EXECUTIVE ANALYSIS OF FIRE SERVICE OPERATIONS IN EMERGENCY MANAGEMENT

The Damage Assessment Process in Cape Coral, Florida following Hurricane Charley.

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CERTIFICATION STATEMENT

I hereby certify that this paper constitutes my own product, that where the language of others is set forth, quotation marks so indicate, and that appropriate credit is given where I have used the language, ideas, expressions, or writings of another.

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Abstract

This descriptive research project dealt with damage assessment following Hurricane Charley. The problem was Cape Coral Fire Department had not evaluated the damage assessment process following Hurricane Charley. Failure to research this prevented identifying potential improvements in damage assessment for future disasters. The purpose of this project was to assess the methods, instruments, and opinions of those who performed damage assessment for improvement in future disasters. This study answered three questions. How was damage assessment performed following Hurricane Charley? What were the opinions of how damage assessment was conducted by field personnel? What were the opinions of how damage assessment was collected by EOC personnel? Research was conducted by literature review, research of others, interviews and surveys. The findings determined that despite difficulties, the damage assessment operation was successful. Recommendations included assigning damage assessment drivers, conducting a community risk/capability assessment, improve training, update recording methods, improve communications and develop a two-tiered damage assessment system.

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Introduction

The focus of Emergency Management in the City of Cape Coral, Florida takes an all-hazards approach when attempting to educate the public regarding disaster preparedness. However, the threats from hurricanes are the biggest natural threat that the City of Cape Coral faces related to potential disaster events. Over the years the projected tracts of many tropical storms and hurricanes have raised concerns of public safety officials; only to have every previous storm change course and never become a real and serious threat to the City of Cape Coral since its incorporation in 1970. Portions of the city's disaster plan had been tested through state-wide mock hurricane disaster drills previously, but never put to use nor tested through an actual disaster event. However, on August 13, 2004 that changed forever when Hurricane Charley roared ashore and severely impacted Southwest Florida. This research project will focus on a very small and narrow portion of this disaster plan related to damage assessment and take an in-depth look at how it functioned during the disaster operations related to Hurricane Charley within the City of Cape Coral, Florida.

The problem is that the Cape Coral Fire, Rescue, & Emergency Management Services (CCFR&EMS) has not evaluated the damage assessment process used following the impact of Hurricane Charley. Failure to research this topic may prevent the organization from identifying potential improvements to the damage assessment planning and response process for future disaster events that may impact this city. One cannot imagine the overwhelming needs and requirements demanded on a fire department following a disaster event such as Hurricane Charley. Due to the long-lasting effects of this hurricane, the CCFR&EMS has never formally stopped and looked back at what worked well, and what didn't. This project will attempt to answer those questions related to one small operational area of the disaster plan; damage

assessment. The purpose of this descriptive research project is to assess the methods and instruments used in collecting damage assessment data and the opinions of those directly involved in performing the damage assessment operations following Hurricane Charley for potential improvement for future disaster events. Using the descriptive research approach, this project will focus on answering the following three research questions. How was damage assessment performed in Cape Coral, following the impact of Hurricane Charley? What are the opinions of how damage assessment was conducted by those who performed field operations? What are the opinions of how damage assessment was conducted by those collecting field reports operating at the Emergency Operations Center (EOC)?

Background and Significance

Located in Southwest Florida, the City of Cape Coral incorporated in August 1970, and its population continues to grow rapidly. With more than 160,000 residents, Cape Coral is one of the fastest growing areas in Florida. According to Public Information Officer Connie Barron, (personal communication, April 3, 2007) Cape Coral is the third-largest city geographically in the State of Florida and is the eleventh-largest city in population. The City of Cape Coral is the largest city in Southwest Florida and is unique, in that; within the city's boundaries is a vast network of over 400-miles of man-made canals leading to the Gulf of Mexico. With the close proximity to the Gulf of Mexico and the vast network of canal systems associated with the geographical make up of Cape Coral, the city it is extremely vulnerable to hurricanes and it's related storm surge.

When Hurricane Charley impacted Southwest Florida on August 13, 2004, it became the second-strongest hurricane to impact Florida; second only to Hurricane Andrew in August, 1992. The Centers for Disease Control and Prevention (CDC) reports, on August 13, 2004 at

approximately 3:45 p.m. EDT, Hurricane Charley made landfall at Cayo Costa, Gulf of Mexico barrier island west of Cape Coral, Florida as a Category-4 storm, with sustained winds estimated at 145-mph (CDC: September 17, 2004). The eye wall of Hurricane Charley passed just twenty-miles north-northwest of the City of Cape Coral as it traveled northeast through Charlotte Harbor, Florida. Sheltered in the city's hurricane resistant EOC, many public safety personnel and elected officials sat in disbelief as the wrath of Hurricane Charley was releasing its tremendous destructive power on all areas of the city. The city's Emergency Management Director/Fire Chief Bill Van Helden, immediately took the lead-role and began to explain to the city's leaders and Incident Management Team (IMT) in the EOC during the hours of Hurricane Charley's impact of what to expect and what would be done as he placed the City of Cape Coral's disaster plan into action. All emergency services throughout the city ceased operations when sustained wind-speeds reached forty-five miles per hour. As Hurricane Charley continued to unleash its tremendous power; 911 calls began to pour into the emergency dispatch center. With all emergency response operations suspended during the impact period of Hurricane Charley, 911 calls began to accumulate. No response would occur during the storm's peak until wind speeds diminished below forty-five mph sustained, to allow for police, fire and ambulance to safely respond. Knowing that all emergency responders in the fire and police department's would be taxed on providing service in a disaster event, the city's disaster plan called for the function of immediate damage assessment to be performed by fire inspectors and building inspectors from within the city's staff. This untested concept of performing damage assessment with fire inspectors and building inspectors, rather than emergency first responders was thought to be different than what many other areas of the United States do in disaster events. Two advantages were seen in this damage assessment concept; one would be more emergency

responders available for emergency response, and secondly, those individuals that were more familiar with construction stability and target hazard locations due to their normal job functions within the city would be performing this important task.

The importance of this research project is vital to the CCFR&EMS if it is to understand what went well in the damage assessment phase of operations, and what areas can be improved upon in the damage assessment phase of the city's disaster plan. The workload and extreme demands placed on all city services is difficult to describe during a disaster event such as Hurricane Charley. The resources of the CCFR&EMS were taxed beyond capacity as it responded to hundreds of emergency alarms over the days immediately following Hurricane Charley. Mass power outages plagued the city for days, loss of the city's computer system hampered fire department operations with no means of electronic use of the computer fire reporting system. Time continued and the disaster plan entered into recovery and mitigation over the following months. Demands outside the city such as documentation required by the Federal Emergency Management Agency (FEMA) and insurance company issues and lack of qualified building contractors and supplies were just some of the concerns in Cape Coral. Over time, hurricane recovery was replaced with new demands of the CCFR&EMS which never afforded the opportunity to stop and conduct an in-depth review or critique of all involved in the disaster operations surrounding Hurricane Charley. This research project will focus on one small area of operation during this disaster event and determine if the immediate damage assessment phase of the operation within the city's disaster plan should continue or be revised for future disaster events that may strike Cape Coral.

Finally, this project was selected based on the direct relevance to the third course required in the Executive Fire Officer Program (EFOP). The third course of the EFOP:

Executive Analysis of Fire Service Operations in Emergency Management (EAFSOEM); has the student function in the different roles within an emergency management scenario and the related considerations one will face in different disaster events. In addition, this project addresses the United States Fire Administration's (USFA) operational objective of promoting within communities a comprehensive, multi-hazard risk-reduction plan led by the fire service organization.

Literature Review

What is damage assessment? In reviewing the literature, the definition, terminology, description, and agency interpretation of this topic varied greatly. The most recent EFOP course through the National Fire Academy (NFA) and the United States Department of Homeland Security (DHS) titled: EAFSOEM defines in the student manual (2006) damage assessment as a "gathering of information related to the impact of an event, or series of events, on life and property, within a defined area (p. SM 6-3). However, in searching for the definition of damage assessment in the student manual of the Emergency Management Institute (EMI) under the jurisdiction of FEMA, located at the National Emergency Training Center in Emmitsburg, Maryland the term damage assessment is not used. Rather, the term used in the student resource guide for Rapid Assessment Planning Workshop in Emergency Management (WEM), (see FEMA 1995) is replaced with the term rapid assessment and defined as "all immediate response activities that are directly linked to initial assessment operations in order to specifically determine lifesaving and life sustaining needs (p. I-6). A previous EFOP research project conducted by Hoecherl (2002), discovered the term Preliminary Damage Assessment (PDA) used in the NFA's programs to be defined and used similarly to the term Rapid Impact Assessment (RIA) that is used in the programs associated with EMI courses. This same

research project explains that a PDA is a tool used to identify the severity of damage and the unmet needs of humans, business, government and the entire community; where as the RIA concept only has meaning for specific geographic areas related to gross damage from wind and water which is used for determining search and rescue priorities. Hoecherl continued that there is no known existence of a national standard or program model regarding rapid damage assessment reports (2002). This situation caused difficulties in Cape Coral following Hurricane Charley due to that much of the damage assessment data conducted and collected by personnel was not acceptable in its format presentation or documentation for the personnel affiliated with FEMA. The National Fire Protection Association (NFPA) defines damage assessment in Standard-1600 (2004), which addresses emergency management. NFPA: 1600 (3.3.2) defines damage assessment as "an appraisal or determination of the effects of the disaster on human, physical, economic, and natural resources" (p. 1600-6). The City of Cape Coral's Comprehensive Emergency Management Plan (CEMP), (2006) which was revised shortly after Hurricane Charley impacted this city, defines damage assessment as "estimation of damages made after a disaster has occurred which serves as a basis of the Governor's request to the President for a declaration of Emergency of Major Disaster" (p. VII-7). With the various definitions of Damage Assessment explained, the literature was reviewed for the purpose of conducting damage assessment.

In reviewing the literature for the purpose of why damage assessment is conducted, it was discovered that most literary sources had similar language explaining its purpose or justification. The Recovery Plan (2006), document for the City of Cape Coral listed four reasons for the purpose of conducting disaster assessment. The Cape Coral Recovery Plan (2006) listed the following:

> To determine recovery priorities, resource needs, justify state and federal assistance, and identify unsafe structures; 2) to determine the nature or extent of impact to city infrastructure for prioritization; 3) to provide information after the disaster and detailing the situation, location and extent and nature of damage; and 4) to provide information to determine priorities and requirements for restoration and reconstruction (p. RF# 1-1).

The student manual used in the NFA's: EAFSOEM course (2006) states the purpose of post-incident damage assessment is to "provide detailed information on the total amount and types of damage sustained to the community or area from the event" (p. SM 6-7). The post-incident damage assessment is different from the immediate damage assessment in that it is more detailed and specific and is not under the same time-critical urgency during the disaster event. The Florida Division of Emergency Management (2007) states that one of the most important elements of a local response to an emergency or disaster is damage assessment. It is essential in determining what happened, the effects, hardest hit locations, and prioritization to situations and resources needed from local, state or federal levels. Even the electrical power companies of Florida conduct damage assessment reconnaissance and prioritizes resources and efforts based on its findings. According to Marlow, Slatter, and Wozniak (2006) the Orlando Utilities Commission prioritizes restoration power as "1) hospitals, 2) fire and police stations, 3) emergency broadcast facilities, 4) water plants, sewage plants and lift stations, 5) food centers, 6) shelters, 7) commercial facilities, and 8) general circuits" (p. 14).

The purpose of damage assessment is also clearly outlined and justified for the sequence of events leading to a Presidential declaration within the State of Florida. The Florida Division of Emergency Management (2007) stresses the importance of disaster assessment and that it must be conducted at the local level. To summarize the events that lead to a Presidential

declaration in Florida, the following events must transpire. In Florida, local jurisdictions have the authority to declare, by resolution, a local state of emergency pursuant to Section 252.38(6) (e), of Florida Statutes. Such a declaration will allow counties in Florida to request state assistance, if needed; invoke mutual-aid assistance; and waive procedures and formalities otherwise required of local governments by law to conduct business in responding to the disaster. If a county determines the disaster is beyond its ability to effectively respond, a state of emergency can be declared by the Governor of Florida through an executive order. Once the State EOC has received the preliminary damage assessment and data information, the State of Florida and FEMA will initiate a joint damage assessment with the affected county government for justifying the need for federal assistance. If the county and state resources are overwhelmed to the point they are unable to adequately respond to the disaster, the Governor of Florida submits a written request to the President through FEMA, Region IV, in Atlanta, Georgia.

The next area of literature to be reviewed studied whom the assignment and responsibility of actually conducting damage assessment would be assigned too in a disaster event. The assignment of damage assessment duties varied based on the major natural-disaster threat associated to the various geographical areas of the United States. Areas threatened from a major earthquake for instance, which occur suddenly and with out warning, were commonly found to use on-duty fire fighters in a windshield survey from fire apparatus for conducting immediate damage assessment. Both the Los Angeles, California and Redmond, Washington fire departments, which are continuously under threat of a major earthquake, look to the fire department's on-duty personnel to conduct immediate damage assessment through windshield surveys; followed by the assistance from other government agencies and professional experts in the post-incident phase of damage assessment (Ganz, 1998 and City of Los Angeles, 1998). The

method of conducting damage assessment changes slightly to areas of the coastal United States that are threatened by hurricanes. Florida has dramatically different methods in conducting damage assessment compared to the west coast of the United States where earthquakes are commonly a threat. Seminole County, Florida (2000), utilizes a large and diverse force to conduct rapid damage assessment according to its disaster plan. In addition to fire and police reporting damage assessment, the operation also includes the sheriff's office helicopter fleet, personnel from the county's public works, environmental, traffic and utility departments.

In 2004, the use of fire inspectors for the City of Cape Coral's damage assessment team was thought to be innovative in its approach to a disaster event. However, Bushnell (2002) reported in his research "the most prevalent component of the fire department organization involved in damage assessment was the inclusion of fire prevention staff, as reported by 65% of the respondents" (p.34). The Florida Division of Emergency Management generated a list of agencies or individuals to consider when forming damage assessment teams. The Florida Division of Emergency Management listed the use of city and county engineers, utility personnel, police and fire officials, property appraisers, building inspectors, agricultural extension agents, county health officials, Red Cross officials, real estate officials and insurance agency representative as those commonly used for damage assessment teams (2007). One should note that absent from these lists are the reporting of damage within a community by the general public. In Florida, as hurricanes approach the coast and forecasters predict landfall paths, many areas of the state are issued either a voluntary or mandatory evacuation order for the areas in which they live. Barrett (2006) confirms that a large natural disaster often causes such damage and disruption to infrastructure that normal sources of information and witnesses often

do not exist on a local level because they are simply not there. In addition to specific personnel used in the damage assessment process, technology is beginning to play a key role as well.

Following the tsunami in December of 2004, National Aeronautics and Space Administration (NASA) began using satellite imaginary to create damage assessment maps for the United States Agency for International Development (USAID) Office of Disaster Assistance (see NASA, 2007). Aerial photos will probably become more common in disaster damage assessment operations in the future as technology advancements develop even further. Newcombe (2006) explains the role satellite photos can and will play in the future, related to damage assessment following a major disaster. This new high-resolution aerial imaginary was first used for damage assessment on the World Trade Center attacks on 9/11, followed by Hurricane Charley and Hurricane Katrina. In the same article, a professor from the University of Utah explains that images document what happens; taking air photos during a disaster will not only preserve the scene of an emergency, it will provide information on the damage extent and foretell what to expect the next time a disaster strikes.

Literature was reviewed pertaining to specific damage assessment research projects conducted from previous disaster events. Parker and Renning-Rowell (1972) reported on how the Tennessee Valley Authority (TVA) conducted damage assessment related to severity based on flood water depth of residential occupancies based on aerial and water-based views of visible structures. The TVA looked at four separate items in the damage assessment process; structure construction material, valuation of structure, visible exterior damage, and velocity of flow and buoyancy. Based on advancements in technology, FEMA has recently redrawn and distributed updated maps related to storm surge flooding from hurricanes based on the category strength of the approaching hurricane for coastal areas of the United States. This new FEMA storm surge

map for Cape Coral shows the serious threat flooding will have on Cape Coral, Florida and surrounding areas related to a land-falling hurricane's category (see appendix A).

Related to hurricanes, Olds (2005) reported that the City of Lakeland, Florida located in Central Florida, was hit by hurricanes Charley, Frances, and Jeanne in 2004. The final structural damage assessment costs for all three of these storms totaled more than $6.3 million dollars for the City of Lakeland alone (see Table 1).

Table 1

Hurricane Structural Damage, Lakeland, Florida

	Charley	Frances	Jeanne
Damaged	78	122	1,065
Destroyed	6	1	5
Estimated Cost	$430,850	$656,000	$5,296,100

(p. 6)

Hurricane Jeanne was by far the most destructive for the City of Lakeland, Florida. During Hurricane Jeanne, 90,000 homes were without electricity for more than a week, over 350 streets were blocked, 33 traffic signals were out and 32 major water line breaks occurred. Olds (2005) reported that "the most pressing problem was that the other city departments, exclusive of police and fire, did not seem to know how to work within an Incident Command System" (p. 7). Debris and blocked streets were not as numerous during Hurricane Frances on September 5, 2004 in Lakeland, as this was attributed to Hurricane Charley which impacted the area on August 13, 2004 which ridded most of the debris from the community. There may be other reasons to consider as well as to why the damage from the 2004 Hurricane season was not as costly as it could have been if steps where not taken from previous storms in Florida's history.

In 1992, Hurricane Andrew struck Florida and left $20 billion in claims damage to the insurance industry and was the most expensive disaster in United States history at the time according to O'Rourke (2005). The lasting effects of this storm energized private industry and government agencies to work together to investigate ways to reduce the damage potential that a hurricane could inflict in Florida's future. One major success from Hurricane Andrew was the stringent building codes that were developed in Miami/Dade County related to wind speed survivability to new residential and commercial construction. According to Connie Barron, Public Information Officer for the City of Cape Coral (personal communication, May 21, 2007), the full-time population of the city in 1992 was approximately 65,000 full-time residents. The explosive construction and population growth in Cape Coral of the late 1990's and early 2000's saw the population of Cape Coral grow to more than 150,000 full-time residents by 2004 according to Barron. Therefore, Hurricane Charley became the first major Hurricane to challenge the new Florida construction standards adopted following the destruction from Hurricane Andrew in 1992. More than half of the residential and commercial structures in Cape Coral were built under the new more-stringent hurricane-resistant construction codes. Many feel that Cape Coral fared far-better than other areas throughout Florida due in part, to these new more-stringent hurricane resistant construction standards. O'Rourke (2005) states that after studying storm damage and evaluating the effectiveness of building materials and methods, engineers from the Institute for Business and Home Safety found that houses built after 1994 sustained less damage because of post-Andrew construction requirements; and homes built under revised 2001 building codes fared even better in the 2004 hurricane season in Florida.

The worst hurricane to date in United States history was Hurricane Katrina which devastated many areas of the gulf coast region of Louisiana and Mississippi on August 29, 2005.

Damage assessment from Biloxi, Mississippi alone displays the importance of how important conducting damage assessment can be in informing state and federal agencies for seeking assistance following a disaster of this magnitude. Eleven days following Hurricane Katrina, the City of Biloxi, Mississippi (2007) generated preliminary damage assessment findings of 25,575 buildings standing before the storm, and reported 5,014 buildings gone or destroyed following landfall from Katrina.

In conclusion, the literature review discovered that common terminology should not be taken for granted. Many terms related to damage assessment have blurred meanings or are manipulated slightly from state to state or even agency to agency to the point there is not a clear understanding from everyone operating within a disaster. Even different phases of an operation such as damage assessment can and do have different meanings. One limitation noted in the literature review was the fact that many governmental agencies have limited research related to the aspects of the damage assessment process. This is probably due to the fact that the overwhelming requests for service and resources simply prohibit the ability to accurately document and conduct research of the damage assessment process until sometime after the disaster event has begun to stabilize. The vast literature discovered during this review related to damage assessment focused primarily with how to organize and prepare a damage assessment guideline or disaster plan for a potential disaster event. The majority of literature reviewed found that most agencies involved in immediate damage assessment conduct the process through a windshield survey by first-response suppression fire fighters. The post-incident damage assessment conducted found that most utilized experts in diverse specialties that worked in teams to accomplish a more thorough assessment of actual damage within a community or region. In

review of the literature and the limited research and reporting of damage assessment based on actual disaster events gives the foundation and rationale for this research project.

Procedures

This research project utilized the descriptive research methodology to answer: 1) How was damage assessment performed in Cape Coral, following the impact of Hurricane Charley; 2) what are the opinions of how damage assessment was conducted by those who performed field-operations; 3) what are the opinions of how damage assessment was conducted by those collecting field reports operating at the EOC? The procedures for conducting this project included data collected from the literature review, various surveys, review of government documents related to the operations surrounding Hurricane Charley response, personal interviews and review of public communication records.

The literature review began on the campus of the NFA in Emmitsburg, Maryland in January, 2007. In Florida, the literature review continued using a computer search of the internet for articles and previous research of others related specifically to damage assessment. The libraries of Edison Community College (Lee County, Florida) and Florida Gulf Coast University were visited to research additional articles and conduct inter-library loans.

The group of participants of the survey titled; Field Damage Assessment (appendix B) consisted of thirty-two individuals within the City of Cape Coral department of community development and fire. Of these thirty-two participants, twenty-four were building inspectors and eight were fire inspectors. The thirty-two participants were all male and ranged in age from thirty-nine to fifty-three years of age. All participants of this survey have been continuously employed with the City of Cape Coral from six to more than twenty-four years and will be identified as the Field Damage Assessment control group throughout this research

project. The field damage assessment control group participants included one supervisor from the fire prevention division and three supervisors from the department of community development. All participants of the field damage assessment control group conducted both immediate and post-incident damage assessment duties within the municipal boundaries of Cape Coral following the impact of Hurricane Charley.

A noted limitation of the field damage assessment control group participants is that eight employees from the department of community development (building inspectors) that conducted field damage assessment duties are no longer employed with the City of Cape Coral since Hurricane Charley and were unable to be located or contacted for inclusion in this research study. The final limitation to be noted is the possibility of the control group's unknown bias that may be present for unknown reasons when completing the survey instruments or conducting the interviews with those noted within this project.

The field damage assessment survey was the very first instrument used in collecting preliminary data related to operations in the field during Hurricane Charley by the field damage assessment control group. The survey for the field damage assessment control group was designed and developed on the website SurveyMonkey.com® on March 11, 2007. The field damage assessment survey consisted of ten questions that asked the control group participants about their related duties of damage assessment following Hurricane Charley. The survey was sent to all thirty-two field damage assessment control group participants on the City of Cape Coral's email intranet with an internet link to the survey. The instructions on how the survey was to be completed by the field damage assessment control group was explained in each answer of the survey. Some of the survey questions were written to identify areas of operational difficulty and success related to damage assessment. The remaining questions were written to

allow for a percentage-based score rating the success of the damage assessment process from an individual perspective and from an organizational perspective. This percentage rating was rated as one being the lowest, and five being the highest. Specifically, one represented complete failure of the mission; two represented minimal success; three was half the mission completed; four was the majority accomplished; and five being complete mission success. The statistical significance of the field damage assessment survey and its related results represents eighty percent of the individuals that participated in the collection of damage assessment data during Hurricane Charley. All thirty-two surveys were completed and returned by April 17, 2007 from the participants. Of the thirty-two participants from the original possible forty that were involved in the field damage assessment operation, thirty-two surveys were returned which is statistically significant for one-hundred percent of the survey population. This survey also asked a final question of participants within the field damage assessment control group if they might be available and interested for an interview related to damage assessment duties during Hurricane Charley. The results and findings of the field damage assessment survey resulted in a second survey questionnaire being developed.

The second survey was titled; DA(Damage Assessment) Field Operations In-depth (appendix C) to specifically identify difficulty and successes related to damage assessment in the field operations section by the thirty-two field damage assessment control group participants. This second survey for the field damage assessment control group was designed and developed on the website SurveyMonkey.com® on May 21, 2007. It was sent to the field damage assessment control group participants as before on the City of Cape Coral's email intranet with an internet link to the survey. The results from the damage assessment field operations in-depth questionnaire survey were completed and accounted for by all thirty-two participants on June 2,

2007. Of the thirty-two participants from the original possible forty that were involved in the field damage assessment operation, thirty-two surveys were returned which is statistically significant for one-hundred percent of the survey population.

The participant group of Emergency Operations Center (EOC) personnel of the survey titled; EOC Damage Assessment (appendix D) consisted of seven individuals within the organization. These seven participants included every person involved in actual damage assessment recording during Hurricane Charley at the Cape Coral EOC. These participants consisted of three females and four males aged forty-two to fifty-three years old and will be identified as the EOC control group throughout this project. The EOC control group participants have been continuously employed with the CCFR&EMS from seven to over twenty-two years of service. The positions the EOC control group represent within the fire department included administrative secretarial staff, division chief of prevention, battalion chief of emergency medical operations, battalion chief of special operations, and the emergency management coordinator. This survey was designed and developed on the website SurveyMonkey.com® on March 8, 2007. After the design and development of the survey, it was sent to the EOC control group participants on the City of Cape Coral's email intranet with an internet link to the survey. The instructions on how the survey was to be completed by the EOC control group was explained in each answer of the survey. Some survey questions allowed only a single answer, while others allowed multiple answers per question.

A limitation of the EOC control group is that all control group participants served in various capacities, functions, and duties within the EOC during Hurricane Charley, but all participated in collecting damage assessment reports from field operations personnel at some point during the disaster assessment phase of the disaster. A final limitation to be noted is the

possibility of the EOC control group's unknown bias that may be present for unknown reasons when completing the survey instruments or conducting the interviews with those noted within this project.

The EOC Damage Assessment survey was the very first instrument used in collecting preliminary data related this project by the EOC control group. This survey consisted of ten questions that asked the control group participants about their duties of damage assessment information collection following Hurricane Charley to identify key areas that required further investigation and study within the project. The questions within the survey varied from single answer, to multiple answers per question, and two questions which required the participant to write what they felt were the successes and difficulties associated with the damage assessment collection from field operations. The remaining questions were written to allow for a percentage-based score rating the success of the damage assessment process from an individual perspective and from an organizational perspective. This percentage rating was one being the lowest, to five being the highest possible score. Specifically, one represented complete failure of the mission; two represented minimal success; three was half the mission completed; four was the majority accomplished; and five being complete mission success. All seven surveys were completed and accounted for by April 10, 2007. The statistical significance of the survey and its related results represents one-hundred percent of the individuals that participated in the EOC operation in recording damage assessment data. This survey also identified individuals within the EOC control group that were available and interested for interview related to damage assessment duties during Hurricane Charley.

The next instrument to be used in the evaluation of damage assessment duties was the accuracy and completeness of the field damage assessment form (appendix E) used in the field

following Hurricane Charley by the thirty-two field damage assessment control group participants. After extensive searching of records and files in cardboard boxes, file cabinets and offices within the City of Cape Coral fire headquarters and the EOC, only forty-two original damage assessment form documents could be located and known to exist in their entirety. Due to this very limited number of damage assessment forms compared to the far greater number that were generated during the Hurricane Charley disaster, which was confirmed by the field damage assessment control group participants, it was determined that this instrument should be dropped from consideration for inclusion in this project due to the non-statistical relation of surviving documentation. The decision to omit these limited forms was due to the validity of an accurate representation of original forms could not be quantified as a basis for research and therefore omitted from this project. The final instrument used in the collection of data related to damage assessment were the review of historical government documents and email communications that exist related to damage assessment from Hurricane Charley operations.

Results

The first research question of this project asked: How was damage assessment performed in Cape Coral, following the impact of Hurricane Charley? The field damage assessment control group conducted all field damage assessment in Cape Coral in both the preliminary and post-incident damage assessment phases of the operation. Damage assessment was performed in conjunction with the guidelines stated in the CEMP (2006), “fire prevention inspectors will assess damage associated with commercial structures and occupancies within specific assigned geographical areas” (p.18-6). Included in the CEMP (2006) is the function of the Department of Community Development (DCD) where “building inspectors within DCD will assess damage associated with residential structures and occupancies within specific assigned geographical

areas following a disaster" (p. 18-3, 18-5). In interviews with both Fire Prevention Lieutenant Alan Carter (personal communication June 5, 2007) and Bill Selvia in DCD (personal communication, June 5, 2007) both confirmed that preliminary or immediate damage assessment was nearly complete within the first twenty-four hours of deployment following Hurricane Charley. Actual damage assessment operations did not commence until the sustained wind speeds decreased below forty-five mph in the City of Cape Coral. However, this time frame information of damage assessment being completed within twenty-four hours was contradicted by a city document obtained during research of historical government documents and records related to Hurricane Charley in Cape Coral. This specific City of Cape Coral document was the Situation Status Report update issued at 1600-hours on August 14, 2004 from the Cape Coral EOC which would make it nearly twenty-four hours after Hurricane Charley had struck the city (2004). In this City document, the Department of Community Development (DCD) had bulleted information under its heading that stated; "substantially completed preliminary damage assessment throughout the city"; with the next bulleted line reading "anticipate an additional 24-36 hours to complete initial assessment" (p. 1). The next City of Cape Coral Situation Status Report (2004) update conducted at 7:00 p. m. on August 14, 2004 from the EOC states that DCD was "30% complete- another two full days to complete, and fire prevention – businesses 20% complete" (p. 2). Immediate Damage Assessment was accomplished using the field damage assessment control group participants working individually using separate city vehicles to conduct windshield surveys throughout the city. Both Carter and Selvia stated in their respective interviews that the goal in the preliminary or immediate damage assessment phase was to quickly identify if all areas of the city could be reached and the quantity and severity of damage to structures in a general impression based only on observations from windshield surveys using the

field damage assessment control group participants. Damage assessment findings and information was then sent back to the Cape Coral EOC as soon as possible so this vital information could funnel all the way to the State EOC in Tallahassee for requesting federal assistance. The post-impact damage assessment was conducted within the guidelines of Cape Coral's CEMP (2006) for many days following the strike of Hurricane Charley by the field damage assessment control group participants, who were eventually accompanied by members of FEMA, the Southern Building Association, and disaster representatives from the insurance industry. Both Carter and Selvia stated that not all of the preliminary damage assessment could be completed on August 13, 2007 due to the dangers associated with operating during nightfall and major power outages. It was felt it was simply too dangerous for personnel to be conducting damage assessment at night with the amount of damage discovered during the remaining hours of light on August 13, 2004.

Carter stated that the design and function of the fire prevention staff in the damage assessment phase was similar to how fire inspectors are assigned throughout the city in the normal day-to-day operations of conducting fire inspections and new construction inspections. Each fire inspector has specific assigned geographical areas within the city in which they conduct all annual fire inspections and new construction compliance reviews during normal fire department business operations. Carter continued that the inspectors have been in and out of these buildings many times throughout their years of service and know how the buildings look and are constructed. This allowed the fire inspectors to quickly identify damage to commercial structures and look further to potential structural integrity issues when damage was discovered. Each fire inspector filled out a damage assessment form for each building that sustained moderate to severe damage and communicated this information by various methods throughout

the damage assessment phase of operations to EOC personnel throughout this phase of the operation. One single method of communicating the findings from the field damage assessment control group participants to those within the EOC was simply not possible due to failures associated with the communication systems during the early stages of response to Hurricane Charley.

Selvia (personal communication, June 5, 2007), from DCD stated that even though they had more building inspectors than the fire department in the field, they had far-more residential structures to inspect during damage assessment operations. The main goal in the post-incident phase of conducting field damage assessment by building inspectors were to identify every house that was to be red-tagged as unsafe for entry or inhabitance by the owner or occupant. He stated that inspectors did nothing else for the first forty-eight hours other than identify unsafe structures. He mentioned that during the ongoing damage assessment it started to become easier to identify damaged residential occupancies due to the blue-colored tarps placed on roofs of homes that FEMA and the fire department were distributing to home owners to cover missing roof decks and walls. In conclusion of how damage assessment was conducted, both Carter and Selvia stated that the CEMP was heavily-used and followed throughout the damage assessment phase of the response to Hurricane Charley.

The second question of this study asked: What are the opinions of how damage assessment was conducted by those who performed field operations? This question was answered by two separate surveys and interviews of participants of the field damage assessment control group. In the first survey of the field damage assessment control group (see appendix B), the participants were asked ten specific and separate questions. The results of this first survey lead to the design and development of a more in-depth survey (appendix C), to collect additional

data regarding the damage assessment duties in the City of Cape Coral following Hurricane Charley from the field damage assessment control group participants. The comprehensive analysis of the survey data is listed in the remainder of this section based on response percentages. To assist in the ease of understanding and interpreting the data from the first field damage assessment control group survey; a percentage graph has been included for each survey question in the appendix section of this project (see Appendix F).

In the first question of the field damage assessment survey (appendix B), 100% of the thirty-two field damage assessment control group participants answered that they were directly involved in field operations duties following Hurricane Charley.

The second question of the survey asked if the field damage assessment control group had partnered with any other department or agency in performing their damage assessment duties. Of the participants, 63% (20-participants) of the control group responded that they had not partnered with any other entity, while 38% (12-participants) had some type of partnership during their damage assessment duties. Of this 38%, four in the control group had partnered with Lee County Emergency Management personnel; four others had FEMA representatives, and the four remaining in the control group worked with mutual-aid fire department personnel at some point during the damage assessment phase.

The third question asked the control group how they were assigned to perform damage assessment within the City of Cape Coral. The field damage assessment control group participants responded that 75% (24-participants) had been assigned pre-determined geographical areas of the city; while the remaining 25% (8-participants) responded that they had no clear understanding of the task.

The fourth question in this survey asked the thirty-two participants of the control group how long did it take for you to perform immediate damage assessment following Hurricane Charley? The control group responded that 75% (24-participants) stated that it took more than 24-hours to conduct immediate damage assessment; while 25% (8-participants) stated it took between 12 – 24 hours to conduct immediate damage assessment.

The fifth question of the survey asked how damage assessment was reported to the EOC. Five categories were listed for the control group to select and multiple selections were allowed for responding to this question. Of the choices provided, radio transmission was selected by 6% (2-participants); via cell phone was selected by 25% (8-participants); handed in on written form was selected by 53% (17-participants); face-to-face was selected by 13% (4-participants); and other method was selected by 3% (1-participant).

The sixth question asked the control group participants on how they would rate the method of reporting damage assessment information to the EOC based on their experience with Hurricane Charley. The control group was given one of five choices to select as: complete failure; minimal mission accomplished; half of the mission was accomplished; majority of mission accomplished; and total success of mission. The control group responded by 75% (24-participants) felt that the mission was accomplished with minimal success; followed by 22% (7-participants) responded that half of the mission was accomplished; followed by 16% (5-participants) that the majority of the mission was accomplished. No participant selected that it was a complete failure or total success when answering this specific question.

The seventh question of the survey asked the control group to check the box of eight listed items that prevented or interfered with the performance of their damage assessment duties. This question allowed for more than one selection of the eight items listed which were blocked

roadways; communications failure; lack of proper equipment; public interference; transportation issues; EOC staff; elected officials; and other reasons. The percentage for each item selected from the control group were blocked roadways accounted for 28% (9-participants); communications was selected by 100% (32-participants); lack of proper equipment was selected by 16% (5-participants); public interference, transportation issues, EOC staff, and elected officials was not selected by any participant of the control group and only 6% (2-participants) listed other reason that prevented or interfered with them from conducting damage assessment duties.

Question number eight of the survey asked the control group to select on a scale of one (lowest) to five (highest) of how they would rate the their personal involvement in the success of the damage assessment mission following Hurricane Charley. The selection and responses were 1) complete failure of mission had 0% selecting this category; 2) minimal mission accomplished was selected by 50% (16-participants); 3) half of the mission accomplished was selected by 25% (8-participants); 4) majority of mission accomplished was selected by 25% (8-participants); and 5) total success of the mission was selected by 0% of the participants.

The ninth question of the field damage assessment control group was asked to rate on a scale of one (lowest) to five (highest) of the overall success of how the damage assessment phase of Hurricane Charley was performed in the City of Cape Coral. The selection categories and responses from the control group were 1) complete failure of mission was selected by 6% (2-participants); 2) minimal mission accomplished was selected by 50% (16-participants); 3) half of mission accomplished was selected by 28% (9-participants); 4) majority of mission accomplished was selected by 16% (5-participants); and 5) total success was not selected by any participants of the control group.

The tenth and final question of the survey asked the participants of the field damage assessment control group if they would be available for an interview at a later date related to their experience in damage assessment with Hurricane Charley if needed. Of the thirty-two participants, 56% (18-participants) selected that yes; they would be available and listed names and contact information. The remaining 44% (14-participants) selected to respectfully decline the availability for an interview.

The results of the field damage assessment survey lead to the design and development of a second survey tool to be used on the same thirty-two participants of the field damage assessment control group for this project. This second survey tool for the field damage assessment control group was titled: DA (Damage Assessment) Field Operations In-depth (appendix C) and consisted of nine specific questions. The comprehensive analysis of the survey data is listed in the remainder of this section based on response percentages. To assist in the ease of understanding and interpreting the data from this second in-depth damage assessment survey; a percentage graph has been included for each survey question in the appendix section of this project (see Appendix G).

The first question of this survey asked the participants that were involved in conducting damage assessment in the field, what training or understanding did they have prior to participating in the process during Hurricane Charley. There were five selections available to select and the responses were: 1) no training at all was selected by 56% (18-participants); 2) briefed quickly of what to do before deployment was selected by 3% (1-participants); 3) some training on subject was selected by 31% (10-participants); 4) in-depth training provided was not selected by any participant; and 5) clear understanding and confident in mission was selected by 9% (3-participants.

The second question of the in-depth survey asked participants of the control group an open-ended question about the damage assessment forms that were used. The question asked the forms used in damage assessment were… 1) perfect for the task; 2) met some objectives and able to accomplish task; 3) minor problems that required field modifications; 4) major problems that wasted my efforts; and 5) useless and need to be redesigned? The responses were 1) perfect for the task was not selected by any participant; 2) met some objectives and able to accomplish task was selected by 13% (4-participants); 3) minor problems that required field modifications was selected by 22% (7-participants); 4) major problems that wasted my efforts was selected by 56% (18-participants); and 5) useless and need to be redesigned was selected by 9% (3-participants.

Question three of the in-depth survey asked participants of the control group if they had received any further training on damage assessment following Hurricane Charley. The selection and response from the control group were 1) no, none at all was selected by 16% (5-participants); 2) minimal training, still would have problems was selected by 56% (18-participants); 3) some training efforts have been made was selected by 28% (9-participants); 4) good training provided was not selected nor was 5) fully-trained and ready if it happens again, by any of the participants.

Question four of the survey asked the participants of the control group now that they have conducted damage assessment following the disaster of Hurricane Charley, what areas need attention in their opinion. There were eight possible selections and the participant was able to check more than one selection for this answer. The responses and selections were 1) more reliable methods to communicate with EOC were needed was selected by 100% of the thirty-two participants; 2) provide training for personnel in damage assessment was selected by 66% (21-participants); 3) damage assessment documentation forms were selected by 94% (30-

participants) 4) better transportation was selected by 53% (17-participants); 5) more trained personnel was selected by 9% (3-participants); 6) more rest and rehabilitation for personnel was selected by 9% (3-participants); 7) provide in-depth supervisor training was selected by 81% (26-participants); and 8) Emergency Management personnel need further training was selected by 38% (12-participants) of the control group.

The fifth question of the in-depth survey asked the participants of the control group to list what they found to be the most frustrating or difficult situation regarding conducting damage assessment. The replies to this question where in one of six general responses from the control group participants. The most common reply listed was from 50% (16-participants) and listed lack of communication with EOC or immediate supervisor as the number one response. The next highest response was from 16% (5-participants) that listed that the wrong damage assessment forms were handed out and that FEMA did not recognize them in proper documentation format. The next response given had 13% (4-participants) reply that duplicated efforts occurred after FEMA arrived in Cape Coral. Tied at 13% (4-participants) was the reply that there was no recognition or feedback on performance following Hurricane Charley. The next reply was from 6% (2-participants) that they had been assigned additional or different duties while responsible for conducting damage assessment. The final response reply was from 3% (1-participant) that he had run out of damage assessment forms in the field.

The sixth question of the in-depth survey asked the participants of the control group that based on their experience with Hurricane Charley, how they think the City of Cape Coral would perform at damage assessment if a hurricane strikes again. There were five possible responses on the survey and the replies to the responses were 1) still not ready; was selected by 22% (7-participants); 2) poorly was selected by 34% (11-participants); 3) similar results was selected by

38% (12-participants); 4) better prepared this time was selected by 6% (2-participants); and 5) fully-ready this time was not selected by any of the participants in the control group.

The seventh question of the in-depth survey asked participants of the control group what was the number one item that needs to occur to perform damage assessment more efficiently next time a disaster strikes Cape Coral. Their responses and selections were 1) clear roads faster was not selected by any of the participants of the control group; 2) establish dependable communication method was selected by 69% (22-participants); 3) provide better transportation was not selected by any of the control group participants; 4) use computer technology in data collection was selected by 6% (2-participants); 5) redesign/use other handwritten damage forms was selected by 13% (4-participants); 6) provide training for personnel was selected by 13% (4-participants); and 7) other (write-in answer please) was not selected by any of the participants of the control group.

The eighth question of the in-depth survey asked each participant of the control group what the City of Cape Coral did best related to conducting damage assessment following the impact of Hurricane Charley. This question required the participant to write-in a response on the survey. The responses from the control group participants resulted in a general theme in seven different categories. The most-common general themed response came from 28% (9-participants) that the job was completed despite the terrible communications failure. The second-highest common general themed response came from 25% (8-participants) who responded that the identification of unsafe/dangerous structures immediately after the storm. The third common themed response came from 16% (5-participants) that stated finding help for those that needed assistance. The fourth most-common themed response came from 13% (4-participants) who stated that establishing numbers and locations of damaged structures for

permitting and repairs. The fifth most-common themed response tied with 13% (4-participants) who stated providing good customer service to taxpayers. There were two other responses that were stand-alone and did not have a general theme. One participant stated that no one was injured; and the other was that the city convinced citizens to evacuate prior to the storm hitting.

The ninth and final question of the in-depth survey required a write-in response from participants of the field damage assessment control group. The participants were asked what they felt they needed to state in their opinion related to damage assessment that this author had failed to address in this survey. The responses from this question were of four common themes. The most-common themed response came from 53% (17-participants) that damage assessment teams should not be assigned special or extra details from supervisors while conducting the damage assessment mission. The second most-common themed response came from 25% (8-participants) that stated a frustration that there was never any critique or review of the damage assessment process by emergency managers or supervisors of those involved with the assignment. The third most-common themed response came from 13% (4-participants) that stated they were frustrated by the failure of city staff and/or elected officials to understand the difficulties of conducting damage assessment in a devastated disaster environment. The fourth and final most-common themed response came from 9% (3-participants) that wanted to know if the city (senior staff) had really learned anything from the event.

The third and final question of this research project asked, what are the opinions of how damage assessment was conducted by those collecting field damage assessment reports operating at the City of Cape Coral EOC? This survey was designed to collect data from the seven participants of the EOC control group. The EOC damage assessment survey asked ten specific questions to the EOC control group participants. The results of this survey are detailed in

percentages based on responses from the EOC control group. To assist in the ease of understanding and interpreting the data from the EOC control group survey; a percentage graph has been included for each survey question in the appendix section of this project (see Appendix H).

The first question of the EOC control group survey asked to confirm they were directly involved in damage assessment either in field operations or the EOC following Hurricane Charley. The response was 100% (7-participants) confirming they were directly involved in damage assessment either in the field or EOC during Hurricane Charley.

The second question of the survey asked the EOC control group what their actual assignment was related to damage assessment following Hurricane Charley. The response was 86% (6-participants) were only in the EOC; while 14% (1-participant) stated both field operations and EOC assignments.

The third question of the survey asked the EOC control group to list any items that interfered with their success of performing damage assessment duties. The EOC control group had the ability to select multiple questions up to twelve possible selections for a response. The twelve selections and related responses were 1) power failure was not selected; 2) equipment malfunction was not selected; 3) radio transmissions was selected by 43% (3-participants); 4) cell phone transmissions was selected by 100% (7-participants); 5) lack of trained personnel in the field was selected by 14% (1-participant); 6) elected officials was not selected; 7) other city departments was not selected; 8) outside agencies was not selected; 9) public interference was not selected; 10) workload overwhelming was not selected; 11) lacked knowledge in performing this function was not selected; 12) other reasons was not selected.

The fourth question of the EOC control group survey asked participants to select those assigned the primary task of reporting immediate damage assessment to the EOC in Cape Coral. The responses and selections were 1) fire inspectors was selected 100% (7-participants); 2) fire suppression personnel was selected by 14% (1-participant); 3) police was selected by 29% (2-participants); 4) public works was not selected; 5) building inspectors was selected by 100% (7-participants); 6) Lee County Emergency Management was not selected; 7) CERT teams was not selected; 8) citizen reports was selected by 43% (3-participants); 9) media broadcast was not selected; 10) other method was not selected.

The fifth question for the EOC control group survey asked participants on a scale of one (lowest) to five (highest) on how they would rate their success in performing damage assessment duties following Hurricane Charley? The choices and responses from the EOC control group were 1) complete failure of mission was not selected; 2) minimal mission accomplished was selected by 14% (1-participant); 3) half of the mission accomplished was selected by 29% (2-participants); 4) majority of mission accomplished was selected by 57% (4-participants); 5) total success of mission was not selected.

The sixth question of the EOC control group asked the participants to rate the overall performance of the CCFR&EMS related specifically to immediate damage assessment following Hurricane Charley. The choices and responses for the EOC control group participants were 1) complete failure of mission was not selected; 2) minimal mission accomplished was selected by 14% (1-participant); 3) half of the mission accomplished was selected by 29% (2-participants); 4) majority of mission accomplished was selected by 57% (4-participants); 5) total success of mission was not selected.

The seventh question of the EOC control group survey asked participants with the experience gained following Hurricane Charley, should the same model or method of immediate damage assessment be deployed in Cape Coral for the next disaster event. The EOC control group selected that it would remain the same 71% (5-participants) and 29% (2-participants) selected it should be changed.

The eighth question for the EOC survey asked the control group specifically related to the immediate damage assessment phase following Hurricane Charley, did they identify any weaknesses or difficulties to this function. The EOC control group participants responded with 100% (7-participants) stating the failure of the Nextel cell phone, local telephone service, and intermittent radio system failure as being the greatest difficulty to performing their damage assessment recording duties.

The ninth question of the EOC survey asked the control group specifically related to immediate damage assessment following Hurricane Charley, did they identify any successes related to this function. The responses were 57% (5-participants) listed the use of both fire inspectors and building inspectors in damage assessment as a great success. The next response was that the system worked as designed was selected by 29% (2-participants) of the EOC control group participants.

The tenth and final question of the EOC survey asked the EOC control group participants if they would be available for an interview at a later date related to their experience with damage assessment during Hurricane Charley if needed? All seven participants (100%) of the control group stated that they would be available for an interview.

Discussion

The findings related to this research project are unique because of the very-limited research available from previous disaster events from individuals who have conducted damage assessment during field operations. The majority of research that currently exists related to actual damage assessment following a disaster has focused mainly on specific construction industry trades and materials or from a humanitarian response standpoint. There was a major research response from all industries and fields following Hurricane Andrew that hit Florida in 1992. Hoecherl, (2002) described the aftermath of Hurricane Andrew as "apocalyptic proportions" with significant damage to 83,000 structures and leaving 160,000 people homeless. He added that the federal government was sharply criticized for their slow response to the disaster; which the federal government blamed the delay on the lack of early damage assessment intelligence from the regional EOC and Florida emergency management officials. The resulting literature from research surrounding Hurricane Andrew has allowed for many changes not only in Florida, but the entire United States coastal areas that are threatened by Hurricanes. Wakimoto and Black (1994) conducted extensive research related to damage assessment specifically related to the wind speeds at the eye wall of Hurricane Andrew. The research project compiled extensive research from aerial surveys and ground surveys from personnel to document the destructive path left by Hurricane Andrew. These findings were then superimposed on radar paths of Hurricane Andrew as it traveled over the Florida peninsula to map out and confirm damage from Hurricane Andrew for the creation and development of future computer software models that calculate and predict potential hurricane damage assessment from hurricane radar of future hurricanes. The United States Department of Housing and Urban Development launched a research effort to assess damage to single-family residential housing in

Florida, (see Crandell, 1993) and ways to improve construction methods for survivability of homes in future hurricanes. Many of the findings in this and other research efforts following Hurricane Andrew resulted in updated and more stringent changes in Florida's construction codes to make structures more hurricane resistant. The construction improvements that occurred for hurricane survivability following Hurricane Andrew directly benefited Cape Coral in reducing damage from Hurricane Charley in 2004.

Their have been many previous research projects in the Executive Fire Officer Program that have created or reviewed disaster plans at their respective agencies. To review every one would simply be too great a task to address in this project. However, there are many that share in similarity and those subjects will be addresses specifically related to this project. Many previous research projects have recommended the use of law enforcement in their damage assessment plans. Ganz (1998) recommended this consideration, where police officers would perform rapid damage assessment to reduce time to accomplish the mission. Though Cape Coral does not have this designed into their CEMP and such a plan was not implemented during Hurricane Charley, the idea has advantages. In Cape Coral, the city has a take-home police car program for every uniformed officer. This recommendation has merit in this author's opinion that would greatly enhance the ability to rapidly perform immediate damage assessment throughout the city following a disaster event due to the shear numbers of police officers with vehicles. Bushnell's (2002) research reported that slightly more than half of the respondents to a survey related to damage assessment reported emergency management, external to the fire service, performs immediate damage assessment.

In the majority of other disaster plans by previous EFO student research projects is the use of first-response on-duty fire fighting personnel for conducting damage assessment following

a disaster in their respective community. This concept has valid merit where disasters might occur from tornados, earthquakes, floods or terrorist attack type-events where they might occur suddenly and without warning. Hurricanes, which are the major disaster threat for Cape Coral, allow time to prepare as they approach land. Hurricanes can be tracked from the time they develop off of the coast of Africa or below Cuba in the Caribbean and can be tracked for hundreds to thousands of miles as they approach Florida. As hurricane computer models predict a storm's path, the City of Cape Coral can begin to prepare for the potential hurricane strike and implement the CEMP. As with Hurricane Charley, Cape Coral had everyone ready before the storm actually hit the area. The area of concern under our current CEMP is what will be done when a sudden catastrophic disaster event strikes suddenly without warning? What if it occurred after normal business hours? The City of Cape Coral's CEMP is heavily-slanted to dealing with a hurricane-type disaster as currently written, though it states it takes an all-hazards approach. In an internal City of Cape Coral memo from the Fire Chief Bill Van Helden to the Emergency Management Planner Ellen Davis on September 23, 2004 dealing with lessons learned (Hurricane Charley), the Fire Chief listed that personnel from DCD that conducted damage assessment were in prior to the storm and those same personnel were then used non-stop after the event and for the longest-period of time without relief. This non-stop use of the participants of the field damage assessment control group may have influenced some of the negative and low ratings associated with the responses listed in the two surveys. These same personnel may not be able to perform successfully in a future disaster event that strikes suddenly, and without warning in Cape Coral. Bushnell (2002) recommended a two-tiered damage assessment model in his research project in which fire prevention personnel would handle immediate damage assessment duties during normal business hours, while the standby volunteer engine company assumes the

responsibility during off business hour time periods. For fire fighters to perform damage assessment in Cape Coral, they would need to receive the training and understand their respective roles in the CEMP that currently does not exist.

Training and understanding of the disaster plan at all levels and ranks of the department and government has been a resounding theme in many of the previous EFO projects I have reviewed dealing with creation or review of disaster plans. The concept of everyone knowing and understanding the disaster plan plagued Cape Coral during Hurricane Charley by the responses from those that conducted damage assessment field operations within this project. The Fire Chief down to the line firefighter must have an understanding of the disaster plan is one recommendation made by the research effort conducted by Hoecherl (2002). Yet Bowman, (2006) further recommends seeking input and understanding from everyone involved in the emergency management process, not just emergency responders, but private-sector and non-profit groups should be sought as well in disaster planning. This author takes issue with such a suggestion, the majority of private sector and non-profit groups will not be responding to the disaster event in a response and recovery mode and therefore would be an unnecessary component of a CEMP. Hoecherl (2002) reviewed the CEMP plan for the City of Fort Lauderdale Fire-Rescue plan that was written in 1993 and the City of Fort Lauderdale CEMP which was revised in 1995. Neither plan at the time was in sync with Broward County's comprehensive emergency management plan which was revised in 2001 in which both operate under. Hoecherl continued that both Fort Lauderdale plans address the requirement of performing damage assessment, but both clearly lacked any defined lines of authority of whom, and when, and how that task will be performed. Damage assessment duties were clearly defined following Hurricane Charley in Cape Coral and the recent CEMP revision clearly lists fire

prevention and DCD as the responsible departments for conducting this mission following a disaster.

In my interpretation of the results of this project, the EOC control group scored a higher satisfaction of completing the mission in conducting damage assessment opposed to the field damage assessment control group. To summarize the responses that can be correlated with a percentage of mission success in the EOC control group found both questions had duplicate answers. Question five and six asked that the field damage assessment control group participant to select the overall mission success and 14% responded it was a minimal success; 29% responded half the mission was accomplished; while 57% felt that the majority of the mission was a success. Many factors may be attributed to this response, however, the magnitude of damage and disbelief in seeing this for the first time may have caused participants of the field damage assessment control group to feel overwhelmed and that little progress was made during the damage assessment phase of the mission. The participants in the EOC control group were conducting their mission inside a sheltered, air-conditioned EOC environment with electricity provided by back-up generator power and not impacted by the first-hand visual destruction observed by the participants of the field damage assessment control group. This more-comfortable EOC environment alone may have provided for a more content and positive attitude related to the survey responses related to damage assessment from the EOC control group. However, 100% of the EOC control group participants listed failure of the communication systems as being the item that caused the greatest difficulty in performing the duties in damage assessment recording during Hurricane Charley.

In summary to the first question of how damage assessment was performed, both Carter and Selvia felt more personnel were needed for conducting damage assessment

operations. However, both understood that limited resources should be expected for a disaster event of this magnitude. All governmental resources throughout Southwest Florida were simply overwhelmed when dealing with the disaster surrounding Hurricane Charley.

There was much frustration however from the field damage assessment control group participants related to communication failures, wrong damage assessment forms and lack of training or understanding of the mission. The majority of participants of the field damage assessment control group responded less favorably than the EOC control group related to the damage assessment mission. In question number six of the field damage assessment survey, 75% of the participants felt that the methods of reporting damage assessment to the EOC was minimally successful. This was directly related to the multiple communication system failures surrounding Hurricane Charley. Question eight and nine of the field damage assessment survey can be correlated with a percentage of mission success from the field damage assessment control group participants. Related to personal involvement in the damage assessment process, 50% responded they were minimally successful; while 25% responded half the mission was accomplished with the remaining 25% responding the majority of the mission was accomplished. Question nine represented the overall damage assessment mission success from an organizational perspective from the field damage assessment control group. The responses were less favorable than the EOC control group. Of the responses, 6% stated that damage assessment was a complete failure; 50% responded minimal success; 28% with half the mission accomplished; and only 16% responded that the majority of the damage assessment mission was accomplished. Some of this frustration may have been avoided through better training and understanding of the CEMP prior to sudden implementation during Hurricane Charley. Though the participants in the field damage assessment control group was not divided between fire prevention and DCD

personnel in this project's design, frustration seemed higher by those participants from DCD in the field damage assessment control group which may have influenced the overall outcome of this study. One consideration to this may be the fact that the DCD personnel (building inspectors) were far outside their normal duties and comfort in performing in an emergency or disaster event. The fire prevention personnel seemed more content with the performance of damage assessment which may be directly attributed to their training and experience related to their respective fire service careers. All of the fire prevention personnel have different years of experience as firefighters in fire/rescue operations. This observation was further confirmed by Carter (personal communication June 5, 2007) who stated that he felt damage assessment was conducted in accordance with the CEMP as it was designed to function. Selvia (personal communication, June 5, 2007), on the other hand was not as confident that the damage assessment went as smoothly. He felt it was somewhat overwhelming and unorganized in conducting the residential portion of the damage assessment by using one inspector per vehicle, but that it did get accomplished. Selvia stated that many of his subordinates felt a driver would have allowed for a more efficient and safer method of conducting the windshield survey. This comment would directly relate to the 53% of respondents from the field damage assessment control group in question number four of the in-depth survey which listed better transportation was needed. Alan Carter later mentioned in his interview that fire prevention staff meets annually at the Lee County EOC with other Lee County fire departments to receive training related to conducting damage assessment in the field. It should be noted that DCD personnel do not receive, nor attend this annual damage assessment training event.

The implication for CCFR&EMS from this research study is the opportunity to recognize that there are potentially many areas for improvement related to conducting damage assessment

following the input from those that participated in damage assessment operations surrounding Hurricane Charley. Some of these were addressed in an After Action Report from Hurricanes Charley and Frances by Fire Chief Van Helden to City Manager Terry Stewart in an internal written memorandum on 14 October, 2004. Specifically related to damage assessment Emergency Management Planner Davis recommended reducing the number of people in the EOC. Carl Schwing, Director of DCD recommended improvements in communications, more inspectors for damage assessment, more specific damage assessment duties, and better pre-assigned grids for inspectors for damage assessment in the future. Emergency Management Director / Fire Chief Van Helden recommended conducting damage assessment of city infrastructure, particularly water facilities, city hall, fire stations, and hospitals. The suggestions from Fire Chief Van Helden would be directly addressed during damage assessment if the city were to develop and adopt the "community risk / capability assessment model" for the City of Cape Coral as taught in the EAFSOEM course (see United States Department of Homeland Security, 2006) in unit four of the student manual (p. SM4-3 – SM4-71). This model would also address the recommendation from DCD Director Carl Schwing regarding a more-focused and better pre-assigned grid for inspectors in future damage assessment missions following a disaster.

In summary, the participants of this study have provided valuable knowledge in understanding the damage assessment process following Hurricane Charley in Cape Coral, Florida. Improvements are needed in areas such as communications, training, and documentation related to conducting damage assessment. Hurricane Charley changed the mindset of many individuals in the public safety sector in Southwest Florida, including this author. Many had felt that the geographical location of Southwest Florida and the many, many storms that had threatened us previously, only to change course, had left us with a sense of

immunity and false sense of security of being seriously vulnerable. On August 13, 2004 Hurricane Charley changed that mindset and feeling of immunity. Being prepared with a plan that can be implemented and remain flexible that everyone is familiar with will be vital to the success of one's mission following a disaster event.

Recommendations

The recommendations related to this study are provided to improve on the areas related specifically to conducting damage assessment operations in the City of Cape Coral for future disaster events. By collecting the data from the surveys, interviews with personnel within the study's control groups, and review of the literature, the following recommendations are provided for consideration.

Establish or designate drivers for the damage assessment teams to increase efficiency of existing team's personnel. This can be accomplished by allowing the damage assessment inspector to be observing, documenting and contacting the EOC rather than concentrating on driving and conducting damage assessment simultaneously. This will create for a safer environment and allow the inspector to constantly conduct the windshield survey and document findings without having to be distracted from the dangers of driving on the debris-littered roadways in a disaster environment. Such a recommendation may possibly prevent the need for additional inspectors during a disaster as was recommended by many participants within this study. Drivers would allow for better efficiency of the inspectors as riders acting as observers only.

The next recommendation would be for the City of Cape Coral to conduct a community risk / capability assessment for identification of target hazards and specific occupancies and infrastructure that require immediate assessment for damage following a disaster event. This

would allow for a more detailed assessment of the key structures, facilities, and target hazards within the city in a more efficient and precise manner than occurs currently in the CEMP.

The next recommendation would be to take the comments from this study and provide training for fire prevention and DCD inspectors related to damage assessment expectations and procedures before the next disaster strikes. Many of the inspectors that participated in Hurricane Charley have valuable recommendations and ideas that could be discussed in a training environment that might lead to improved changes in conducting damage assessment for the future. The inspectors who conducted the damage assessment in Hurricane Charley have suggested that the next hurricane might be a repeat performance of Hurricane Charley if training and expectations and procedures are not clearly explained. This would be a great opportunity to teach the contents of the CEMP to not only the inspectors, but all city departments and personnel that are expected to perform duties within the CEMP.

Recommendation of updating the damage assessment form and seek recommendation or adoption of existing damage assessment forms from FEMA. In addition, the investigation into technology such as computer tablets or laptop software with a template program for damage assessment that can quickly by filled out by an inspector rather than completing a hand-written form. Such a system would also allow for storage and transfer of vital damage assessment information more quickly for future disaster events while having an excellent method for data retrieval for post-incident recovery.

The next recommendation would be to design, develop, or purchase a reliable backup communication method when telephone, cell phone and computer systems fail. This can be accomplished by a backup radio system, mobile cell phone transmission tower system, or other

computer laptop wireless transmission service exclusive to the operations of the City of Cape Coral.

The final recommendation from the findings of this project would be to design a two-tiered system for conducting damage assessment for disaster events that occur suddenly without warning for firefighting personnel within Cape Coral. Currently, the CEMP is mainly written that would allow for a pre-plan and assembly period prior to the disaster occurring as is common with a hurricane-type event. Systems and procedures should be in place for when a sudden disaster might strike without warning and seriously delay the damage assessment process which would cause further delay in additional resources from being requested and secured to assist; as was the case in 1992 during Hurricane Andrew.

In summary, this project focused on finding out how damage assessment was conducted from those participants in the field damage assessment process and those that collected the findings in the City of Cape Coral's EOC during Hurricane Charley in 2004. The control group participants listed straight-forward comments and have identified many key areas that can be improved to make the process of damage assessment more efficient in the future. This project looked specifically at damage assessment, which was one very small section of the overall Hurricane Charley disaster response effort. By no means was the disaster assessment conducted during Hurricane Charley considered to be a failure or in need of major improvements. Both weaknesses and successes in the damage assessment process were identified by this research project. Will improvements and modifications be made from this research project? That remains to be seen. Over all, the city manager, elected-officials, media outlets, emergency management representatives and the general public felt that the overall response to Hurricane Charley in Cape Coral, Florida was handled extremely well. The men and women that worked tirelessly through

the days and weeks following Hurricane Charley learned many lessons not only from Hurricane Charley, but the record-breaking year of hurricanes that struck Florida in 2004. Further research is needed in the area of emergency management and related operational duties related to actual disaster events. Only by evaluating and researching the current systems we have in place for standard practices related to response and recovery for actual disasters will the field of knowledge be advanced. Though Hurricane Charley is now behind us and even overshadowed by the more devastating disaster events surrounding Hurricane Katrina in 2006, Hurricane Charley will never be forgotten by those that participated in the disaster response.

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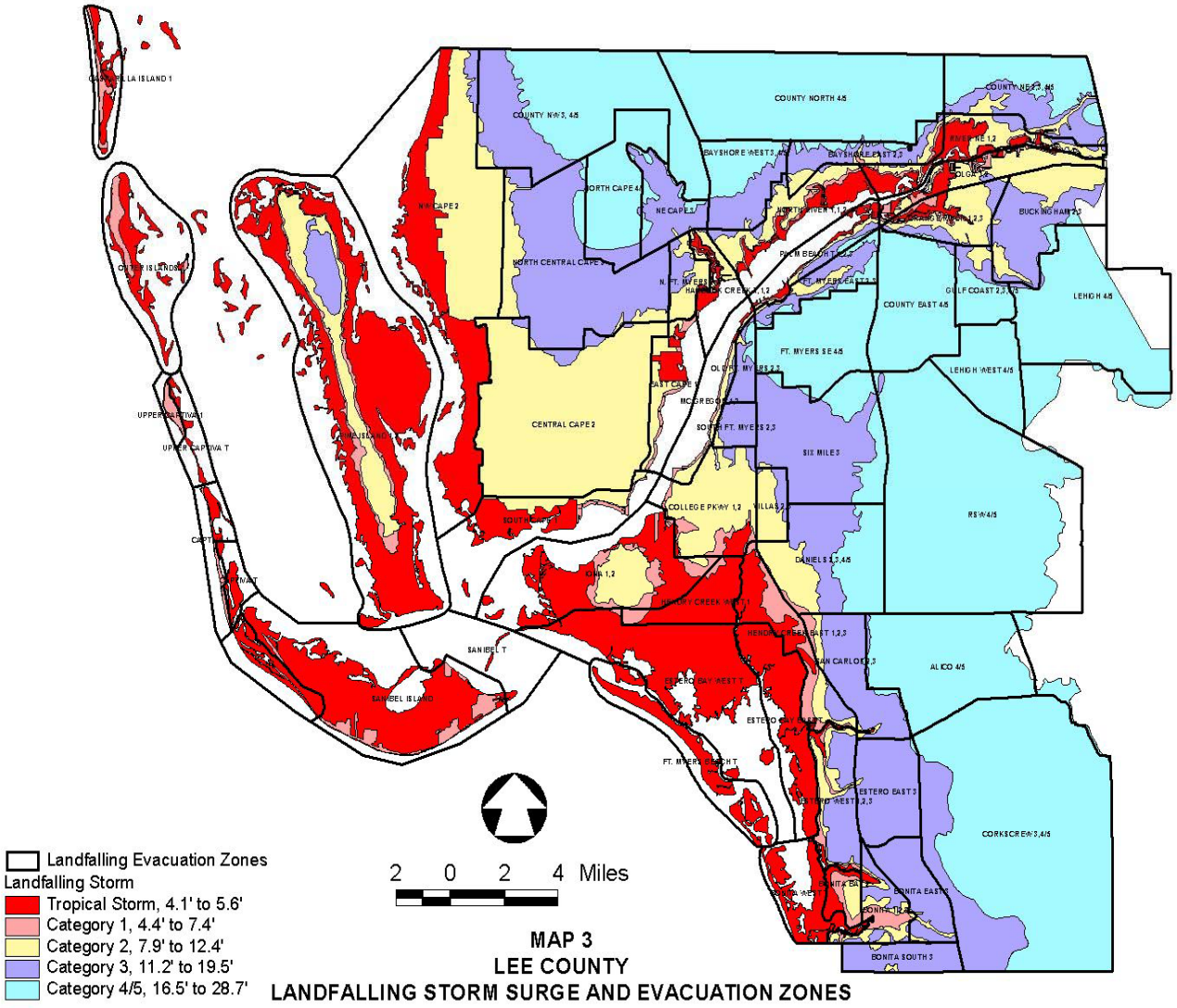
Appendix A


Landfalling Evacuation Zones
Landfalling Storm
Tropical Storm, 4.1' to 5.6'
Category 1, 4.4' to 7.4'
Category 2, 7.9' to 12.4'
Category 3, 11.2' to 19.5'
Category 4/5, 16.5' to 28.7'
2 0 2 4 Miles
COUNTY NORTH 4/5
BAYSHORE WEST 3, 4/5
BAYSHORE EAST 2,3
NORTH CAPE 4/5
NE CAPE 3
NW CAPE 2
NORTH CENTRAL CAPE 1
CENTRAL CAPE 2
EAST CAPE 1
MCGREGOR 2,3
SOUTH FT. MYERS 2,3
FT. MYERS SE 4/5
COUNTY EAST 4/5
GULF COAST 2,3,4/5
LEHIGH 4/5
LEHIGH WEST 4/5
SIX MILES 3
COLLEGE PKWY 1,2
DANIELS 2,3,4/5
RSW 4/5
ALICO 4/5
CORKSCREW 3,4/5
BUCKINGHAM 2,3
BONITA EAST
BONITA SOUTH 3
SANIBEL ISLAND
MAP 3
LEE COUNTY
LANDFALLING STORM SURGE AND EVACUATION ZONES

Appendix B.

Field Damage Assessment *Exit this survey >>*

1. Hurricane Charley Damage Assessment

I am currently enrolled in the Executive Fire Officer Program through the National Fire Academy. A requirement of this program is to conduct an applied research project after each course. Your participation in this survey is vital for this research project! Please take less than 5-minutes to complete this survey.

David G. Kilbury

1. Were you directly involved in performing immediate Damage Assessment duties following the impact of Hurricane Charley?

☐ *Yes, only in field operations.*

☐ *Yes, only in the EOC*

☐ *Yes, both in field ops and the EOC*

☐ *No, not at all.*

2. During the Damage Assessment phase of Hurricane Charley, did you partner with any other department or agency in performing your duties?

	Yes	*No*
Police	☐	☐
Public Works (Streets & Utilities)	☐	☐
Building Inspector	☐	☐

Lee County Emergency Management	☐	☐
Electrical Company	☐	☐
Mutual Aid Fire Department	☐	☐
Other	☐	☐

3. How were you assigned to perform Damage Assessment within the City of Cape Coral?

☐ *Pre-determined geographical area*

☐ *Responded to specific target hazard locations only*

☐ *I traveled only major roadways*

☐ *Responded to locations as assigned by IC*

☐ *No clear understanding of task*

4. How long did it take you to perform immediate Damage Assessment following Hurricane Charley?

☐ *Less than 1-hour*

☐ *1-2 hours*

☐ *2-4 hours*

☐ *4-6 hours*

☐ *6-12 hours*

☐ *12-24 hours*

☐ *More than 24-hours*

5. How was Damage Assessment reported to the EOC?

☐ *Radio transmission*

☐ *Via Cell Phone*

☐ *Handed in on written form*

☐ *Face to Face*

☐ *Other*

6. How would you rate the method of reporting Damage Assessment to the EOC based on your experience with Hurricane Charley?

☐ *1 = Complete Failure of Mission*

☐ *2 = Minimal Mission Accomplished (25%)*

☐ *3 = 50% of Mission Accomplished*

☐ *4 = Majority of Mission Accomplished (75%)*

☐ *5 = Total Success of Mission (100%)*

7. Please check any items that prevented or interfered with you performing your Damage Assessment duties.

☐ *Blocked roadways*

☐ *Communications failure*

☐ *Lack of proper equipment*

☐ *Public interference*

☐ *Transportation issues*

☐ *EOC staff*

☐ *Elected officials*

☐ *Other*

8. On a scale of 1 - 5, how would you rate the success of your involvement in the Damage Assessment mission following Hurricane Charley?

☐ *1 = Complete Failure of Mission*

☐ *2 = Minimal Mission Accomplished (25%)*

☐ *3 = 50% of Mission Accomplished*

☐ *4 = Majority of Mission Accomplished (75%)*

☐ *5 = Total Success of Mission (100%)*

9. On a scale of 1 - 5, please rate the overall success of how the Damage Assessment phase of Hurricane Charley was performed.

☐ *1 = Complete Failure of Mission*

☐ *2 = Minimal Mission Accomplished (25%)*

☐ *3 = 50% of Mission Accomplished*

☐ *4 = Majority of Mission Accomplished (75%)*

☐ *5 = Total Success of Mission (100%)*

10. Would you be available for an interview at a later date related to your experience in Damage Assessment with Hurricane Charley if needed?

Yes, My name is:	
No, I respectfully decline:	

Next >>

Appendix C

DA Field Operations in-depth

Exit this survey >>

1. Survey

1. Related to conducting damage assessment, what training or understanding did you have before participating in the process during Hurricane Charley?

- ☐ No training at all (seat of the pants approach)
- ☐ Briefed quickly of what to do before deployment
- ☐ Some training on subject
- ☐ In-depth training provided
- ☐ Clear understanding and confident in mission.

2. The forms used in Damage Assessment were...

- ☐ Prefect for task and easy to use
- ☐ Met some objectives and able to accomplish task
- ☐ Minor problems, modifications made in field
- ☐ Major problems that wasted my efforts
- ☐ Useless and need to be redesigned

3. Since Hurricane Charley, have you received further training on damage assessment?

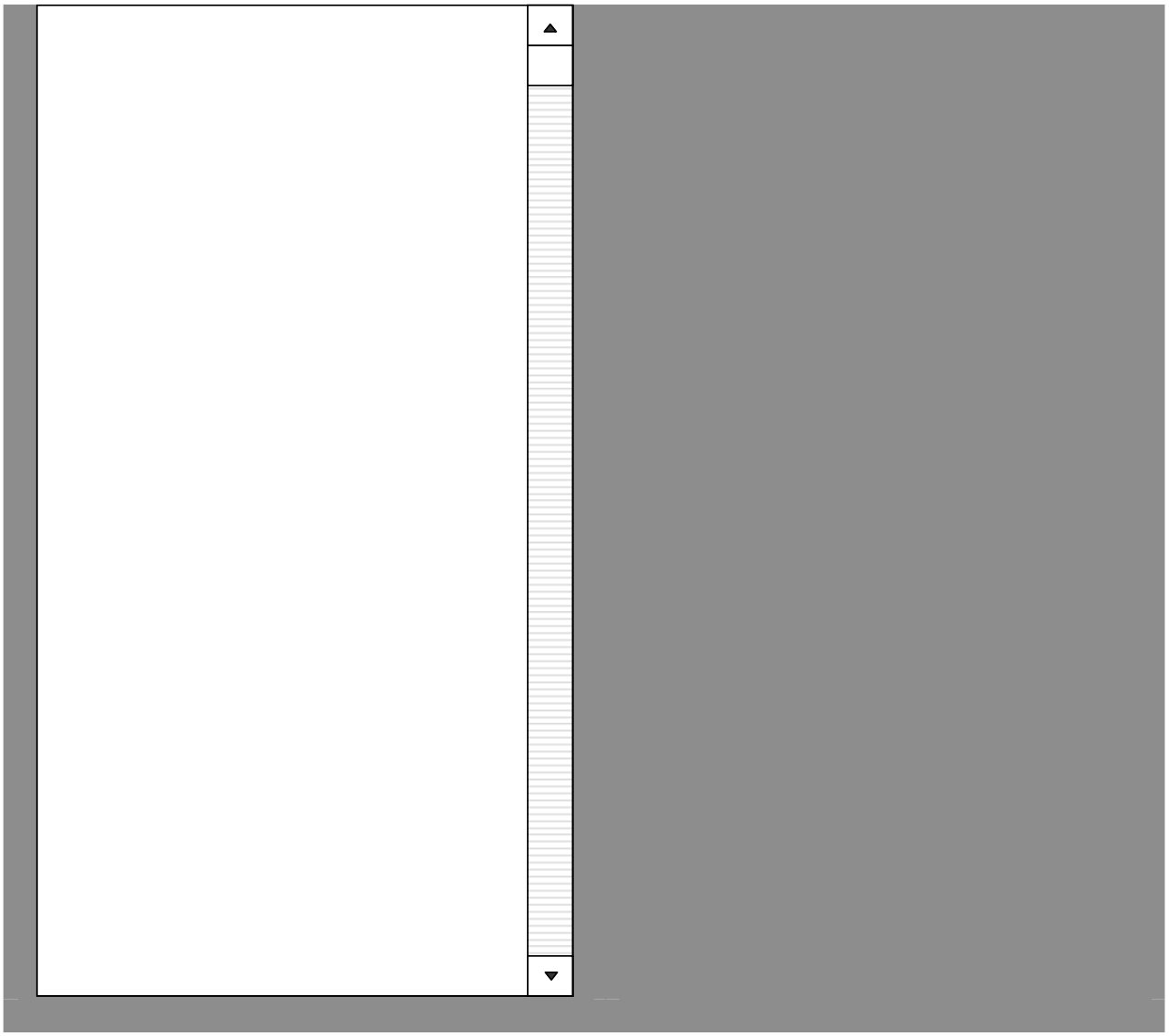
- ☐ NO, none at all, clueless.

- ☐ Very minimal training, still would have problems
- ☐ Some training efforts have been made
- ☐ Good training provided since Hurricane Charley
- ☐ Fully-trained, ready it happen again

4. Now that you have conducted damage assessment following the disaster of Hurricane Charley, what areas need attention in your opinion?

- ☐ More reliable methods to communicate with EOC
- ☐ Provide training for personnel in damage assessment
- ☐ Damage assessment documentation forms
- ☐ Better transportation method
- ☐ More trained personnel resources
- ☐ More rest and rehabilitation for personnel
- ☐ Provide in-depth Supervisor training
- ☐ Emergency Management personnel need further training

5. Please list what you found to be the most frustrating or difficult situation regarding conducting damage assessment?



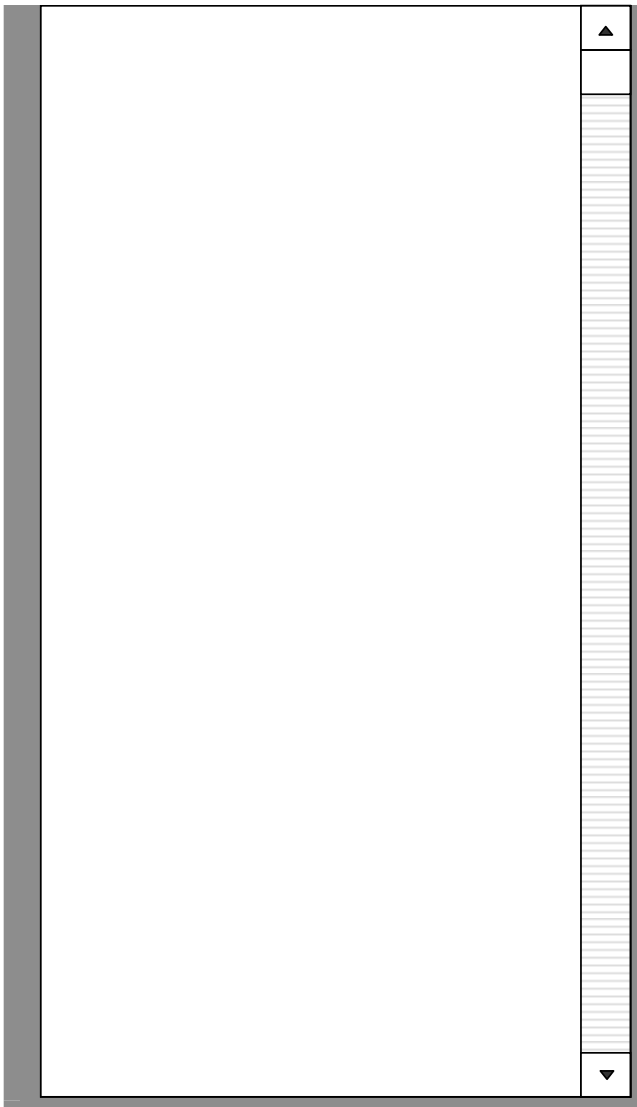
6. Based on your experience with Hurricane Charley, how do you feel we would perform at damage assessment if a hurricane strikes again?

- ☐ Still not ready
- ☐ Poorly
- ☐ Similar results
- ☐ Better prepared this time
- ☐ Fully ready this time

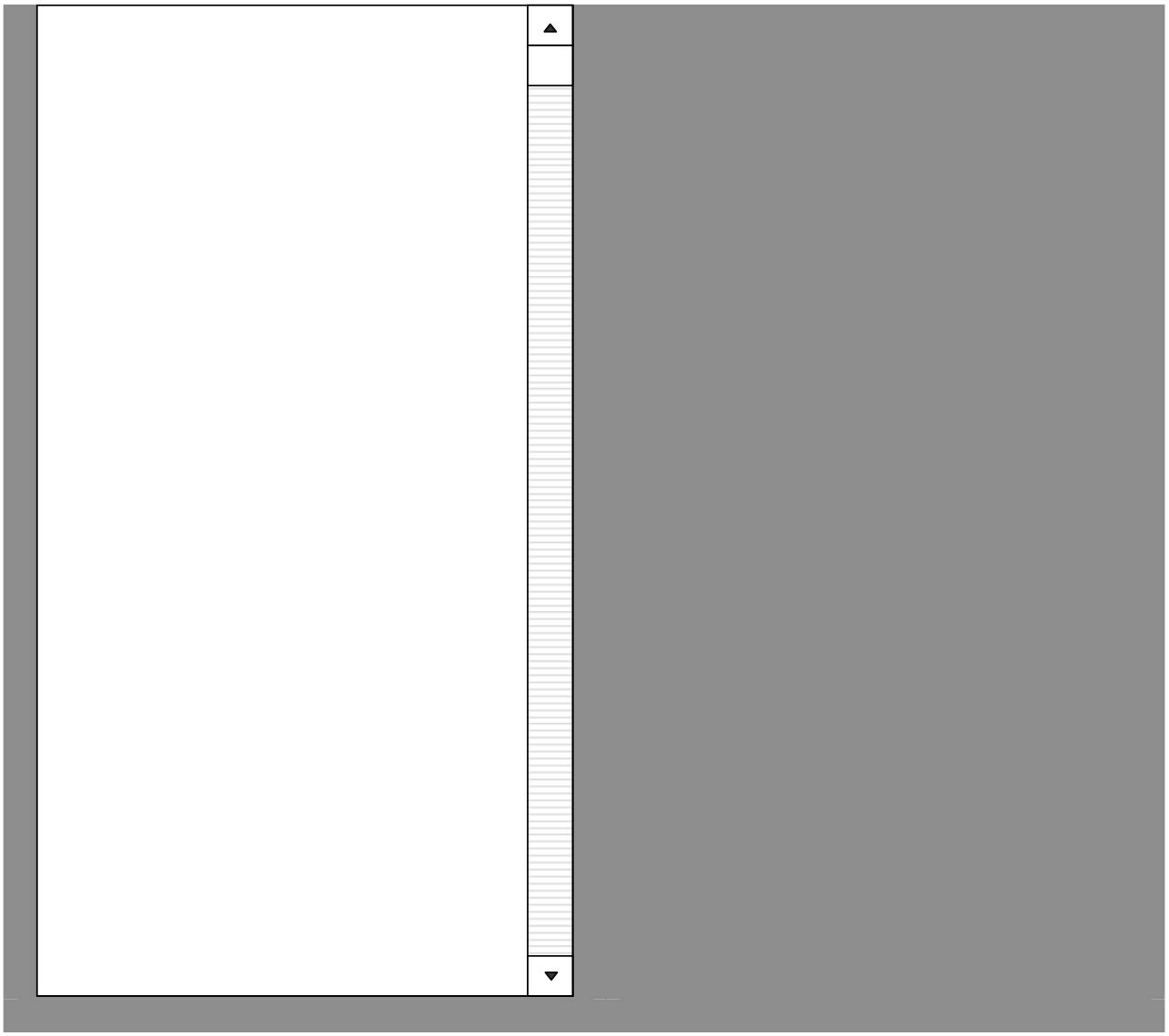
7. What is the number one item that needs to occur to perform damage assessment more effectively next time a disaster strikes Cape Coral?

- ☐ Clear roads faster
- ☐ Establish dependable communication method
- ☐ Provide better transportation
- ☐ Use computer technology in data collection
- ☐ Redesign/ use other handwritten damage forms
- ☐ Provide training for personnel
- ☐ Other (write-in)

8. What do you feel we did best related to conducting damage assessment following the impact of Hurricane Charley in Cape Coral?



9. What needs to be stated related to damage assessment that I failed to address in this survey?



Done >>

Appendix D

EOC Damage Assessment ***Exit this survey >>***

1. Hurricane Charley Damage Assessment

I am currently enrolled in the Executive Fire Officer Program through the National Fire Academy. A requirement of this program is to conduct an applied research project after each course. Your participation in this survey is vital for this research project! Please take less than 5-minutes to complete this survey.
Thank you,
David G. Kilbury

1. Were you directly involved in Damage Assessment either in field operations or the EOC, following Hurricane Charley?

☐ ***Yes***

☐ ***No***

2. What was your assignment related to immediate Damage Assessment following Hurricane Charley?

☐ *Field Operations*

☐ *Emergency Operations Center*

☐ *Both*

3. Please list any item(s) that interfered with your success of performing your Damage Assessment duties.

☐ *Power Failure*

☐ *Equipment malfunction*

- ☐ *Radio transmissions*
- ☐ *Cell phone transmissions*
- ☐ *Lack of trained personnel in the field*
- ☐ *Elected Officials*
- ☐ *Other City Departments*
- ☐ *Outside agencies*
- ☐ *Public Interference*
- ☐ *Workload overwhelming*
- ☐ *Lacked knowledge in performing this function*
- ☐ *Other*

4. List those assigned the primary task of reporting immediate Damage Assessment to the Emergency Operations Center in Cape Coral.

- ☐ *Fire Inspectors*
- ☐ *Fire Suppression Personnel*
- ☐ *Police*
- ☐ *Public Works (Streets & Utilities)*
- ☐ *Building Inspectors*
- ☐ *Lee County Emergency Management*
- ☐ *CERT Teams*
- ☐ *Citizen reports*
- ☐ *Media broadcasts*
- ☐ *Other*

5. On a scale of 1 - 5, how would you rate your success in performing your Damage Assessment duties following Hurricane Charley?

☐ *1 = Complete Failure of Mission*

☐ *2 = Minimal Mission Accomplished (25%)*

☐ *3 = 50% of Mission Accomplished*

☐ *4 = Majority of Mission Accomplished (75%)*

☐ *5 = Total Success of Mission (100%)*

6. On a scale of 1 - 5, how would you rate the overall performance of the CCFR&EMS related specifically to immediate Damage Assessment following Hurricane Charley?

☐ *1 = Complete Failure of Mission*

☐ *2 = Minimal Mission Accomplished (25%)*

☐ *3 = 50% of Mission Accomplished*

☐ *4 = Majority of Mission Accomplished (75%)*

☐ *5 = Total Success of Mission (100%)*

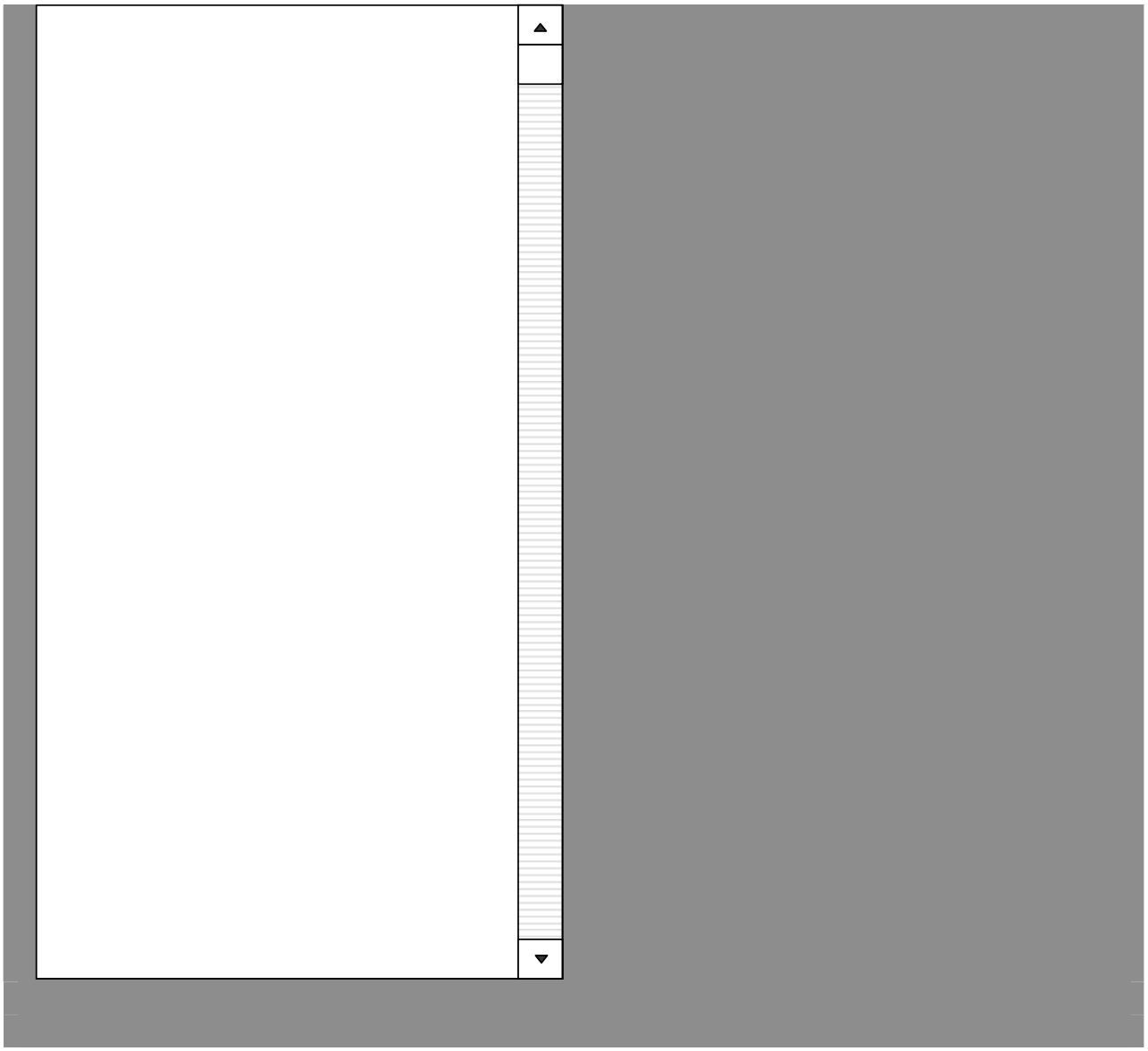
7. With the experience gained following Hurricane Charley, will the same model of immediate Damage Assessment be deployed in Cape Coral for the next disaster event?

☐ ***Yes***

☐ ***No***

8. Specifically related to the immediate Damage Assessment phase following Hurricane Charley, did you identify any weaknesses or difficulties related to this function? Explain:

9. Specifically related to immediate Damage Assessment following Hurricane Charley, did you identify any successes related to this function. Explain:



10. Would you be available for an interview at a later date related to your experience with Damage Assessment during Hurricane Charley if needed?

Yes, my name is:	
No, I respectfully decline.	

Next >>

Appendix E

LEE COUNTY, FLORIDA

DETAILED DAMAGE ASSESSMENT FIELD WORK SHEET

1. Property Address: 2. STRAP #:

3. Owner's Name 4. Contact #:

5. Owners' Address (if different from above):

6. Renter's Name (if applicable):

7. Type of Structure Damaged: O Residential O Wood Frame
O Multi-family O Masonry
O Commercial O Metal Building
O Industrial O Mobile Home

8. Primary Residence: O Yes O No O Don't Know

9. Insurance: Owner Insured: O Yes O No O Don't Know
Renter Insured: O Yes O No O Don't Know

Structural Damage :

	Minor	Major	Percent of Damage Destroyed	
Damage Multiplier		(.2)	(.5)	(1)
Component	Percent of Structure			
Roof/Trusses	20	☐ 4	☐ 10	☐ 20
Exterior Walls	20	☐ 4	☐ 10	☐ 20
Interior Walls	15	☐ 3	☐ 7.5	☐ 15
Floors/Flooring	10	☐ 2	☐ 5	☐ 10
Foundation	20	☐ 4	☐ 10	☐ 20
Plumbing	5	☐ 1	☐ 2.5	☐ 5
Electrical	5	☐ 1	☐ 2.5	☐ 5
A/C & Heat	5	☐ 1	☐ 2.5	☐ 5
	Sub Totals	_____%	_____%	_____%

10. Total Damage (add Subtotals) Percent:

11. Damage Category:	a. ☐ Minor 20% or less	b. ☐ Major 20.01% to 50%	c. ☐ Destroyed Exceeds 50%

12. Building experienced previous flood loss O Yes O No O Don't Know

13. Structural Information:
a. Should power remain off? O Yes O No O Undetermined
b. Is the building uninhabitable? O Yes O No O Undetermined
c. Is engineering needed for repair? O Yes O No O Undetermined
d. Should structure be demolished? O Yes O No O Undetermined
e. Is (was) there water in the structure? O Yes O No If Yes, Depth_____
f. Were pictures taken? If so, Team_____ Roll _____ Frame_____

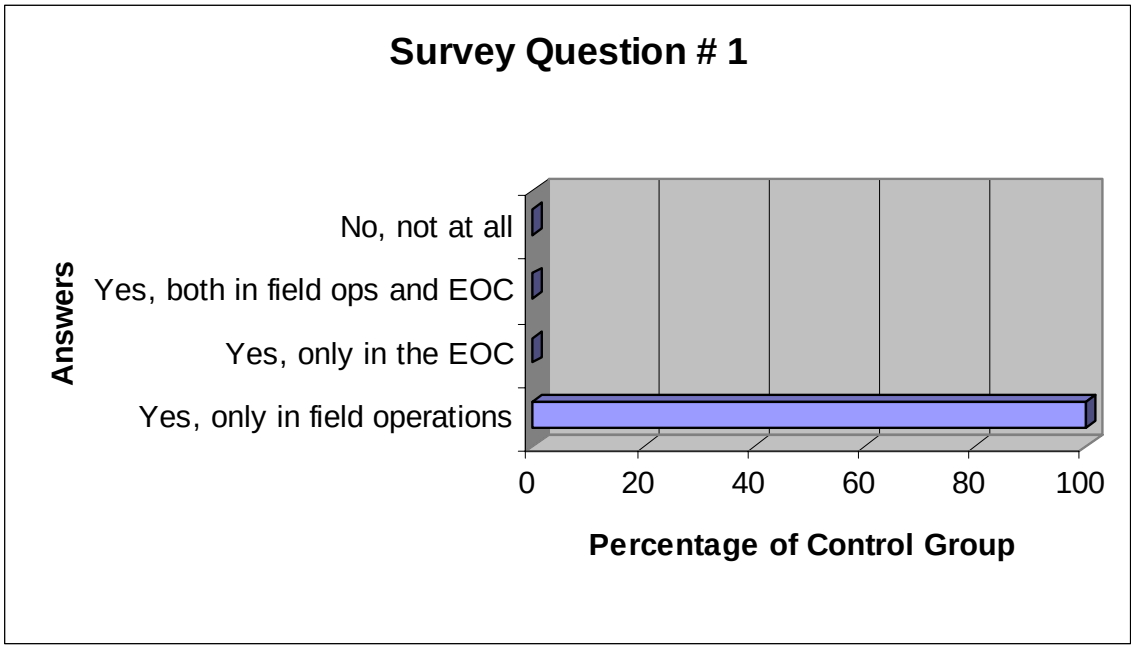
14. Comments:

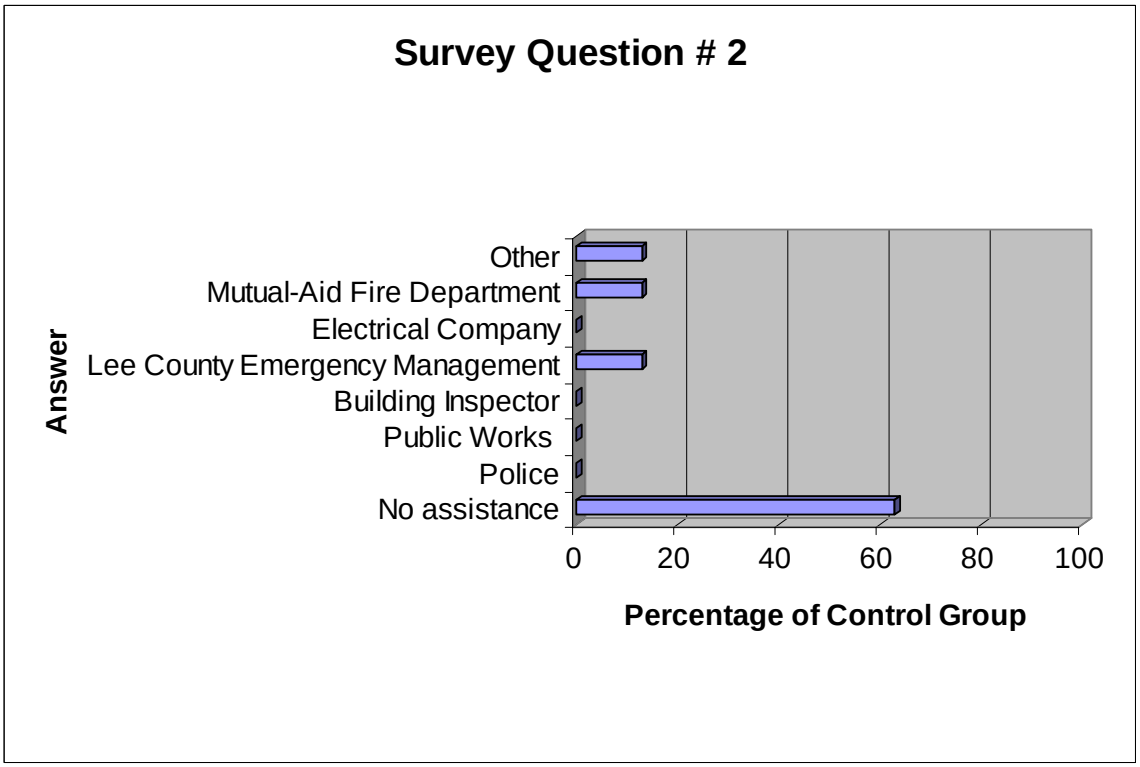
15. Placard Issued:
a. O Inspected, no restriction on use, no placard issued b. O Limited entry (Yellow)
c. O Unsafe to enter or occupy (Fluorescent Orange)

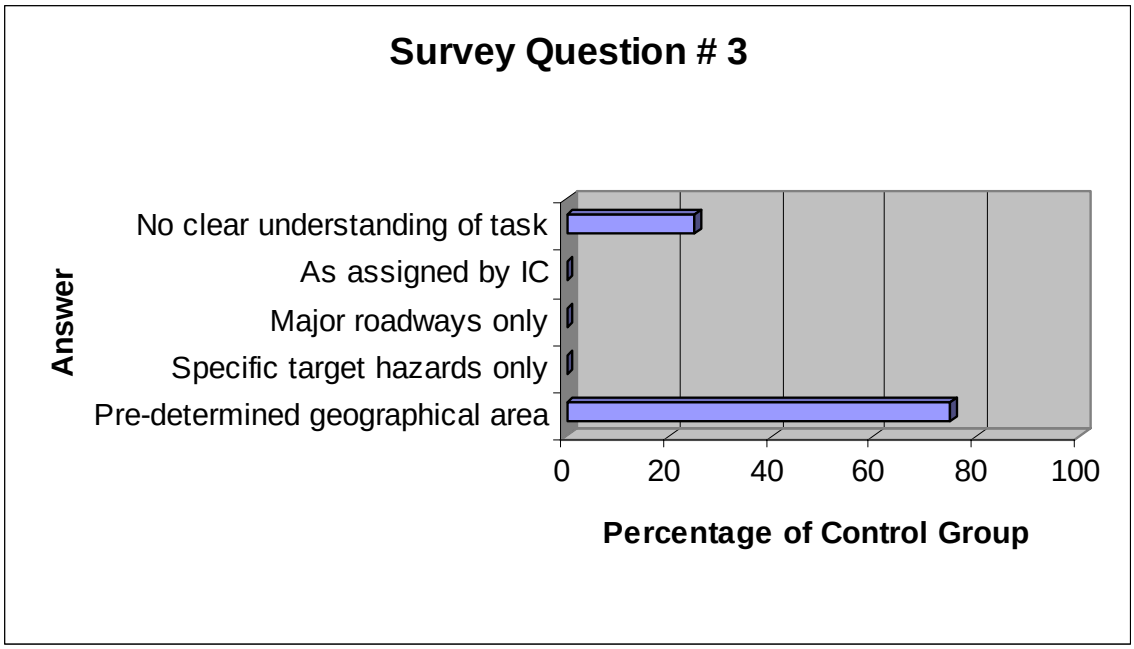
16. Team: Member names:

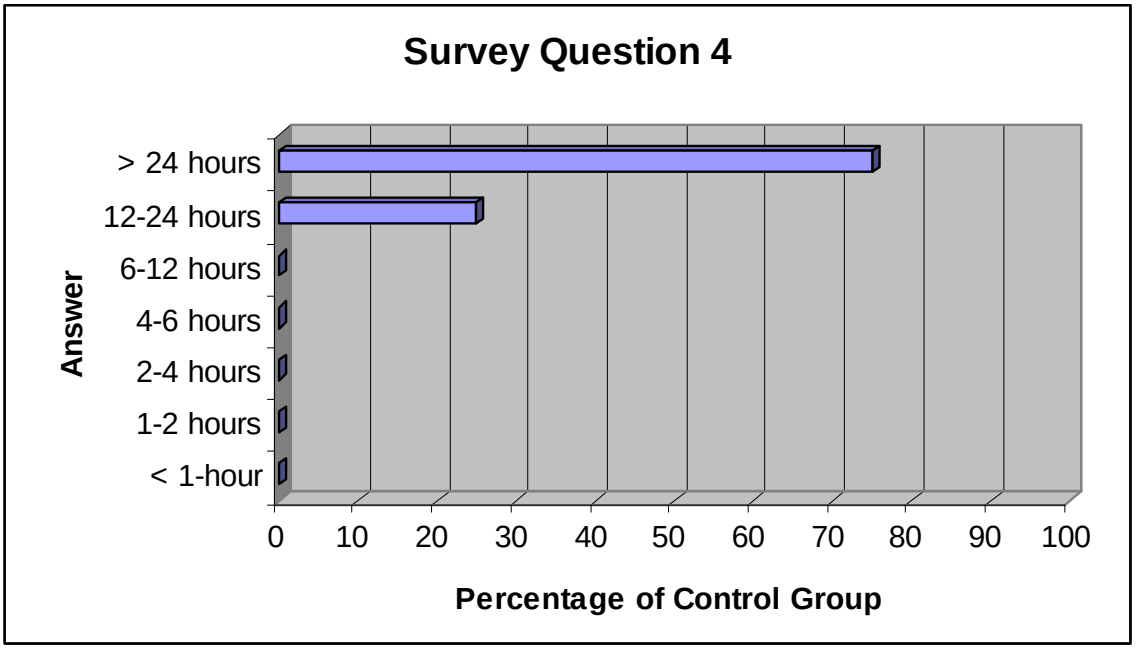
Form completed by_____ (Please print) Date_____

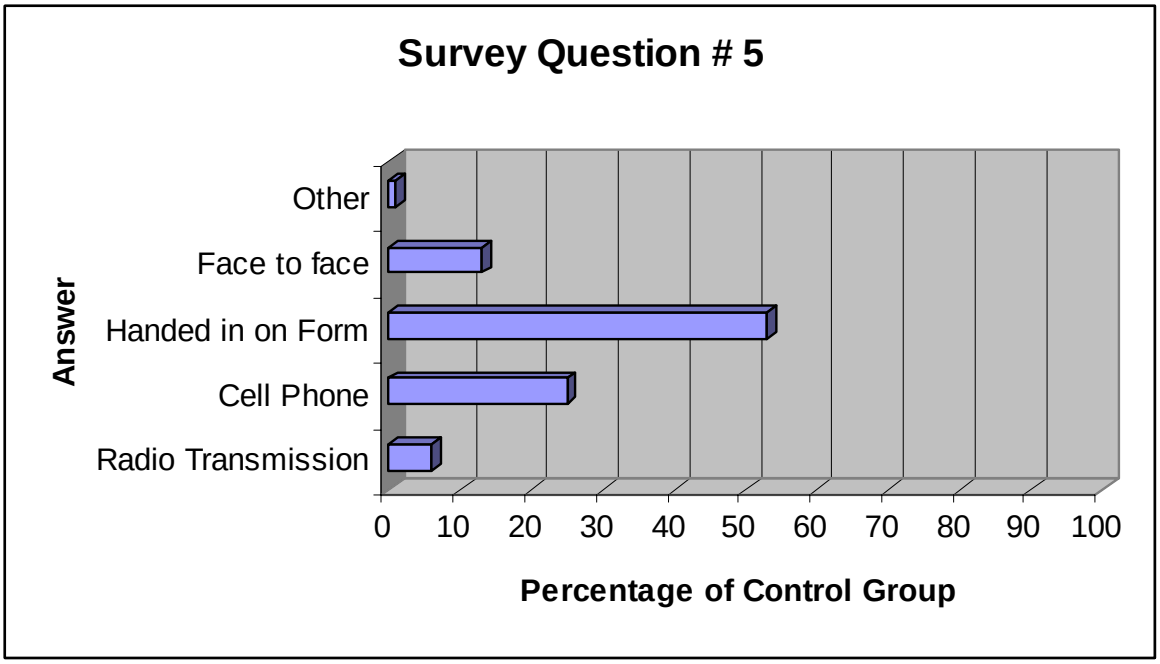
Appendix F

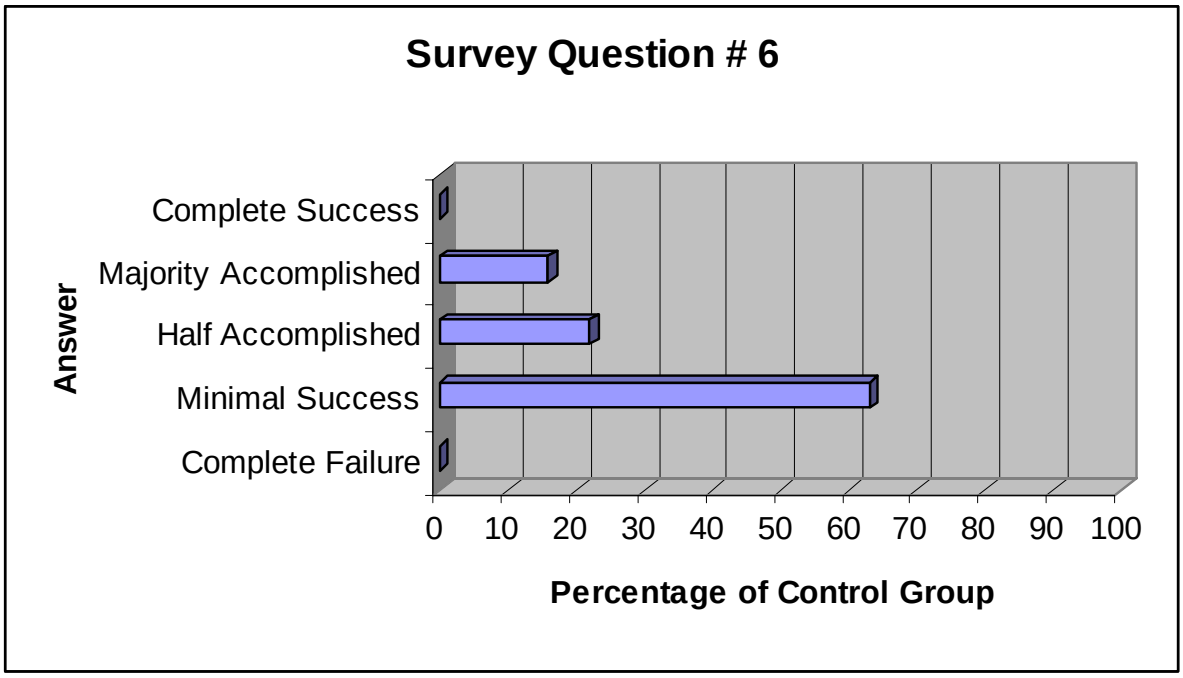

Survey Question # 1
Answers
No, not at all
Yes, both in field ops and EOC
Yes, only in the EOC
Yes, only in field operations
0
20
40
60
80
100
Percentage of Control Group

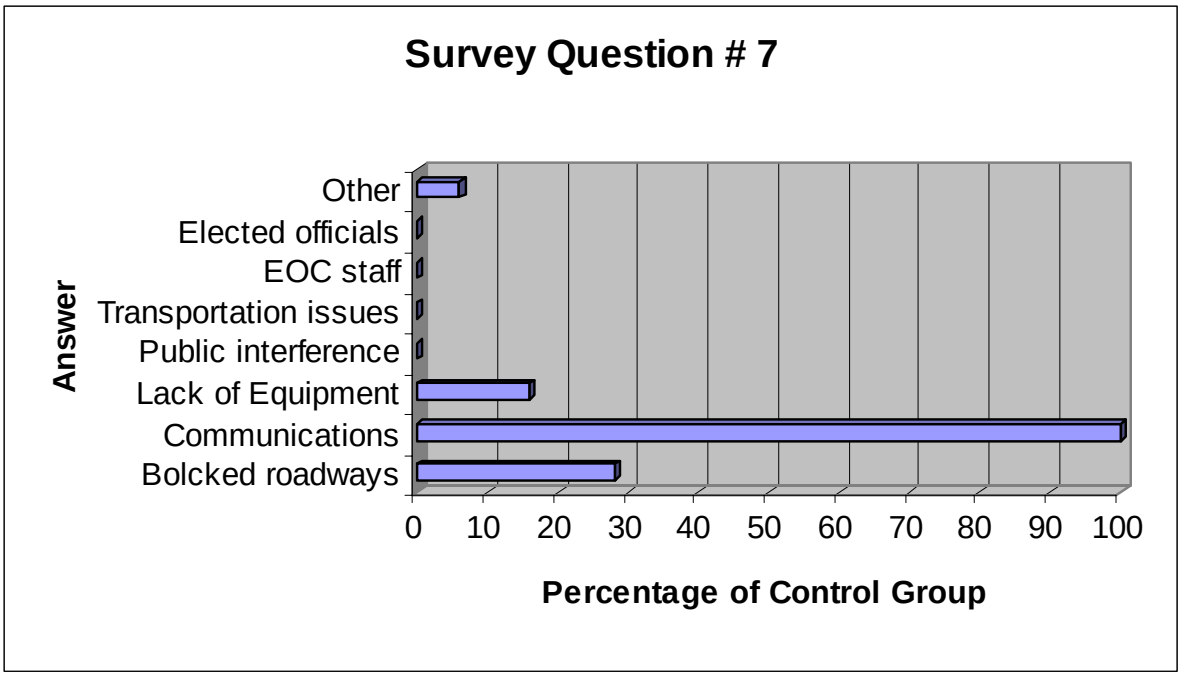

Survey Question # 2
Answer
Other
Mutual-Aid Fire Department
Electrical Company
Lee County Emergency Management
Building Inspector
Public Works
Police
No assistance
0
20
40
60
80
100
Percentage of Control Group

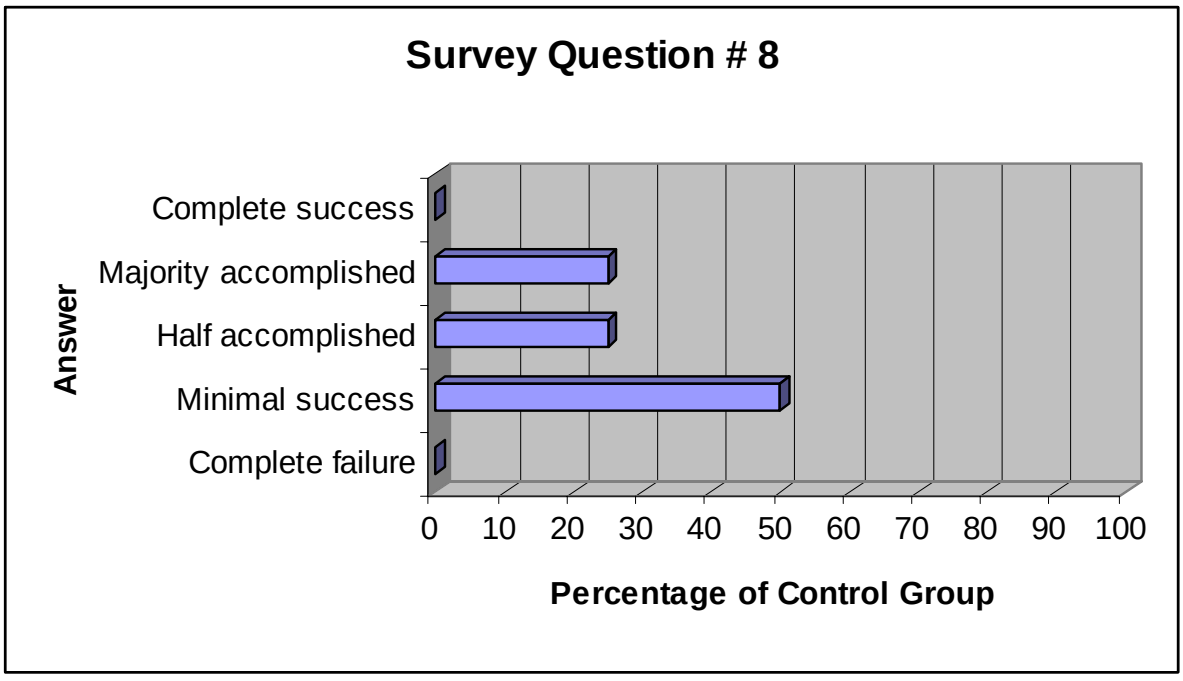

Survey Question # 3
Answer
No clear understanding of task
As assigned by IC
Major roadways only
Specific target hazards only
Pre-determined geographical area
0
20
40
60
80
100
Percentage of Control Group

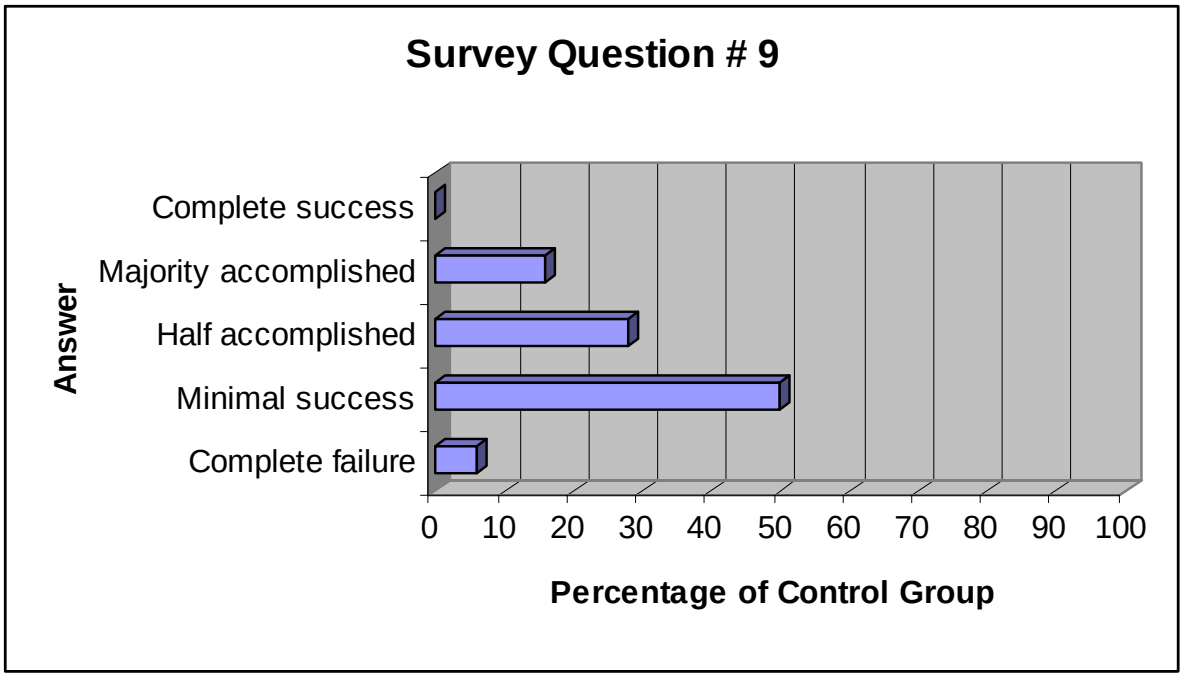

Survey Question 4
Answer
> 24 hours
12-24 hours
6-12 hours
4-6 hours
2-4 hours
1-2 hours
< 1-hour
0
10
20
30
40
50
60
70
80
90
100
Percentage of Control Group


Survey Question # 5
Answer
Other
Face to face
Handed in on Form
Cell Phone
Radio Transmission
0
10
20
30
40
50
60
70
80
90
100
Percentage of Control Group

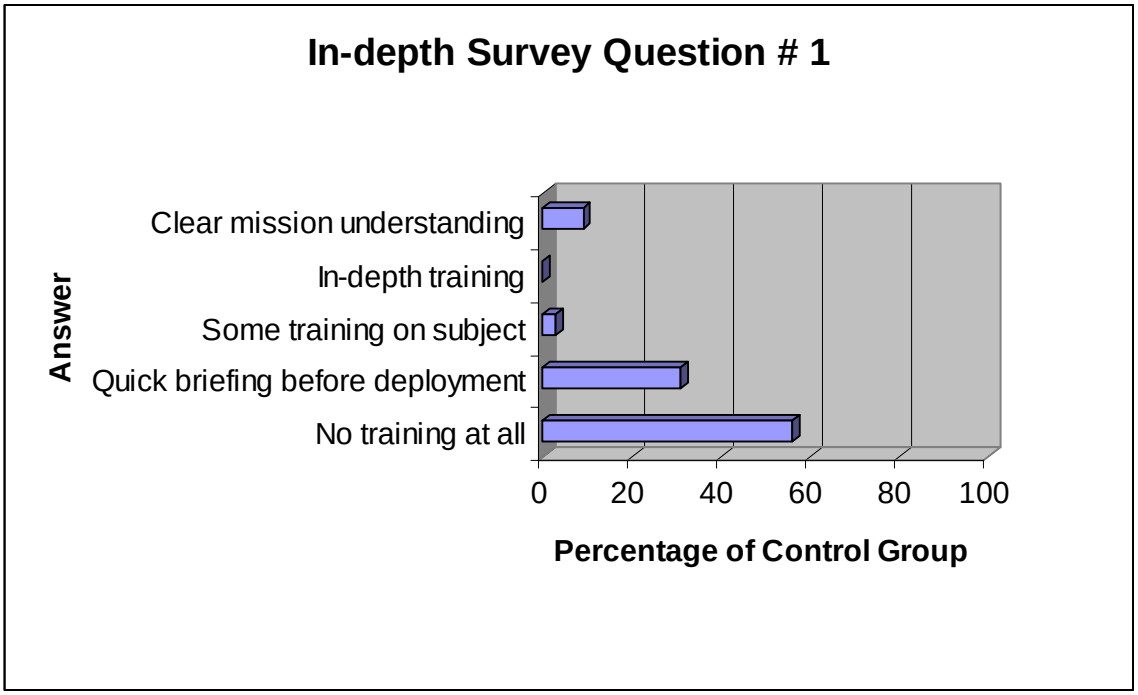

Survey Question # 6
Answer
Complete Success
Majority Accomplished
Half Accomplished
Minimal Success
Complete Failure
0
10
20
30
40
50
60
70
80
90
100
Percentage of Control Group

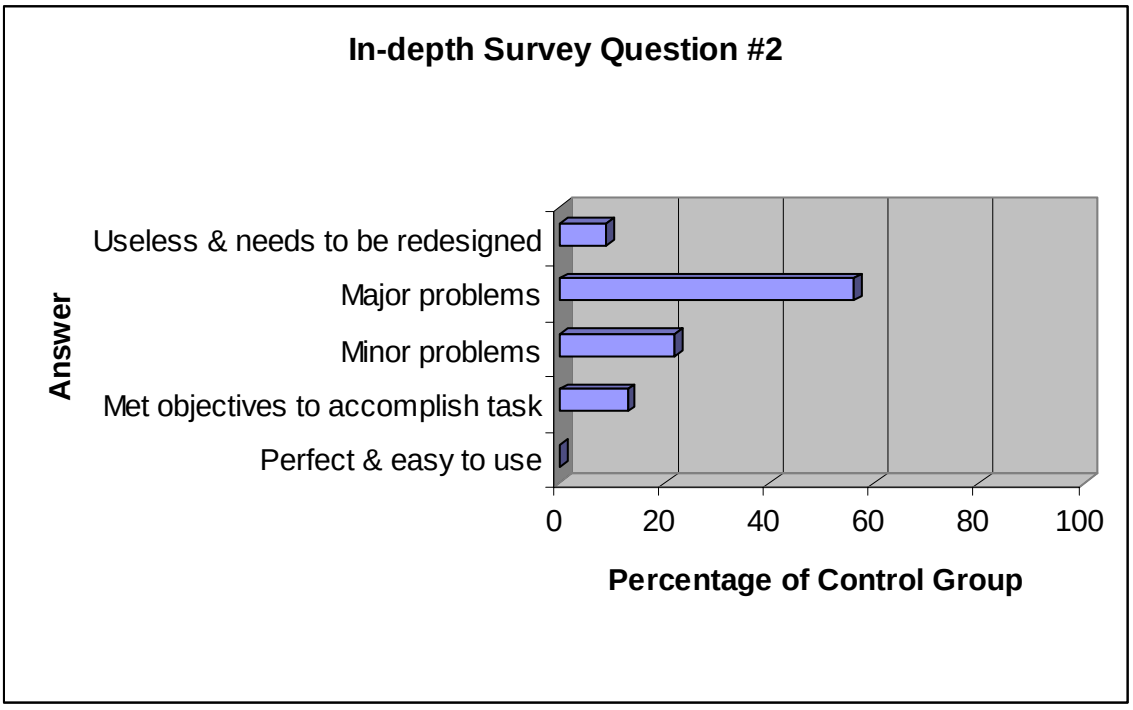

Survey Question # 7
Answer
Other
Elected officials
EOC staff
Transportation issues
Public interference
Lack of Equipment
Communications
Bolcked roadways
0
10
20
30
40
50
60
70
80
90
100
Percentage of Control Group

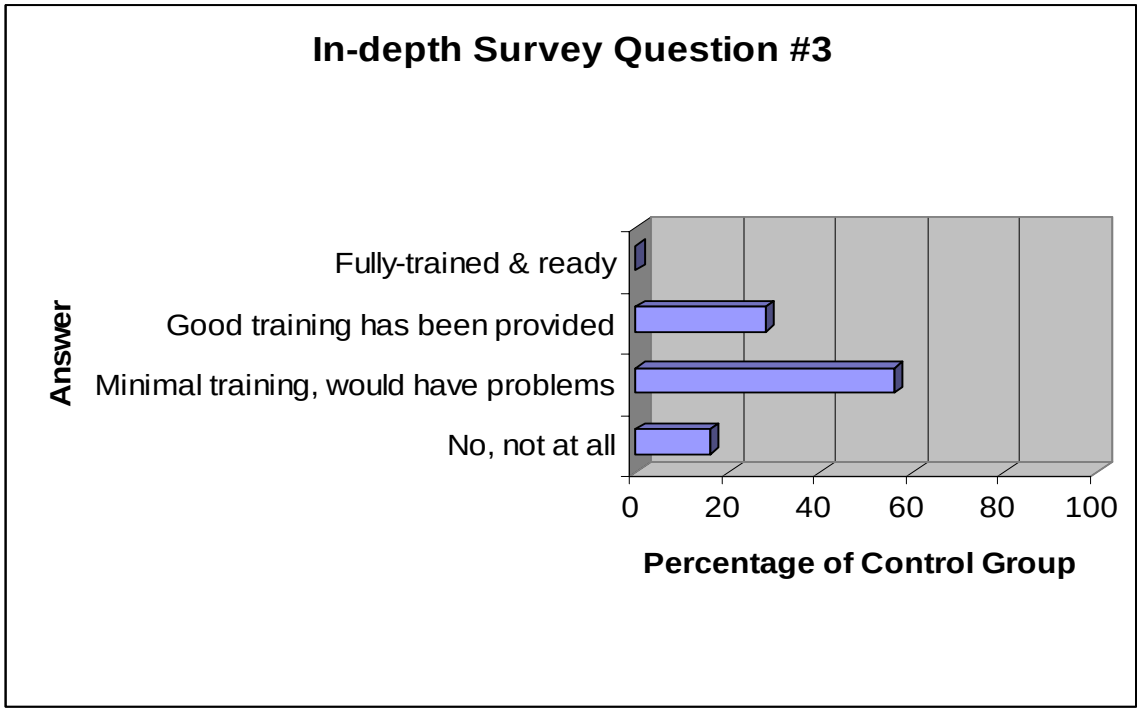

Survey Question # 8
Answer
Complete success
Majority accomplished
Half accomplished
Minimal success
Complete failure
0
10
20
30
40
50
60
70
80
90
100
Percentage of Control Group

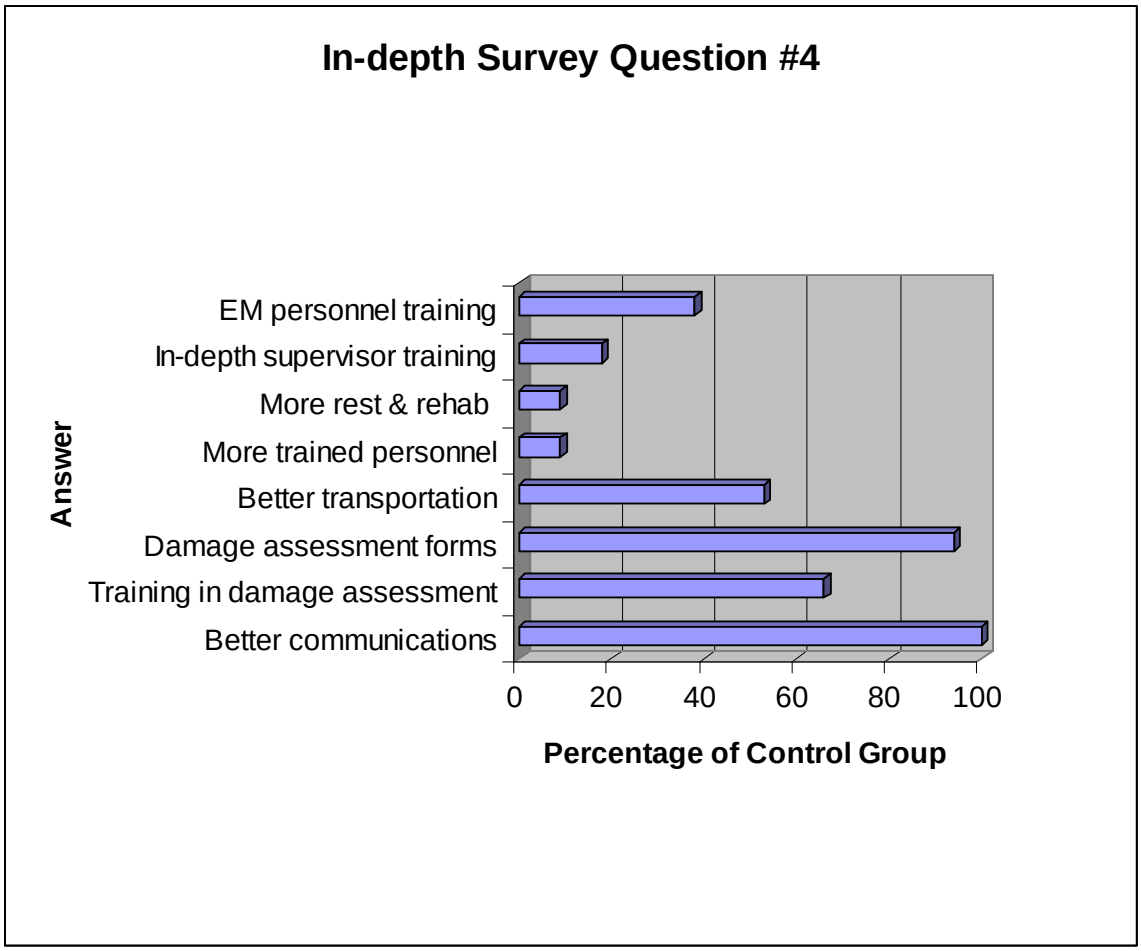

Survey Question # 9
Answer
Complete success
Majority accomplished
Half accomplished
Minimal success
Complete failure
0
10
20
30
40
50
60
70
80
90
100
Percentage of Control Group

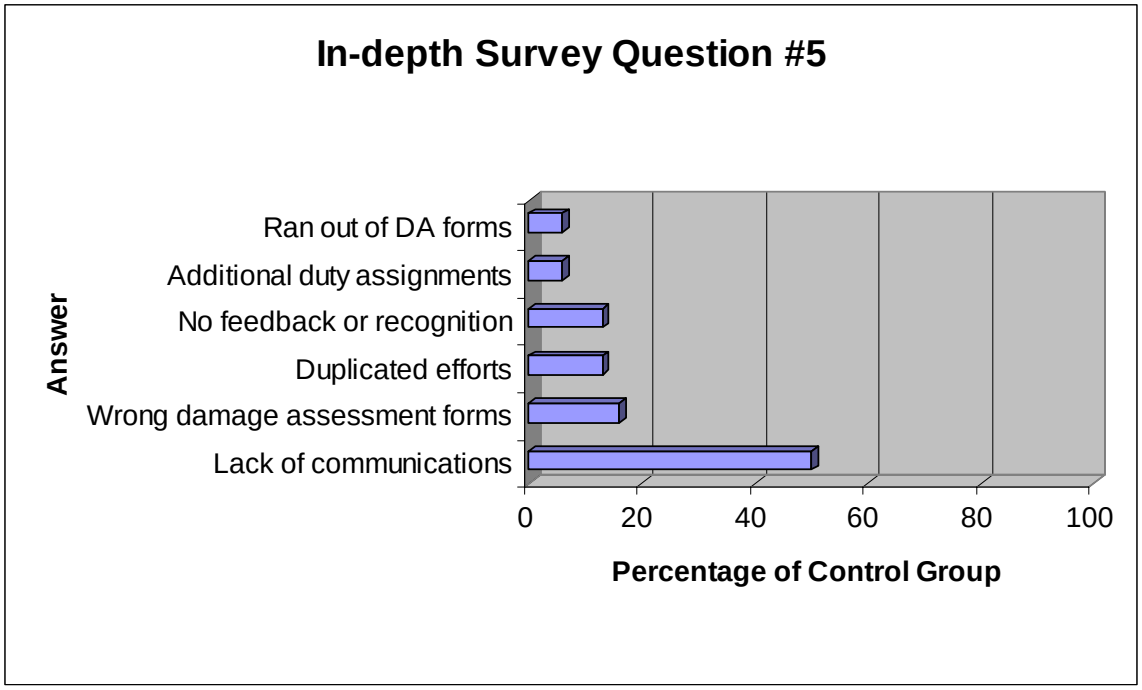
Appendix G

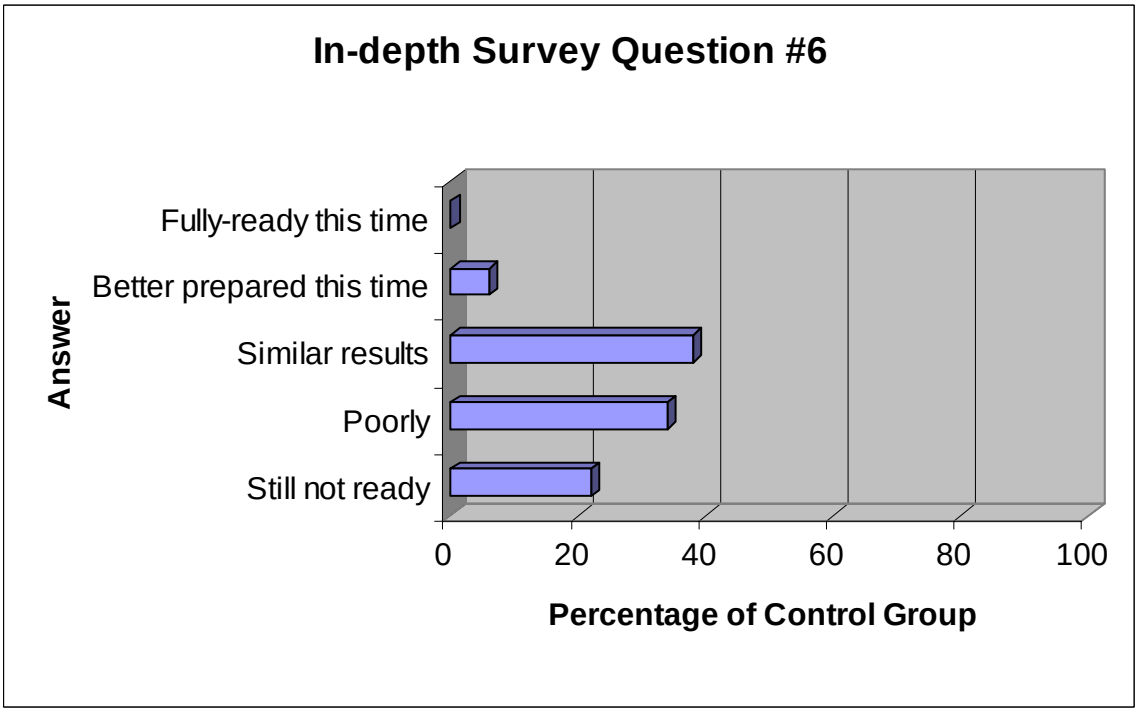

In-depth Survey Question # 1
Answer
Clear mission understanding
In-depth training
Some training on subject
Quick briefing before deployment
No training at all
0
20
40
60
80
100
Percentage of Control Group

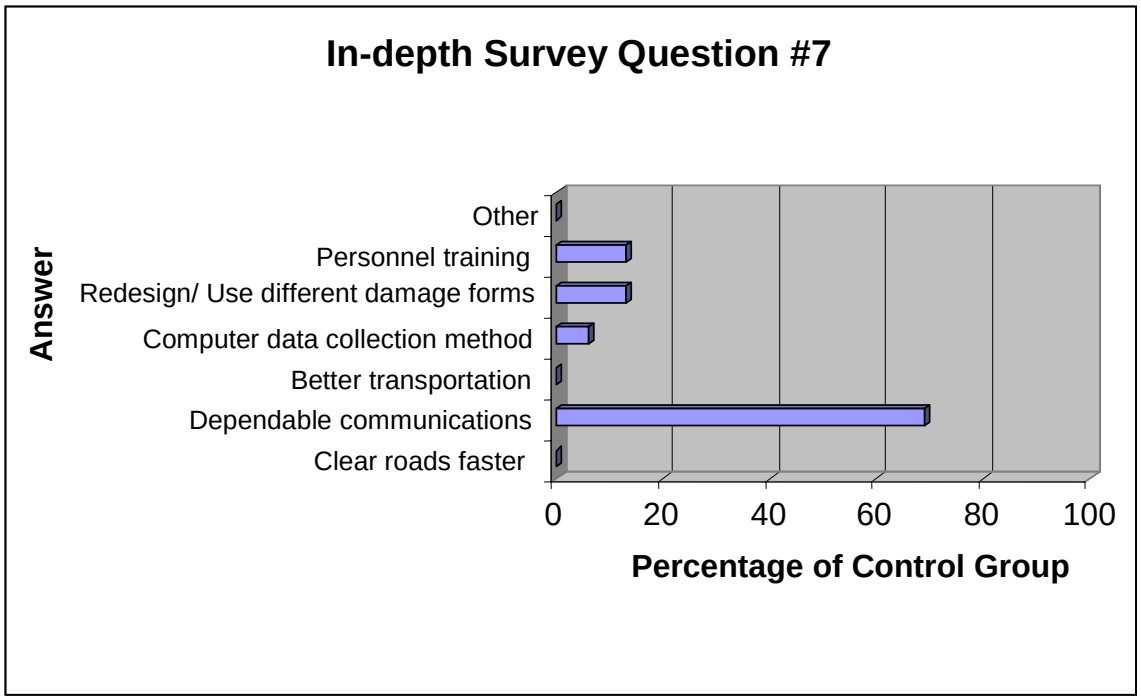

In-depth Survey Question #2
Answer
Useless & needs to be redesigned
Major problems
Minor problems
Met objectives to accomplish task
Perfect & easy to use
0
20
40
60
80
100
Percentage of Control Group

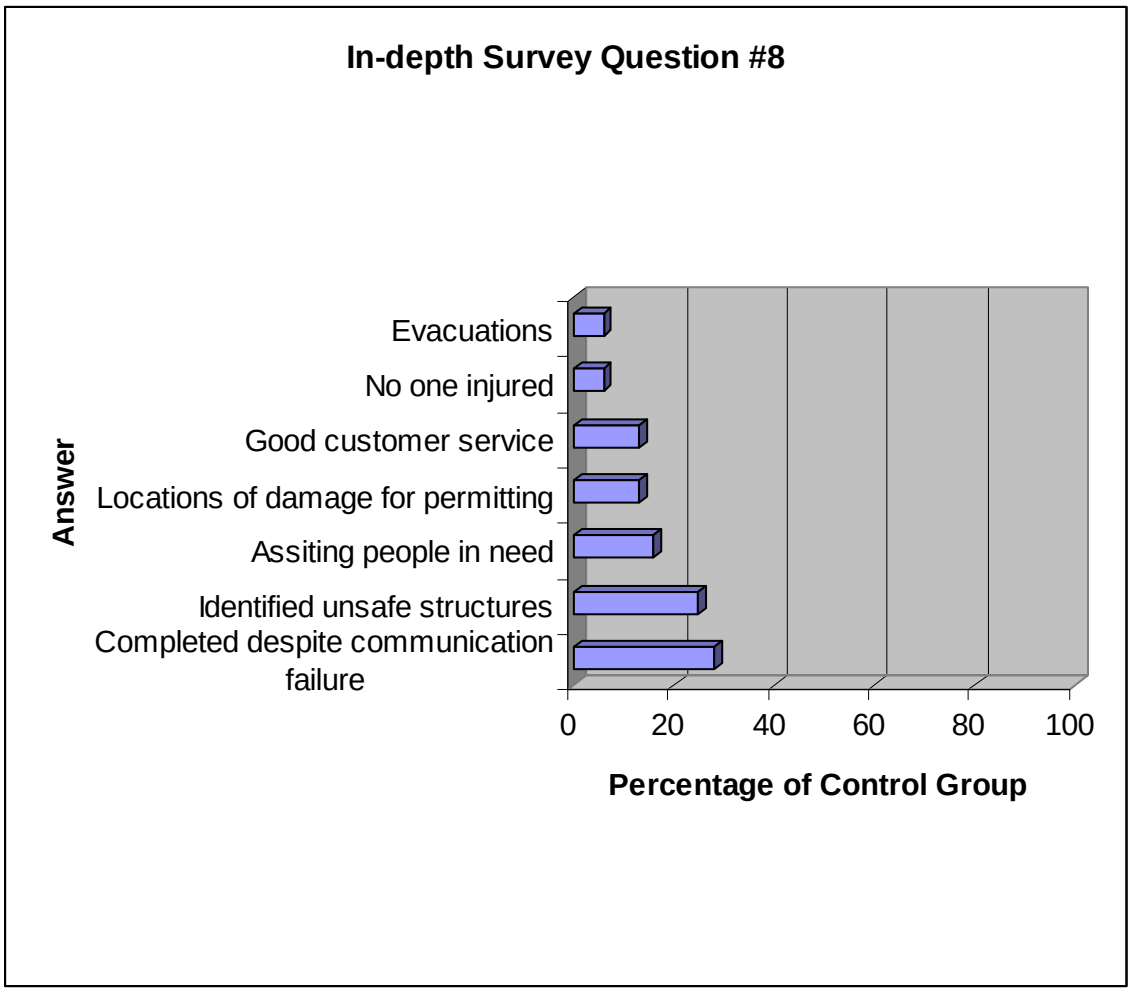

In-depth Survey Question #3
Answer
Fully-trained & ready
Good training has been provided
Minimal training, would have problems
No, not at all
0
20
40
60
80
100
Percentage of Control Group

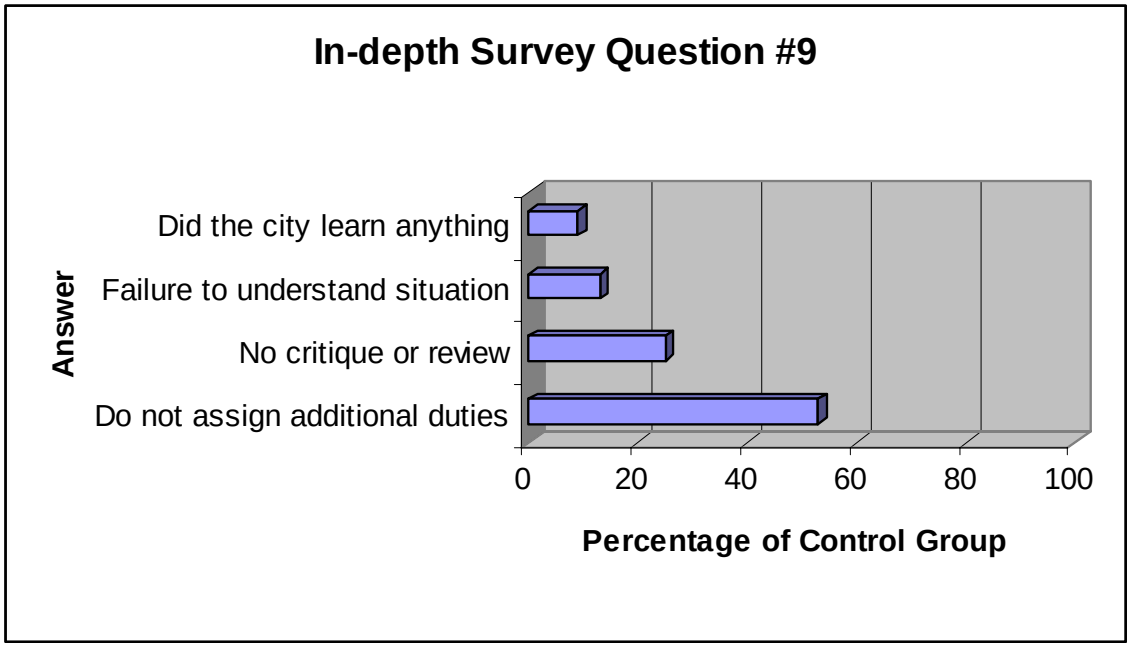

In-depth Survey Question #4
Answer
EM personnel training
In-depth supervisor training
More rest & rehab
More trained personnel
Better transportation
Damage assessment forms
Training in damage assessment
Better communications
0
20
40
60
80
100
Percentage of Control Group


In-depth Survey Question #5
Answer
Ran out of DA forms
Additional duty assignments
No feedback or recognition
Duplicated efforts
Wrong damage assessment forms
Lack of communications
0
20
40
60
80
100
Percentage of Control Group

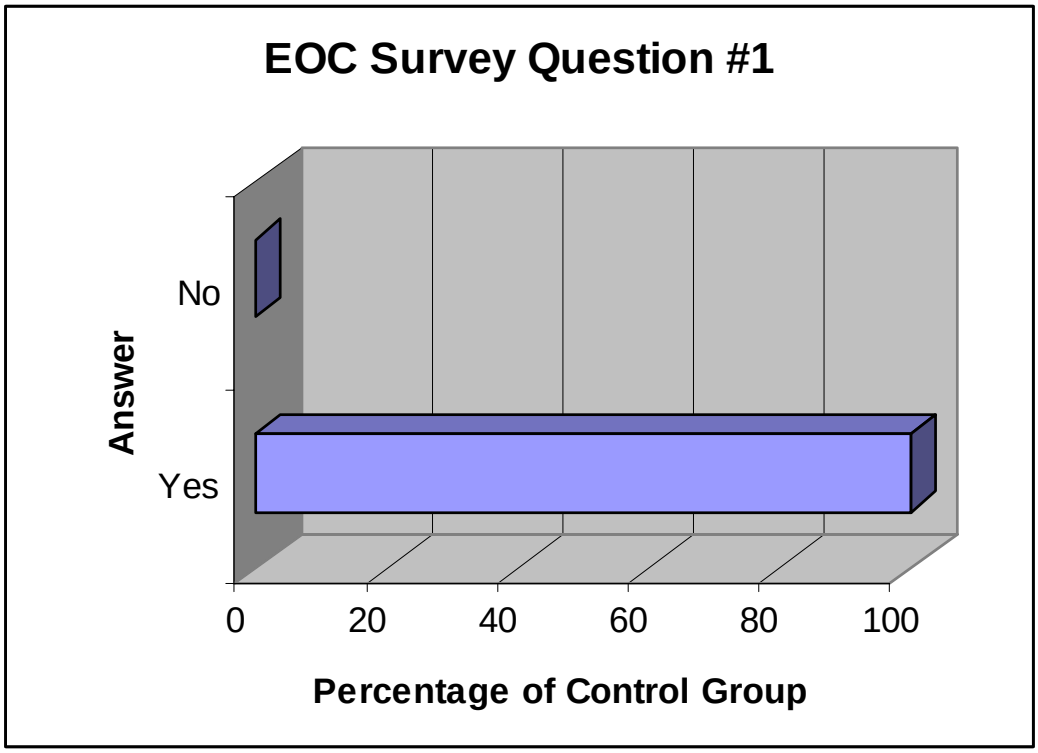

In-depth Survey Question #6
Answer
Fully-ready this time
Better prepared this time
Similar results
Poorly
Still not ready
0
20
40
60
80
100
Percentage of Control Group

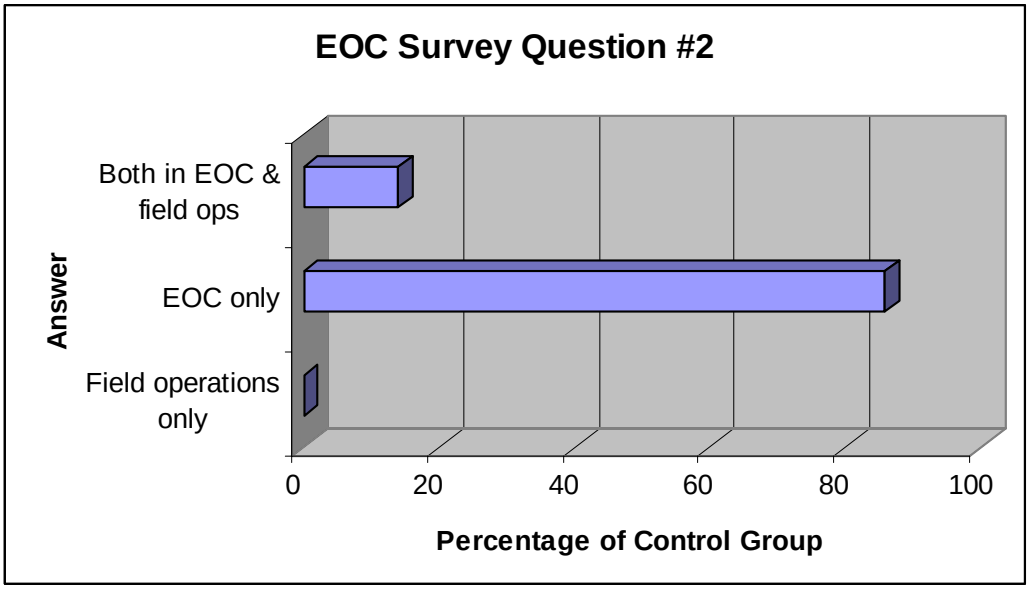

In-depth Survey Question #7
Answer
Other
Personnel training
Redesign/ Use different damage forms
Computer data collection method
Better transportation
Dependable communications
Clear roads faster
0
20
40
60
80
100
Percentage of Control Group

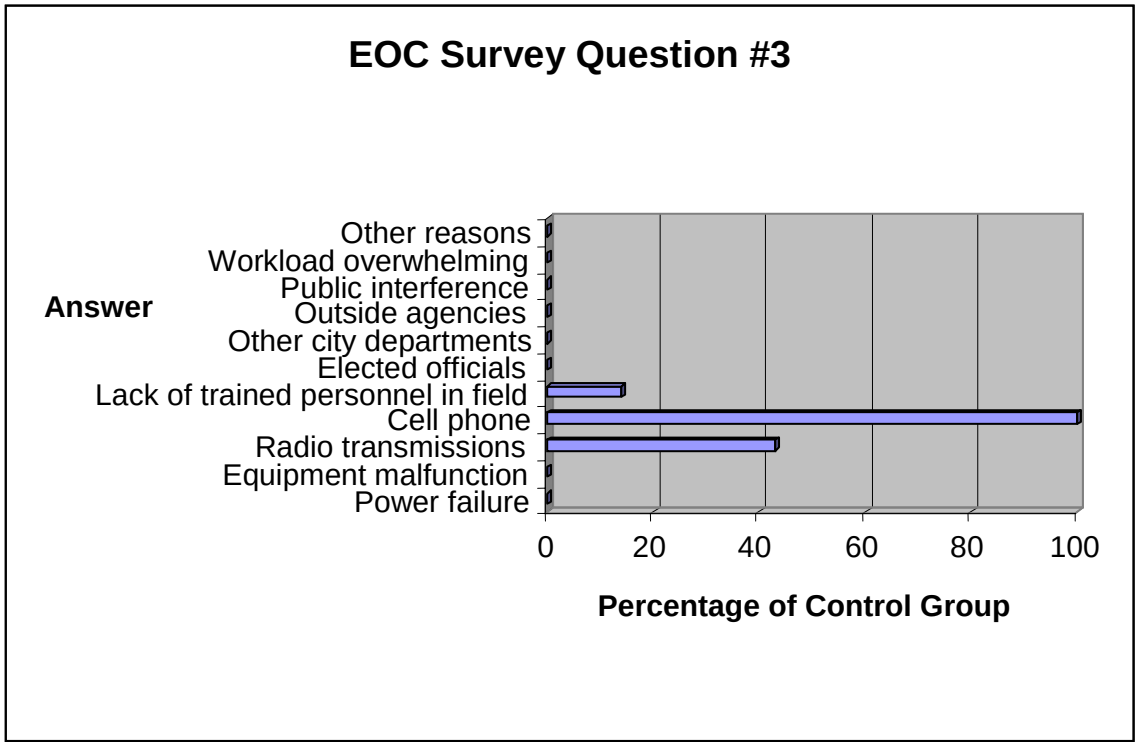

In-depth Survey Question #8
Answer
Evacuations
No one injured
Good customer service
Locations of damage for permitting
Assiting people in need
Identified unsafe structures
Completed despite communication failure
0
20
40
60
80
100
Percentage of Control Group

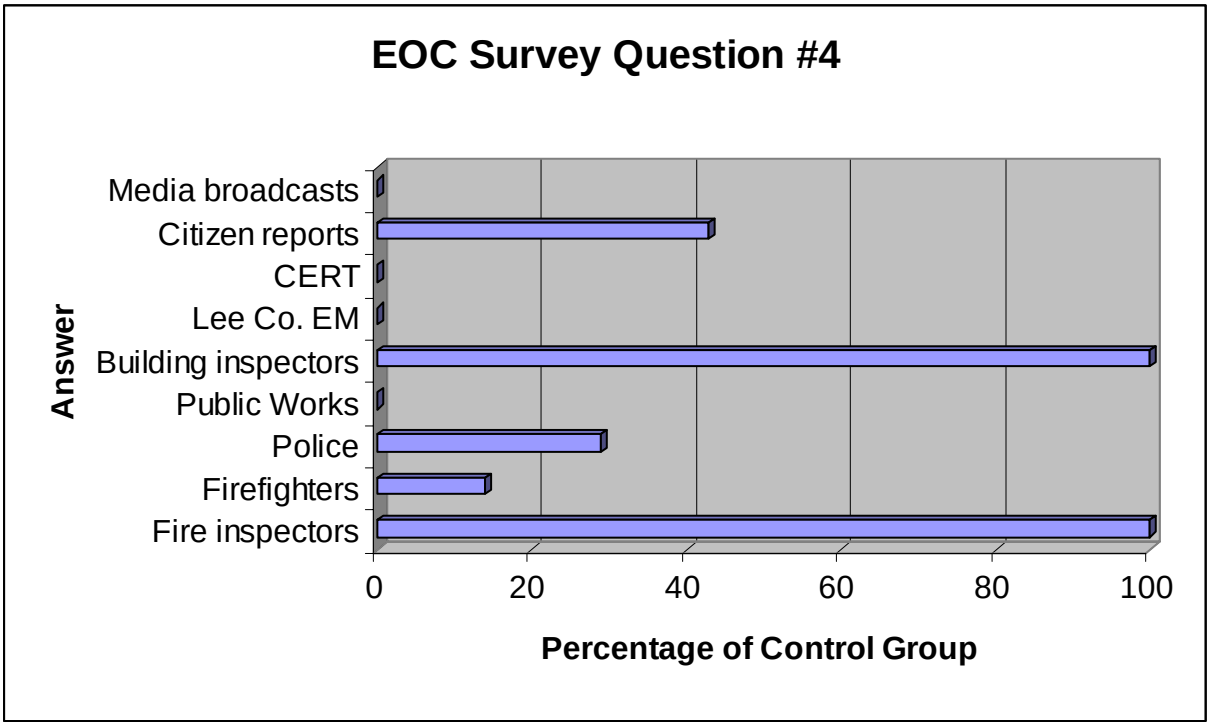

In-depth Survey Question #9
Answer
Did the city learn anything
Failure to understand situation
No critique or review
Do not assign additional duties
0
20
40
60
80
100
Percentage of Control Group

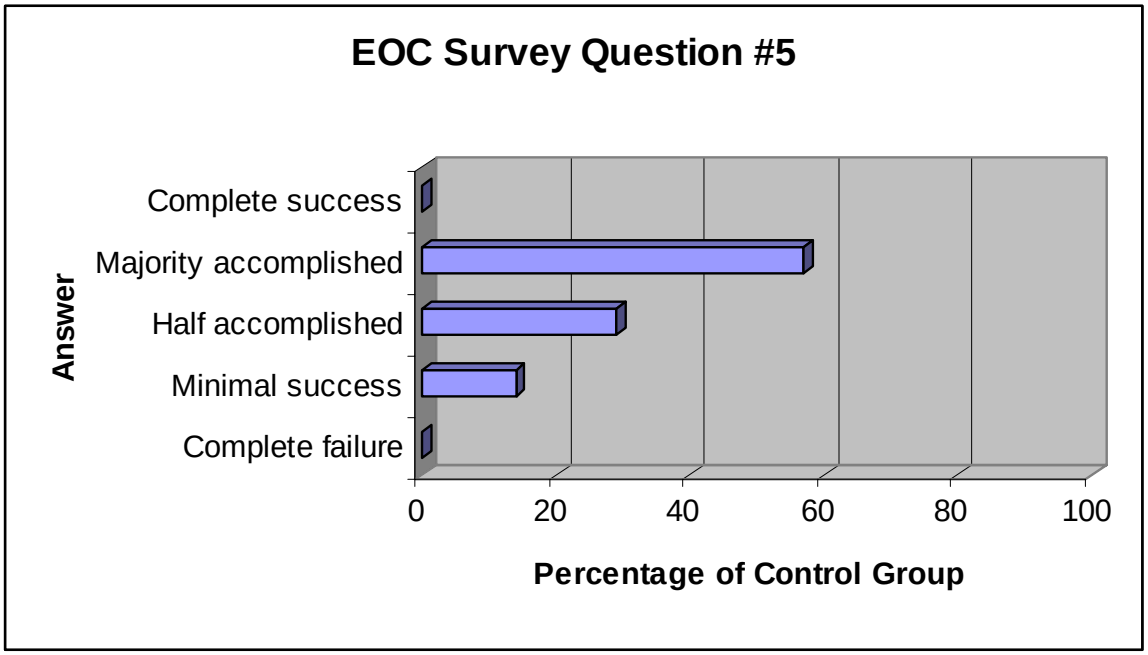
Appendix H

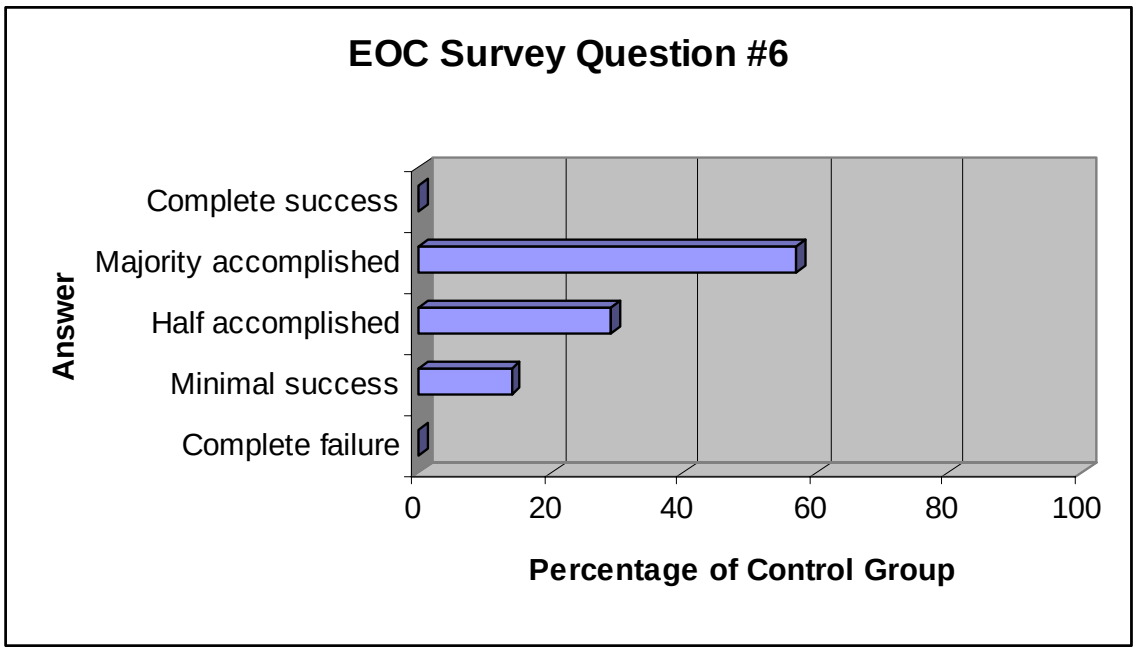

EOC Survey Question #1
Answer
No
Yes
0
20
40
60
80
100
Percentage of Control Group

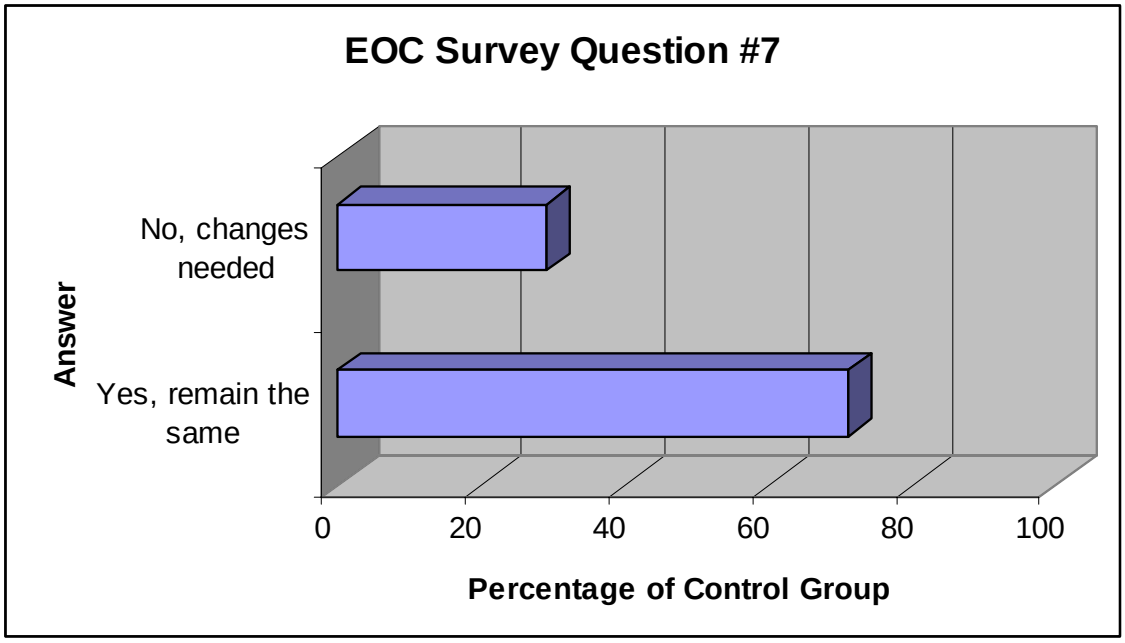

EOC Survey Question #2
Answer
Both in EOC & field ops
EOC only
Field operations only
0
20
40
60
80
100
Percentage of Control Group

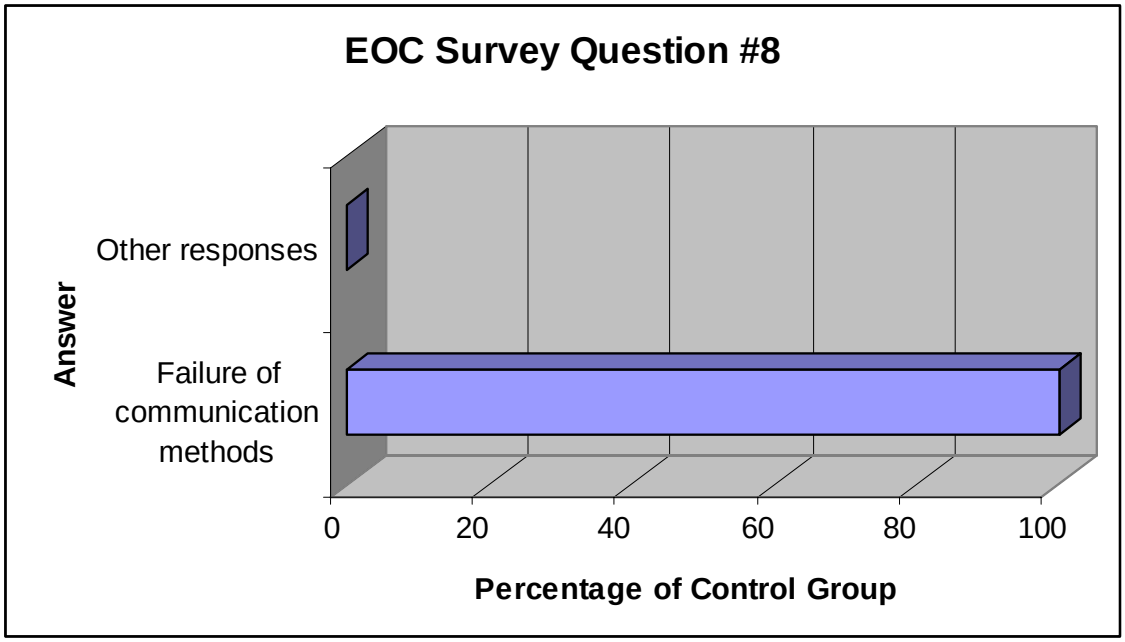

EOC Survey Question #3
Answer
Other reasons
Workload overwhelming
Public interference
Outside agencies
Other city departments
Elected officials
Lack of trained personnel in field
Cell phone
Radio transmissions
Equipment malfunction
Power failure
0
20
40
60
80
100
Percentage of Control Group

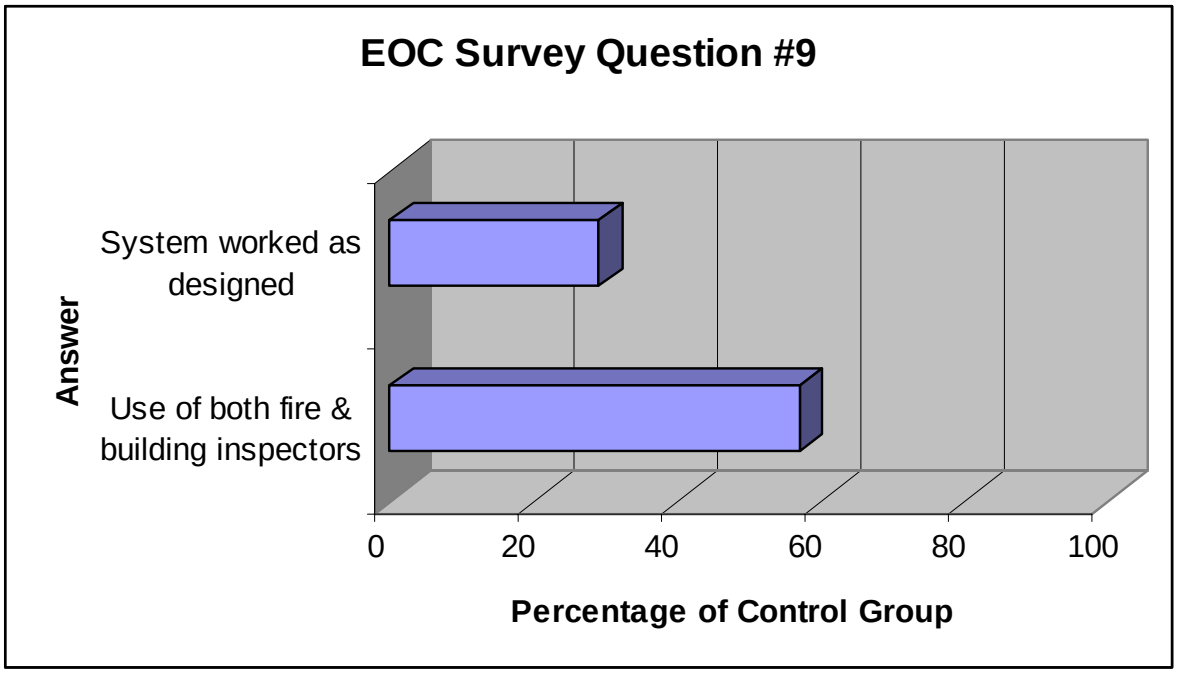

EOC Survey Question #4
Answer
Media broadcasts
Citizen reports
CERT
Lee Co. EM
Building inspectors
Public Works
Police
Firefighters
Fire inspectors
0
20
40
60
80
100
Percentage of Control Group

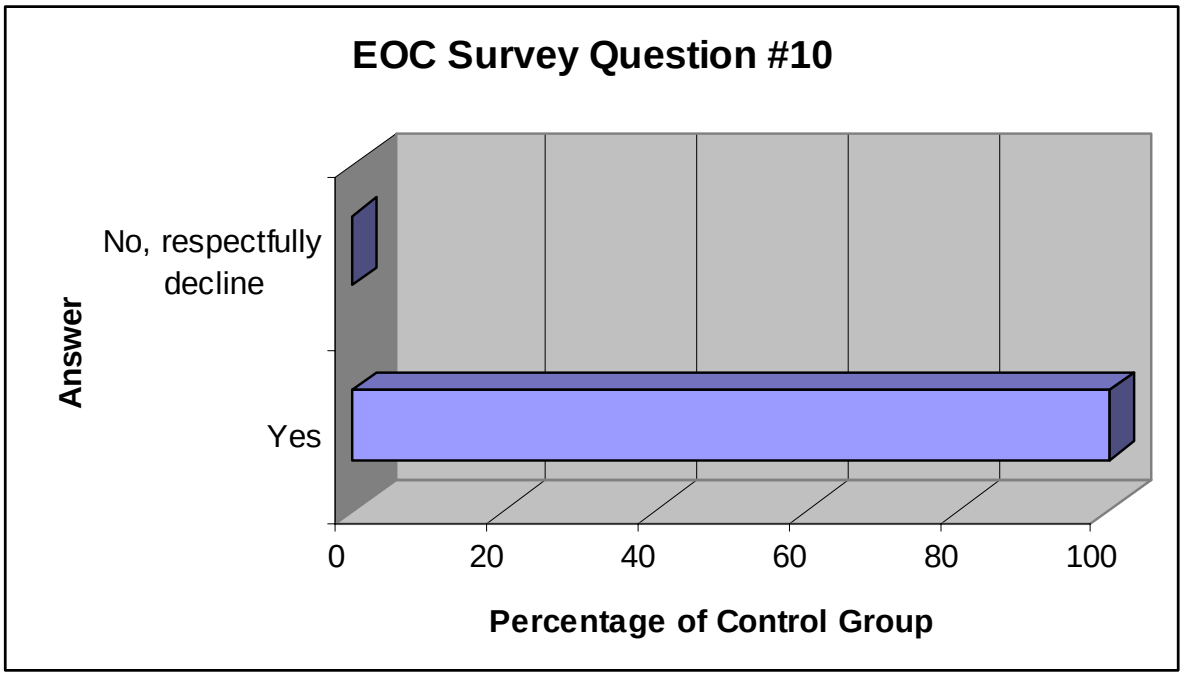

EOC Survey Question #5
Answer
Complete success
Majority accomplished
Half accomplished
Minimal success
Complete failure
0
20
40
60
80
100
Percentage of Control Group


EOC Survey Question #6
Answer
Complete success
Majority accomplished
Half accomplished
Minimal success
Complete failure
0
20
40
60
80
100
Percentage of Control Group


EOC Survey Question #7
Answer
No, changes needed
Yes, remain the same
0
20
40
60
80
100
Percentage of Control Group


EOC Survey Question #8
Answer
Other responses
Failure of communication methods
0
20
40
60
80
100
Percentage of Control Group


EOC Survey Question #9
Answer
System worked as designed
Use of both fire & building inspectors
0
20
40
60
80
100
Percentage of Control Group


EOC Survey Question #10
Answer
No, respectfully decline
Yes
0
20
40
60
80
100
Percentage of Control Group