

For the first time in U.S. history, FEMA decided in 2017 to engage in joint management of some of its temporary housing programs with the GLO days after Hurricane Harvey struck Texas.³⁰ This was certainly a function of the severe stress FEMA was under because of multiple major disasters across the country that they were responding to simultaneously, as well as its desire to improve the processes under current law. On September 13, 2017, Texas Governor Greg Abbott assigned this task to the Texas General Land Office (GLO), an independent state agency whose commissioner is an elected statewide official under the Texas Constitution. Within several days, Texas Land Commissioner George P. Bush gave instructions to speed the drafting of an Inter-Governmental Service Agreement (IGSA) specifying FEMA's and the GLO's respective roles and the rules of procedure, required by FEMA before any assistance can be given. Because this was the first time the GLO administered these programs, no pre-event contracting was in place which could quickly be used to implement these temporary housing programs. The very complex Federal Acquisition Regulation (FAR) had to be followed to bid out these contracts. This is a process-heavy and very bureaucratic set of rules. Regardless whether the FAR is adequate to the task of guiding federal contracting, it is not designed for nor does it function for crisis.

Reed Clay, the Chief Operating Officer for Texas Governor Greg Abbott, in his testimony before the House Committee on Homeland Security on March 15, 2018, properly criticized the "tangle of federal regulations" which hamper FEMA's emergency response system. He reported "some jurisdictions encountered challenges in quickly procuring needed support services, while many others discovered that the contracts they had in advance of the storm did not include all of these contract provisions required under the governing federal laws and/or rules." While he did not refer directly to the Federal Acquisition Regulation by name, it is this law and regulation which governs most federal procurements, including those of FEMA, over which FEMA exercises little control. FEMA must comply with the FAR whether they wish to or not (pursuant to 2 CFR 200 Procurement Guidance).³¹

The FAR was widely criticized by General David Petraeus and other U.S. military officers for slowing down the emergency response and reconstruction programs in Iraq and Afghanistan. On the other hand, for the year Defense Department-lead Coalitional Provisional Authority governed Iraq (and exempted themselves from the FAR), widespread abuse resulted according to Stuart Bowen, the Special Inspector General for Iraq Reconstruction. Given the limitations of the existing federal procurement system, but on the other hand the risk of abuse, what can be done to streamline FEMA's temporary housing program?

In the absence of block grants, the GLO and other state agencies dealing with disaster response and recovery should consider bidding out Indefinite Quantity Contracts or IQC or IDIQs as the Department of Defense calls them (specifically allowed under the existing FAR) before each hurricane season. They can then be accessed with task orders and can be activated within a few days after a disaster event. An IQC is a contract which is advertised in the federal register, like other

³⁰ U.S. Department of Homeland Security, Federal Emergency Management Agency, *2017 Hurricane Season FEMA After-Action Report*, July 12, 2018, accessed August 12, 2018, pp. 6–7, <https://reliefweb.int/sites/reliefweb.int/files/resources/2017FEMAHurricaneAAR.PDF>.

³¹ U.S. Congress, House, Committee on Homeland Security, *Testimony of Chief Operating Officer for Texas Governor Greg Abbott Reed Clay, "Preparedness, Response, and Rebuilding: Lessons from the 2017 Disasters,"* 115th Cong., 2nd sess., March 15, 2018.

contracts, reviewed, and an award made, but the contract is put on hold until it is needed and funding activated. It is a contract in waiting. The IQCs should be revisited each year before hurricane season to determine whether the contractors and businesses which won the initial bids remain capable of executing the terms of the contract when called upon by the GLO. In this way contracts which carefully followed federal law would already be in place before a hurricane strikes and can be activated immediately to speed the recovery. Moreover, this would be much less expensive for the taxpayer than hiring a permanent staff that might not be needed for years.

Recommendation #11

The GLO should bid out indefinite quantity contracts (IQCs) for information management, construction, and other engineering construction services under the Federal Acquisition Regulation (FAR) procedures before the annual hurricane season each year, so contracts are in place to be used within a week of a major disaster.

Federal Contracting Regulatory Relief After Disasters

There exists another remedy which has a long history of success with virtually no abuse over a 50-year period. The Office of Foreign Disaster Assistance (OFDA) within the U.S. Agency for International Development (USAID), which carries out humanitarian programs for people affected by natural disasters, famines, and wars in poor countries around the world, has what is called “notwithstanding authority” under the Foreign Assistance Act. Since its creation in the 1960s, the OFDA director has had the authority to suspend many process provisions of federal law in order to speed humanitarian responses around the world. Audits show little abuse and a high success rate in helping those at risk in disasters. The “notwithstanding authority” is used sparingly and usually for grants to nonprofits (international non-governmental organizations and the Red Cross) which is used to deliver humanitarian aid. This has allowed OFDA to move faster than virtually any other federal department or agency in providing disaster assistance. They can fund grants within days of a disaster because they are not required to go through the mass of federal procedural requirements all federal agencies must follow before they can implement any program.

It is one evidence of the dysfunction of the federal system that the federal government is more competent at providing disaster assistance for people dying in disasters around the world more rapidly and more efficiently than it does for Americans. This is because FEMA does not have “notwithstanding” authority, among other reasons.

In order to speed the procurement process for temporary housing, Congress could consider granting “notwithstanding authority” for a specific state agency getting FEMA funding under the Stafford Act. This would allow the state agency to suspend the Federal Acquisition Regulation (FAR) and other federal procedural laws during the first year of the temporary housing response and other federal onerous procedural requirements, or at least to use a much simpler, streamlined procurement law, which Congress would have to create for emergency purposes. The FAR is approximately 2,000 pages long, and other than the IRS tax code, may be the most complicated federal regulation. Following the law inevitably results in delays because it is so heavily process driven.

Recommendation #12

Congress should grant “notwithstanding” authority to those high disaster risk states which have demonstrated competency in disaster response and recovery for a fixed period of time, perhaps one year. This would allow the waiver of most federal procedural regulations, speed contracting and program management.

Consolidating FEMA Housing and Increasing Flexibility

Other measures should be considered to simplify and make more flexible disaster recovery programs. Of all the recommendations in this report the most common refrain from local officials is the need for merging temporary housing programs with long-term recovery money so both can be used more efficiently and in a more integrated fashion. At present, the FEMA temporary housing program consists of the:

- ◆ Direct Assistance for Limited Home Repair (DALHR) program (FEMA also calls this Permanent Housing Construction or PHC at the national level), the first program of its kind in the contiguous 48 states, in which FEMA partners with the GLO to provide permanent repairs for moderate damage to those without adequate housing resources;
- ◆ Partial Repair and Essential Power for Sheltering (PREPS) program (FEMA also calls this Sheltering and Temporary Essential Power program or STEP at the national level), which provides minor repairs to homes in locations with few or limited housing options (for basic, emergency home repairs);
- ◆ Direct Lease, which involves the leasing of properties not normally available to the public to provide temporary housing for eligible households; and
- ◆ Manufactured Housing Units and Recreational Vehicles, which provides housing through the placement of manufactured housing units on suitable private land or commercial lots.

In the absence of a FEMA block grant system, at a minimum the DALHR (also known as the PHC program) and the PREPS program (also known as the STEP program) should be merged into one program to simplify the FEMA temporary housing system.

In addition, local and state officials GLO interviewed for this report have repeatedly urged federal policymakers take the word “temporary” housing out of the Stafford Act, so that temporary housing funds can be used for permanent housing solutions. Too much of the FEMA funding is used for mobile housing units and recreational vehicles (RVs) to provide temporary housing for survivors. Reports indicate FEMA is considering reducing their reliance on this option. We encourage FEMA to limit their use, and instead spend the funding for permanent reconstruction of housing. It is important to note that there will always be some need for temporary housing units as not all homes are eligible for permanent reconstruction. During this period people can be housed in apartments or hotel rooms if available under the Individual Assistance program.

The existing narrow legal definition of what FEMA may do in reconstructing homes has impeded the integration of long-term solutions with short-term fixes. This reform would be unnecessary, of course, if federal policymakers consolidated all temporary housing programs into a block grant system, but in the absence of such a policy reform, the merger of temporary and long-term housing programs into a single program geared to provide permanent solutions would facilitate the process of fortifying all reconstructed housing against the next hurricane or flood disaster.

In the absence of the phase out of RVs and manufactured homes by FEMA, the state legislature should give the Governor the authority to waive for one-year city and county prohibitions after a Presidential disaster declaration. This report strongly urges county and city officials to take action now to pre-designate zones where RVs and manufactured homes could be placed in the event of a major disaster to speed the deployment process. Some Texas cities delayed waiving their prohibitions for six months after Hurricane Harvey which meant their people suffered as a result.

Recommendation #13

Congress should expand the definition of what is eligible for reconstruction using temporary housing funds so that damaged housing can be rebuilt to be more resilient and fortified to withstand disasters in the future. In the absence of the phase out of RVs and mobile housing units by FEMA, the state legislature should give the Governor the authority to waive city and county prohibitions of their use for one year after a Presidential disaster declaration.

Innovative Solutions and New Housing Technologies

The above reforms would also allow temporary housing money to be used for innovative housing solutions, which FEMA lawyers have ruled violate the Stafford Act language. Many new technologies are not allowed under the existing statutory language of the Stafford Act, which permits the use of FEMA to rebuild the housing back to the condition prior to the hurricane damage, but nothing more.

The RAPIDO report, written by professors from Texas A&M University who are nationally known experts in disaster management, proposed a new innovative housing system for rebuilding housing after a hurricane or other disaster. The cost and speed of the housing was lower than traditional mechanisms. FEMA ruled that the RAPIDO system improved housing and thus was ineligible for funding. Since the RAPIDO report was issued after Hurricane Ike in 2008, even more innovative housing technologies have been developed which would resist heavy wind damage and flooding and are less expensive than current technologies. Perhaps one of the most intriguing is the use of 3D printed homes, which can be built to withstand most hurricane or flooding events at a low cost.³² FEMA, in keeping with the statutory language of the Stafford Act, has ruled these new technologies go well beyond what is permissible. Reports from FEMA indicate policymakers are considering new remedies to these restrictions to allow for these newer innovative technologies. This report strongly endorses such efforts, and encourages FEMA to go forward with these reforms, and encourages the Texas congressional delegation to support and lead these reform efforts.

Recommendation #14

The federal government must expand the definition of what is permissible for reconstruction funding within FEMA programs, and the GLO must investigate and consider using new technologies for housing construction which are less expensive, more resilient, and can be implemented faster than traditional housing construction techniques.

Consolidation of Disaster Housing Programs into One Federal Agency or Department

The federal disaster management system has been designed so that no one is in charge. Many other federal agencies compete (and quarrel) with FEMA for leadership, despite FEMA being designated by law as being in charge of federal disaster response. FEMA must share its mission with SBA, the Corps of Engineers, DOD, HUD, HHS, and many other federal agencies.

Any restructuring of federal disaster recovery (as opposed to emergency response) should also include the consolidation of HUD disaster recovery programs through the CDBG-DR (Community Development Block Grants–Disaster Recovery), the Small Business Administration disaster loans, and the FEMA temporary housing programs described above into one

³² Hazard Reduction and Recovery Center at Texas A&M University, Community Development Cooperation of Brownsville, building community WORKSHOP, La Unión Del Pueblo Entero, A Resource in Serving Equality, Texas Low Income Housing Information Services, *Rapid Disaster Recovery Housing Program*, January 2015.

organizational location in the federal government to further simplify the system and reduce overlapping programs, eliminating conflicting missions and business systems.

Recommendation #15

Congress should enact legislation to consolidate disaster housing programs of FEMA, HUD, and the SBA into one agency or department to eliminate competing missions and business systems which slow down the temporary housing response.

Revisions to the U.S. government's Privacy Act of 1974

Perhaps the most serious deficiency in the existing FEMA temporary housing program is the absence of a common database of eligible recipients which local, state, and federal agencies all have access to that can use to assist survivors. In GLO's interviews with city and county officials, one of the most frequent complaints about the temporary housing program is that they did not know who in their communities were being helped by federal assistance, or who were most seriously affected by the hurricane. When local officials tried to contact those families displaced by the hurricane to provide assistance, they were told the federal privacy law prevented FEMA from providing the lists. FEMA lawyers have narrowly construed the provisions of the federal privacy act which prohibits the names and addresses of those that applied and been accepted or rejected for federal assistance, or where their temporary shelters might be. FEMA told GLO that they could provide information to other state agencies, city and county government officials if they can prove a "need to know" case for each entity, which is much too bureaucratic and too restrictive to be of operational value during a housing crisis in a disaster.

One city department called a meeting of people whose homes would be eligible for the housing buyback program, but because city officials did not have access to their temporary addresses could not invite them to the meeting. Nor could information be shared with local officials on whose homes the work was going on. In fact, much of FEMA's database could not be shared with the GLO point of contact even though it was designated by the governor to implement these programs. The federal privacy act should be amended to allow sharing of pertinent information with other state agencies, and city and county officials involved in disaster response and recovery efforts, since the approval of permits by many of these officials is required for the reconstruction work to be undertaken and the first people disaster survivors usually turn to in the crisis are their local officials.

In the absence of amendments to the privacy law, FEMA should add to their application form an option for each applicant to allow FEMA to make their data available by other government agencies at the state and local level. This is done in other federal agencies such as the Defense Department and it would not require amending the privacy law.

Recommendation #16

Congress should amend the privacy act to give state and local officials managing disaster response and recovery efforts full access to survivor eligibility information. An integrated database should be built from the beginning with full access by state and local recovery and housing response administrators. In the absence of such a change in law, we urge FEMA to amend their benefits application form to allow people to voluntarily make their data available to state and local government agencies in order to provide them services.

HUD Community Development Block Grants Disaster Recovery (CDBG-DR)

One of the provisions of HUD regulations which came under extensive criticism by city and county officials was the requirement that 70% of HUD funding under CDBG be directed to moderate to low-income families. But the way in which this is implemented focuses on counties with large concentrations of low-income families. Some counties received limited or no funds because they did not meet with threshold requirements of income levels. While it is certainly understandable why HUD policies federal funding be focused on low and moderate income people, the way in which this rule operates in practice excludes aid to lower income people who happen to live less populated counties with some higher income families. We recommend amending the HUD regulations to base CDBG distribution levels to all low and moderate-income people regardless of the averages in the county as a whole.

Recommendation #17

HUD should rewrite the formula for the allocation of funding to municipal and county governments directing aid to low- and moderate-income people so that all people in these categories are assisted.

Infrastructure Solutions to Protecting the Texas Coast

Coastal Barrier System

By Texas state law the protection of the Texas coast is an express responsibility of the General Land Office. Thus this report concludes with an explanation of the GLO and Corps of Engineers project to protect the Texas coast. In 2008, Hurricane Ike hit two weeks after the start of the great recession and caused \$30 billion in damages to Galveston and the surrounding area. Narrowly missing the Port of Houston, Hurricane Ike would have caused over \$100 billion in damages had it hit the port directly, according to some estimates. The surge nearly overwhelmed the refinery protecting levees at Port Arthur and Texas City and came within a foot of making the great recession a new great depression.

The safety of the Texas Coast is crucial for the economic well-being of Texas and the country. This is because 25% of the nation's refining capacity comes from the area; 25% of Texas' population, nearly 8 million people, live in the Texas Gulf Coast region; the population of the coast is projected to reach 10 million by 2050; and over \$250 billion in goods are exported from Texas ports annually, leading the nation in exports; the Port of Houston is the second busiest port in the country; the expansion of the Panama Canal has increased the importance of Texas' Ports dramatically; and over half of the country's jet fuel is produced along the coast.

In order to protect the Texas coast, its environment, its people and the commerce it provides for the country, Congress authorized the U.S. Army Corps of Engineers (USACE) to study the length of the Texas Coast in 2007. In the ensuing 10 years, the study has overcome significant policy and funding hurdles, greatly delaying a project vital to protecting an essential part of the nation's economic and national security interests. Due to these delays, the study will not be finished until 2021.

When completed, the study will likely recommend that a barrier system be constructed along the Gulf from the west end of Galveston Island to High Island, which is on the eastern edge of the Texas/Louisiana border. This system will be composed of sand dunes, expanded beaches, levees, seawalls and possibly two flood gates, one between Bolivar Roads and the other maybe required at the mouth of the Houston Ship Channel. Once constructed, the flood gate at Bolivar Roads will span over 1200 feet, the largest of its kind in the world. This system will create a layered defense that preliminary modeling has shown will greatly reduce storm surge both at Galveston Island and in Houston Bay.

Previous studies funded by the GLO estimate that it will cost approximately \$20 billion to build these structures, though the most expensive portion will be the flood gate at Bolivar Roads, which makes up half of the budget. While there is economy in receiving all the funding at once, it is understood that this is not practical in a single budgetary year. Funding for the entire project can be divided into different phases over a multi-year period.

Currently, the Texas General Land Office and the USACE are in the middle of this long-delayed study, which did not begin in earnest until November 2015, that will address the needs of the Houston/Galveston Bay area. As such, the GLO does not have a Corps Chief's Report ready; however, both are on schedule to complete the draft environmental impact statement and the Tentatively Selected Plan (TSP).

Sabine to Galveston Levees

In 2011, the United States Army Corps of Engineers and the GLO agreed to study feasible storm risk management and ecosystem restoration projects from Brazoria County to Orange County. Known as the Sabine to Galveston Study, the proposed construction area is of considerable national and economic security concerns as it is home to: two Strategic Petroleum Reserves; numerous chemical plants, including Dow Chemical; oil and gas refineries, including the Port Arthur refinery, the country's largest; and Port Beaumont, the nation's fourth largest port and the largest military port in the country, responsible for most of our overseas troop deployments.

A USACE Chief's Report for Sabine to Galveston was completed in August 2017. It recommends the expansion and hardening of existing levees in Freeport and Port Arthur and the construction of a new, 23-mile levee system in Orange County, which is currently unprotected and was severely damaged by Hurricanes Ike and Katrina.

Congress appropriated \$3.9 billion for the construction of the project in the Balanced Budget Act of 2018. The Sabine to Galveston project is critical to USACE and the GLO's plans to manage the risk to the Texas Coast.

Currently, the GLO and the USACE are in the middle of this long delayed study, which did not begin in earnest until November 2015: this will address the needs of the Houston/Galveston Bay area. As such, we do not have a Corps Chief's Report ready; however, we are on schedule to complete both the draft environmental impact statement and the Tentatively Selected Plan (TSP) by the fall of 2018.

Once completed, these plans will work together to provide a comprehensive system that will greatly reduce the area's storm surge risk. The State of Texas, its industry, and the nation have invested too much in the area's infrastructure to continue to expose it to the dangers posed by the next hurricane.

Investment in the Texas Coastal Barrier System and the Upper Texas Coastal Levee System is sound economic and national security policy. These projects present unique opportunities for the Federal government to demonstrate that it can tackle and complete large, complicated problems in short order.

Recommendation #18

This report endorses acceleration of the engineering studies needed to advance the Texas Coastal Barrier System and Upper Texas Coastal Levee system, and the funding of these projects by the U.S. government.

CONCLUSION

The indisputable fact remains that the State of Texas is and will continue to be at high risk of natural disasters, particularly hurricanes and floods. It is not a matter of *if* Texas will be devastated by another hurricane or catastrophic flood, it is a matter of *when*. While the emergency response system of the Texas is well organized and managed, the disaster recovery and mitigation system to protect the public is weak and poorly organized. Not enough is being done to reduce the risk of flooding, fortify homes and businesses, both those already constructed and those which will be built in the future, given the likely and substantial increase in the state's population. Improving that recovery and mitigation system for the State of Texas requires statutory reforms, federal and state government reorganization, flood control measures at the state level, capacity-building at the local and regional level, and building code standard setting and enforcement. This will require the expenditure of public funding by the State of Texas from its own resources and should not cede that responsibility for the protecting the public to the federal government any longer.

APPENDIX: GLO HURRICANE HARVEY TDHA LESSONS LEARNED

The Texas General Land Office (GLO) staff, in conjunction with FEMA personnel, gathered lessons learned as the Hurricane Harvey Temporary Direct Housing Assistance (TDHA) program progressed and evolved. This was part of an ongoing feedback system to improve the process as the recovery unfolded. Most observations, if the legal and regulatory framework permitted, were, and continue to be, addressed through changes in the processes. When the observations that were easily corrected through procedural changes are removed from the list and similar observations are consolidated, we are left with four major observations that, in order to be successful in future state led TDHA missions, must be addressed. Suggesting changes to the legal or regulatory framework is beyond the scope of this appendix. Recommendations are limited to those fixes that can be made within the existing framework. These observations and recommendations are listed in no particular order, as they are of equal importance and all must be addressed to have a TDHA mission that is timely and effective.

Observation 1: Plans and Contracts Must be in Place Prior to the Event

It is impossible to have a fast start to any multi-million-dollar program without pre-planning. The Texas General Land Office, nor any other agency of any other state or territory, has conducted a Temporary Direct Housing Assistance (TDHA) mission or has been tasked to prepare for such a mission so there was no planning structure available to begin working from.

Hurricane Harvey was declared a federal disaster on August 25th, 2017. On September 10th, FEMA authorized a direct housing mission. From September 14th-22nd, FEMA, The Governor's Office, and the General Land Office, worked out the general terms of a TDHA mission which resulted in an Intergovernmental Service Agreement between FEMA and the GLO. On September 29th, FEMA had completed enough inspections to qualify the first registrants as being eligible for direct housing. On October 7th, the first temporary housing unit was installed. Between September 22nd and November 17th, the eight other legal documents, and program guidance was negotiated with FEMA, and vendor contracts were issued. FEMA allowed the GLO to begin installation of temporary housing units prior to completion of the required documentation on November 17th. Home repair programs were begun after all documents were signed.

This sounds like an inordinate length of time, and it is. The contracts and agreements could not have been completed faster as multiple federal and state laws had to be addressed, compliance with a multitude of state and federal regulations had to be ensured, a workable process had to be designed, and coordination and contracts with Councils of Government (COGs) and the City of Houston, had to be completed. During this period, FEMA was installing temporary housing solutions and was providing funds to registrants based on their individual need.

Recommendation for Observation 1

The Texas General Land Office Staff should capture all documentation and lessons learned into Standard Operating Guidance (SOGs) documents covering all aspects of the Harvey TDHA program, and save these documents for future use. In addition, the GLO should work with the Governor's Office, the Director of the Texas Division of Emergency Management, and FEMA to develop an updated IGSA for use in the next event requiring TDHA. This draft IGSA should accommodate all possible programs allowable under federal law and regulations, adjusted for local Texas conditions, and approved by all parties annually. This review should be completed no later than the end of January

each year. This would allow draft administrative plans, action plans, program SOGs, fact sheets, statements of work and quality assurance surveillance plans to be preapproved by FEMA for rapid execution. These programs require a significant amount of contract support. It is also imperative that the GLO preposition contracts, with redundant vendors, prior to an event to rapidly execute when TDHA is approved. This should all be accomplished no later than May 31st of each year.

Having these plans prebuilt and contracts prepositioned with an annual review conducted prior to the most likely period that would require execution of a TDHA (Atlantic Hurricane Season, June 1st to November 30th) would remove approximately seven weeks from the housing recovery timeline. The GLO is currently working with the Governor's Office and FEMA to ensure an updated IGSA is in place. In addition, the GLO is working through the procurement process to have prepositioned contracts in place that meet all federal regulations, and that can be utilized under a new IGSA. To keep planning going after Hurricane Harvey's mission is completed, will require funding to maintain the experience and the planners.

Observation 2: Training Must Occur Not Only at the Federal and State Level, but the Local Level as Well

It does little good to have a plan if those who are integral to it do not know what the plan is. Texas, does an outstanding job planning and training for disaster response, but we spend little funds and time in preparing for recovery. This hampers not only the mechanics of the execution of the housing mission, but also the messaging of what the mission is and is not. TDHA missions are constrained by federal law and regulation that cannot be waived or amended by state or FEMA officials. For instance, the Stafford Act (42 U.S.C. §§ 5121-5207), which governs all federal disaster response, requires that housing assistance be "temporary". This restricts what can be done as part of a FEMA TDHA mission. Knowledge of the Stafford Act, and other relevant state and federal laws is not generally known by the public or state and local officials. Most knowledge of these laws has been gained through actual experience. Fortunately, most citizens and officials do not have regular experience with disasters.

Members of the public often assume that if their house is damaged in a disaster, that they will get a FEMA trailer to keep, or their house will be completely repaired with FEMA funds if they do not have insurance to cover their loss. Many local officials also have the same assumptions. In addition, local governments may not be aware that their ordinances may impede disaster housing recovery and may require temporary adjustment.

Recommendation for Observation 2

By offering training for local officials and conducting tabletop training exercises with local emergency management officials, the GLO can help inform officials of legal requirements, and the required process under federal regulations. In turn, GLO can learn what are the local ordinances, and how local organizations can assist in the recovery. Training can teach expertise on forming the county and city recovery committees which are so essential to long term recovery, how to speed TDHA programs, messaging to citizens on how to receive assistance, what to expect when they receive it, and avoiding fraudulent actors who are all too common in disaster-stricken areas. Exercises allow local and state officials, along with voluntary organizations; to think through the problems associated with housing recovery, visualize the time lines and flow of the process, and determine where they have capability shortfalls that the GLO may need to help them mitigate.

Observation 3: Data Management and Privacy Protection

FEMA uses two separate databases to manage disaster recovery registrants. Due to regulations in support of the requirements of the Federal Privacy Act of 1974, (5 U.S.C. § 552a) this data cannot be shared with state or local authorities except through legally vetted specific requests for specific purposes. This includes recipients of FEMA contracts with participants in an IGSA. To have access to program recipient data, GLO employees had to pass a FEMA background check but still could not access the databases directly. Also, as recipients talked to FEMA personnel, their eligibility status, to include which solution they were eligible for, often changed. Local authorities were not allowed access to the data at all unless they sent a specific request for one-time access. This situation was initially addressed by the GLO receiving spreadsheets to work from. This technique did not work due to the aforementioned changes in recipient status and differences between the two FEMA databases and the GLO contract management database.

Recommendation for Observation 3

GLO and FEMA must co-locate their state level TDHA office, not only in the same building, but in the same space. This allows real time vetting between FEMA and the GLO on individual cases. In addition, it allows for recipients to call a single “Housing Hotline” manned by personnel from both agencies with access to all FEMA and GLO information, to research the recipients case in real time and provide them with the correct information in a timely manner. By establishing liaison offices with the affected COGs/large cites that consists of both FEMA and GLO TDHA personnel, a level of information sharing can be established, provided the local authorities are precleared by the FEMA Personally Identifiable Information access clearance system.

Another area where we can improve data sharing is with Voluntary Organizations Active in Disasters. The Texas Division of Emergency Management maintains lists of credentialed voluntary organizations that are willing and capable of assisting in TDHA missions. Through the exercises listed in Observation 2, their capabilities can be documented, and by preclearing selected personnel from their organizations, we can bring them into the TDHA program. For example, if we provided voluntary organizations a list of applicants who are both eligible for Partial Repair and Essential Power for Sheltering and willing to receive help from volunteers, then the organizations could conduct the early tasks, such as removing wet/moldy dry wall, removing debris, etc. This would allow the limited federal funds available for each project to focus on more expensive repairs. In addition, voluntary organizations could then follow the GLO and finish repairs to the home. Thus, getting the family further down the road to recovery.

Observation 4: Communications and Messaging

At the outset of the TDHA mission, the GLO was focused on one goal: helping Texans get back into their homes as quickly as possible. With resources being funneled directly to the TDHA programs, there was not enough of a focus on communication and messaging. At times, this led to some confusion among recipients, elected officials, and the media as to how the process would be carried out.

Recommendation for Observation 4

The GLO, jointly with FEMA, TDEM and the Governor’s Office, must continue to execute a well thought out communications and messaging plan to educate, not only officials, but most importantly the public on what TDHA will do for the citizens and what it will not do. This messaging should occur, not just during the event, but also, just

as importantly, between events. It must focus on the process, the need to register with FEMA after a disaster, how to avoid fraud, and most importantly how to prepare for a disaster. A key message is the need for flood insurance for property owners, and renter's insurance for renters. Example messages are: FEMA cannot, by law, repair or replace all your losses, only insurance can do that; And flood insurance is not only for those who live in low lying areas, many homes damaged by Harvey were not in flood zones.

Hurricane Harvey nearly matched Katrina as the most expensive storm in U.S. history. When you also consider Maria, Irma, and several other floods, 2017 was a busy year for FEMA. As our population on islands and coastal areas grows and our urban areas continue to expand, we can expect more floods like those that struck Texas in 2015, 2016, and Harvey in 2017. We must evolve a better, and faster recovery system. The above recommendations, are being implemented by the GLO in concert with our partners at FEMA, the Governor's Office, Texas Division of Emergency Management, the coastal COGs, and cities. Each new event will bring new lessons learned. We must continue to analyze them and expand and improve our planning and preparedness to help our citizens and communities repair and recover their lives after disasters.