

Contracting for Disaster Reconstruction

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Master in City Planning

at the

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

June 2018

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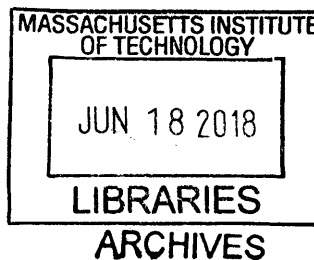
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# Contracting for Disaster Reconstruction

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Submitted to the Department of Urban Studies and Planning On May 21, 2018  
in partial fulfillment of the requirements for the degree of Master in City Planning

## **Abstract**

The combination of more powerful and unpredictable storms and growing urban populations have led to increasing demands for disaster response and an opportunity for the logistics community to provide meaningful evaluation and expertise. In the United States, FEMA is continually updating their disaster response methods to accommodate the changing dynamics of disasters—most recently in rethinking strategies to provide interim housing for large populations of survivors. One of FEMA's most complicated challenges has been forecasting and securing the large number of skilled contractors required to complete the multitude of assessments, reconstruction projects, and rebuilding missions in the wake of large-scale storms. International governments have faced similar challenges, and through case studies and informant interviews, an evaluation of contractual structures that affect FEMA's post-disaster housing provision is presented. This thesis will present a cross case study analysis of how contracts were structured between the government and private firms hired as part of the reconstruction efforts following the 2016 flooding in Louisiana and the 2010-2011 earthquake sequence in New Zealand to find recommendations and future learning opportunities for the US government.

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## Introduction

Planning ahead of a disaster is not only a feasible goal, it is essential. While no-notice disasters will continue to occur at unpredictable times, the location and level of risk is a known quantity. Of the ten most populous cities in the world, eight are at high risk of earthquakes, and six are vulnerable to floods, storm surges and tsunamis.<sup>1</sup> Disaster prevention, mitigation, and preparedness are more effective than an improvised disaster response;<sup>2</sup> evaluating and preparing logistics responses in advance improves disaster relief and response from these predictable hazards.<sup>1</sup> Internationally there are competing views on who should be preparing for such disasters – governments vs NGOs or volunteer organizations – and what these organizations should be doing prior to a disaster to prepare. When specifically researching preparations for temporary housing after an emergency, a variety of methods and philosophies exist due to complex political dynamics and high cost of reconstruction.<sup>1</sup>

In the United States of America after a major disaster the US government, specifically the Federal Emergency Management Agency (FEMA), assumes the role of providing temporary housing for disaster survivors. The current mission and role of FEMA is *“to support the citizens and first responders to promote that as a nation we work together to build, sustain, and improve our capability to prepare for, protect against, respond to, recover from, and mitigate all hazards.”* Under this mandate, FEMA provides temporary shelter after an emergency. The agency is continually evaluating both the physical housing units that are available as well as the methods and procedures used to place survivors. This thesis will focus on the procedural roles that FEMA plays in coordinating the contractors and builders needed for housing missions following a major disaster.

Hurricanes Katrina, Harvey, Irma, and Maria, and Superstorm Sandy have highlighted the vulnerability of US cities over the past twelve years. Following such large-scale disasters, FEMA has been accused of gross unpreparedness in their response efforts for large urban populations.<sup>3</sup> One of the most publicized criticisms has been FEMA’s handling of temporary housing for survivors after Hurricane Katrina.<sup>4</sup> In response, Congress restructured FEMA’s authority after Katrina and the agency has been systematically updating its practices, particularly in the field of logistics. In June of 2017, FEMA initiated a two-year project to reimagine the agency’s disaster-related housing assistance program. Both the cost and time required for getting survivors into housing increases substantially with the number of



people affected by a storm event. FEMA's goal in this study is to move survivors into temporary housing faster and at a lower cost.

Reconstruction after a hurricane is an enormous challenge, but it is key to the return of survivors to the community. After the devastation caused by Hurricane Katrina, the lack of affordable temporary housing made it difficult for those who had lost their homes to remain in or near the city.<sup>5</sup> Compounding this issue was the need to also house contractors and workers to participate in the rebuilding process. The Brookings Institution, a non-profit public policy organization, reported that following Hurricane Katrina, the population of New Orleans fell by as much as fifty percent. The authors of the report concluded that residents relocated outside the city because there was not enough housing.<sup>6</sup> It is vital to the success of a community to rebound after a disaster if survivors remain in close proximity of their place of employment. In the case of Hurricane Katrina, it was reported that three years after the storm the population had fallen by twelve percent,<sup>6</sup> indicating a permanent loss of residents after the storm, with the loss potentially linked to lack of temporary housing. An improvement in the resourcing of skilled workers for a rebuilding effort could significantly improve the rate at which survivors can return to their homes, which could lead to a higher retention of survivors within the community.

FEMA has demonstrated an ability to quickly obtain and distribute money from the federal government to disaster stricken areas. However, one major bottleneck to recovery—which is not limited to the US, as it has been noted in the literature in for both worldwide and domestic disasters—has been a lack of supply, coordination, and management of the reconstruction workforce.<sup>7</sup> Contractors and builders are always in demand following a disaster, with governments competing against private citizens to hire the small pool of available workers. Adding to this challenge is the lack of housing for potential workers in the disaster-stricken area, as was seen after severe flooding in Minot, ND in 2016.<sup>8</sup> This compounding bottleneck causes delays in both simple housing repairs as well as the long-term housing construction and recovery efforts.<sup>7</sup> This thesis will seek to inform the way FEMA prepares for the post disaster reconstruction phase of their response efforts by evaluating contractual mechanisms and comparing the way FEMA organizes and structures the hiring of contractors to other international governments.

Specifically, this thesis will provide case studies of the contracts utilized in DR-4277, the 2016 Louisiana flooding disaster in the United States, and the 2010-2011 earthquake sequence in New Zealand. Then, through a cross case study analysis, a comparison of the

contracts will be conducted to gain insights as to how these two governments have differently structured their relationships with building and assessment firms. Understanding how the United States contracts contrast from New Zealand will provide opportunities towards future research as to how the contractual differences may have affected survivor outcomes.

## **1.A Literature Review**

### **1.A.1 Natural Disasters in Urban Areas**

The Centre for Research on Epidemiology and Disasters, a World Health Organization Collaborating Centre, a weather event is recorded as a natural disaster in EM-DAT (CRED's global database on natural and technological disasters), an event must meet at least one of the following criteria: Ten or more people reported killed; 100 or more people reported affected; Declaration of a state of emergency; Call for international assistance.<sup>9</sup> Extreme weather events such as those meeting the criteria listed above, which also includes large, unpredictable storms and natural disasters, has led to a significant increase in economic damage over the past thirty years.<sup>10</sup> Climate change, whether attributed directly or indirectly to human activity, affects coastal regions, making cities with large urban populations particularly vulnerable.<sup>10</sup> A threatening rise in sea level, heat waves, and extreme rainfall events are intensifying the scale and frequency of disaster response efforts.<sup>9,10</sup> For these reasons, continued research in the area of disaster response and logistics is increasingly relevant and important.

The rise in catastrophic events has coincided with a rapidly expanding population in urban areas, with many forced to occupy hazard-prone areas,<sup>1</sup> resulting in a steady climb of the number of people affected by such events.<sup>11</sup> The International Federation of the Red Cross and Red Crescent Societies have published that they anticipate a significant rise in the annual number of hydro-meteorological disasters, with property losses increasing steadily, especially in large urban areas.<sup>1</sup> Significant increases in the global population have intensified disaster outcomes because more people live in vulnerable areas.<sup>9</sup>

In 2005, Hurricane Katrina hit New Orleans and demonstrated that large-scale destruction and extreme losses of lives are not limited to developing countries and that the continental US is not immune to such events.<sup>10</sup> Seven years later, when Superstorm Sandy made landfall in New York City it was proven that even the richest, most cosmopolitan cities, are under-prepared for large-scale weather events.<sup>10</sup> Hurricanes Harvey, Irma, and

Maria have dominated the 2017 news cycle as the United States witnessed a rapid succession of disasters, and the challenging response efforts, over a short period of time. Such incidents have forced the government on all levels – federal, state and local – to analyze response efforts.<sup>12</sup> FEMA’s direct interest in temporary housing solutions will be complemented by this investigation of the reconstruction needs to repair and rebuild after a disaster, including an analysis of how the supply of contractors and builders could be optimized for a successful reconstruction effort.

### 1.A.2 Case Study Research

This thesis will present case studies that focus on post-disaster reconstruction to convey the details and timeline of the response effort in regards to the contracting of construction firms. Case studies serve an important role in research by illustrating an event, inspiring new conceptual frameworks, and finding similarities across studies.<sup>13</sup> In the following thesis, two unique cases will be highlighted and then organized into a framework to find comparisons and connections that might lead to further research questions.<sup>13</sup> This research will illustrate the reconstruction and contracting efforts for the 2016 flooding in Louisiana and the 2010 and 2011 earthquake sequence in Christchurch, New Zealand.

Case studies about the New Zealand earthquakes are widespread,<sup>14</sup> however, this event has not been described in a case study detailing the hiring process of contractors, or the contracts specifically. The Louisiana flooding in 2016 has only been referenced in the literature in regards to social media communications,<sup>15</sup> although the event might have been recent enough that more publications will follow. The following case studies will add to the literature by providing an overview of the 2016 Louisiana flooding in addition to contract-specific information as well as a contract-specific overview the 2010-11 Christchurch, New Zealand earthquakes. The cross case study analysis will provide opportunities for future research in the evaluation of contracting, disaster response, and reconstruction time.

### 1.A.3 Post Disaster Reconstruction

Post Disaster Reconstruction—a collection of several related fields of research, including Post Disaster Recovery, Post Disaster Rebuilding, and Post Disaster Redevelopment —is a rising domain in the research literature surrounding disaster recovery.<sup>16</sup> And within Post Disaster Reconstruction, there are two distinct areas of focus: public infrastructure (the rebuilding of roads, bridges, restoring electricity, water supply etc.), and housing. Housing projects consume 30-50% of financial allocations from the

government after a disaster and, depending on the location and political structure can be managed either by the local community and housing owners, or by a government-hired firm.<sup>17</sup>

The construction industry effectively manages routine housing projects, however, the post-disaster construction domain is much more challenging. Many of the standard policies and regulations that are followed by the construction industry were not drafted with the intention of being implemented in an emergency situation, and therefore are difficult to execute quickly and on a large-scale.<sup>18</sup> Adding to these challenges are funding issues, insufficient spaces for temporary and permanent housing, cost escalation, low supply of labor and materials, and the low quality of construction.

Under normal circumstances, construction projects follow predictable timelines and resources can be allocated appropriately. Unfortunately, the post-disaster reconstruction environment is much more dynamic, complex, and unpredictable.<sup>19 20</sup> As noted in the Handbook For Reconstructing After Natural Disasters published by the World Bank, "Post Disaster Reconstruction begins with a series of decisions that must be made almost immediately. Despite the urgency with which these decisions are made, they have long-term impacts, changing the lives of those affected by the disaster for years to come."<sup>21</sup> Long-term impacts include the percentage of the population that remains or returns to an area following the disaster, which could greatly influence the resilience of the community to fully rebound.<sup>22</sup> Permanent displacement of survivors due to an inadequate response effort, reiterates the importance of decision-making methods in advance of a disaster, specifically in the realm of housing and reconstruction.

Adding to the challenge of post-disaster housing and reconstruction is the general lack of pre-event resource planning, including little proactive engagement with the construction industry,<sup>23</sup> which is a critical component of disaster response.<sup>24</sup> In regards to hiring for the reconstruction effort, this thesis will review relevant contracts and agreements that governments have had in place prior to a disaster and how these service agreements either helped or hindered the rebuilding effort. Literature surrounding the supply of contractors identifies the need for more coordination pre-disaster between contractors and governments.<sup>23</sup> The recommended outcome mirrors research completed in the field of logistics and supply chain management for disaster response: that systems must be aligned with flexibility to adapt.<sup>25</sup>

Understanding and comparing contracts used in rebuilding efforts will inform the existing research in the field of Post Disaster Reconstruction by highlighting universal elements that contribute to more efficient reconstruction staffing following a disaster with better quality construction outcomes.

#### 1.A.4 Post Disaster Reconstruction Contracts

Prior to the New Zealand earthquake sequence, Masurier et al. analyzed procurement methods for reconstruction following an earthquake.<sup>18</sup> Through this analysis the authors indicated the large infrastructure firms would be well suited to reconstruction projects in comparison to smaller local firms because such firms would have more experience in procurement and delivery of construction projects with purchasing processes already established. In addition, existing relationships with construction companies would enable them to quickly ramp up their supply chain. While national firms have played major roles in reconstruction, specifically in the United States and New Zealand, there are numerous roles well suited to local firms.

The analysis of Masurier concludes with the recommendation of project alliancing as a mechanism for composing reconstruction contracts. Alliancing is defined as a rebuilding situation where there is a collective ownership of the risks associated with the delivery of the project. Firms work together with each other and the government, have an equal say, and the relationship is a true partnership. On the other hand, Witesman and Fernandez argue that any for-profit entity, whether for reconstruction or otherwise, will result in a principal-agent relationship.<sup>26</sup> A principal-agent relationship is one in which the principal, in this case the government, contracts an agent, such as a building firm, to “perform some service on their behalf that involves delegating some decision-making authority to the agent.”<sup>27</sup> Principal-agent relationships can lead to agency issues such as adverse selection, which is when the principal does not and cannot fully understand the risk involved with the hiring of that firm.

While Masurier et al. foresaw that future reconstruction projects would benefit from an alliance contract partnership,<sup>18</sup> Witesman and Fernandez predict that due to adverse selection in the principal-agent contract, this will not work.<sup>26</sup> In the following cases studies, a closer look at the contracts between national and local firms will be reviewed to understand if disaster reconstruction contracts are formatted to elicit alliances between firms and the government or if the government approaches the contracts as a principal-agent relationship. Reimagining the construction outcomes if either New Zealand or the US

had purposely implemented a project alliance relationship or principal-agent structure could provide insight into the future of disaster contracting.

#### 1.A.5 Contract Analysis to Inform Forecasting for Post Disaster Reconstruction

The literature within the humanitarian response domain has many models and forecasting methods that can be employed in disaster response and post disaster reconstruction. Understanding the contracting methods established by a government prior to a disaster and immediately following a disaster, could inform such models when it comes to forecasting the number of contractors needed following a major event. While these models tend to be similar to those found in the business supply chain, there are some distinct differences: disaster response modeling has some unpredictable variables including demand and location; lead times are short and sudden; there is a lack of supply for initial resources; and there are multiple decision makers.<sup>28</sup> All four of these elements factor into the evaluation of forecasting the demand and supply of contractors after a disaster. Therefore, it could be considered relevant to review other existing disaster recovery models and forecasts to observe how such unknown variables are handled.

Under the umbrella of Urban Disaster and Housing Recovery there are models that are noted in the literature that are relevant to reconstruction. Such models include topics on planning to minimize future risk of flooding,<sup>29</sup> statistical indicators to assess empirical patterns of urban disaster recovery,<sup>7</sup> and methods of quantifying sustainable recovery efforts.<sup>30</sup> There is significant research in post-disaster material demand modeling,<sup>31 32 33</sup> which will inform and inspire this thesis, as understanding the materials necessary for reconstruction will reflect similar methods needed to forecast the needed workforce.

However, current literature seems to be lacking models to optimize the allocation of temporary housing for survivors, processes to evaluate when to repair, versus rebuild, as well as methodologies on how to contract such work. Such forecasts and studies would directly affect the number of contractors and firms needed by the state or federal government. This thesis could form the basis of a model for forecasting specific needs related to hiring contractors following a natural disaster by providing a defined framework and analysis on contracts that have been used during specific reconstruction operations.

#### 1.B Research Questions

This thesis seeks to begin answering the overarching question: Can the contractual organization of service operations, specifically building contractors, be better optimized

during relief efforts following a natural disaster to provide higher quality work in a more efficient manner? To answer this question, a series of related sub-questions will be explored to analyze how the New Zealand government handles disaster response in comparison to the United States, and to determine if and how the United States could potentially update policies in regards to contracts to improve outcomes for survivors.

Specific case studies for each country, the 2016 flooding in Louisiana and the 2010-2011 earthquake sequence in New Zealand, will answer the following questions:

- How did each government coordinate housing assessments?
- What were the temporary and permanent housing options provided by each government following the natural disaster?
- What role did insurance play in the response efforts for each country?
- What role did contractors play in the response efforts for each country?
- How did each country hire and manage firms to complete the related assessment and building tasks?
- What were the contractual structures used by each country?

Through a cross case study analysis, a comparison between the two country's disaster response mechanisms will be provided. This evaluation will include answers to the following questions:

- How did the different approaches to insurance affect the response efforts?
- What were the contractual structures or factors that shaped the effectiveness of the response and/or the final outcome?

Finally, in the conclusions and recommendations section, the following research question will be evaluated:

- Are there contractual structures and /or housing repair policies that could improve efficiency and effectiveness in the United States?

## **1.C Hypothesis**

The United States and New Zealand governments will structure their disaster response and reconstruction strategies differently, some parts to a greater extent than others. Different agencies, ministries and government entities will be responsible for different

aspects of the housing missions with some parts tackled by the national government and some delegated to the local government. Finding and identifying the commonalities and differences between governments to fulfill the rebuilding needs of their communities will provide the basis of analysis that could lead to a better understanding of how the international community could improve temporary housing processes. Comparing New Zealand housing outcomes with those in the United States, and identifying key policies and contractual structures that directly affected the reconstruction outcomes for each incident could help identify potential areas for improvement in regards to the repair and rebuilding process, leading to safe, quality repairs in a timely manner.

### **1.D Methodology**

This thesis will present reconstruction-contracting case studies from the United States and New Zealand, two governments that are socio-economically similar to each other ('high-income' as designated by the World Bank). The two events that will be compared are the 2016 flooding disaster in Louisiana and the 2010-11 earthquake sequence in Christchurch, New Zealand. These two events were chosen because of the similar number of citizens and residents that were affected by the disasters, and the vastly different ways in which the government responded. In Table 1 on the following page, an overview of the disaster and response can be viewed as a basis to begin understanding the similarities and differences in the events.

Additional disasters were considered for this research including the 2010 earthquake in Chile, the 2016 Kumamoto earthquake in Japan, and the 2005 Kashmir earthquake in Pakistan. After reviewing the Pakistani earthquake response, it was determined that the government provided cash grants to survivors for rapid construction and rebuilding, but did not coordinate the response effort directly and therefore would not provide insight into contracting for reconstruction. Due to language barriers, obtaining the government contracts proved challenging for Japan and Chile. Contracts for Japan could not be obtained, and while the Chilean documents were eventually acquired, without a proper translation of the document, the risk of misunderstanding the contract was high. Therefore, these case studies were not pursued. In the future, these disasters could potentially be sources for additional case studies if translation services were arranged.



**Table 1. Numbers Comparison between US and New Zealand Disasters**

	US Flooding	New Zealand Earthquake
<b>Number of Damaged or Destroyed Homes</b>	90,000 <sup>34</sup>	100,000 <sup>42</sup>
<b>Managed Repairs</b>	10,000 <sup>35</sup> (SaH temporary)	67,000 <sup>36</sup> (permanent)
<b>Managed Rebuilds</b>	Unknown (Restore Louisiana)	7,000 <sup>37</sup>
<b>Temporary Units (MHUs)</b>	1,900 units, 1,900 households <sup>38</sup>	124 units, 1167 households <sup>39</sup>
<b>Cash Assistance</b>	35,000 <sup>34</sup> (home owner repairs)	116,000 <sup>37</sup> (home owner repairs only)
<b>Home Buyouts</b>	0	8,000 <sup>40</sup>
<b>Low Interest Loans</b>	\$1.2 billion (SBA) <sup>34</sup>	0
<b>Percent of Owners Insured</b>	11% <sup>41</sup>	80% <sup>42</sup>
<b>Insurance Total Cost</b>	\$2.4 billion (NFIP) <sup>34</sup>	\$13 billion (private, residential) <sup>43</sup>
<b>Government Cost</b>	\$776 million (IA housing grants) <sup>34</sup> \$528 million (Public assistance grants) <sup>44</sup> \$1.3 billion (CDBG grants) <sup>41</sup>	\$11 billion (EQC)

The following US and New Zealand case studies first outline how each government structures disaster response—specifically, the agencies or ministries responsible for temporary and permanent housing, as well as the aspects of response managed by the national versus local government versus private entities. Within this analysis, the types of housing programs will be identified and detailed. For example, the United States offers cash grants, rental assistance, rental repairs, shelter-at-home repairs, placement into manufactured housing units, and, on rare occasions, permanent repairs.

Following the overarching structure of the government response to housing, a more detailed understanding of how the housing programs have unfolded in each country in regards to a specific incident; specifically, the 2010-2011 earthquake sequence in New Zealand and the 2016 flooding disaster in Louisiana. While private citizens can and do contract much of their repair work on their own, for large-scale reconstruction efforts, the national or local government may take on some of that responsibility. This thesis will be reviewing instances where the government contracted firms to help repair or rebuild private homes as part of the disaster response effort.

To understand this process, the government agencies and ministries contracting the work will be outlined, and when available, specific contracts will be reviewed. In the United

States there are a variety of relationships that are involved in this process, for example there are contracts or sometimes agreements between FEMA and the state in need of assistance, the state and the contractors hired to complete the work, and then between the contractor and sub-contractors that fulfill the work. These sections will include an overview of the housing responses that required contracting building firms for reconstruction, with details specifying the types and extent of repairs contacted by the national or local government. The contractual structures of the documents utilized to hire and manage the construction firms will be outlined for each disaster and compared within and between the two countries.

Contracts, invoices, and data from the US Government were obtained through the Freedom of Information Act, requested through FEMA and the State of Louisiana. Contracts, documents, and data from the New Zealand Government were obtained through the Official Information Act, requested through the Earthquake Commission, and Southern Response. Additional data was collected through news reports and press releases from both the governments and the contracted firms during and after the reconstruction process.

Reviewing when contracts were signed, and comparing dates to rebuilding and repairing timelines will provide the basis of an evaluation reviewing how the hiring response from the government affected survivor outcomes. Additionally, contractual structures and incentives could provide insight as to how governments have organized and managed private sector hiring in rebuilding efforts.

This thesis will take a multi-method approach including expert interviews and document analysis with an objective of identifying the supporting and hindering factors on workforce contracting following a natural disaster. How the international community coordinates large-scale reconstruction challenges could influence how the United States responds to the large-scale disasters increasingly experienced here.

## **2 Case Studies Introduction**

The purpose of these case studies is to provide a method of comparing when and how international government contract private firms to aid in the housing rebuilding efforts after a major natural disaster. To capture the ways in which each country is different, a common framework was established to apply to each incident. Within this common framework, one can understand how each government proceeds in the rebuilding effort, and provides a method of comparing across multiple disasters in different countries.

## 2.A Disaster Response Framework

First, a basic understanding of how each government responds to disasters must be understood. Even though this is not directly related to housing missions, the differences between the countries starts with the way each country have established their emergency response divisions and responsibilities. To fully understand how the contracts are implemented, and the agencies or departments responsible for executing them, an outline of what sections of the government are involved with the housing mission and the history of how the country evolved their methods of response is relevant. Important legislation and milestones in disaster response will be outlined prior to each case study to provide enough background information to support the understanding of the methods each country currently uses for contracting for the rebuilding process.

Following the historical context, the case studies will then take a step-by-step approach following the disaster framework. Within each step, the coordinating agency, department, or ministry will be identified, and whether or not the government used contractors will be indicated. There are three main areas that will be explored which lead up to the government hiring contractors for the rebuilding efforts: (1) the First Response; (2) the Assessment of Need; and (3) Housing Programs. While contractors for the rebuilding effort are not hired during the First Response section of the disaster framework, decisions and actions taken by the government during this phase influence the way in which a housing mission is executed and effect how the government handles housing as the disaster unfolds. Therefore, understanding and including the First Response framework is essential to understand the resulting housing missions for each country. While the first response will look similar within each country, this outline will be structured in regards to the specific disaster for each case study.

Following the First Response section of the framework is the Needs Assessment. Within this section an entity, either the government or private firms review the survivor needs and provide information to better understand how many households are in need. Assessments are approached differently by each country, and can vary within a country for each disaster. For example, in the United States, each state has the ability to determine how to run the assessments, so it may vary widely between areas depending on where the disaster hits. These case studies will only be highlighting the specific disaster that is being illustrated.

The last section of the framework will focus exclusively on the rebuilding efforts for private homes. Throughout the assessment and rebuilding processes, instances when

contractors were utilized will be identified and their roles will be summarized. When possible, a general summary of the contract will be outlined. Following the case studies, a comparison of the US approach versus the New Zealand approach will be analyzed to determine lessons learned from each country following a large-scale recovery event.

### **3 Case Study: 2016 Flooding in Louisiana, United States**

#### **3.A Introduction**

The United States government relies on a combination of local, state, and federal resources when responding to natural disaster. The Federal Emergency Management Agency (FEMA) oversees the national response, which is coordinated with state emergency agencies and local organizations. To provide an understanding of the United States response and reconstruction efforts, this case study will focus on a housing mission that resulted from severe flooding in southern Louisiana in 2016.

Scattered thunderstorms beginning in mid-August of 2016 quickly transitioned to a slow moving storm system in and around Baton Rouge, Louisiana. Torrential rainfall exceeded 2 feet in the city and some surrounding suburbs, with heavy rain continuing the following day. Rivers in the area rose rapidly and flooded homes, roads, and businesses within hours of the storm. As a result, over 100,000 households were affected by this disaster; FEMA and the State of Louisiana coordinated a housing mission that comprised of rental assistance, quick repairs, temporary housing units, and permanent repairs. As this was such a large mission, the government contracted out many aspects of the rebuilding process.

In the following case study, a brief outline of the history of emergency response in the US will be presented, followed by an in-depth look at how the housing assistance program unfolded in Louisiana following the floods. This will include the options available to residents in the aftermath through both FEMA and the state. A review of the programs that required contractors to carry out the rebuilding process will be presented as well as an assessment of the contracts between the US government and the building contractors.

## 3.B History of Emergency Response in the United States

### 3.B.1 Early Legislation

The first piece of federal legislation from the United States government for disaster relief was the Congressional Act of 1803.<sup>45</sup> This act was passed following a series of fire in New Hampshire to provide assistance for local merchants. This type of ad-hoc legislation for disaster response was repeated throughout the nineteenth century. For example, it was the main response mechanism to the great fires of New York City in 1835 and Chicago in 1871, the 1900 hurricane in Galveston, Texas, and the 1906 San Francisco earthquake.<sup>46</sup>

During the Great Depression in the 1930s, the federal government began implementing emergency management functions, such as emergency response and flood mitigation as a way to stimulate the economy. This included legislation that allowed federal agencies such as the Reconstruction Finance Corporation and the Bureau of Public Roads to provide loans for the reconstruction of public infrastructure following a disaster.<sup>45</sup> Emergency planning was sidelined in the 1940s and 50s as the nation was focused on wartime defense and fear of a possible nuclear attack.<sup>48</sup> This was the beginning of a constant fluctuation in focus from the federal government between planning for outside threats (wartime defense, nuclear war, terrorist threats) versus planning for natural disasters that continues today. In the 1960s and 70s, a series of hurricanes shifted the focus back to natural disaster relief. One of the outcomes of these storms was the evolution of flood insurance.<sup>45</sup>

The National Flood Insurance act of 1968 created the National Flood Insurance Program (NFIP), which allowed communities to offer federally subsidized low-cost flood insurance in exchange for restricting development in floodplains. To increase the number of households covered, the Federal Insurance Administration (within the Department of Housing and Urban Development), implemented the Flood Insurance Act of 1972 and began linking mandatory flood insurance to any federally backed homeowner loan for properties with a high risk flooding area.<sup>45</sup>

### 3.B.2 National Government Disaster Response Agency

In 1974 the Disaster Relief Act was passed into law. Among other changes, this act first delineated the process of requesting federal relief after establishing a presidential disaster declaration,<sup>45</sup> a requirement that is still enforced today. This legislation was also the first step to consolidate over one hundred agencies, groups, and miscellaneous programs used in

coordinating responses. Because so many organizations and programs were involved with emergency responses, poor communication and parallel efforts hindered response efforts.<sup>45</sup>

### *3.B.2.a The Federal Emergency Management Agency (FEMA)*

Furthering these efforts, the Federal Emergency Management Agency (FEMA) was established by Executive Order 1212 in 1979. The newly defined agency was given the essential role of “...anticipat(ing), prepar(ing) for, and respond(ing) to major civil emergencies...” this mandate included planning for an efficient use of available resources, and hazard mitigation. This executive order officially consolidated remaining response entities into a single agency.<sup>47</sup> Some of the agencies FEMA absorbed included the Federal Insurance Administration, the National Fire Prevention and Control Administration, the National Weather Service Community Preparedness Program, and the Federal Disaster Assistance Administration.<sup>48</sup> The consolidation effort was disjointed given that the organizations that made up FEMA were scattered in five different buildings with different Congressional bosses.<sup>45</sup>

Over the next two decades, FEMA continued migrating their focus from civil defense and the threats of nuclear war, to a clearer focus on natural disasters. This led to the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act) in 1988, which was designed to establish a more systemic federal assistance program from the federal government to state and local governments, and gives FEMA the sole responsibility of coordinating government-wide relief efforts.

The Stafford Act had four major goals: (1) encourage states and localities to develop comprehensive disaster preparedness plans; (2) establish multi-level government coordination prior to a disaster; (3) promote the use of insurance coverage; and (4) specify federal assistance programs for losses due to a disaster. The Stafford Act outlines the federal response to emergencies; this includes descriptions of the temporary housing programs offered by the United States to local governments in a disaster, as well as the provision that the US federal government will provide temporary housing for survivors for up to eighteen months following a disaster.

### *3.B.2.b Department of Homeland Security*

The Oklahoma bombing in 1995 gave new focus to terrorist emergencies in the United States<sup>45</sup> and in 2001, FEMA faced an unprecedented test with the September 11th terrorist attacks in New York City and Washington, DC.<sup>48</sup> This shifted the federal focus away

from natural disasters and the primary focus became terrorism. Immediately following the attacks, Congress passed the Homeland Security Act of 2002, which created the Department of Homeland Security (DHS). The intent of this newly created agency was to improve coordination efforts among federal agencies involved with law enforcement, disaster preparedness and recovery, border protection, and civil defense. In 2003, FEMA was absorbed into the Department of Homeland Security and became a part of the Emergency Preparedness and Response Directorate.<sup>45</sup>

As the government rapidly responded to the threat of terrorism, the focus on natural disasters diminished. This shift in focus coincided with one of the worst natural disasters in the history of the United States when Hurricane Katrina, a Category 5 storm, hit the city of New Orleans. The storm was the first major disaster after the creation of DHS and the new agency was not properly prepared.<sup>49</sup> Despite official requests for help through the proper chains of command, the response was extremely slow due to strict adherence to bureaucratic legislature. In many instances, FEMA's actions appeared to prohibit aid, angering the American public and motivating a call for reform.<sup>50</sup> FEMA did not gain any goodwill from the public after the agency's long-term response efforts; one of the most publicized criticisms of the agency were the poorly constructed, unplanned, travel trailers FEMA used for survivors of the disaster.<sup>4</sup>

To improve the coordination of FEMA with other government and NGO responses, Congress passed the Post-Katrina Emergency Management Reform Act in 2006. This provided a clearer chain of command through the National Disaster Recovery Framework, which defines coordination structures, the role and responsibilities of the leadership, as well as guidance for all levels of government during a disaster. FEMA has continued improving their response efforts post-Katrina, specifically in regards to the housing needs of survivors. Housing programs currently offered by FEMA will be addressed in subsequent sections.

### **3.C Initial Response Efforts**

In the United States, the local government is primarily responsible for proving the first response to emergencies such as natural disasters. Local government officials, such as mayors, city councils, and boards of commissioners alert residents to the threat and assess whether assistance will be needed. If the situation warrants outside help, local officials submit a request to the State Governor. Governors have the ability to declare a state of emergency and enact relevant emergency management legislation to the affected area.<sup>51</sup> In

Louisiana, the rain storms began on August 11, 2016, and on August 12, Governor John Bel Edwards declared a state of emergency<sup>52</sup> and addressed the public stating,

*"We are in constant contact with local officials and first responders, and assistance is already on the move to affected parishes... Every available resource will be used to assist citizens as this situation continues to unfold."<sup>53</sup>*

In Louisiana the Governor's Office of Homeland Security and Emergency Preparedness assists the Governor in distributing aid. Following the Governor's state of emergency declaration, organizations such as the Louisiana National Guard began coordinating with local officials to fulfill requests from local governments for high-water vehicles, boats and sandbags.

When large-scale emergencies occur and the local and state governments do not have enough resources to cover the response necessary, additional help from the federal government can be requested. For these situations, documentation from the local government, as well as information from the Governor's office is presented to the President of the United States and a request is made to declare the situation a major disaster. As the rainstorms in Louisiana continued, a flash flood emergency was triggered on August 13. On August 14, the Governor toured the affected area with a FEMA representative and requested federal assistance. President Barak Obama issued a major disaster declaration that same day. The initial declaration provided federal assistance to four parishes; the declaration was later expanded to over twenty.

Under a declaration of a major disaster, supplemental disaster assistance can be provided to individuals, families, and the community.<sup>51</sup> Included in this assistance package are grants for temporary housing and home repairs. Once the President declared a major disaster in Louisiana, residents were able to access additional aid from the federal government. In the United States a variety of federal housing assistance programs are available, including immediate dispersal of financial aid for temporary rentals as well as long-term rebuilding assistance.<sup>54</sup> To determine what type of aid survivors are eligible for, needs must first be evaluated and assessed. This process is headed and carried out by FEMA.

### 3.C.1 Role of Insurance

As mentioned previously, the National Flood Insurance Program (NFIP) was enacted in the late 1960s to federally subsidize flood insurance for homeowners. Following the Louisiana floods, FEMA extended the grace period for previous insurance holders who had



let their policy lapse, granting 120 days instead of the standard 60-day period.<sup>55</sup> For NFIP policyholders in Louisiana, FEMA was able to disperse immediate funds that would later be repaid by homeowners when their insurance claim was processed.

FEMA oversees the NFIP, and through the program federally backed mortgage lenders must require homeowners to purchase flood insurance in areas of high risk flooding. Unfortunately, property owners that own their homes outright do not have to comply, and homeowners with mortgages in high-risk areas can let their coverage slip. Adding to this challenge following the Louisiana flooding, the majority of the areas hit by the storm were not in high-risk areas, and the rate of coverage was very low.<sup>56</sup> Only 36% of the high-risk area homes that were impacted in this flooding event had flood insurance, while only 12.5 percent of homeowners in low and moderate-risk zones were covered.<sup>57</sup> Due to the low number of insured households, there were a large number of applicants for Individual Assistance from FEMA.

### **3.D Needs Assessment**

To assess the needs of disaster survivors, FEMA requires those requesting help to apply for assistance. In Louisiana, FEMA dispatched forty Disaster Survivor Assistance Teams on the ground and at shelters to begin addressing the immediate and emerging needs of disaster survivors. These teams assisted survivors with on-site registration, applicant status checks, on-the-spot needs assessments, and access to partners offering survivor services.<sup>58</sup> Survivors were offered several other methods to register and connect with FEMA officials including an online registration portal, a toll-free number, and FEMA operated Disaster Recovery Centers (DRCs).

At DRCs survivors were able to meet with recovery specialists to register a claim with FEMA or review the status of their claims. Within a week of the Louisiana flooding emergency, FEMA received over 110,500 applications.<sup>59</sup> Survivors are typically encouraged to first file claims with their insurance providers before registering with FEMA as insurance settlements affect the assistance FEMA can provide. FEMA strongly advocates procuring flood insurance policies through the National Flood Insurance Program, as the FEMA housing assistance program is not designed to cover all survivor needs as private insurance would. FEMA assistance is intended to provide basic needs and necessities for survivors, but not as a means of completely recovering from a disaster.<sup>60</sup>

### 3.D.1 Individual Assistance from the Federal Government

FEMA’s Individual Assistance (IA) program is tasked with processing the vast number of applicants that apply for assistance. IA considers many factors when it comes to offering assistance, including: income level, housing impact, and other immediate needs. When individuals are applying for housing assistance, individual assessments, which typically include in-person property inspections, influence what survivors are eligible for.<sup>61</sup> In Louisiana, within ten days of filing an application, FEMA was required to call applicants to schedule an appointment with a home inspector (note: the actual inspection was not required to take place within the ten day period).<sup>62</sup> Due to the large number of applicants that needed to be processed following this event, FEMA contracted several private businesses to conduct the inspections.

#### 3.D.1.a Role of Contractors in Needs Assessment

Following the application process, FEMA coordinates inspections and assessments of homes to determine survivor need. To aid in this process, FEMA contracted seasoned inspection agencies including Vanguard Emergency Management (Vanguard) and Alltech Inc. (Alltech) with Vanguard handling roughly 48,500 inspections and Alltech handling roughly 95,000 inspections. Table 2 (below) will be expanded upon in each section to highlight response efforts that FEMA contracted agencies to complete.

**Table 2. Firms Contracted for Louisiana Flooding Inspections**

<b>Coordinating Government Agency</b>	<b>Assistance Type</b>	<b>Name of Assistance</b>	<b>Contracted Organizations</b>
<b>FEMA</b>	<b>Assessments</b>	<b>Financial and Direct Assistance through Individual Assistance</b>	<b>Vanguard EM Alltech Inc.</b>

FEMA contracted both Vanguard and Alltech for home inspection services in September of 2013 through an Indefinite Delivery Contract, which indicates that FEMA contracted both firms as vendors prior to a disaster without exact times or exact quantities for future service.<sup>63</sup> FEMA has contracts such as this one to respond quickly when there is an emergency situation. Specific details in regards to the work that the emergency management firms would provide were detailed in paperwork and were signed by both the government and the two firms on August 18, 2016, four days following the State of Emergency declaration.

The initial contract for Vanguard was to provide 25,000 inspections for a base period of sixty days, with an option to add additional inspections. FEMA utilized this option and added an additional 5,000 inspections on August 21, 2016, 10,000 inspections on August 27, 2016, 2,500 in October, and 6,000 in November of 2016. All contracts with Vanguard were closed by December 16, 2016 and the final amount paid for this service was \$9.21 million.<sup>63</sup>

Alltech was initially tasked with 70,000 inspections in their initial contract. A second contract with Alltech was signed a week after the first (August 25, 2016) for an additional 25,000 inspections; 8,000 more inspections were requested in November of 2016. Alltech's contract was closed in March of 2017 and total amount paid to Alltech was \$19.6 million.<sup>64</sup>

### **3.E Housing Assistance and Reconstruction**

Following a disaster, both the state and the federal government (through FEMA) coordinate to provide housing assistance. All states have an Emergency Operations Plan (EOP) that provides an initial outline of how the state and federal government will work together following an emergency or disaster. In Louisiana, the Governor's Office of Homeland Security and Emergency Preparedness (GOHSEP) is tasked with coordinating emergency responses with FEMA. In Louisiana GOHSEP and FEMA partnered together to determine the assistance programs offered to flooding survivors.

There are several funding mechanisms that the government enacts to provide housing assistance. Immediate aid for housing assistance is financed and distributed through FEMA and is entirely funded by the federal government as per the Stafford Act, Section 408.<sup>65</sup> Beginning in 2012, following Hurricane Sandy, the federal government also began offering housing assistance through the Public Assistance Grant Program, which is covered in Section 403 in the Stafford Act.<sup>65</sup> There are also two long-term loan programs that disaster survivors can apply to for loans for rebuilding: Small Business Administration (SBA) loans, and Community Block Development Grants (CBDG). The following sections will provide further detail for these programs.

#### **3.E.1 Federal Assistance to Individuals and Households (Stafford Act, Section 408)**

As stated previously, the Stafford Act allows the US federal government to provide housing aid for up to eighteen months following a disaster. To implement housing aid, FEMA leads the Disaster Housing Program, which ensures that disaster survivors whose homes are damaged during a disaster will have a safe place to live while repairs are made to their residences. This program is specifically created to help service those who do not have

insurance or for instances where insurance does not cover all of the full extent of the repairs (Haddow 2017). There are two methods FEMA employs to distribute housing assistance: financial assistance and direct assistance, both are provided through the Individuals and Households Program (IHP).

Financial assistance permits FEMA to quickly disperse money for homeowners through to cover lodging expenses, emergency repairs, temporary rental assistance, and mortgage and rental assistance. FEMA can directly deposit funds into a survivor's account, or the agency can issue a check.<sup>66</sup> The IHP has an initial maximum limit for financial assistance set by law to \$25,000, and is amended annually; <sup>66</sup> for the Louisiana floods, the maximum was adjusted to \$33,000<sup>67</sup>. The other form of assistance offered by FEMA is direct assistance. Direct assistance provides temporary housing in kind or services and FEMA handles the placement of survivors and the payments. There is no limit on direct assistance that FEMA can provide, other than the eighteen-month timeline that is effect for both types of assistance.

Both financial assistance and direct assistance make up the housing assistance options available to disaster survivors. In the United States There are four types of housing assistance that applicants may be eligible for: (1) Temporary housing assistance; (2) Repairs; (3) Replacement; (4) Permanent or Semi-Permanent Housing Construction.<sup>66</sup> In some cases housing assistance is financial, and in others the assistance is direct. There are some cases, such as temporary housing where the assistance could either be financial or direct depending on the aid provided.

Within ten days of the Louisiana floods, 120,000 people had applied for assistance,<sup>38</sup> and FEMA had distributed over \$155 million—intended to help survivors with temporary rental assistance, essential home repairs, and other disaster-related needs.<sup>68</sup> If a Louisiana survivor were to take advantage of more than one of these assistance programs, all of the funds received would be deducted from the \$33,000 total allotted amount.

### *3.E.1.a Role of Contractors in Individual and Housing Assistance*

Of the four types of housing assistance that FEMA can provide listed above, the Louisiana flooding emergency prompted the agency to implemented the first two: Temporary housing assistance, and repairs.

### 3.E.1.a.1 Temporary Housing

Temporary housing assistance from FEMA includes rental assistance, lodging expense reimbursement, and direct housing. Rental assistance and lodging expense reimbursement are both forms of financial assistance because funds are given directly to survivors. Direct housing is when a survivor is placed into a temporary residence, which could either be a manufactured housing unit (MHU) or a housing unit paid for by FEMA.

In Louisiana, the Individual Assistance team used initial data to determine that due to the large number of damaged homes and low number of available housing units, an MHU housing mission would be necessary. FEMA prepares for such a mission by keeping approximately 1,800 MHUs in staging areas to access following an emergency. If initial modeling indicates that additional units will be necessary, FEMA has contracts in place with numerous firms in the US to ramp up production of the units to fulfill survivor needs. While the first 1,800 units are installed, the additional requested units are produced. By the time the first set of units is installed, the second wave of units is typically ready.

FEMA contracts firms to 'haul and install' the MHUs to keep the process progressing. Agencies contracted for these services are listed below in Table 3. During the Louisiana recovery phase, Shaw Environmental Inc. (Shaw) and St. Martin Brown and Associates LLP (St. Martin) to aid in this process.

**Table 3. Firms Contracted for MHU Haul and Install**

<b>Coordinating Government Agency</b>	<b>Assistance Type</b>	<b>Name of Assistance</b>	<b>Contracted Organizations</b>
<b>FEMA</b>	<b>Temporary Housing</b>	<b>Direct Assistance through Individual Assistance</b>	<b>Shaw Environmental Inc. St. Martin Brown</b>

Shaw Environmental is another Indefinite Delivery Contractor with FEMA, with Shaw and FEMA signing an agreement in 2009 that was set to last for 7 years.<sup>69</sup> The contract between FEMA and Shaw Environmental for 'haul and install related activities' to support the Louisiana flooding disaster was signed on August 25, 2016, two weeks following the State of Emergency Declaration. In the initial contract, no exact numbers are provided as to how many units will be installed or inspected. On September 16, 2016 FEMA added a supplemental agreement to the contract to prepare for the installation of 450 additional units and 600 more inspections; on September 28, 2016, 400 additional units were added,

and 750 more were added in the beginning of October. The numbers for both the installation of units and site inspections continues to grow eventually totaling 1775 installations and 1800 inspections.<sup>69</sup> In November of 2016, change order is added to the contract for the deactivation of approximately 1,900 MHUs, set to be complete by May 2017. Shaw Environmental was awarded \$92.1 million dollars for this contract.<sup>69</sup>

St. Martin Brown, a New Orleans, LA firm, played a much smaller role in this process. Tasked with 'haul and install services' in a contract signed on August 24, 2016, the firm was paid \$50K and completed their task in two months.<sup>70</sup> Further details about the tasks that were performed by St. Martin Brown could potentially be derived from the contracts if released by FEMA. Due to time constraints, the FOIA request for these documents were not fulfilled by the time of publication.

### 3.E.1.a.2 Repairs

Through direct and financial assistance mechanisms available through Individual Assistance, FEMA cannot coordinate repairs for homeowners. FEMA only provides a funding source for homeowners, meaning they offer financial assistance and do not offer managed-repairs. The following section about 'essential assistance' will have details about FEMA's role in hiring contractors for temporary repairs through the Shelter at Home program.

Once a financial assistance amount has been awarded, homeowners would hire a private contractor to complete the work. Funding for repairs is not intended to completely reverse the effects of the disaster; repairs are solely envisioned to make the structure "habitable, safe, sanitary, and functional."<sup>66</sup> When FEMA provides funds for repairs through the housing assistance program, the amount is deducted from the total assistance allowable.

In recent disasters, including the floods in Louisiana, FEMA has instituted another repair program entitled, Multi-Family Lease and Repair Program (MLRP). Through this program, FEMA pays for disaster-related repairs to multi-family housing, such as apartment complexes, in exchange for the units to temporarily house disaster survivors (for up to 18 months).<sup>71</sup> MLRP is considered a direct assistance program. While the program stipulates that contractors can either be hired and managed by the property owner or by FEMA. In Louisiana, properties that were utilized for the MLRP had the repairs managed by the owners with funding from FEMA.<sup>72</sup> Therefore, no government contracts for the rebuilding effort can be evaluated.

In some instances, homes are so badly damaged or destroyed that they cannot be repaired. If an uninsured primary property is beyond repair, a homeowner can receive financial assistance towards a replacement or new home. Housing construction is rarely implemented by FEMA and was not utilized during the Louisiana floods. New construction is only considered if there are no buildings to rent and there are no areas suitable for the manufactured housing units. If housing construction is implemented by FEMA, the assistance can either be financial or direct depending on the situation.

### 3.E.2 Essential Assistance (Stafford Act, Section 403)

In an attempt to reduce the costs of temporary housing assistance, FEMA has been experimenting with a transitional shelter assistance program—providing low-cost, rapid repairs to private homes, allowing families to shelter at home while long-term repairs are contracted and executed. Funding for the quick repairs is provided through the Essential Assistance section of the Stafford Act and therefore does not affect an individual's cap for financial assistance. However, the programs invoked through Section 403 do not provide direct funding to homeowners, and instead provide direct repairs by contractors hired and managed by the federal government.<sup>73</sup>

The first time FEMA implemented this program was after Hurricane Sandy through a pilot program titled, Sheltering and Temporary Essential Power (STEP). Homeowners were provided with up to \$10,000 of repair work to improve homes to basic standards. A similar iteration was implemented after the Louisiana floods and it was titled, Shelter at Home.

#### *3.E.2.a Role of Contractors in Shelter at Home*

**Shelter at Home was slightly different than its predecessor, STEP, as it allowed for up to \$15,000 in repair work per single-family residence. To apply for this program, homeowners were required to register—separately from their FEMA registration, insurance claims, and/or SBA loans—and coordinate an appointment with a Shelter at Home assessor. Shelter at Home contractors were hired and managed by the State of Louisiana to assess the homes for damage and to do the repair work. Using funds from FEMA, Louisiana's Governor's Office of Homeland Security & Emergency Preparedness (GOHSEP) specifically hired nine contractors: Citadel Builders, Core Construction, DSW Homes, JWT, Lamar Contractors, Lemoine Company, Roy Anderson Corp, SLSCO, and TKTMJ to complete the repair work and AECOM (which stands for Architecture, Engineering, Consulting, Operations, and Maintenance) to oversee the entire program.**

Table 4, below, captures this information.

**Table 4. Firms Contracted for Shelter at Home**

Coordinating Government Agency	Assistance Type	Name of Assistance	Contracted Organizations
GOHSEP	Temporary Repairs	Shelter at Home through Essential Assistance	<b>AECOM</b> <b>Citadel Builders</b> <b>Core Construction</b> <b>DSW Homes</b> <b>JWT</b> <b>Lamar Contractors</b> <b>Lemoine Company</b> <b>Roy Anderson Corp</b> <b>SLSCO Ltd.</b> <b>TKTMJ, Inc.</b>

The contracts were based on a seven-page policy document<sup>74</sup> released by FEMA that was based off of the STEP model following Hurricane Sandy. This policy document specifically outlined requirements to the state in regards to the execution of the program, including who exactly was eligible for repairs, how to verify owner information, and exactly what the \$15,000 cap covered. The contract also specified what could be charged for each type of repair and the pay rate for specific job descriptions. The following list details what repairs were made available to homeowners through the Shelter at Home program. The state curated this list and assigned each type of repair a value that the contractor was allowed to charge:

**Interior**

- Inspection and testing of electrical, HVAC, and plumbing systems to ensure they are in safe working order.
- Removing drywall, insulation and other water-absorbing wall coverings (excluding fire-rated walls) damaged by flooding.
- Removing flood-damaged water-absorbing flooring material including carpet, carpet padding, and other materials.
- Disposing debris at the street right-of-way.
- Cleaning and sanitizing exposed floor and wall surfaces where flooring or wall coverings were removed.
- Ensuring there is one (1) temporary working bathroom in the home, which could include cleaning or fixing a bathtub/shower, toilet and sink.



- Maintaining heating and minimum air conditioning for comfort.
- Repairing or replacing damaged water heaters.
- Inspecting and repairing natural gas lines if necessary.
- Testing and repairing or replacing/installing smoke and carbon monoxide detectors.
- Providing mini-refrigerators and microwaves as necessary (The total appliance allowance will be \$500 where needed).

### **Exterior**

- Taking temporary actions to weatherproof the home and prevent water intrusion; repairs could be temporary patches.
- Patching (minor and quick repairs), door hardware replacement, and replacement/repair of doorjamb and headers as necessary for secure entry and exit.
- Securing broken windows with minor carpentry or hardware repairs.
- Repairing damaged front stairs or porches to allow safe entrance and exit.
- Ensuring that plumbing is connected to a sanitary sewer or approved sewerage disposal system.
- Ensuring that potable water is available and operational.

As the contents of this lists suggests, the program is intended to cover essential necessities for homeowners to move back into their home.

The contract between AECOM and GOHSEP was signed on August 28, 2016, with AECOM awarded \$37.8 million dollars for program management and set to end of February 27, 2017. The nine firms contracted to do the repairs were signed with the government between August 31 and September 14, 2016. All contracts with the building firms were set to end of February 28, 2017; however, an amendment in February extended all contracts to March 28, 2017. The nine building firm contracts were set for a maximum of \$40.5 million dollars each.

Based on invoices, home assessments began immediately, with the first inspections logged by some contractors on September 2, 2016. Initial inspections ended in November and December of 2016, and the repair work extended through March of 2017. More than 10,000 households utilized this program with the average cost of repairs totaling \$10,500.<sup>75</sup> The average length of repairs was three weeks.<sup>75</sup>

### 3.E.3 Repairs through Small Business Administration Loans

Following the quick-response of placing survivors into temporary housing and/or providing homeowners with temporary repairs, the next step for disaster survivors is to make permanent repairs to their homes. Based on income, the Small Business Administration (SBA) offers some low-interest loans. Homeowners and renters are eligible for loans of up to \$200,000 for the repair and replacement of their primary residence and up to \$40,000 to replace their possessions.<sup>76</sup> If a homeowner or renter is not eligible for a loan, the SBA can refer the survivor to FEMA's Other Needs Assistance (ONA) program.

For survivors that are not eligible for an SBA loan, the ONA program can assist with repairing or replacing essential household items, transportation assistance, including repairing or replacing a personal vehicle, and moving and storage assistance to relocate personal property from the disaster area to prevent further damage.<sup>77</sup> Survivors that are eligible for SBA loans are also eligible for ONA in the form of funeral assistance, medical and dental assistance, and childcare assistance.<sup>77</sup>

In neither program: the SBA loan program, or the Other Needs Assistance program, does FEMA or any government agency hire contractors to complete any reconstruction for the disaster recovery.

### 3.E.4 Community Block Development Grants

Recovery from disasters can be a long-term process. The US Government offers additional services to disaster survivor that can be utilized as part of the long-term recovery. Community Development Block Grants (CDBG) are federal funds that provide communities with resources to address a wide range needs. The program is run through the US Department of Housing and Urban Development (HUD) and provides annual grants to local and state governments. CDBG specifically offers Disaster Recovery Assistance designated for cities, counties, and states that have been in Presidentially declared disaster areas.<sup>78</sup> Funding from HUD is not immediate and is intended for long-term recovery efforts rather than as a first response. Each state implements CDBG funding differently. In Louisiana, the state used the funding to set up a program entitled, The Restore Louisiana Assistance Program.

#### 3.E.4.a Role of Contractors through Restore Louisiana Assistance Program

Through Restore Louisiana, homeowners were provided with additional support and funding in their rebuilding efforts. After applying for aid through the program (a separate

application process than FEMA aid, Shelter at Home, and SBA loans), then another home inspection occurred. Applications were then prioritized for aid based on the extent of the damage, the status of the repairs, the location of the property, and the vulnerability of the family (higher priorities for low and moderate income families as well as for seniors). Each application was assigned a priority phase (1-5) and began the reconstruction process with those designated in phases 1-3. As funds became available additional phases were covered by grants.<sup>79</sup>

Inspections began with the assessors evaluating the damage to a property and then providing a cost estimate for the repair or reconstruction work. Previous aid through FEMA’s Individual Assistance financial assistance program, insurance payouts through either the NFIP or private insurance, and loans through SBA, were all deducted from the cost estimate to determine the eligible aid for the household.

There were four methods in which one could receive rebuilding assistance or reimbursement. Homeowners could choose (1) program managed or (2) homeowner managed rehabilitation or reconstruction; (3) reimbursement for completed repairs; or (4) voluntary buyouts and acquisitions. Program managed repairs (option 1) allowed applicants to have the state manage and complete the repair or reconstruction process. One contractor, IEM, was hired by the State of Louisiana using the funds from HUD to manage the entire project. Under this contract, IEM was responsible for hiring and managing all sub-contractors that would be completing all construction projects related to Restore Louisiana. The state paid IEM directly for the repairs and homeowners did not handle any money exchanges. Homeowners were required to enter into grant agreements with the state in order to qualify for the program.

**Table 5. Firms Contracted for Restore Louisiana**

<b>Coordinating Government Agency</b>	<b>Assistance Type</b>	<b>Name of Assistance</b>	<b>Contracted Organizations</b>
<b>Louisiana Office of Community Development</b>	<b>Permanent Repairs</b>	<b>Restore Louisiana through CDBG Disaster Recovery Grants</b>	<b>IEM</b>

The IEM contract was based on a policy document<sup>79</sup> released by the Louisiana Office of Community Development, the office that coordinates CDBG funding for the state. This policy document specifically outlined the program options available to homeowners, the eligibility

criteria, the prioritization structure, and what the grant program would cover. In comparison to the FEMA policy document for the Shelter at Home Program, which was seven pages long, this document is substantially longer and more complex, spanning 160 pages. The contract specifies what can be charged for each type of repair and the pay rate for specific job descriptions, it provides grant award letters and no-award letters, as well as the various grant agreements needed for homeowners. Parts of the policy document related to costs and schedules are included directly into the IEM contract.

The IEM contract was signed on April 21, 2017 with no specific end date listed. The maximum amount of the contract was for \$308 million dollars with \$126.75 million intended for program management and construction management, \$81.25 million for environmental reviews, and \$100 million for homeowner grants (to fulfill the program managed repairs as described above). As IEM would be coordinating the subcontractors, rather than the state (differing from the Shelter at Home program), the contract specified nineteen firms that IEM was authorized to subcontract. Of these nineteen, three had been contracted for the Shelter at Home program.

Repair work was to be estimated using Xactimate, a cost estimating software. Based on the repair estimate, the construction management cost (the amount to be paid to IEM) was calculated using a table with seven tiers beginning with \$0 to \$15,000 and reaching \$200,000-\$300,000. IEM fees ranged from \$3,450 to \$69,000. The contract restricted contractors to an average of 32 hours of labor costs per project. In an assumed attempt to keep this program on schedule, detailed fees are imposed on the contractor for missed deadlines and delays including customer outreach timeframes, repair schedules, number of damage estimates to be completed each month, time of completion to closing, as well as administrative deadlines such as responding to customer appeals and public records requests. Twenty-five specific metrics were outlined that would be met with a penalty if missed. For example, if a homeowner files an appeal, the contractor has 30 days to resolve the issue. For every day after the 30 day mark, the contractor will pay \$500. The full list of restrictions can be seen on page 57 of the contract in the appendix.

As of January 2018, more than 45,000 households have filled out an eligibility survey to see if they qualified for aid. Following a completed survey, homeowners are evaluated and then invited to formally apply. As of January 2018, 38,000 had been invited and encouraged to submit a full application.<sup>80</sup>

### 3.F Conclusion

The following table, Table 6, illustrates the Disaster Framework as described in the introduction as it related to the 2016 flooding disaster in Louisiana. In this table the use of contractors as part of the residential rebuilding effort can be understood from a system-wide perspective. From the need for skilled workers to complete the initial assessment, temporary repairs, and finally permanent repairs, the range of contractual partnerships can be viewed.

**Table 6. US Government Agency Contracts during the Louisiana Flooding Disaster**

	Government Agency	Description of Rebuilding Efforts	Contracts	Contract Dates
<b>First Response</b>	FEMA	Search and Rescue Efforts	N	
<b>Assessment of Need</b>	FEMA	Assessment of damage to begin assigning Financial and Direct Assistance	Y	8.18.16 - 12.16.16
<b>Housing Programs</b>	FEMA	Financial Assistance	N	
	FEMA	Rental Assistance	N	
	FEMA	MHU Haul and Install	Y	8.25.16 - 5.17
	GOHSEP	Emergency Repairs through Shelter at Home	Y	8.28.16 - 3.28.16
	FEMA	Multi-Lease and Repair	N	
	HUD & State of LA	Permanent Repairs through CDBG Grants	Y	4.21.17 - ongoing

As can be seen in the table, there are many overlapping programs during which numerous agencies have similar needs from similarly skilled workers. The first need is for assessments, and as can be seen in the timeframe, this type of worker is contracted very soon following the disaster. The Louisiana Case Study illustrates that the US government prepares for the rapid deployment of building assessments through the use of Indefinite Delivery Contracts, which indicates that FEMA contracted firms prior to the disaster.<sup>63</sup> FEMA also used Indefinite Delivery Contracts for MHU haul and install needs, which are needed after significant disasters when there is a housing mission. Because of the Indefinite Delivery Contract system, national firms are employed to complete both assessments and haul and install needs. As the firms are hired in advance of knowing where a disaster may occur, the national firms must send representatives to the area to complete the work. This can be viewed as a positive because additional skilled workers will be needed following the

disaster, and this type of contract assures that the need will be met. However, outside work crews will not have a full understanding of the area because they will be lacking the local knowledge that comes from working in an area that is familiar.

For both the assessments and the haul and install contracts, the initial contracts were established in days following the disaster; four days after a State of Emergency was declared for the assessments and nine days for haul and install. Both contracts were extended several times as the need increased. This flexibility in the contracts allowed the firms to accommodate more assessments, however, additional needs were met by extending the timeframe rather than increasing the number of workers.

The approach taken by the state of Louisiana to hire for the reconstruction effort was different. As the Shelter at Home program was relatively new, there were no Indefinite Delivery Contracts that could satisfy the need for the repair work. The Governor's Office of Homeland Security and Emergency Preparedness (GOHSEP) contracted firms to fulfill this program. Their strategy, following past rebuilding efforts by the US government, was to contract a program management firm and nine specific contractors; the program management firm handled the organization of the contracting firms and acted as the main point of contact for the GOHSEP office.

Louisiana state and HUD used a variation of this arrangement when contracting for Restore Louisiana. During this second-wave of repairs using CDBG funding, the state of Louisiana contracted one firm, and one firm only, for the program. This firm was then tasked with the hiring and management of all contractors in relation to the project. As the program did not overlap with the Shelter at Home program, some of the contracting firms were hired for both projects.

In addition to the structural differences between the firms for Shelter at Home and Restore Louisiana, another major difference were the penalties enacted by the government for missed deadlines. For Shelter at Home, the responsibility of meeting repair deadlines was on the building contractors. While no specific deadlines or timeframes were outlined within the contracts, the State required each building firm to submit a \$750,000 performance and payment security bond with their signed contract. As per the contract, these funds were placed in an, *"escrow account to be used in the event of Contractor's failure to perform and timely pay its laborers, suppliers and subcontractors in accordance with the Contract. Contractor hereby agrees and acknowledges that failure to perform and timely pay its laborers, suppliers and subcontractors in accordance with the Contract may result in*

*forfeiture of Performance and Payment Security.”*

For Restore Louisiana, the onus of meeting project deadlines belongs to the management firm, as they are the only contracted firm for the program. This means that the program management firm carries the liability of missed deadlines. The list of penalties that may be imposed is extensive and includes twenty-one items that the state indicated as performance metrics within the contract. This was a much more detailed approach to the program than had been seen in Shelter at Home.

The two approaches to the contracting process for Shelter at Home and Restore Louisiana would be worth comparing in future research. It would be useful to FEMA and other US States to understand whether contracting all the firms is beneficial on the government side, or if it was more efficient to contract only the program management firm. Unfortunately, because the contracts were structured in this way, it has led to a lack of transparency in the rebuilding process. While the contracts for each individual firm hired for Shelter at Home are available to the public to review through the Freedom of Information Act, the only publicly available contract for Restore Louisiana is the program management firm. No additional contracts are released as they are technically between two private firms. This lack of transparency potentially hides contracting issues from the public and the aid, or lack of aid, to survivors is somewhat masked.

## **4 Case Study: 2010 and 2011 Earthquakes in New Zealand**

### **4.A Introduction**

New Zealand is an island nation situated within the “Ring of Fire” in the Pacific Ocean, an area known for increased seismic and volcanic activity. Earthquakes are common and the Ministry of Civil Defense and Emergency Management (MCDEM) oversees the national response. Funding for reconstruction efforts comes from the disaster insurance fund, managed by the Earthquake Commission (the EQC). To illustrate how the government and the EQC respond to natural disasters, this case study will document the reconstruction efforts of the EQC and private insurance following the earthquake sequence that unfolded in the Canterbury and Christchurch regions in 2010 and 2011.

A series of earthquakes on a previously unknown fault line began in September of 2010 and extended for over a year. The largest and most devastating earthquake occurred on February 2011, resulting in 185 fatalities and causing widespread destruction in the midst

of a recovery effort from the initial quake six months earlier. As a result of these repeated disasters, more than 100,000 homes were destroyed, and approximately 8,000 residential households were “red-zoned,” where the land was designated as uninhabitable due to severe land liquefaction.<sup>115</sup> This was the largest and most complicated disaster ever managed by the EQC due to the continually recurring earthquakes.

In the following case study, a brief outline of the history of emergency response in the New Zealand will be presented, followed by an in-depth look at how the housing reconstruction process unfolded. This will include the options available to residents in the aftermath through both the national insurance, the EQC, and private insurance. An assessment of the contracts the EQC and the private insurers had with the program management firms and the building contractors will be reviewed. Following this case study, and cross case study analysis will be provided to compare the US approach with New Zealand.

## **4.B History of Emergency Response in New Zealand**

### **4.B.1 Early Legislation**

The New Zealand government first began passing legislation in regards to disaster relief following the major Hawkes Bay earthquake in 1931 and resulting lack of a coordinated emergency response. In the aftermath of the earthquake the first response and the recovery was tasked to the local government, which was unprepared for the role. The central or national government provided some relief, but it was limited. Local residents formed committees to better organize relief operations, but the lack of authority and support of citizen groups was challenging.<sup>81</sup>

To prevent confusion and chaos in future disasters, New Zealand enacted the Public Safety Conservation Act in 1932. This Act allowed the Governor-General to proclaim a state of emergency anywhere in New Zealand and directed the national government to procure and regulate necessities such as food, water, and fuel for those affected.<sup>82</sup> Lacking from this Act were regulations that would compel or force local agencies to plan ahead for disaster response, and while some local governments did initiate disaster preparedness programs after their experiences from the Hawkes Bay earthquake, it was not mandated.<sup>81</sup>

The threat of war in the mid 1930s led to the Committee of Imperial Defense; and the three major concerns the committee prepared for were air raids, poison gas attacks, and earthquakes. New Zealand did not have to ward off any battles on their shore, but in 1942



two earthquakes did shake the country, one in Wellington, and another in Wairarapa. To help clear the rubble and to assist with the demolition of damaged and destroyed buildings, the national government sent Emergency Defense Corps, an armed forces delegation derived from the Committee of Imperial Defense.<sup>83</sup> This was the first instance of Committee of Imperial Defense dispatching for an emergency response.

Another significant result of the 1942 earthquakes was the upgrade of the War Damage Commission to the Earthquake and War Damage Commission. New Zealand had mandatory insurance for home and property owners to cover damages that might occur during a war. At the time of the 1942 disaster, earthquake insurance was voluntary and as a result many properties were not insured.<sup>84</sup> The Earthquake and War Damage Commission instituted mandatory insurance for any residential purchase using a government-backed loan. The insurance premiums (levies) collected by the government are deposited into the Natural Disaster Fund, which is utilized to help cover property losses as the result of a natural disaster.<sup>85</sup> Coverage was later extended to include other natural disasters such as natural landslides, volcanic eruptions, hydrothermal activity, and tsunamis with coverage for war damage eventually being removed.

Additional regulations were enacted in 1953 when the Local Authorities Emergency Powers Act was voted into law. Through this Act, local governments were provided with specific responsibilities following an emergency, such as the first response, the ability to organize after an emergency, such as the appointment of emergency committees, and the ability to borrow money from the national government through the Local Authorities Loans Board.<sup>86</sup> One year later the cabinet approved a national plan for emergency response titled Government Action in a Major Emergency (GAME). GAME was minimally used, but it did provide guidelines and directions for various national government departments to follow in an emergency.<sup>87</sup>

#### 4.B.2 National Government Disaster Response Agency

The impetus for a national emergency ministry came in the late 1950s after the United States and Russia both began testing intercontinental ballistic missiles and developing nuclear weapons. In 1959, New Zealand established the Ministry of Civil Defense to formally address both natural disasters and military threats.<sup>81</sup> The Civil Defense Act of 1962 clarified the role of the Ministry in regards to natural disasters, further propelling the focus of the Ministry to natural events rather than nuclear attacks.<sup>81</sup>

#### *4.B.2.a Civil Defense Emergency Management*

Throughout the next few decades, the national government continued to refine the roles of the Ministry of Civil Defense and the responsibilities for local governments. In the Civil Defense Act of 1983, recovery after a natural disaster was more explicitly outlined; this Act was later repealed and replaced by the Civil Defense Emergency Management (CDEM) Act of 2002. This Act was passed by the Ministry of Civil Defense which had been renamed the Ministry of Civil Defense and Emergency Management (MCDEM) a few years earlier in 1999. The CDEM Act is the current standard in New Zealand and it is the framework used by the MCDEM following the 2010 and 2011 Canterbury and Christchurch earthquakes.

The CDEM Act focuses on disaster and emergency preparedness and the roles of the local versus national government. To achieve the vision of a more resilient New Zealand, as set forth by the CDEM Act, local and regional coordination was determined to be the most crucial aspect. The framework provided regarding this cooperative relationship is considered to be the cornerstone of the Act.<sup>81</sup> The CDEM Act requires local CDEM Groups to be established as consortiums of local authorities partnering with emergency services, lifeline utilities, local businesses, and community groups. In this Act, it is also explicitly stated that individuals and communities must be responsible for themselves and self-reliant. New Zealanders are able to achieve this required level of self reliance because of the insurance program mentioned previously set up by the Earthquake Commission (the EQC). This legislation has drastically impacted the way in which New Zealand responds to emergencies as well as how the rebuilding effort for private property is funded. Because funding for the rebuilding effort is entirely managed through government and private insurance, there are no specific housing programs for disaster survivors through the MCDEM.

#### *4.B.2.b Earthquake Commission (EQC)*

The Earthquake Commission Act of 1993 further solidified this method of funding as well as providing national regulations regarding eligibility and standard payouts. All residences that were privately insured for fire—which was a requirement of government-backed mortgages to have by law—were automatically covered by the EQC. When owners would purchase insurance, they would also be charged a levy that would go to the national government and be kept in the Natural Disaster Fund. Coverage from the EQC entails a direct payout; at the time of the 2010 and 2011 earthquakes, residential properties could receive up to \$100,000 towards the repair of their homes, and \$20,000 to cover their

belongings.<sup>88</sup> Private insurers would then cover the remainder of the rebuilding costs. Private owners without insurance, such as homeowners that owned their properties outright and did not purchase insurance, must rely on charitable giving and international NGOs for help.

The New Zealand government, and specifically the Ministry for Civil Defense and Emergency Response, is responsible for the Natural Disaster Fund. The Fund is reinsured through channels worldwide to protect the New Zealand government should a large and drastically devastating disaster hit the country. Prior to the earthquakes in 2010 and 2011, the Natural Disaster Fund held close to \$6.1 billion. The EQC has stated the between the two earthquakes, most of the fund has been depleted; private insurance owners had the levies increased from \$207 to \$276 a year in an attempt to rapidly build back the Fund.<sup>85</sup>

#### **4.C Initial Response Efforts**

There are two designations that New Zealand uses to authorize emergency relief. The first is a state of local emergency, which would encompass an entire CDEM Group area and can be declared by an elected member of the local authority or an elected member of a community board. In some cases the CDEM Group designates the person(s) authorized to declare a state of local emergency as part of their framework. The second designation used by New Zealand is a state of national emergency which must fit under the definition of emergency as stated in the CDEM Act of 2002: *“is the result of any happening, whether natural or otherwise, including, without limitation, any explosion, earthquake, eruption, tsunami, land movement, flood, storm, tornado, cyclone, serious fire, leakage or spillage of any dangerous gas or substance, technological failure, infestation, plague, epidemic, failure of or disruption to an emergency service or a lifeline utility, or actual or imminent attack or warlike act<sup>89</sup>”* and the event: (1) has caused or may cause loss of life or injury or illness or distress or in any way endangers the safety of the public and property; (2) cannot be dealt with by emergency services; and (3) requires a significant and coordinated response.<sup>90</sup> The Prime Minister declares a state of national emergency and the designation provides government officials with authority and funding to deliver an appropriate response.<sup>90</sup> The timing of a declaration will depend on the situation and timing of the event.

##### *4.C.1.a Darfield or Canterbury Earthquake 2010*

The 2010 earthquake hit at 4:35am on September 4, 2010, the epicenter was in Darfield, a town in the Canterbury region of New Zealand. The population of the Canterbury region

was roughly 550,000 people, with 370,000 people located in the main city of Christchurch. Christchurch was comprised of approximately 145,000 dwellings.<sup>91</sup> The 7.1 magnitude quake was felt throughout the entire South Island as well as parts of the lower North Island.<sup>92</sup> Within an hour the Canterbury Regional Civil Defense Emergency Management Office issued media statements to provide advice and information to residents. As damages were assessed, the state of local emergency was declared at 9:30am by the area's largest urban city, Christchurch, followed by Selwyn and Waimakariri districts at 10am. <sup>93</sup>

By 1:30pm the Earthquake Commission issued a media release with additional advice, more specific to filing a claim and dealing with the aftermath clean up. The Insurance Commission, a representative body of the private insurance industry in New Zealand, released a similar statement roughly one hour later. Within one week the EQC had received 45,000 claims.<sup>93</sup> Early estimates stated that close to 100,000 of the 160,000 residences sustained damage. Shelters were opened to those in immediate need following the earthquake. An estimated 200 people needed the shelters and within two weeks the shelters were closed. Most displaced people were staying with family and friends or in hotels.<sup>94</sup>

At no point during this event did the Prime Minister declare a national state of emergency. However, the MCDEM activated the National Crisis Management Centre, located in Christchurch. The Minister for Civil Defense set up offices here to coordinate the national response.<sup>95</sup> Within two days a Minister specific to the Canterbury Earthquake Recovery is appointed as well as a Cabinet Committee to oversee the response efforts.<sup>95</sup> On September 14, ten days following the earthquake, The Canterbury Earthquake Response and Recovery Act 2010 was passed into law. This bill provided the government with additional power, such as the ability to suspend taxes on businesses within the affected area, to assist with earthquake response.<sup>95</sup> Another major portion of this bill established the Canterbury Earthquake Recovery Commission (CERC) to coordinate the local and national response efforts.<sup>96</sup> The government provided ninety percent of the funds for infrastructure repairs.<sup>97</sup> Local states of emergencies for the three affected districts were lifted on September 16, twelve days following the event.<sup>98</sup>

In the aftermath of the earthquake, private insurance was the primary funding mechanism for survivors in need of temporary rentals while their homes were being repaired.<sup>99</sup> This was because the EQC does not provide funds for temporary housing assistance, but most private insurance policies do. Additional grants and assistance were

available through non-profits such as Housing New Zealand and the New Zealand Red Cross.<sup>99</sup> As private insurance coverage was beginning to run out—roughly five months after the earthquake—the national government released a plan to help fund temporary housing.

The government also established the Canterbury Earthquake Temporary Accommodation Service (CETAS) to provide assistance, a joint effort between the Ministry of Social Development (MSD) and the Department of Building and Housing (DBH).<sup>99100</sup> The Commission was established with the purpose of providing advice to Ministers to facilitate the response to the earthquake including the use and distribution of resources. The Commission was also intended to act as a liaison between the national and local government.<sup>101</sup> Unfortunately just three days following the announcement, a devastating aftershock shook the city of Christchurch causing widespread damage more destructive than the initial quake.

#### *4.C.1.b Christchurch Earthquake 2011*

The 2010 earthquake that hit the Canterbury region of New Zealand was followed a series of aftershocks. On February 22, 2011, five months after the initial earthquake, a 6.3 aftershock devastated the region for a second time. Although technically an aftershock, the effect was no different than an earthquake. Due to the epicenter of this earthquake being roughly twenty kilometers closer to Christchurch than the initial quake, and the fact that many of the buildings were already structurally damaged, this event caused more widespread damage to an already vulnerable area.<sup>102</sup>

The earthquake hit at 12:51pm, when many people were away from their homes. While the first earthquake caused no fatalities, this second quake resulted in 185 deaths. At 4.21 pm, the mayor of Christchurch declared a local state of emergency and the following day the Prime Minister declared a national state of emergency.<sup>103</sup> The national state of emergency superseded the local state of emergency. This was only the second time that a national state of emergency had been declared in New Zealand and the first time it pertained to a natural disaster.<sup>104</sup> New Zealand remained in a state of national emergency until April 30, 2011.<sup>40</sup>

In response to this disaster, the national government reimagined the Canterbury Earthquake Recovery Commission to become a larger entity to aid in the rebuilding effort. CERC was disestablished and in its place the Canterbury Earthquake Recovery Authority (CERA) was enacted. This new authority was established and voted into law on March 29, 2011. One of CERA's main functions was to delineate the area around Christchurch and assess the possibilities of rebuilding. Residents in Christchurch were now contending with

two major earthquakes, many significant aftershocks that also caused major damage, the CERA assessments of rebuilding feasibility, as well as EQC and insurance assessments and claims.<sup>105</sup> Due to the extensive damage and uncertainty regarding the rebuilding plans, the CERA assessments became the highest priority for citizens in determining what steps they needed to take to rebuild.

#### **4.D Needs Assessment**

Earthquake damage requires immediate inspection to determine whether properties are structurally sound.<sup>106</sup> The following information is in regards to the rapid assessment for the February 22, 2011 earthquake. While sources in regards to the first earthquake are not available, it can be assumed that similar assessments unfolded in September of 2010.

The first wave of inspections after the February earthquake was coordinated through the Department of Buildings and Housing (DBH), a department under the Ministry of Civil Defense Emergency Management (MCDEM). Within hours of the Christchurch earthquake, DBH was coordinating with the Building Officials Institute of New Zealand (BOINZ) to organize a deployment of building surveyors to rapidly assess the damages.<sup>107</sup> BOINZ led 72,000 assessments around the Christchurch area to determine what properties were available for shelter.<sup>107</sup> In total, 130,000 building inspections were completed, with residential structures accounting for 90%.<sup>106</sup> This assessment was intended to quickly determine the safety of the structures so that residents could feel confident that returning to their homes was safe.

Following the first rapid assessment, the government, specifically the Canterbury Earthquake Recovery Authority (CERA) was aware that the damage in New Zealand was widespread and entire neighborhoods and regions had become uninhabitable because of the land liquefaction. The influx of sand and silt in certain areas made the ground unstable and unable to continue to support structures or infrastructure. Insurers and property owners were unsure about the feasibility of rebuilding in the affected areas and resolving EQC and insurance claims was anticipated to be a long and arduous process without government intervention.

One of the first tasks for CERA was to guide this process for Canterbury and Christchurch. To begin, CERA collaborated with geotechnical engineers to assess the land damage and then used this assessment to assign areas into different zones: red, orange, green, or white.<sup>108</sup> If an insured property was in a residential red zone, then the government was authorized to make an offer to purchase the land to allow owners to move to a new

location. If and when the government purchased a red zone property, then the government would be entitled to the EQC and private insurance payout. This set-up allowed for the government buy-out to be partially funded. For those properties that were uninsured, the government offered a lower purchase price. This was due to the fact that the property had less value as there would be no insurance claim to offset the cost, and to continue to incentivize property owners to continue renewing and maintaining insurance in the future.

The government of New Zealand wanted home owners, insurers, and reinsurers to feel confident both about the rebuilding process and the ability for home owners to choose to move out of areas unfit for rebuilding. The first assessment was on June 23, 2011, and in the initial assessment, approximately 5,000 buildings were designated in a 'red zone.'<sup>108</sup> Some properties were orange-zoned, which indicated they were in areas that needed further investigation. Green zones were areas that could be rebuilt. By October of 2012, all properties in the affected area were firmly placed in either a red or green zone.<sup>108</sup> Of the 190,000 structures, 180,000 were green zoned and could move forward with insurance claims. For these owners, private insurance would conduct additional assessments of the property to determine how much coverage was required. Initially, 7,200 properties were designated as red zoned; 98% of red zone properties accepted the buy-out option from the government. This resulted in the government of New Zealand becoming the largest claimant for insurance pay-outs following this disaster.<sup>108</sup> After an appeals process, some additional properties were red-zoned, bringing the total to almost 8,000.

To implement the large government buy-out of nearly 8,000 properties, CERA established the Residential Red Zone Programme to assist property owners with the buy-out program. Included with this program were call centers for owners to request more information and that also initiated calls to those in red zones to provide information on the government offers. The Residential Red Zone Programme set-up two Earthquake Assistance Centres in red zone neighborhoods to more easily connect with residents to provide them with information and support. These Centres were considered one-stop-shops where owners could connect with CERA representatives, insurers, local authorities, legal experts, and help finding temporary assistance. CERA also established a website where owners could search their address for up-to-date zoning information.<sup>108</sup>

Through the zoning of affected areas, the assessment phase following the earthquakes was accelerated to a certain extent. However, only a small percentage of private residences

were within a red zone, which meant that there were many properties that would still need to be assessed by either the EQC or private insurance, and in some cases, both.

#### 4.D.1 Role of Contractors in Needs Assessment

The New Zealand government, on many levels, leans on skilled workers to carry out assessments following earthquakes. The MCDEM, through the department of Building and Housing worked with the Building Officials Institute of New Zealand to coordinate building inspectors from around the country to rapidly inspect buildings immediately following the earthquake. This effort utilized 420 building inspectors over the course of six weeks. The building officials were government employees paid by their local councils, so no outside firms were needed to facilitate this process. The assessments were intended to be quick and to give residents answers as to whether they could return to their home or not.

Following the rapid assessment to determine safety, a more detailed assessment was required by the Earthquake Commission to better understand the scope of the reconstruction as well as the extent of the land damage. To prioritize the detailed assessments, the EQC first conducted their own rapid assessments on the properties. Then, based on the extend of damage, a priority list was created so that the most damaged houses would be fully assessed first so that the repair work could begin.

The EQC hired assessors and estimators directly for this process and did not rely on a contracted firm to handle the task.<sup>109</sup> The EQC “sourced contractors from trade organisations or providers with long-standing involvement with EQC” as the Chief Executive, Ian Simpson.<sup>110</sup> In a news release dated three weeks after the February earthquake, the EQC stated they had 160 assessors currently working with plans to deploy 320 the following week and 500 the week after that.<sup>111</sup> In total, 2000 field workers were hired by EQC for earthquake recovery.<sup>110</sup> The full assessments of properties extended for an additional ten months, ending in December of 2011. In total 196,468 properties were assessed for damage following the February earthquake.<sup>112</sup>

In addition to the housing assessments, the EQC also needed to understand the changes in landscape. The EQC hired Tonkin and Taylor, an environmental and engineering consultancy to evaluate properties that were affected by land damage, as the results would greatly impact the rebuilding process.<sup>113</sup> Over the course of both earthquakes and the series of aftershocks, Tonkin and Taylor ultimately assessed 130,000 residences.<sup>114</sup> In Table 7 below, the firms contracted for inspections and assessments are compiled.



**Table 7. Firms Contracted for New Zealand Earthquake Inspections**

Coordinating Government Agency	Assistance Type	Name of Assistance	Contracted Organizations
MCDEM	Assessments	Rapid Assessments	BOINZ ( <i>volunteer based, not contracted</i> )
EQC	Assessments	<ol style="list-style-type: none"> <li>1. Rapid Assessments</li> <li>2. Full Assessments</li> <li>3. Geotechnical Assessments</li> </ol>	<ol style="list-style-type: none"> <li>1. In House</li> <li>2. In House</li> <li>3. Tonkin and Taylor</li> </ol>

#### 4.E Housing Assistance and Reconstruction

The MCDEM does not coordinate housing missions as part of its mandate. The main government response for housing needs is led through the Earthquake Commission (EQC), the insurance that New Zealand property owners are mandated to join. The EQC covers up to \$100,000 of damage due to natural disasters. For properties that exceed the EQC payout, New Zealanders would then be required to turn towards their private insurance. The government does not provide financial or direct assistance for those without private fire insurance (fire coverage is required for eligibility of EQC coverage), leading to high proportions of the populations subscribing to private insurance. Homeowners lacking insurance are encouraged to look for charitable agencies for assistance.

Because such a large majority of New Zealanders subscribes to EQC, and it is a government-run insurance, many comparisons can be made to the methods they employed following the housing emergency. Additional comparisons can be made with the private insurance market as well. As the area was so hard hit following the earthquake, the government needed to buy one of the largest private insurance holders in the Christchurch area out. This led to a government agency essentially fulfilling the insurance agreements. Both responses, the EQC insurance response and the private insurance response, provide insight as to how the New Zealand government structured their rebuilding efforts following the earthquakes.

##### 4.E.1 Earthquake Commission

The EQC is the first line of coverage following a natural disaster. More than 80% of the affected property owners had insurance that made them eligible for EQC coverage.<sup>115</sup> Following the Canterbury and Christchurch earthquakes, the EQC processed approximately 250,000 claims.<sup>116</sup> To expedite the large volume of claims the EQC established a policy that

for repairs under \$15,000 NZ, homeowners were given a cash settlement and for repairs between \$15,000-100,000 NZ (the maximum EQC payout), homeowners could choose between a cash settlement or a “managed repair.”<sup>117</sup> This meant that homeowners with limited damage would be required to contract repairs on their own, allowing the EQC to concentrate on the larger repair projects.

The EQC established the Canterbury Home Repair Programme to assist homeowners that fell into the \$15,000-\$100,000 range with managed repairs, as this was below the point where private insurance would take over. The program was launched to assure homeowners that all aspects of the repair would be managed, including:

- Physical repairs
- Legal and building code compliance
- Quality monitoring and control
- Remediating any defects identified during the three-month defects liability period<sup>118</sup>

For home owners that requested repairs through the Canterbury Home Repair Programme, the EQC contracted a large independent construction firm from New Zealand, Fletcher, to manage the complex logistics of this process.<sup>119</sup> Fletcher established a new subsidiary: Fletcher EQR or Fletcher Earthquake Recovery, to handle this large volume of work. Fletcher EQR and their sub-contractors were responsible for a more detailed damage assessment. Homeowners would be given a scope of work that listed the damages to be repaired through the sub-contracted firms. Through this process Fletcher EQR monitored over 100,000 repairs and managed over 1,200 different contractors in a five-year span.

If damage exceeded the \$100,000 NZ cap, the entire home repair or rebuilding project was handed over to the private insurer.<sup>117</sup> In these cases the homeowner was still entitled the \$100,000 NZ payout from the EQC, but this claim would be paid to the insurance company, who would then pass it along to the homeowner through the final payout of rebuilding process.

#### *4.E.1.a Role of Contractors with the EQC*

The EQC began looking for a program management firm shortly after the September 4, 2010 earthquake. By September 27, 2010, EQC had released a request for proposal and on October 15, 2010, announced that Fletcher Construction would be appointed with this new position.<sup>120</sup> By late October the two parties had an agreement, titled a ‘Memorandum of Understanding’ with Fletcher Construction Company to act as their preferred contractor<sup>121</sup>

(Table 8). In this document, the role of Fletcher is defined as EQC’s agent, with Fletcher tasked to “*source and manage skilled and competent contractors, suppliers, and consultant to carry out the relevant reinstatement work.*”

While details of the number of repairs are not specified in the document, the EQC released media statements within the same timeframe stating that the estimated damage was around 50,000 homes.<sup>122</sup> Fletcher began setting up offices in damaged neighborhoods to provide local support to survivors and announced a plan to begin repairs two weeks after the announcement of their appointment; which would be roughly eight weeks following the disaster. The first priority was to make properties weather tight to protect against further damage.<sup>120</sup> Permanent repairs began in mid-November, 10 weeks following the earthquake.<sup>123</sup>

**Table 8. Firms Contracted for EQC Program-Managed Repairs**

<b>Coordinating Government Agency</b>	<b>Assistance Type</b>	<b>Name of Assistance</b>	<b>Contracted Organizations</b>
<b>EQC</b>	<b>Housing Repairs</b>	<b>Program-Managed Repairs</b>	<b>Fletcher EQR</b>

Following the more damaging February earthquake, the role Fletcher would play drastically increased. News reports following the earthquake estimated 100,000 homes had been damaged in the disaster.<sup>124</sup> A longer, more substantial Project Management (PMO) Services Agreement was drafted and signed, detailing more specifics about the working relationship between EQC and Fletcher. The new agreement included a more detailed scope of work including pre-construction services, design approvals, pricing schedules, and accreditation requirements for contractors. Although the actual contract released by EQC is undated, a later addendum cites the original PMO Service Agreement as going into effect on July 6, 2011.<sup>125</sup>

The Service Agreement between EQC and Fletcher is ongoing as of early 2018 as repairs and rebuilding projects were still wrapping up. In the seven-year time frame of the agreement, two amendments were made. The first addendum allowed Fletcher to hire their own Technical Support Resources for design and engineering with clarification on payment and indemnity. The date of this addendum is unclear. Another amendment of the initial agreement between the two parties was signed on May 18, 2015, more than four years after the earthquake. This document listed changes in payment terms as well as specific incentive

metrics based on key performance indicators for Fletcher.<sup>126</sup> Fletcher EQR states that, through this “*role as Project Management Office, EQR has costed, engineered and monitored repair works to around 100,000 homes, working with homeowners and around 1200 contracting firms on the planning and delivery of the work.*”<sup>127</sup>

#### 4.E.2 Private Insurance

When the damage to a home was significant, and required more the \$100,000 NZ to repair or replace, then the property was declared over-cap and private insurance would take over the remainder of the payment. Following the 2010 and 2011 earthquakes, there were close to 24,000 house claims that went over-cap.<sup>128</sup> In addition to claims that were considered over-cap were also claims that EQC does not cover (such as walkways, pools, and driveways) that are considered out of scope. Approximately 64,500 claims from the 2010 and 2011 earthquakes were made to private insurers as the repairs were considered out of the scope of EQC.<sup>129</sup> Of the claims that were over-cap, 78% of the claims were cash settled and 21% were insurance-managed rebuilds or repairs.<sup>130</sup>

##### 4.E.2.a Southern Response

After an EQC assessment would come back as over-cap, then the private insurers would assess the property to determine the level of repair. As part of this case study, a closer look will be taken at Southern Response Earthquake Services. This particular insurer is unique as it is a government-owned private insurer. Because of the role the government has in this entity, there is more transparency in the contracts and documentation, which allows for data requests and international comparisons.

Southern Response Earthquake Services was previously AMI, a private insurer that had most of their holdings in Christchurch. Following the earthquakes, the firm restructured and sold to the New Zealand government after analysis indicated they would not be able to meet the funding needs of claimants.<sup>131</sup> After the sale of AMI to the government, the firm was rebranded as Southern Response Earthquake Services, which was instated to handle AMI earthquake claims. This transfer was official on April 5, 2012.<sup>132</sup>

As with other private insurers, Southern Response offered clients either a cash settlement or a managed-repair. To demonstrate the sense of scale that Southern Response was dealing with, more than 40% of the claims for private insurers that were for over-cap damages were handled by Southern Response, making up roughly 8,000 claims, resulting in ~2,500 properties that were rebuilt or repaired.<sup>132</sup>

#### 4.E.2.b Role of Contractors

As with other government entities managing construction project, Southern Response hired a secondary firm, Arrow International, to coordinate the contractors and the rebuilding effort. Arrow International was short-listed as a candidate to manage the EQC’s repairs, but lost out to Fletcher.<sup>133</sup> The building partners that ultimately handled the construction work were contracted directly by Southern Response, though managed by Arrow International as shown in Table 9.

**Table 9. Firms Contracted for Private Insurance Program-Managed Repairs**

<b>Coordinating Government Agency</b>	<b>Assistance Type</b>	<b>Name of Assistance</b>	<b>Contracted Organizations</b>
<b>Southern Response</b>	<b>Housing Repairs and Rebuilding</b>	<b>Program-Managed Repairs</b>	<b>Arrow International + building partners</b>

The contract between Southern Response and Arrow could not be obtained due to speculation that it “would place Arrow at a significant commercial disadvantage should the details of the services they provide became known to their competitors.” However, there were three documents released that provide insight as to how Southern Response contracted their builders. A specific agreements between Southern Response one of their building partners, Ainsworth Builders Ltd. (Ainsworth) was released titled, “Residential Repair Programme Relationship Agreement,” a “General Conditions of Contract,” that appears to offer a more detailed definition of the contractors’ roles, and a “Contract Agreement,” which is a document binding a homeowner, a contractor, and Southern Response together.

These documents outline the relationship between the two organizations including a description of how Southern Response will request the services of Ainsworth. Details about specific prices for services and supplies are included as well as a stipulation that there is no minimum amount of work guaranteed. The agreement also does not set expectations for the extent of services needed. Within the ‘contract price components’ section are specific types of roles that the contractor can provide, and the specific hourly price that can be charge for this work. The released agreement is not dated and does not specify the length of term.

#### 4.E.3 1.C Temporary Housing Assistance

The Earthquake Commission (EQC) did not cover the cost of temporary housing or accommodation following the earthquake. EQC claims were only intended to cover the cost

of repairing or rebuilding. Homeowners used private insurance coverage to cover the cost of accommodation during repair. EQC coordinated with insurance providers by issuing Insurance Advice Notes that would indicate the length and time of repair. Owners could then either collect a lump sum for the rental, or have their insurance billed directly.<sup>118</sup>

While this process was successful for some homeowners, there were many that had already used their rental entitlements by the time their repairs began. In these cases, the New Zealand government provided financial assistance (up to \$330/week) for temporary accommodations.<sup>118</sup>

#### *4.E.3.a Canterbury Earthquake Temporary Accommodation Service (CETAS)*

Because the housing stock was so low due to the extensive damage and high demand, the government created a service entitled Canterbury Earthquake Temporary Accommodation Service (CETAS), which provided assistance in finding temporary accommodations for both owners and renters during the rebuilding efforts. Those in need could either register online or call the offices to discuss requirements. This service was a coordinated effort between The Building and Housing Group (within the Ministry of Business, Innovation and Employment) and the Ministry of Social Development.<sup>134</sup>

To alleviate some of the complications due to the low stock of temporary accommodations, the New Zealand government created four temporary villages with 20-42 modular houses within each to be used exclusively for those needing a temporary place to stay during a rebuilding effort. To qualify to stay in these homes, owners must either be in the process of repairing their home, or if red-zoned, planned to stay in the Canterbury region.<sup>135</sup> The homes were intended for rent, but the rates were lower than the market, making these accessible for families during reconstruction.<sup>135</sup> In most cases either the EQC or insurance covered the cost of temporary residences during the construction period, and families did not need to cover the expense themselves. Rates were \$190 per week for two people, \$271 per week for four people and \$337 per week for six people.<sup>135</sup>

Two of the villages were completed in the summer of 2011, with one housing residents beginning in July and a second in August. A third was opened in July of 2012 and the final village opening in September of 2013. The original plan was for the villages to be utilized for no more than two years. The rebuilding efforts were longer than anticipated and the timeline dragged out by a few years. One village was closed in April 2016 (the houses were sold and relocated); two others were repurposed for other disaster survivors, one in

January 2017 and one in May 2017. The houses on the fourth site were permanent construction (versus the modular units) and slated to be sold throughout 2017 and 2018.<sup>136</sup>

#### 4.E.3.b Role of Contractors in Temporary Housing

Coordinated through the Department of Building and Housing (under the MCDEM), three New Zealand firms were contracted to provide the temporary accommodation: a consortium of Hawkins/Spanbild/Fulton Hogan; Jennian Homes; and New Zealand Transportable Units.<sup>135</sup> Although the MCDEM did not typically participate in housing reconstruction efforts, the extent of the need of New Zealanders led to this first-time program. The three firms were selected to provide complementary services to each other: program management skills, infrastructure services, and pre-fabricated dwellings.<sup>137</sup>

**Table 10. Firms Contracted for Temporary Housing Unit Construction and Installation**

Coordinating Government Agency	Assistance Type	Name of Assistance	Contracted Organizations
DBH (Under MCDEM)	Temporary Housing Units	<ol style="list-style-type: none"> <li>1. Infrastructure</li> <li>2. Program Management</li> <li>3. Units</li> </ol>	<ol style="list-style-type: none"> <li>1. Futon Hogan</li> <li>2. Consortium</li> <li>3. Consortium and Jennian Homes</li> </ol>

As an example of the timeframes for these projects the first village was completed in 44 working days, averaging 2 days per housing unit, and the second village was completed in 67 days, averaging 1.6 days per unit.<sup>138</sup> Contracts for the construction and installation of the temporary housing units were requested, however, the Official Information Act request was delayed. Future research could include an evaluation of these vendors and the contracts used to hire each firm.

#### 4.F Conclusion

Table 11 (on the following page) illustrates the Disaster Framework as described in the introduction as it relates to the 2010-2011 earthquake sequence in New Zealand. Through this table the use of contractors as part of the residential rebuilding effort can be understood from a system-wide perspective. The range of contractual partnerships can be viewed, specifically in the need for skilled works to complete permanent repairs and rebuilds from the government and private insurance.

The Ministry of Civil Defense and Emergency Management (MCDEM) is responsible for search and rescue efforts and in an earthquake scenario; this includes rapid assessments

to determine building safety. The Department of Housing and Building is within the MCDEM and that department works closely with organizations such as the Building Officials Institute of New Zealand (BOINZ) to coordinate the deployment of building assessors to

**Table 11. New Zealand Agency Contracts during the 2010-11 Earthquake Sequence**

	Government Agency	Description of Rebuilding Efforts	Contracts	Contract Dates
<b>First Response</b>	MCDEM	Search and Rescue Efforts	N	
<b>Assessment of Need</b>	Department of Housing and Building	Assessment of damage to determine safety	N	
<b>Housing Programs</b>	EQC	Financial Assistance	N	
	EQC	Rental Assistance	N	
	EQC	Permanent Repairs	Y	10.15.10 - ongoing
	Private Insurance	Permanent Rebuilding	Y	4.5.12 - ongoing
	Department of Housing and Building	Temporary Housing Construction	Y	6.11 – 9.13

quickly determine whether structures are safe to enter or not. The building assessors primarily came from surrounding councils and were already employed by the government. There were no contracts needed for this operation.

The next series of assessments were the done by the EQC to determine the repair damage totals. These were performed by EQC employees, in some cases very new hires, but there were no contracted firms hired for this work. Following the initial EQC assessment, building firms that were contracted by Fletcher to support the EQC rebuilding efforts would perform a detailed assessment in regards to the repairs and presents the EQC, Fletcher, and the homeowner with a scope of work. While there were no firms directly hired to assess the damage, many assessments were still taking place.

The largest contracted partnership in New Zealand to support the rebuilding effort was between the EQC and Fletcher. It is clear from the evolving EQC and Fletcher agreement documents that after the more damaging February 2011 earthquake, the role of Fletcher in the rebuilding process needed to be more explicitly described. This scaling process—from a



Memorandum of Understanding to a Project Management Agreement—as the disaster was unfolding, indicates that the EQC was not prepared to handle the massive rebuilding process. Had the firm envisioned the widespread destruction that was caused by the earthquake sequence, perhaps the first agreement would not have been as lightweight. One notable constant between the two documents was a minimum monthly payment that the EQC was to pay to Fletcher until enough project work was assigned to the firm to cover that minimum.

The agreements between the two firms continued to develop and be updated; five years after the initial event, in 2015, an addendum provided Fletcher with incentives for completion. This is the only reconstruction contract that had both a minimum payment built into the agreement as well as an incentive for completion. It is unclear if these were strategies that were suggested by the EQC or required by Fletcher. As the agreement seems to so heavily favor Fletcher over the EQC, it may be assumed that the EQC had not fully considered contract options when partnering with Fletcher.

As a direct comparison, the Southern Response contract with Arrow International would have offered more clarity to understand if this type of contract was the norm in New Zealand. However, due to commercial interests, Southern Response would not release their contract with Arrow. However, the contracts that Southern Response had with the individual builders indicate that the onus of completing a project within the deadline is on the builder. Building firms were required to pay all temporary lodging fees for survivors once the deadline to complete the repairs had passed. This set up was markedly different than the agreement between the EQC and Fletcher.

The relationship between EQC and Fletcher has been criticized by the New Zealand public. Organizations, such as EQC Fix have formed to put pressure on the government to investigate the EQC and on the EQC to improve their performance.<sup>139</sup> EQC Fix claims that the contracts between EQC and Fletcher incentivized Fletcher to continue managing home repairs for properties that should have been ‘over-cap’ (over the \$100,000 EQC limit). Private insurance companies were incentivized to let Fletcher complete the repairs because this released them from any financial obligations to the homeowners.<sup>139</sup>

Some of the EQC backlash has been because the wording of the Earthquake Commission Act requires the EQC to replace or reinstate a building to the same condition it was when it was new. This clause has led to some disagreements between the insurance group and the clients as to what level of repair should be implemented. A class action

lawsuit in regards to this issue began in November of 2013.<sup>140</sup> Another lawsuit requesting clarification of the EQC policies was filed in November of 2015, five years after the first earthquake.<sup>141</sup>

In the future, the EQC and their clients would benefit from clarifying all of their policies and contracts. While the EQC-Fletcher contract was reviewed carefully for this research, based on the number of lawsuits and complaints from the New Zealand public, it would benefit the EQC to more carefully word their documents in the future. Several community advocacy groups, such as CanCERN, Breakthrough Services, and Residential Advisory Service (RAS) for Property Owners exist to bridge the gap between the government, private insurers, and homeowners. Such groups have worked closely with the EQC and Southern Response and their employees to understand the difficulties faced when trying to implement the ambiguous policies and directives set forth by the contracts, agreements, and documents produced by the government. The advocacy groups then use this knowledge to help community members request and receive needed assistance.<sup>142</sup> Such groups would be instrumental if and when the New Zealand government decides to modify and update their policies and contract agreements for disaster reconstruction. The unbiased views spanning both sides of the issue have the potential to bring clarity and meaningful change to those in position to enforce policies, and those on the receiving end of the assistance.

## **5 Cross Case Study Analysis**

In comparing the case studies of the New Zealand 2010-2011 earthquake series and the 2016 Louisiana flooding disaster, insights can be derived on how each country responds to disasters. Both New Zealand and the US governments relied on contracted firms to manage and execute the assessment, project management, and construction required to rebuild, although the documents used were very different. The following sections will provide a comprehensive comparison of the contracts and agreements used between the government agencies of each country and the private firms hired to facilitate the repairing and rebuilding process.

A recurring theme in this cross case study analysis will be incentives. The US and New Zealand both enacted several contracts and agreements, however, the documents incentivized the contracted firms in vastly different ways. In the following sections these differences will be emphasized with some suggestions as to how these official documents affected the survivor outcomes. Through the analysis and comparison of New Zealand's

rebuilding process to that of the US, potential improvements and recommendations can be derived. Each section will conclude with learning opportunities that the US may decide to pursue moving forward.

In Table 12 on the following page, the contracts that were reviewed for this thesis and the government body that contracted each firm are outlined. Below that are the different topics that were included within each document. It can be seen that while many of the contracts have similar structures, there are clear differences between and within each country as highlighted in the table. The review of contracts and performance agreements between government agencies and private firms, reveals evidence of contractual variables that affected the outcomes. In the following sections, this thesis will examine the country's approaches to insurance, assessments, program management, and rebuilding efforts. Differing contractual structures and variables will be presented as well as a discussion on how such differences could be further researched to better understand how contracts incentivize private firms.

## **5.A Comparison of the Role of Insurance**

In this section an overview of how the US and New Zealand approach disaster insurance will be discussed to provide a synopsis of how these administrative differences altered the way firms were contracted to aid in reconstruction. Understanding the role insurance played in the disaster recovery efforts for the US flooding in 2016 compared to the New Zealand earthquake sequence in 2010-2011 will frame how the differences in funding mechanisms—crucial to contracting—affected the pathway to recovery. Even though this thesis is ultimately about comparing contracts, understanding the differences in the role insurance played in the recovery efforts will provide a deeper level of understanding in regards to the specific services contracted by each government as well as the differing government sectors that contracted the help. There are some high-level takeaways that the US can learn from New Zealand and some opportunities for the US to understand how other approaches to disaster recovery influence rebuilding efforts.

### **5.A.1 Differences in the Role of Insurance as a Funding Mechanism**

As mentioned in the case study, in New Zealand all residences that are privately insured for fire—which is a requirement by law—are automatically covered by the Earthquake Commission (EQC). More than eighty percent of the property owners affected by the 2010-2011 earthquake sequence were eligible for EQC coverage.<sup>115</sup> When owners

**Table 12. Contract Comparison Between Louisiana Flooding and New Zealand Earthquakes**

<b>Government Agency</b>	<b>GOHSEP (SaH)</b>	<b>GOHSEP (SaH)</b>	<b>Louisiana State (ReLA)</b>	<b>EQC</b>	<b>Southern Response</b>
<b>Private Firm</b>	AECOM	Contractors	IEM	Fletcher	Contractors
<b>Type of Work</b>	Temporary Repairs: Project Management	Temporary Repairs: Building	Permanent Repairs: Project Management	Permanent Repairs: Project Management	Permanent Rebuilds: Building
<b>Contract Sections</b>					
<b>Scope of Work</b>	X	X	X	X	X
<b>Monitoring Plan</b>	X	X	X	X	X
<b>Deliverables or Expectations</b>	X	X	X	X	X
<b>Termination</b>	X	X	X	X	X
<b>Insurance</b>	X	X	X	X	X
<b>Right to Audit</b>	X	X	X	X	X
<b>Indemnification</b>	X	X	X	X	X
<b>Liability</b>	X	X	X	X	X
<b>Payment Process</b>	X	X	X	X	X
<b>Conflicts of Interests</b>	X	X	X	X	
<b>Payment Rate Schedule</b>	X		X	X	X
<b>Key Personnel Restrictions</b>	X		X	X	
<b>Compliance Provisions</b>	X	X	X		
<b>Term of Contract (Dates)</b>	X	X	X <i>(start date only)</i>		X
<b>Max Payment</b>	X	X	X		
<b>Performance Metrics</b>	X	X	X		
<b>Job Descriptions</b>	X		X		
<b>Standard Supply Pricing</b>		X	X		X
<b>Deadline Penalties</b>		X	X		X
<b>Performance Bond</b>		X	X		X
<b>No Guarantee of Work Quantity</b>		X	X		X
<b>Arbitration</b>				X	X
<b>Government Agency Role</b>				X	X
<b>Health and Safety Laws</b>				X	X
<b>Minimum Payment</b>				X	
<b>Incentives</b>				X <i>(addendum)</i>	

purchase private fire insurance, they are charged a levy that funds the Natural Disaster Fund. The Fund is reinsured through global channels worldwide to protect the New Zealand government should a large and drastically devastating disaster hit the country. In regards to incentives, the country is highly motivated to heavily enforce homeowners to purchase insurance because the Natural Disaster Fund is the country's main funding mechanism for disaster response. Because this is the way New Zealand has organized their recovery funding, all claims or applications for relief are directed through the Earthquake Commission (EQC), the national insurance program, with additional funding support from the private insurance sector. The EQC handles initial assessments, disbursements of emergency assistance to residents, and coordinates the rebuilding and repairing efforts.

In the US, the National Flood Insurance Program, run by FEMA, is mandated for homeowners in high-risk communities who have a federally-backed mortgage. However, this is not the main mechanism for funding disaster relief from the US government. Many US residents rely on assistance from FEMA to recover from disasters. The federal government provides FEMA with a substantial budget to help fund the reconstruction efforts. In 2017 the 'Major Declarations' disaster fund for FEMA was \$6.7 million.<sup>143</sup> This figure is not used for operating costs and is only used for aiding survivors after a disaster. If a disaster occurs that requires additional funding, FEMA applies for an appropriation from Congress. These appropriations help fund temporary repair programs, such as Shelter at Home, as well as CDBG grants, such as Restore Louisiana. Because the US has significant funding for disaster relief that is not tied to the payment of insurance premiums, the government is not as incentivized to pursue insurance-delinquent property owners. While additional data would be required to prove this claim, the number of insured property owners in each country begin to indicate that New Zealanders are more compliant with purchasing mandatory insurance than those in the US.

#### 5.A.2 Differences in the Number of Insured Homeowners

The closest approximation that the US has to New Zealand's EQC in the national Flood Insurance Program (NFIP), but only a small percentage of homeowners in high-risk communities subscribe. Of the communities that were affected by the 2016 floods, the highest rate of insured properties was 36%; the lowest was just 3%.<sup>144</sup> This is in comparison to over 80% of the homeowners that had insurance in New Zealand following the earthquakes.<sup>115</sup>

In the US, properties that are owned outright do not require insurance, and that may account for some of the properties that were not insured in Louisiana. Other uninsured properties could be the result of a property owner that initially had insurance but stopped paying premiums, despite being required to hold insure as an obligation of their mortgage. Evidence demonstrates a strong correlation between low-income households and the rate of insurance coverage.<sup>145</sup> For low-income families, insurance premiums often do not take priority over mortgages, utility payments, and groceries. Compounding this issue is that moderate and low risk communities have no flood insurance requirements. The rate of households that have coverage is very low: averaging 12.5% in the areas of Louisiana that flooded in 2016.<sup>144</sup> When a disaster hits, the majority of homeowners do not have enough coverage to fund full repairs, and if flooding causes the damage, common home insurance does not typically provide any assistance because flooding is excluded.

After a major flooding disaster hits a region, the rate of insured families increases. This incentive is a notable trend, but it only last a few years and then the rate of flood insurance slowly drifts back to the baseline level a few years after the incident.<sup>146</sup> This indicates that during the recovery process the public is incentivized to purchase insurance, perhaps because they can see the devastation and can understand the need. However, once the incident fades from memory, the security that having flood insurance brings is not enough to continue to incentivize homeowners to buy into the system. Further research could help to clarify the barriers to purchasing insurance in the US, and lessons could be learned from how the New Zealand government incentivized property owners to comply.

### 5.A.3 Differences in Expectations

Another notable difference between these two insurance approaches are the outcomes expected from the government by survivors. The New Zealand Earthquake Commission Act, which establishes the EQC as a national insurance, is similar to the Stafford Act in the US. Both set the standards as to what survivors are entitled to following a disaster. According to the Earthquake Commission Act, survivors are entitled to a repaired home in a 'like new' condition; while FEMA is mandated by the Stafford Act to provide safe, temporary shelter while homes are repaired (repairs are generally at the homeowners expense, with funding from SBA loans, insurance claims, and CDBG Disaster grants).

As this thesis focuses on contract comparisons, it is important to be aware of the legal expectations set by the policy documents in each country. The different approaches that each country took towards mandating disaster insurance led to differences in disaster

reconstruction management, including how firms were contracted and what they were contracted to fulfill. For example, the EQC coordinates permanent repairs, while FEMA and its state and local government partners concentrate efforts on the most cost effective way to provide temporary shelter to residents. Homeowners are expected to apply for grants and loans to fund their own rebuilding efforts. The temporary repairs offered through Shelter at Home after the Louisiana flooding were of a very different quality than the EQC repairs. Shelter at Home repairs were nominal, the bare minimum required to make a house habitable until the homeowner could obtain additional funding. This approach was taken because of limitations imposed on federal assistance by the Stafford Act.

Viewing these cases through the legal entitlements ensured by each country to the public will help better explain many of the following differences between the two country's disaster response tactics. It is notable that even though the promised outcomes were different in each scenario, there were still assessment and building needs that were fulfilled. Government agencies hired and contracted private firms to assist with the reconstruction efforts and the structure and wording of the contracts influenced the outcomes. This affected both the assessments, and the repairing and rebuilding processes as discussed in the following sections.

#### 5.A.4 Insurance Learning Opportunities

As stated before, this thesis is not a comprehensive comparison of insurance practices between the US and New Zealand. However, there are some learning opportunities within this domain that may provide some new perspectives the US approach. As mentioned in the pervious sections, additional research regarding the high compliance to purchasing insurance in New Zealand could help the US government better understand the barriers to insurance in the US. This would begin to answer whether the low rates of insured homes in the US is a result of low income populations that cannot afford the premiums and are incentivized to use the money for immediate household expenses, unrealistic risk assumptions of the general public, or the government or banking industry failing to enforce insurance mandates because they are incentivized to make other decisions.

Another important learning opportunity that the US could takeaway from New Zealand is how insurance affected the relief efforts in New Zealand. Because the majority of New Zealand homeowners had insurance and because the national government could rely on the insurance payouts on those properties, the government could subsidize purchasing

the damaged homes very quickly—within ten days of the disaster. This approach allowed survivors to quickly have some options as to how they would move forward from this event. In the US, buying out homeowners and permanent reconstruction efforts are only done as a last resort because insurance compliance in the US does not lend itself to this practice. The percentage of NFIP insured properties in any given area is not high enough that the government can provide this type of support to homeowners. The agency does not want the public to rely on government funds to rebuild and FEMA has concerns with funding permanent repairs because it incentivizes homeowners to continue to avoid purchasing insurance. However, given the rates of insured properties in flood zones, the incentive to purchase flood insurance in the US is not high enough.

The US could learn from the New Zealand government how to better incentivize the purchase of insurance so that in the future more homeowners can be aided by the NFIP. If areas are continually flooded, and the NFIP had enough economic incentive to move homeowners out of the flooding zones, then the US could take a similar approach to New Zealand. In the long term offering buyouts as an option to high-risk areas would incentivize homeowners to rebuild in less risky areas and the number of affected properties would gradually become lower. Further research into the reasons why US homeowners don't purchase insurance, and understanding better incentives to change this practice would benefit FEMA response efforts, and provide additional choices for US homeowners.

## **5.B Comparison of Needs Assessments Contracts**

In New Zealand and the US there were many levels of assessment that needed to take place. Rapid assessments were undertaken within a short time frame to assess immediate safety concerns, then government agencies aiding survivors conducted additional assessments. The most notable difference, especially in regards to contracting, is that New Zealand relied on local building officials, and current EQC employees to coordinate the assessments, while the US contracted two disaster management firms to conduct the needs assessments for the federal government. Each country's approach to needs assessments were handled differently, leading to different outcomes for survivors in terms of reconstruction timeframes and number of assessments.

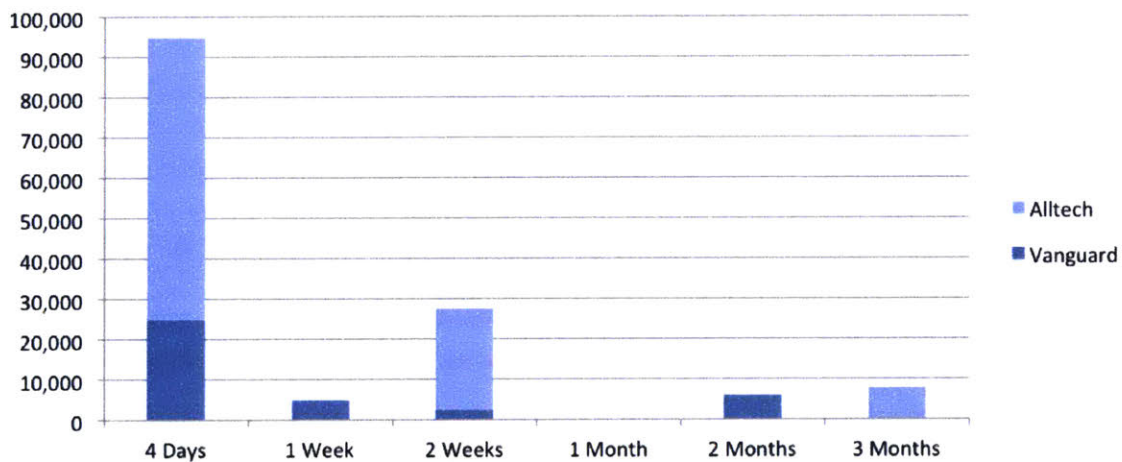
### **5.B.1 Differences in Initial Assessment Approaches**

After the flooding disaster in the US there were many requests for financial assistance and temporary housing. To accommodate these requests, FEMA handled the first wave of



assessments by contracting emergency management firms experienced in this line of work. The firms employed had already been vetted by the agency and signed Indefinite Delivery Contracts, indicating FEMA contracted the firms prior to the disaster.<sup>63</sup> Over 100,000 assessments were completed for FEMA within seven months. This assessment was used to qualify survivors for repair grants or housing assistance. Housing assistance could include cash assistance for temporary rentals, a subsidized rental property or an MHU. The following graphic illustrates the rate in which the assessments were contracted. As seen below, FEMA was able to quickly estimate how many assessments were needed—the majority of the assessments were contracted within the first few weeks of the disaster. A few months later, some additional assessments were added into the contract. All assessments were completed within seven months. Through additional details available in the invoices, a more detailed sense of the rate in which the assessments were completed could be uncovered.

**Figure 1. Number of Assessments Contracted by FEMA within Recovery Timeframe**



New Zealand had a different goal when it comes to assessments. Rapid assessments were used to determine building safety and were required after each earthquake. The national government of New Zealand coordinated this response by using building officials employed by local governments to handle this task. Geotechnical assessments were also required to determine the land suitability for rebuilding; a process was managed by CERA. The geotechnical assessments were used to determine which homes were red-zoned—and sellable to the national government—following the February 22 earthquake. Decisions regarding the red-zone buyouts were available within ten days of the disaster.

## 5.B.2 Differences in Subsequent Assessment Approaches

The evaluations from Vanguard Emergency Management and Alltech were just the beginning of the assessments for US flooding survivors. Additional assessments were required for those applying to Shelter at Home, Temporary Housing Assistance (MHUs), NFIP claims, SBA loans, private insurance claims, and funding from Restore Louisiana. There was no coordination of the assessment response due to timing responses of each program as well as the radically different goals and restraints. It is possible that many survivors were required to coordinate and receive assessments from all of these response options to fully fund and manage their rebuilding efforts.

In New Zealand, more detailed assessments were used to determine need and were handled by the EQC. However, it is likely that the assessments made by Vanguard and Alltech were more similar to the EQC assessments than they were to the rapid assessments evaluating safety concerns that the New Zealand government coordinated. The EQC did not contract out the assessments however, differing from the US approach. Assessors were hired directly to complete this task; if a repair project was priced between \$15,000-\$100,000, and within the EQC limit, another assessments was completed by the building contractor firm, Fletcher, to provide the EQC with detailed pricing information. In some of these cases, Fletcher's estimate was higher than \$100,000, and the repair (or rebuild) project was pushed to private insurance. Private insurance firms, such as Southern Response, would then have one of their contractors conduct another assessment to estimate the cost of the project.

As the EQC assessments are most similar to the assessments conducted by Vanguard and Alltech, comparing the rate at which the assessments were conducted or contracted would provide insight as to how this process was handled without the aid of a contracted firm. Unfortunately, data regarding the number or rate of assessments completed by EQC over the course of their reconstruction efforts could not be obtained. Southern Response, a government entity acting as a private insurer did publish their assessment rates, and from that, some data about the EQC can be derived. Southern Response was formed a year after the earthquakes, so data regarding EQC assessments is quite limited.

What can be learned from Southern Response is that by August of 2012, roughly two years after the first earthquake, 6,596 properties had been identified by the EQC as over-cap. By the end of 2017, the number of over-cap claims had reached 8,325. It is assumed that the increase in over-cap claims was due to more detailed assessments completed by the

EQC contracted firm, Fletcher, indicating more extensive damage than originally speculated. It is assumed that the majority of EQC recipients were assessed within this timeframe, as an EQC assessment was required for the determination to take place. However, due to client disagreements in EQC assessment results, the process is ongoing. Many properties have had to be reassessed due to natural settling and environmental exposure.<sup>147</sup> The process appears to be near to completion, but not fully completed seven years following the disaster.

While the New Zealand process was long, it must be noted that this was a unique situation for the country with far more residential housing damage that had ever been experienced before. Despite the widespread devastation, and no pre-established contracts as the US relies on, the New Zealand government was still able to mobilize building inspectors quickly to evaluate the damage. Even more notable, within days of the disaster, the government had identified houses that were situated on land that was no suitable to rebuild on, and provided homeowners with an agreeable option to sell their home to the government. Following the rapid assessments and color-zoning, disaster survivors were then slated for assessments from the EQC and, if the damage was severe, a private insurer. The result was far fewer assessments than the potential assessments a US survivor could endure.

### 5.B.3 Needs Assessment Learning Opportunities

The manner in which each country approached needs assessments resulted in trade-offs experienced by survivors. In the US, the first assessments were conducted by FEMA to determine the need required from the federal government. However, because not all need is met through FEMA, additional funding necessitated additional assessments from other financial sources, such as the State of Louisiana, insurers (the NFIP and private), and the Small Business Association. This led to many homeowners experiencing a large number of total assessments. In New Zealand, the number of assessments survivors needed to coordinate was much lower. The EQC and a survivor's private insurance were responsible for the full reconstruction of residential units and therefore needs assessments were limited to these two organizations. As demonstrated in New Zealand, this full-repair approach led by one agency can lead to extremely long wait times. It is assumed that the New Zealand assessments required more detailed reviews of the properties to determine appropriate compensation as the EQC was estimating for 'like new' repairs; this is versus the FEMA

approach of rapid assessments to quickly distribute funds to offer the bare minimum of relief.

Neither the US nor New Zealand has been able to optimize the assessment process to be both minimally invasive and a quick turnaround. However, there are some learning opportunities in regards to the needs assessment process that could influence future reconstruction efforts. In New Zealand, the lower number of total assessments is the key takeaway, and finding a way to incentivize key stakeholders in US disaster reconstruction—the government, contractors, survivors—to reduce the number of assessments, provides insight as to how this could be implemented.

Ideally survivors should endure one or two comprehensive assessments that can be shared across multiple agencies without having to wait years for repairs. In the US a shared database of assessments that could be accessed by multiple government agencies could begin to alleviate the burden of assessments for survivors. As the US already contracts a large emergency management firm to run the initial assessments, it would be worth researching the feasibility of extending this contract over the course of recovery to serve as the main assessor throughout reconstruction. The US government, contractors, and survivors could benefit from this method and would be incentivized to buy into a one-assessor approach. It would save time and funding for all sides as well as improves the turnaround time for decision-making. Perhaps further research to demonstrate the cost benefits and savings of this approach could begin to change the US approach to needs assessments.

### **5.C Comparison of Reconstruction Contracts**

Within the context of reconstruction, defined for this thesis as the repairing and rebuilding process, there are three identifiable modes of work that were contracted by the US and New Zealand governments: program management, building and repairing, and the installation and set-up of temporary housing units. In this section, contracts from each mode of work will be reviewed and compared. While there are many similarities across all of the contracts in this section, there are notable small differences within each that have had larger consequences to the survivors' journey. Recommendations and learning opportunities will be presented for each reconstruction mode of work to begin to outline and establish future steps to take to improve this process.

Please note that the respective governmental agencies heading each of the following programs were contacted and the relevant contracts were requested. In some cases the

contracts were released, and in other cases the request was denied. The following comparisons and conclusions were drawn based on the documents obtained. Invoices from the rebuilding efforts were also requested, and some were released and analyzed for this research. Invoices provide an important layer of insight to this research as it is the evidence of how the contract shaped the response. Further research could be conducted if additional invoices were obtained and analyzed.

### 5.C.1 Differences in Program Management Contracts

The most striking similarity across the reconstruction process between the US and New Zealand was the use of program management firms to coordinate the rebuilding process. This structure was adopted by all four of the programs and agencies evaluated, which appoints one firm as the go-between for government and the private firms hired to rebuild. This delegation ascertains the program management position as one of the more powerful roles in the reconstruction process. The contracting structure used to define this relationship varies between and within each country. The differences and likenesses will be presented along with potential learning opportunities that could improve and strengthen the US approach.

Within the case studies reviewed for this thesis in the US and New Zealand, four major government-run rebuilding efforts took place, two in each country (see Table 13). All four efforts appointed a single contracting firm to act as a program manager responsible for coordinating the responses of the building firms. In the following table, the government agency and the contracted firm are listed.

**Table 13. Program Management Contracts in the US and New Zealand**

	United States		New Zealand	
Program Name	Shelter at Home	Restore Louisiana	National Insurance	Private Insurance
Government Agency	GOHSEP	Louisiana State	EQC	Southern Response
Private Firm	AECOM	IEM	Fletcher	Arrow International
Type of Work	Temporary Repairs	Permanent Repairs	Permanent Repairs	Permanent Rebuilds

In the US, there was Shelter at Home, a temporary repair program, and Restore Louisiana, a permanent repair program. Contracts between program manager and the State were made available for evaluation. The two New Zealand efforts were a coordinated

insurance-based response, with lower levels of damage tackled by the national insurer, EQC, and higher levels of damage managed by private insurance. For this thesis, the EQC program management agreement was evaluated, however, there the request to view the contract between the private insurer and their program manager was declined.

There were two approaches taken by the government agencies in contracting a program management firm and the building firms: contracting each firm directly (both the project managing firm as well as all the individual building firms) or contracting only the program manager and having that firm sub-contract the building firms. In the US, the Shelter at Home building firms were all contracted directly with the US government, while Restore Louisiana only contracted the program management firm, IEM. New Zealand was split as well, with the EQC signing an agreement directly with Fletcher, allowing them to subcontract all the building firms, and Southern Response having separate agreements with their program management firm and all of their building partners.

From the government agency perspective, coordinating and contracting with one firm exclusively would appear to be more streamlined and potentially more effective. In the United States, the number of contracts that needed to be constructed, reviewed, and managed, and invoices to be assessed and paid, dropped from ten during Shelter at Home to one for Restore Louisiana. In addition, the onus of meeting the contract key performance metrics was relegated to just one firm. The difference between the EQC and Southern Response was similar, with the EQC working directly with Fletcher and Southern Response working with Arrow International and multiple building partners.

#### *5.C.1.a Structure of Program Management Contracts*

Of these four examples, three of the contracts were obtained: both contracts from the US (Shelter at Home and Restore Louisiana) and the EQC and Fletcher Agreement from New Zealand. Across these three program management contracts there are similarities including: scope of work, a plan for monitoring progress, termination procedures, insurance requirements, a right to audit, liability and indemnification definitions, key personnel restrictions, provisions against conflicts of interest, and payment procedures. There are some sections that appear to be standard to the US including compliance provisions, terms of contract, maximum payments, performance metrics, and job descriptions.

In the sections that are exclusive to US contracts some key information is determined and agreed upon by each party entering the contract that is notably missing in New Zealand. Specifically the terms of contract, which in the US refers to the contract start and end dates,

and the maximum payment. These are key elements to the US contracts as these details help to determine the length and funding commitment that the government has to the private entity. This requires some upfront estimation on how long the rebuilding process will take, the amount of funding available, and the potential payout to the private firms. In a recovery process, these numbers may be unclear, but defining a starting point for dates and payment help to provide a clearer picture as to how the private firm is performing. Key performance metrics also helps to define progress for these contracts, and while the EQC and Fletcher agreement does have such metrics, they were added four years after the initial document.

The program management contract structure evolved in the US between Shelter at Home and Restore Louisiana to include additional details such as deadline penalties, a performance bond requirement, and a clause stipulating no guarantee on the amount of work to be managed by the private firm (in this case, IEM). These specifics continue to clarify the relationship between the government and the private firm, and placed more restrictions and onus on IEM to ensure projects were completed on time.

The EQC contract with Fletcher has stipulations that are unique compared to the other contracts. Specifically this includes defining the government agency role, arbitration agreements, a minimum monthly payment, and an incentive structure to afford Fletcher bonuses for work completed on time. Without access to the Southern Response and Arrow agreement, it is unclear whether these choices were unique to the EQC, or are common across New Zealand.

#### *5.C.1.b Program Management Contracts Learning Opportunities*

The contracts in regards to program management vary between countries and programs. By identifying details that differentiate the approaches, the potential for future analysis and research can start to be outlined. These instances open opportunities to understand and clarify how these details affect the bigger picture. In reviewing the differences between the US and New Zealand, there are several contract variables that could have incentivized contracting firms to operate in unintended ways. In the following sections specific variables will be elaborated upon.

##### *5.C.1.b.1 No Guarantee of Work Quantity, Maximum Contract Amount, and Tiered Payments*

In Louisiana the program management contract used by the state for Shelter at Home was amended and updated when the state unveiled Restore Louisiana. More specific language was added (as noted previously) to include deadline penalties, a performance

bond requirement, and a clause stipulating no guarantee on the amount of work to be managed by the private firm. One may argue that such language was added to create an arrangement that was more favorable to the government, and therefore the public, rather than the private entity. Penalizing the management firm for missing deadlines, not meeting environmental standards, and requiring a performance bond (a performance bond is similar to insurance) all seem to unequivocally benefit the public by keeping the construction projects moving forward and protecting them against deficient builders. However, the no guarantee for work quantity—likely intended to explicitly state that the program manager is not entitled to receive the maximum funding available—could incentivize other behavior.

Established in economics as the principal-agent problem, the behavior of a firm can be altered because they are looking to maximize their benefits. In this case, IEM lacks concrete knowledge of how much they will ultimately be able to bill for, which could have effected their behavior. IEM signed a contract for \$308 million, of which \$126,750,000 was slated for program management and building/construction management. Yet the contract has a stipulation that there is no guarantee of work quantity. When assigned sites to evaluate, builders, with the support and influence of IEM, may feel compelled or incentivized to assess the site to need more coverage than necessary. Overestimating sites would ensure that the builder and IEM receive as much of the maximum payment as possible. And, addressing another variable, if the excess reported damage is easy to identify as fixed, then IEM would be able to easily avoid deadline penalties.

This practice could have been compounded by the IEM compensation metrics fixed in the contract. IEM was paid a construction management cost that was based on the total repair estimate, with seven tiers beginning with \$0 to \$15,000 and reaching \$200,000-\$300,000. IEM fees ranged from \$3,450 to \$69,000, with significant increases for higher tiers of service. This means there are significant incentives for the contractor to assess a home for over \$100,000 of damage, and an equal incentive for IEM to approve that.

Between these variables: a no guarantee of work quantity, an explicit maximum payment, and a tiered payment system, the incentive to move quickly and thoroughly could be beneficial to the public. However, there could be unintentional consequences of over reporting damage towards the beginning of a project in an attempt to quickly profit as the number of project sites was unknown. This could drain the budget for survivors who apply later in the process and need significant help.



Without specific implementation and invoicing data, it cannot be stated that this is explicitly the case in Louisiana. However, it does provide an instance where additional research and exploration could provide a better understanding of the economic behavior of contractors. With invoicing data from Restore Louisiana, the timing and amount of damage in which properties were assessed through a principal-agent analysis to see if earlier assessments were significantly different than later assessments. Additional information could be obtained in regards to the tiered system by reviewing the number of projects within each tier and how close each project estimate was to the upper and lower limits. Further research could include surveying contractors hired by IEM as well as IEM management to better understand how each party figured the contract details into their project plans. Through a better understanding of how stating a project budget maximum may conflict with a no work guarantee could potentially help shape future disaster reconstruction efforts to better serve survivors.

#### 5.C.1.b.2 Minimum Monthly Payments

As a second example of how a contract can motivate the program manager, the use of incentives in New Zealand will be reviewed. The EQC and Fletcher signed an initial partnership agreement following the first earthquake in September, and then a more substantial contract after the February earthquake. In the second program management agreement there were several stipulations that were unique to this agreement. Such conditions included a specific section to define the government agency role, arbitration agreements, and a minimum monthly payment. In the addendum added several years after the initial contracts, an incentive structure was added to afford Fletcher bonuses for work completed on time (rather than penalties as used in Restore Louisiana).

The conditions unique to this contract are quite different than the Louisiana contracts because the outcomes appear partial to favoring the contractor over the government agency. The variables most likely to influence the choices made the program manager are the minimum monthly payments and the incentive structure. By instituting a minimum monthly payment, the agreement between EQC and Fletcher actually incentivizes Fletcher to move slowly through the rebuilding process. If the firm is guaranteed profits for completing no work, then the firm wouldn't begin seeing an incentive for working quickly or heavily until they were certain the billable hours they submitted would far surpass the minimum. With a minimum payment, no work has the same financial payout as a work period just under the minimum. In fact, if Fletcher were to be just under the minimum, it

would be more expensive to the firm than doing nothing at all because they have to pay for time and materials.

Compounding this incentive structure between Fletcher and EQC was the way in which the insurance system in New Zealand operated. The EQC was responsible for damages up to \$100,000, which translated to Fletcher managing and profiting from any projects under that total. Once a home was estimated to have more than \$100,000 of damage, the program management was assigned to the private insurance. This meant that instead of paying Fletcher, the EQC would send the \$100,000 to the private insurer to use in the rebuilding process. This arrangement could have incentivized Fletcher to under report damage so that the firm could retain the program management fees.

Together, the minimum payment and the upper limit on damages, could potentially lead to a slow recovery with some structures having hidden damage that was not reported. Lacking specific project execution and invoicing data, it cannot be stated that this is explicitly the case in New Zealand. However, anecdotal evidence of Fletcher's progress through the recovery phase indicates that the reconstruction effort has been painfully slow. As of the writing of this thesis, seven years after the February 2011 earthquake, there remain homes that are awaiting reassessment from the EQC and Fletcher after shoddy repair services have come to light.<sup>139</sup> Additional research and exploration regarding the EQC and Fletcher partnership agreement through a principal-agent analysis could provide a better understanding of the economic behavior of contractors and could influence future recovery efforts.

#### 5.C.1.b.3 Incentives and Penalties for Key Performance Metrics

The Fletcher contract and the Restore Louisiana contract provide a unique contrast of approaches to program management within disaster reconstruction. The two responses were for affected populations that were comparably sized with a similar governmental purpose to provide permanent repairs to residential properties. In these two situations the mechanisms used to incentivize the program managers and builders were radically different and could potentially provide specific results as to how the reconstruction effort is affected by contracts. Specifically, in New Zealand the EQC and Fletcher contract had written incentives that were intended to improve the speed of the construction process, while the Restore Louisiana contracts instituted penalties against IEM for delays and missed deadlines.

The incentives agreed upon by Fletcher and the EQC were calculated by the key performance indicators in regards to time, cost, quality, and safety. The documents obtained for this thesis through the Official Information Act did not specify how the EQC would determine or measure these indicators. However, it would be assumed that documents outlining how the key performance indicators would be measured could be obtained. In the US, there were much more defined and detailed penalties in the Restore Louisiana contract with IEM. There were twenty-five metrics spanning tasks such as education and consumer outreach goals, reconstruction deadlines, environmental reviews, eligibility verification deadlines, response and resolution of appeals, staffing, and insurance requirements. Each metric had a task, a deliverable, a defined measurement, and the penalty for non-compliance stated directly in the contract.

Future research could include a closer look at the invoicing to begin to see a clearer understanding of how these incentives and penalties within the contracts affected the outcomes. Invoices provide an important layer of insight, as they are the evidence that depicts how the contract shaped the response. Through the Freedom of Information Act, all of the Restore Louisiana invoices could be obtained. These invoices would more clearly show how often the penalties were enacted against IEM and could indicate how the firm was incentivized by such penalties (if at all). If invoices between Fletcher and the New Zealand government were released, then the number of incentive payments (as well as the number of months that Fletcher collected the monthly minimum) would be unveiled. Invoices would provide evidence such as how often the minimum payment portion of the contract was enacted, and whether or not the firm was incentivized in a positive or negative way by this clause.

### 5.C.2 Differences in Building Contracts

Of the four major rebuilding efforts reviewed, two of the programs contracted building firms directly: Shelter at Home in the US, and the Southern Response efforts in New Zealand (outlined below in Table 14). In the other two programs, Restore Louisiana and the EQC efforts, the building firms were contracted directly by the program manager and were not able to be obtained. All invoices from Shelter at Home and a small number of invoices from Restore Louisiana were released through the Freedom of Information Act for this research.

In the US, contracts between GOHSEP and nine of the contracted firms were available to review. The wording of the nine contracts was identical with only the contracted firms names changing and some slight variability regarding the start dates. In addition to the

specific contracts between each building firm and the State of Louisiana, FEMA guidelines that were notated in the contracts were also evaluated as part of the contract. The Southern Response building effort was contractually structured in several documents that were reviewed as part of this analysis. There were specific agreements between Southern Response and their building partners, titled, “Residential Repair Programme Relationship Agreement,” a “General Conditions of Contract,” that offered a more detailed definition of the contractors’ roles, and a “Contract Agreement,” which was a document binding a homeowner, a contractor, and Southern Response together.

The two programs provided construction services on opposite ends of the rebuilding spectrum. Shelter at Home was enacted to provide homeowners with the bare minimum of repairs to allow them to shelter in place until more permanent repairs could be made. Southern Response was an over-cap private insurer that New Zealanders turned to once their repairs exceeded the EQC maximum, resulting in Southern Response primarily being responsible for coordinating full rebuilding efforts and extensive repairs. Despite these differences, both programs were structured with the government agency contracting the building firms directly, rather than subcontracted by the project manager.

**Table 14. Building Firm Contracts in the US and New Zealand**

	United States		New Zealand	
Program Name	Shelter at Home	Restore Louisiana	National Insurance	Private Insurance
Government Agency	GOHSEP	Louisiana State	EQC	Southern Response
Building Firms	Multiple (9+)	Subcontracts	Subcontracts	Multiple (19+)
Type of Work	Temporary Repairs	Permanent Repairs	\$15,000 - \$100,000	> \$100,000

It should be noted that the Shelter at Home program in the US only offered managed-repairs. While there were options for individual assistance, grants, and loans through different governmental agencies in the US, this particular program was intended to only handle temporary repairs. In contrast, the Southern Response insurance claimants could elect to have either a cash payout or a managed-repair.

*5.C.2.a Structure of Building Contracts*

Many of the similarities and differences between the two country’s Building contracts are the same as the Program Management contracts. The Building contracts reviewed

included a scope of work, a plan for monitoring progress, termination procedures, insurance requirements, a right to audit, liability and indemnification definitions, key personnel restrictions, and payment procedures. Again, there are some sections that appear to be standard to the US that are missing from New Zealand, and vice versa.

Of note, there are significant differences between Southern Response's Building contracts and the EQC Program Management agreement assessed in the previous section. Southern Response took a similar approach to the US in that there are standard prices set for supplies, deadline penalties, and a mandatory performance bond. Although the EQC did not include any of these measures when contracting with Fletcher, the program manager, Southern Response determined that these clauses would be beneficial to address. The Southern Response Building contracts are more similar to the US than they are to the EQC contracts.

What sets the Building contracts apart from the Program Management contracts were the specifics in regards to what the customer, i.e. survivor in these cases, is entitled to receive. While the Program Management contract is mostly establishing the relationship between the government and a private entity, the Building contracts must do that in addition to spelling out exactly what is the expected outcome for the recipient.

#### *5.C.2.b Building Contracts Learning Opportunities*

It is well understood that Shelter at Home in the US and the services provided by Southern Response in New Zealand were very different. However, a review of the contracts between the government agency and the private building firms highlight similar structures and approaches to building contracts. By identifying and narrowing in on the specific details that do differentiate each approach, the potential for future analysis and research can begin to be uncovered. These open opportunities to understand and clarify how these details affect the bigger picture.

As noted above, the most significant difference between the Building contracts in the US and New Zealand contracts were the specific line items listed as the delivery content. Only the US included this level of detail and this key variable could potentially offer the most insight into how reconstruction building contracts affect survivor outcomes

##### *5.C.2.b.1 Specifying Delivery Content*

Both the US and New Zealand, through building contracts, try to establish a consistent delivery of repair to the survivors. The US contract refers to both the FEMA policy

document as well as specific documents attached to the contract that the builder must use to estimate and complete the repairs. This includes a very specific price list for the intended emergency repairs and maintenance, an inspection checklist, a work order form, and the FEMA guidance document mentioned previously. Southern Response has similar clarifying documents for their contractors to use, with most of the specific contract details captured in the "General Conditions of Contract." While key roles and positions in this document are assigned hourly rates, allowable costs for supplies and projects are not documented. It is assumed that due to the large variety of services that Southern Response was contending with (as many of their clients were complete rebuilds), were too diverse to accurately record.

Although the two approaches here are very similar, the main difference is in the details. The US outlines very specific items that are covered within the program with specific pricing for each item. There is some potential that this level of detail could again cause a principal-agent problem and incentivize contractors to execute work that is not required, or disincentive contractors from performing work that is necessary. It is assumed that FEMA and the State of Louisiana appropriately categorized the pricing structure within this contract. However, based on the expertise, experience, availability of supplies, and specific location of the survivor, different building firms may profit more or less than other firms for specific line items. For example, if one firm were to find that they were not profitable when repairing HVAC systems, but did see a profit when replacing the systems completely, then that firm may make many unnecessary replacements. Every line item for every firm has the potential to offer more or less profit for each firm and by assigning each item a price, then a building firm has some incentive to decide whether or not to assess and fix or replace specific items based on their personal profitability.

While no formal complaints have been made in regards to Shelter at Home contractors abusing the contract systems, a thorough review of line items in the Shelter at Home invoicing could uncover trends and significant differences between how line items were handled between different firms. If the differences were significant and began to illustrate that specifying delivery content was not beneficial to survivors, additional research could be done in reviewing how Southern Response handled their estimation process that, in contrast, did not specify specific line items. By researching the best method to facilitate a contract that has specific line items to be delivered, with alleviating an incentive interference, the public and, most importantly, the survivors, will benefit.

## **6 Conclusion and Recommendations**

The intention of this thesis was to compare contracts between the United States and New Zealand to see if there were opportunities for the US to improve their disaster reconstruction efforts. Specifically, this thesis was examining contracts between government agencies and private contracting and building firms. This exploration uncovered several areas that the United States could improve disaster recovery, both within the contracts and within the structures that led to the contracts. Because disaster response is structured differently in the US and New Zealand, there were several areas that were uncovered for possible improvements that were discovered through the process of examining the contracts, but not necessarily the contracts themselves.

In this conclusion, short-term and long-term goals will be provided as a series of next steps that the US government can take based on the learning opportunities outlined in the previous sections. Following the set-up of the cross case study analysis, the recommendations include ways to either improve or learning opportunities regarding insurance incentives, needs assessments, and contract structures, specifically clauses that appear to affect the incentives of the contracting firms hired to complete the repairs and building efforts.

### **6.A Insurance**

New Zealand has a much higher level of compliance than the United States, and the national government offers insurance to a much broader audience than only those in a dangerous area. These two differences lead directly to the short- and long- term goals that the United States should address.

In the short-term, the US could learn from the New Zealand government how to better incentivize the purchase of insurance so that in the future more homeowners can be aided by the NFIP. Because the national disaster insurance in New Zealand is tied to the purchase of private insurance, almost all homeowners have some protection. This is vastly different than in the US, where only a small number of homeowners own flood insurance, including areas that are known to be in the flood plain. This could be considered a two-part program where the US designates more areas to be eligible for the NFIP and actively works to increase the number of subscribers in the designated areas.

Having more households in the insurance program is key to generating more income to use in the case of a disaster. Insurance payouts provide homeowners with permanent

repairs far more quickly than aid from the government. FEMA's mission is to provide temporary shelter, therefore programs such as Shelter at Home are not intended to fully repair a home; and the funding for permanent repairs through CDBG grants, such as Restore Louisiana, come very late to the reconstruction process. As noted in the introduction, the key to aiding communities after a disaster is to assist survivors in remaining close to their homes and neighborhoods. Temporary repairs and long delays for funds are less successful than providing permanent repairs in an efficient manner. An expansion in the insurance program could begin to provide such coverage to future communities affected by disaster.

Additionally, if more homeowners had insurance, then the NFIP would have more funds to start moving homeowners out of areas that are continually flooded and change the future trajectory for such homeowners. In the future, the US could take a similar approach to New Zealand and designate certain areas after a major flood as a red-zone and offer homeowners a fair buyout price. In the long-term offering buyouts as an option to high-risk areas would incentivize homeowners to rebuild in less risky areas and the number of affected properties would gradually become lower. Further research into the reasons why US homeowners don't purchase insurance, and understanding better incentives to change this practice would benefit FEMA response efforts, and provide additional choices for US homeowners.

## **6.B Assessments**

In reviewing the contracts for assessments in the United States, it was notable that there were not similar contracts to compare this to in New Zealand. In addition, each program instituted by the US began with additional assessments—in excess of six if the homeowner had private insurance, insurance from the NFIP, and took advantage of government-funded reconstruction programs—none of which were coordinated. In New Zealand, survivors required one assessment from the national insurer, the EQC, and then a second from private insurance if the damage was substantial.

Ideally survivors should endure one or two comprehensive assessments that can be shared across multiple agencies. Consolidating assessments should be considered a high-priority for the US as it is wasting time and money by duplicating efforts. It also negatively affects the time a survivor spends waiting for assistance. In the US, a short-term goal should be the creation of a shared database of assessments that could be accessed by multiple government agencies. As the US already contracts a large emergency management firm to run the initial assessments, as a long-term goal the US should research the feasibility of extending this contract over the course of recovery. That way a consistent assessment



agency could serve and provide continuity throughout the reconstruction process. The US government, contractors, and survivors could benefit from this method and would be incentivized to buy into a one-assessor approach. It would save time and funding for all sides as well as improve the turnaround time for decision-making.

### **6.C Contracts**

Based on the variables presented in the cross case study analysis, research could begin to provide a better understanding of how contract structures incentivized the reconstruction process. As the purpose of this thesis was to provide the US government with learning opportunities, the following short- and long-term goals are based on the comparison to New Zealand contracts (summarized in Table 15). Through comparing New Zealand and US contracts, the differences that were uncovered could provide research opportunities to better understand the effects of certain clauses. One important lesson that this thesis study has uncovered is that the contracts are only half of the story. The true insight would come from invoices, which would provide evidence as to how the contracts affected the completed work.

There are clear learning opportunities from both the Shelter at Home program and Restore Louisiana. From Shelter at Home, an evaluation of the invoices could provide a better understanding of whether detailing prices for specific line items influenced the repairs that were made. The short-term goal for this research would be to evaluate the construction companies to identify firms that efficiently completed more repairs within the program boundaries. These firms and their clients could be interviewed to better understand how successful firms utilized and understood the contracts. As a long-term goal, a best practices document could be created to provide to future contractors hired to perform similar work. Such a document could include details on how contractors conduct time and cost estimates and could incorporate any findings from the evaluations detailed below, regarding specific clauses such as specifying supply pricing and maximum payments.

Further research and surveys could provide insight to better understand if the variability of contractor performance was related to the specified pricing detailed in the contract, and whether or not that type of clause was beneficial to homeowners or not. Additional research could be conducted to better understand how Southern Response handled their estimation process and whether or not their process had less negative incentives than the US approach. By establishing the best methods to contract for specific

line items within a repair menu, and alleviate any incentive interferences will benefit the public and the survivors.

**Table 15. Short- and Long-Term Goals Based on Case Study Research**

	Short-Term Goals	Long-Term Goals
<b>Insurance</b>	Incentivize more homeowners to participate in National Flood Insurance Program. Research the main obstacles to better understand what prevents homeowners from obtaining insurance.	Expand the flood insurance program in the US to include more areas so that more homeowners are covered and there is a larger pool of money to use for disaster response
<b>Assessments</b>	Start developing a shared assessment database.	Research the feasibility of using one vendor to conduct and manage assessments throughout the reconstruction process to reduce the number of assessments that homeowners are subjected to throughout the recovery.
<b>Contracts</b>	<p>(1) Obtain invoices for Shelter at Home to compare contractor performance and estimates.</p> <p>(2) Interview Shelter at Home contractors to gain insight as to how specifying delivery content and pricing affected the repair work that was conducted.</p> <p>(3) Obtain invoices for Restore Louisiana to track if penalties were utilized to begin understanding how these affected the outcomes.</p>	<p>(1) Identify high performers and create a 'best practices' document for future contractors.</p> <p>(2) Compare US estimation methods to those used by Southern Response in New Zealand to see if there are other methods of contracting for specific repairs that alleviate incentives.</p> <p>(3) Pair this research with surveys of survivors to understand their perception of the reconstruction process to determine the effectiveness of penalties on survivor outcomes.</p>

Restore Louisiana provides another perspective on contracts that could improve survivor outcomes. In the Restore Louisiana contracts, penalties were included to incentivize the program manager to ensure that contractors and builders completed their work on time, conducted survivor outreach programs, and followed specific environmental standards. By obtaining the invoices from Restore Louisiana, evidence can be obtained to show whether or not the penalties were enforced and to what extent they were utilized. This short-term goal would be the basis of a longer-term research project that could then pair survivor outcomes and perceptions of the reconstruction process with the penalties in place. One could learn whether or not the penalties aligned with what the survivors viewed

as important and if the penalties were used to appropriately incentivize builders to provide survivors with what they would perceive as a successful outcome.

Additional learning opportunities could come from a closer comparison of the Restore Louisiana and EQC Fletcher results to better understand whether the incentives used by New Zealand were more or less beneficial than US approach of using penalties. By establishing the best methods to incentivize or penalize the reconstruction effort the public and the survivors will benefit. Further research into the contracting of private firms for these efforts could improve survivor outcomes and these short- and long-term goals provide a starting point for this process.

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