

Prattville Tornado Response Plan

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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

The action research method was used to develop a program for tracking the location of tornado safe rooms in Autauga County and the City of Prattville, Alabama. The problem was that private residential tornado safe rooms were not consistently registered in a central database enabling rescuers to quickly locate and free people. The purpose of this research project was to locate tornado shelters in the county and city, have the information uploaded in to the computer aided dispatch system at the Autauga County Dispatch Center (911), and entered into the Geographic Information System (GIS) map of Autauga County. A further goal was to set ongoing protocol to register future shelters. This project focused on answering the following questions:

1. What single family residents had tornado safe rooms?
2. How many of the single family residence with tornado safe rooms were registered in a central database?
3. How was the information about tornado safe rooms used by the fire department to systematically rescue people trapped inside debris covered safe rooms?
4. What on going recording and registering system could be put in place to improve the outcome of the community if a tornado did strike?

The procedures used for the collection of data for was through interviews, solicitation of information from the community and information acquired from the literature review. The major finding from the research; there were numerous tornado safe rooms in the county and city, but no system in place for tracking and notifying rescue workers of their locations. Tornado safe room data was available, but lacked coordination among agencies slowing the rescue of trapped victims in safe rooms. Recommendation from this research was agencies need to register and subsequently share critical information regarding shelter locations, aiding to better community recovery after a tornado strikes.

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Introduction

The tornado season of 2011, has been horrific and Alabama has experienced a vast majority of the total devastation. Tornadoes are unpredictable, varying in size and intensity.

April 27, 2011, was the deadliest single day of tornadoes since March 18, 1925; a tornado outbreak that left 747 dead in seven states. In Alabama, the official death toll was 236 people killed in the storms, according to the state Emergency Management Agency. Additionally, another 2,219 people were injured (Gray, 2011).

The only means of near absolute protection from a direct hit from a large tornado is to be inside a reinforced tornado safe room. Throughout this research paper, “safe room” is synonymous with “tornado shelter”. The Federal Emergency Management Agency (FEMA) has outlined acceptable criteria for their design and construction in *FEMA Pamphlet – 320, Taking Shelter from the Storm*. After a tornado passes, there are often major problems locating people that are trapped or buried in the safe rooms. Debris from the wreckage of destroyed homes, trees and other materials displaced by the tornado often cover up safe rooms, making it difficult for emergency responders to locate them.

The problem identified was Autauga County and the City of Prattville did not have a way of identifying the location of tornado shelters and transmitting the data to emergency responders. The purpose of this research project is to identify all tornado shelters in the county and city, have the information uploaded in to the computer aided dispatch system at the Autauga County Dispatch Center (911), and also entered into the Geographic Information System (GIS) map of Autauga County. Further, it was to establish on going protocol for updating the records when new shelters were built. This will enable emergency responders to systematically locate people

who are trapped in their safe rooms and at the same time increase the efficiency of the Prattville Fire Department and the surrounding volunteer fire departments.

This project will focus on answering the following questions regarding Autauga County and the City of Prattville:

1. What single family residents had tornado safe rooms?
2. How many of the single family residence with tornado safe rooms were registered in a central database?
3. How was the information about tornado safe rooms used by the fire department to systematically rescue people trapped inside debris covered safe rooms?
4. What on going recording and registering system could be put in place to improve the outcome of the community if a tornado did strike?

The action research method taught in the Executive Development course at the National Fire Academy was the foundation on which this paper was developed. This was accomplished by studying procedures used in other communities, collecting needed data for Autauga County and coordinating activities with key agencies within the county. The final step was developing a plan for the ongoing registration of future tornado safe rooms and making the information available for effective and efficient rescue operations when a tornado strikes the community.

Background and Significance

The City of Prattville is a suburb of Montgomery, Alabama, and lies in the southeast corner of Autauga County. The Prattville Chamber of Commerce stated that in 2010, the population of the city was 33,960 and Autauga County had a population of 54,571. (Appendix A for Letter of Statistics from the Chamber of Commerce). This reflects an increase from the previous census.

As the population density of the Prattville continues to grow, the potential devastation from these unpredictable storms escalates. On February 17, 2008, at approximately three o'clock in the afternoon a tornado touched down in the City of Prattville causing widespread damage to a residential neighborhood and several businesses. Crystal Ousley, Deputy Director of Autauga County Emergency Management Agency, said:

A tornado rated as EF-3 struck the City of Prattville. The touchdown path of the tornado covered an area of 14.5 miles long and 440 feet wide. There were no casualties; however, fifty people were injured and several taken to local hospitals for treatment. The city sustained extensive damage to over 50 businesses, 880 homes of which 80 were destroyed in their entirety. (C. Ousley, personal communication, June 17, 2011).

The evaluating tool referred to above was developed for measuring tornadoes and is known as the Fujita Scale. It was introduced in 1971, and used in rating tornadoes from F1 (the weakest) through F6 (the strongest), linking damage to wind speed (Appendix B for Fujita Tornado Damage Scale) ("Fujita Scale," 2011, p. 1). Subsequently, a team of meteorologists and wind engineers updated the original F-Scale to the Enhanced Fujita Scale (EF) and it was implemented in February 2007.

The new Enhanced Fujita Scale was developed to better reflect examinations of tornado damage surveys, so as to align wind speeds more closely with associated storm damage. Better standardizing and elucidating what was previously subjective and ambiguous, it also adds more types of structures, vegetation, expands degrees of damaged and better accounts for variables such as differences in construction quality. It rates tornadoes on a scale

from EF1 (the weakest) to EF 5 (the strongest) see (Appendix C for Enhanced Fujita Tornado Damage Scale) ("Fujita Scale," 2011, p. 1).

The United States Fire Administration (USFA) has five operational objectives. These are directed at the reduction of the loss of life from fire-related hazards but also towards the development of partnerships with communities in Community Multi-Hazard Risk Reduction ("United States Fire Administrations Operational Objectives," 2001, p. 3). The fourth operational objective of USFA focuses on why this research paper is being written. It states, "It will identify 2,500 communities in which the fire department is a partner in Community Multi-Hazard Risk Reduction Plan". Multi-Hazard risk reduction needs to be implemented in all communities and the intent of this project to make it a reality in Prattville and Autauga County.

The Executive Fire Officer Program (EFOP), an initiative of the United States Fire Administration/National Fire Academy is designed to provide senior officers and other key leadership roles with an understanding of the need to transform fire and emergency services organizations from being reactive to proactive; with an emphasis on leadership development, prevention, and risk reduction (U.S. Fire Administration, 2011). In the course, Executive Analysis of Community Risk Reduction, the focus of the course work is on the value of community risk reduction and the process of applying risk reduction to the community. It involves developing partnerships with the community to implement programs, initiatives and services that prevent and/or mitigate the risk of human caused or natural disasters (United States Fire Academy, 2011).

This applied research project will deal with the development of a pre-tornado platform to be used by the Autauga County Emergency Operation Center (EOC), Autauga County Dispatch Center (ACDC) and emergency responders aiding in rescue operations and mitigation after a

tornado strikes. This result – a systematic and efficient protocol to rescue victims trapped in tornado safe rooms and put in place a system to continue to update the data. This aligns with the mandate taught in the Executive Fire Officer Programs, Executive Analysis of Community Risk Reduction course at the National Fire Academy. The need to act proactively by identifying deficiencies, working at unifying agencies and correcting problems is the message the National Fire Academy is conveying to the fire service. This research paper identifies a problem, explains the steps taken to rectifying the problem, and finally the results that came out of the process.

The Prattville Fire Department is comprised of 85 career firefighters and five support staff personnel, operating from three fire stations and one administrative office complex. It is responsible for providing the following services to the community: fire suppression, hazardous materials, swift water rescue, underwater dive rescue, elevated rope rescue, trench rescue, confined space rescue, emergency medical services and transport, fire prevention and fire investigation. Additionally, it is responsible for conducting plans review, fire code inspections, public fire awareness education, and contributing to an assortment of Emergency Management Agency training initiatives. Prattville Fire Department is under contract to provide emergency medical services and all rescue services to Autauga County. Hazardous materials continuously travel through the city by way of the railroad line and a major interstate. Also, the close proximity of Prattville to Maxwell Air Force Base makes it a prime target for terrorist activity.

Included in the service area is an increasingly young demographic segment. There are 11 schools in the county that house elementary age students, many nursing homes and an increasing Hispanic population. Additionally, there is new city/county metro jail with a capacity of 306 and a hospital with a capacity of 75.

Literature Review

Tornadoes are devastating, unpredictable, and often strike with little warning. They are known for destroying practically everything in their path of travel. The force of the winds and severe pressure changes that accompany a tornado make it difficult for anything to withstand its fury, often leaving death and destruction in its wake. The way to survive the danger of a tornado is to be out of its path or in a safe room that is strong enough to withstand the power of the storm. Getting out of the path of a tornado is often not a viable option since they move in erratic patterns and often at great speeds. Unfortunately today, most people do not have an acceptable shelter to go to when a tornado threatens.

The *Opelika-Auburn News* reported on May 28, 2011, “Old-fashion storm shelters have become relics of the past as developers increasingly build homes and entire neighborhoods without them” (“Relics of the past,” 2011, p. 5A). The article went on to say:

The shelters that were common in the 1930s and 1940s, if not earlier, were usually no more than a concrete-lined hole with a locking metal door. They were seldom larger than a walk-in closet and were designed to protect a handful of people for only 20 or 30 minutes – just long enough for the storm to pass.

But now even basements are becoming less common, and they are no longer a guaranteed safe spot. Experts warn that basements without an integrated concrete roof or with windows could be just as dangerous as above-ground parts of the home (“Relics of the past,” 2011, p. 5A).

On April 15, 2011, 45 tornadoes touched down in Alabama, eight of those in Autauga County. One of the tornadoes in Autauga County killed three people, destroyed several homes and a church (Roney, 2011, p. 1C). On April 27, 2011, 53 tornadoes touched down in the

Alabama. This took the annual tally of tornadoes to 98, more than had ever touched down in Alabama's history ("98 tornadoes tallied," 2011, p. 1). Its' cumulative devastation was responsible for the death of 250 people and the destruction of over 7,300 structures. Forestry reported that an estimated 319,981 of woodland was destroyed at a value of over \$266,088,751. They went on to report private landowners lost an estimated 314,500 acres for a total loss valued at \$258,624,313("Joint Alabama-FEMA Situational Report No 41," 2011, p. 4).

Today, the standards for safe rooms far exceed those of the past. They take into consideration a number of factors based upon sound engineering practices and scientific research. In *FEMA P- 320, Taking Shelter from the Storm*, it states:

Having a safe room built for your home or small business can help provide "near-absolute protection" for you and your family or employees from injury or death caused by the dangerous forces of extreme winds. Near-absolute protections means that, based on our current knowledge of tornadoes and hurricanes, the occupants of a safe room built according to this guidance will have a very high probability of being protected from injury or death (*FEMA P-320, Taking Shelter From the Storm*, 2008, p. v).

The National Storm Shelter Association (NSSA) grew out of concern for storm shelter quality after the Oklahoma City tornadoes of May 1999 ("NSSA Origins," 2000). They established the standards for above and below ground safe rooms. This was in an effort to eliminate the construction and installation of storm shelters that would not provide adequate protection to the occupants. Additionally, other organizations were testing materials to insure compliance.

FEMA, in cooperation with the Wind Engineering Research Center at Texas Tech

University, developed performance criteria for tornado shelters. The performance criteria was based upon studies that evaluated the following: resistance to loads from wind pressure for shelters, windborne missile impact resistance on shelter walls and ceilings, shelter access doors and door frames, shelter ventilation, emergency lighting, shelter sizing, accessibility, emergency management considerations, additional requirements for below grade shelters, multi-hazard mitigation, construction plans and specifications, quality control and obtaining necessary permits. ("Tornado Shelter Performance Criteria," 1999 , pp. 2-8).

In recent years, due to the devastation and frequency of tornadoes across the United States, there has been a renewed interest from the general public in installing safe rooms. New Federal programs make this a real possibility for people who would never have had the funding to procure one on their own. Tornado Project, a small company stated, "The deadly tornadoes in 1997 and 1998 seem to have stimulated people's interest in storm shelters, and we have had many emails questioning us about them" ("Storm shelters," 2011, p. 1). Trilogy Partners (an architectural firm) found an appreciation for tornado shelters. The recent tornado that destroyed a large part of Joplin, Missouri made people take a hard look at protection from storms. One resident who recently lost her home said, "I will do without a gourmet kitchen so I can have a basement" (Rath, 2011, p. 1). Jennifer Levitz reports, "Calls to build more bunker –like structures are growing in the Midwest and Southeast after a string of Spring twisters that have left hundreds of people dead" (Levitz, 2011, p. 1). Trisha Raney, a councilwoman in Joplin, Missouri stated, "Despite how many tornadoes we have, many residents don't have a safe place to go during twisters and so few homes even have basements" (Levitz, 2011, p. 1).

The growing death toll from tornadoes also brings with it many questions and concerns when it comes to safe rooms. The most frequently asked questions: What will happen if I get trapped in the safe room or if it floods and I can't get out? People who suffer from severe claustrophobia also explain that they find it very difficult to get confined in a small closed in area even with the threat of a tornado looming down on them . There is no doubt that their concerns are justified.

Education Book Library poses the following idea to ponder:

Most people only think in terms of staying in their storm shelter for a few minutes or hours, but under the worse conditions you could possibly spend more than a day and up to a week, or maybe even longer, in your storm shelter, which means it is really important to have it stocked with everything you could possibly need.

For example, what if your house was moved off of its foundation, landing squarely on top of your storm shelter? The neighbor's house? Their barn? The 100- year old magnolia or oak tree in your front yard? Any of these could realistically hamper your getting out of your storm shelter on your own and could definitely make it difficult for emergency workers to get to you, if they knew you were there (Admin [Admin], 2011, p. 1).

In Wilcox County, Alabama a tornado touched down in Miller Ferry in the early afternoon on March 1, 2007 trapping one family in their tornado safe room. Commissioner Mark Curl said, "Within five seconds after they got in the storm shelter, it hit. Their home was completely demolished and they were trapped in the storm shelter for a good while before rescuers were able to get the trees off it" (The Birmingham News, 2007, p. 1).

A horrific tornado touched down in Oklahoma City, Oklahoma on May 3, 1999. The following is recap of the devastation and problems that confronted responders:

A devastating F5 tornado passed through parts of the metropolitan area, causing a large area of damage. Emergency Management agencies were stretched to the limit as a result of the extent of the damage area. The winds from the tornado were so powerful that whole neighborhoods were damaged to the point of being unrecognizable. In all, 6,000 homes, commercial buildings, and other structures were damaged or destroyed. Some citizens were trapped for several hours in underground storm shelters that were covered with debris. With more severe storms threatening the area during the night, rescue personnel searched through debris for trapped victims (Meldrum, n.d, p. 1).

Being trapped in a tornado safe room is a real concern for people and it is justified. A lot of communities are taking action to prevent this kind of mishap and to put community worries at ease. Oklahoma City, when confronted with this problem, took the following action:

As a result of the May 1999 tornado, the city realized the locations of private storm shelters were needed as a part of its tornado response. The city initiated a voluntary private storm shelter registration program to gather the information from citizens. A telephone hot line was established and a Web-based data entry application was developed, utilizing Microsoft's .Net technology. As storm shelter information is entered, the address is matched directly to the address feature class stored in ArcSDE (Spatial Database Engine). The city maintains the exact locations of more than 215,000 addresses as a feature class of ArcSDE. To date, the city has recorded more than 3,000 private

storm shelters.

An important requirement of the program was to make the information immediately available to emergency managers and rescue personnel. To accomplish this, the storm shelter data is dynamically combined with the address feature class on the ArcSDE server as an SDE view. This storm shelter data appears on a regular geodatabase feature clients including ArcMap and ArcIMS (Arc Internet Map Server) (Meldrum, n.d, p. 1).

In the Norman, Oklahoma, tornado safe room are registered and reported by the home owner.

The web site explains the procedure and the purpose as follows:

The registry consists of a list of storm shelters and valuable information for each shelter such as contact information, shelter address, shelter type, and where on the property the shelter is located. The Geographic Information Information System department will maintain the database and the shelter addresses will be used to map all storm shelter locations. In the event of a natural disaster, address lists and address maps of affected areas can be distributed to emergency responders so that those in need of assistance can be quickly located ("Shelter registry," 2011, p. 1).

In Ada, Oklahoma, a campaign for educating the public on tornado safety was implemented with emphasis on the need to register personal safe rooms:

Their campaign highlighted the fact that each year people are trapped in storm shelters after a tornado and they wanted to ensure the residents if they were trapped in safe rooms that registration would result in quickly locating their shelters and freeing any trapped victims ("ADA safe room registration,"

2010, p. 1).

Madison County, Alabama is also working to improve response plans for people being trapped in tornado safe rooms after a tornado touches down.

David Glassman, the Emergency Operations manager for Madison Fire and Rescue noticed rescuers ran into problems finding survivors in Missouri because they didn't know where existing storm shelters were. "There was nobody in the house and actually there was a storm shelter underneath the house" said Glassman. "What happens with tornadoes if you have debris collapse on top of the storm shelters, you can't get out".

That got him to thinking and he realized that emergency official did not know where safe rooms were located in homes and businesses around the area. He set out to change that and created an online registry of storm shelters in Madison. He said "if a tornado does come through, we need to know what facilities, what homes, have tornado shelters" ("Madison shelter registration," 2011, p. 1).

The literature review showed that tornado safe rooms are once more becoming important to the population who live in tornado prone areas. It made it apparent that major tornadoes have resulted in extreme devastation and losses this tornado season across the nation, including areas in Alabama and Autauga County. People, have a tendency to feel secure believing things will not happen to them; however, tornadoes do pose a significant risk and appropriate action needs to be taken to survive these monstrous storms. The progression in the engineering of tornado safe rooms and the development of rigid standards to insure they can withstand the power of large storms is paramount to survivability. Those are the driving forces taking safe rooms from primitive concrete structures to technologically advanced designs. Also presented was how the

federal government, along with private enterprise brought about needed change in tornado safety. Next, the fears and problems associated with tornado safe rooms were viewed along with things to consider when using them. Finally, a program for tracking private tornado safe rooms in various communities was looked at. This was the foundation on which this applied research project was constructed. The end result was to develop a program that would benefit the community by minimizing the time that citizens were trapped in tornado safe rooms and at the same time increase the efficiency and productivity of emergency responders.

Procedures

The purpose of this applied research project was to determine what could be done to track the location of personal safe rooms. By knowing where the safe rooms are located, people trapped by debris covering the escape opening could be quickly rescued and the emergency response resource more efficiently and effectively utilized. The action research methodology was used to develop this applied research project. The City of Prattville and Autauga County benefited from the outcome of this project. This was accomplished by studying what procedures were currently in place, collecting and soliciting the community for data, coordinating the activities of different agencies, and finally having the data put into a format that could be utilized when a tornado did touch down.

Several interviews needed to be completed to understand the current procedures. The Autauga County Emergency Management Agency and the Autauga County Dispatch Center (ACDC) were the first two interviews conducted. The selection criteria for determining who was to be interviewed was based upon an analysis of the key personnel in the city and county that would be familiar with what currently is being done if a tornado does touch down and at the same time, knowledge of what resources they had at their disposal to develop a pre-incident

program. It was found that two additional interviews needed to be conducted. One with a local newspaper reporter who was instrumental in helping to gather needed data and the other was with the city web page master to determine if there was a resource available that could be used for registration of tornado shelters on a continual basis. All interviews scheduled were brief and informal since the information needed was for a specific subject in their areas of expertise.

The questions for the interviews were developed from information obtained from the literature review. Specific areas of concern that came to light from the research were current data was incomplete and not utilized to its fullest; and technological capabilities were available and could be incorporated into the city and county to hasten response of trapped people in tornado safe rooms. All questions were tailored to what area of expertise the person being interviewed would be knowledgeable.

Three interviews were scheduled to be conducted on the same day because of the close proximity of the interviewees, availability and their schedules. The last interview conducted with the web page master resulted from additional information learned from the literature review and the information learned from a prior interview. The knowledge of what one interviewee knew could not contaminate the information of another interviewee. Each interview was scheduled to last 30 minutes. All questions were developed prior to the interview. The interviewees were informed of the subject matter when the appointments were made.

Prior to all interviews, the interviewees were asked if taking notes while they spoke would disturb them. All the interviewees responded by saying that note taking was acceptable to them. Interviews were conducted in each of the interviewee's offices at the scheduled time. The reason for this was to insure that if the interviewee needed access to their files the information would be readily available. Questions were asked and notes taken while conducting the interview.

There were no limitations to the interview process. The interviewees were available at the scheduled times, knowledgeable of their subject matter, and very cooperative.

The first person scheduled to be interviewed was Autauga County Deputy Director of EMA, Crystal Ousley. She was selected to be interviewed first because she was the manager of the Safe Room Grant Program for Autauga County and would have the greatest amount of knowledge about safe rooms in the city and county. She was asked the following questions:

1. How many tornado safe rooms are in the county and the city? 2. Do you know the location where all the tornado safe rooms are? 3. Is there a program in place for tracking tornado safe rooms? 4. Can the data on the location of tornado safe rooms that you presently have be shared with the Autauga County Dispatch Center (ACDC)? 5. Have you taken any action to register tornado safe rooms or find the location of private funded tornado shelters?

The second person scheduled to be interviewed was the director of the (ACDC), Don McBayer. His extensive knowledge with computer-aided dispatch (CAD), Geographic Information Systems (GIS) and available technology made him an ideal interviewee. He was asked the following questions: 1. Did he see the benefit of inputting in the location of tornado safe rooms into the CAD? 2. Is the technology currently available in Autauga County to layer GIS maps with the locations of tornado safe rooms? 3. Are your personnel authorized and capable of installing data into the CAD and getting a reliable product? 4. Do you have the information as to the location of where tornados safe rooms area in the county and the city?

The third interview was with a newspaper reporter for the *Montgomery Advertiser*, Marty Roney. This particular interview was conducted to solicit information from the community through a newspaper article that he was going to be requested to write. The following question was asked of him: Would you write an article for the newspaper asking the residents of Autauga

County and those that reside in the City of Prattville if they have tornado safe rooms, and if so please contact the Autauga County Emergency Management Agency?

The final interview was with the Prattville Webmaster, Theresa Lee; responsible for the Autauga County and Prattville city web page. The following question was asked of her:

Could you develop a Tornado Safe Room registration page and put it on the city web page where it sends data to the Autauga County Deputy Director of EMA, Crystal Ousley, so that information could be shared with ACDC concerning the location of tornado safe rooms in the city and county?

It is through these procedures that we gain a better understanding of how current data on tornado safe rooms in Autauga County and the City of Prattville was being utilized and how that data could be put to more effective use, benefitting the citizens who have tornado safe rooms and the emergency responders.

Results

This project focused on the importance of tornado safe rooms, but more importantly, how to quickly locate people who may be trapped in them after a tornado touches down. A thorough review of literature revealed this is not a unique problem and is one being handled in a number of communities that are routinely threatened with tornadoes. A comparative analysis of different plans for locating tornado safe rooms in other cities was looked at in order to identify the deficiencies of Prattville and Autauga County. To begin with, a thorough understanding of the current procedures being used in the city and county needed to be reviewed. This information was obtained by conducting interviews with the deputy director of Autauga County EMA, the director of the ACDC, the assistance of a newspaper reporter, and the Prattville Webmaster. These key personnel were in the positions to have this knowledge at their disposal, and also have

the authority to make needed changes and implement programs. In an interview with Crystal Ousley, Autauga County Deputy Director of EMA, the following series of questions were asked in an attempt to get a better understanding of the tornado safe rooms in the city and the county, as well as what programs are currently in place for tracking their locations (C. Ousley, personal communication, Jun 14, 2011).

1. How many tornado safe rooms are in the county and the city?

There are as of this date, 80 tornado safe rooms in the county, of those 30 are in the city. These, I am sure of because they all received a percentage of funding from FEMA under the Safe Room Grant Program. That is a programs where grant funds will be reimbursed 75% or up to \$4000 of the cost to install a safe room. Funds are reimbursed when the safe room is installed and the receipts are presented. We provide all the necessary plans and forms for compliance with FEMA safe room standards.

2. Do you know the locations where all tornado safe rooms are?

I do know the addresses of where tornado safe rooms are that received FEMA funding. We maintain records for accountability of those. We currently are accepting applications for safe room grants at this time. They are available to homeowners for their primary residence. I do not know the location of tornado safe rooms where people paid and installed them using their own private funds.

3. Is there a program in place for tracking tornado safe rooms in Autauga County?

No, not at this time, but I can see a need for it.

4. Can the data on the location of tornado safe rooms that you presently have be shared with the Autauga County Dispatch Center (ACDC)?

Yes, that is not a problem. We have sent some tornado safe room data to them in the past.

5. Have you taken any action to register tornado safe rooms or find the location of private funded tornado shelters?

No, that has not been done.

The Director of ACDC, Don McBrayer was interviewed. The questions and his answers to them are found in the following: (D. McBrayer, personal communication, June 14, 2011).

1. Did you see the benefit of inputting the location of tornado safe rooms into the CAD?

Yes, I can see a real benefit to putting that information in the CAD . We can connect the safe rooms with each address and know where the safe room is at that address.

2. Is the technology currently available in Autauga County to layer GIS maps with the locations of tornado safe rooms?

Yes, recently, we did an upgrade to the GIS system which is ideally suited for determining where a tornado touched down and if the location of tornado shelters was in the system, we could pin point the locations of tornado safe rooms. Then dispatch could send emergency responders to those areas insuring those people were safe and able to get out of their tornado safe rooms.

3. Would the input of data be within the current scope of work that your people are capable of installing and getting a reliable product?

Yes, I have one person specifically responsible for working on GIS mapping. That is his only job and that information falls in line what he does every day.

4. Do you have the information as to the location of where tornados safe rooms area in the county and the city?

We have a few tornado safe rooms in the CAD but do not have them on the GIS mapping system. We recently upgraded the GIS mapping system and that data has not been

installed as of yet. If we had that data we would put it in the CAD and on a GIS layer.

This would not take to long to accomplish.

The next interview was with Marty Roney, a newspaper reporter with the Montgomery Advertiser. He was asked the following question: (M. Roney, personal communication, June 14, 2011).

Would you write and article for the newspaper asking the residents of Autauga County and those that reside in the City of Prattville if they have tornado safe rooms and if so please contact the Autauga County Emergency Management Agency?

Yes, I will take care of that and have it in the newspaper this week (Appendix D).

The last interview was with Theresa Lee, Prattville Webmaster; she was asked the following question: (T. Lee, personal communication, July 7, 2011)

Could you develop a Tornado Safe Room registration page and put it on the city web page where it sends data to the Autauga County Deputy Director of EMA, Crystal Ousley, so that information could be shared with ACDC concerning the location of tornado safe rooms in the city and county?

Yes, I can do and think it is a good idea. It will take me about two weeks to get it up and running.

This research has exposed a lack of communication between agencies but found they were willing to make the necessary changes and cooperate with each other. The research was directed at finding answers to the following questions in an effort to reduce the risk of actions taken by people who are trying to protect themselves from the dangers of tornadoes.

Research Question #1: What single family residents had tornado safe rooms?

The collection of this data was accomplished in a series of steps. First, the information that was available from the Autauga EMA representative was compiled with the data that the director of the ACDC had on file. Second, a newspaper article from the most widely read newspaper in the local area *The Montgomery Advertiser* published an article requesting people who had tornado safe rooms (either FEMA funded or privately funded) contact Autauga EMA with their data (see Attachment D, Tornado Registration Article). Next, a safe room registration web page was developed by the Prattville Webmaster:

(http://www.prattvilleal.gov/component/option,com_mad4joomla/Itemid,455/jid,9/). All data collected was channeled through the EMA Deputy Director where it was analyzed for accuracy, elimination of duplicates and forwarded to ACDC. In total, 92 tornado safe rooms were identified in Autauga County. The location of 12 additional tornado safe rooms came out of this research project and more are expected to appear in the future after the web page has been available for a greater period of time. All information collected was forwarded to the ACDC to be added into the CAD and the GIS mapping system. This action was accomplished and the data is now able to be reflected on the maps (Appendix E and Appendix F).

Research Question #2: 2. How many of the single family residence with tornado safe rooms were registered in a central database?

There were very few tornado safe rooms documented in the CAD before this project was initiated; however, we can see from our research that the documentation of the location of tornado safe rooms is becoming very important throughout communities in the tornado prone areas. The CAD has been updated to reflect the most current data.

Research Question #3: How was the information about tornado safe rooms used by the fire department to systematically rescue people trapped inside debris covered safe rooms?

The information in the past was unable to be used because it was incomplete. This was due to the lack of coordination between the agencies that compiled and utilized the data. The fire department would go into an area that was struck by a tornado. They would search structure to structure for victims with the possibility of overlooking persons trapped in tornado safe rooms. There was no way for emergency responders to be made aware of the location of all tornado safe rooms since the information was incomplete and not accurately documented in the CAD. This problem has been corrected with the update of the CAD.

Research Question #4: What on going recording and registering could be put in place to improve the outcome of the community if a tornado did strike?

Several methods were used to collect data on where tornado safe rooms are located in Autauga County and the City of Prattville. This includes local newspapers, the city web page (Tornado Registration Form) and other media outlets. Second, that information needs to be shared with the agency responsible for inputting data into the CAD. Third, that information needs to be shared with the agency that is responsible for inputting the data in GIS. Finally, all agencies that would use the information need to be educated on the availability of the data and what its' capabilities are. The data will be dynamic and need to be continuously updated to prevent a breakdown in the system. Inaccurate data could result in people being trapped in tornado safe rooms for prolonged periods of time, or even worse, not found until after they have perished. The CAD and GIS mapping system were brought up-to-date with all available information.

It is only logical to conclude that the intensity and severity of recent tornadoes in Alabama and the Southeast will result in an increase in the amount of tornado safe rooms being installed in

the community. That increase means statistically, that the potential risk of people being trapped in tornado safe rooms will increase. This project has identified the location of tornado safe rooms in the Autauga County and the City of Prattville. Advances in technology that are in place in Autauga County now give dispatcher, incident commanders, and emergency responders up to the minute workable maps depicting where tornadoes touched down in relationship to where the tornado safe rooms are located. This will assist emergency responders in faster rescues of those persons that are trapped in their tornado shelters because of the debris.

Discussion

These researches made it apparent that the City of Prattville and Autauga County are not unique in trying to deal with the same problem other cities have experienced. In the article by the *Opelika-Auburn News*, it stated that tornado shelters have become relics of the past and that developers increasingly build homes and entire neighborhoods without them ("Relics of the past," 2011, p. 1). However, recently interest has never been as high as it is right now, according to several of the roughly 100 companies that sell storm shelters (Severson, 2011, p. 1). In the article it went on to say;

A shelter can cost from about \$3,000 for a concrete bunker to tens of thousands of dollars for elaborate steel rooms. A good one should have at least three deadbolts on the doors and walls that can withstand a piece of debris slamming into it at 100 miles per hour (Severson, 2011, p. 1).

On March 1, 2007, Jamie Wallace of Miller Ferry, Alabama, had just entered his tornado safe room due to the impending threat of tornadoes when one struck his family home. In a phone interview with him on June 20, 2011, he revealed;

I had not been in it for more than six seconds when the storm hit and

everything went black. Once everything became quiet I tried to lift the door but it would not budge. I finally got it to lift about 2 inches and could see my neighbors house was gone. I knew things were bad. We were trapped down in safe room for about one hour and fifteen minutes until someone from my work came looking for us. Three large pine trees had snapped and fallen on top of the door to the tornado safe room making it so no one could see it. When we heard the chain saws stop running we called out of the ventilation pipe and got rescuers attention. When we finally got out of the safe room we saw our house was destroyed and we lost everything. Our tornado safe room saved our lives.

(J. Wallace, personal communication, June 20, 2011).

In this particular case Mr. Wallace was fortunate. He was trapped, but only for a short period of time. That could have been much worse if his coworkers did not know he had a safe room. In the article, *Stocking your Storm Shelter*, it stated that you should plan for being in your safe room for over a week or maybe even longer (Admin, 2011, p. 1). The fact is, when a person escapes the wrath of a tornado by entering into a safe room, it is a comforting feeling knowing that someone is aware of its locations. This way they can feel assured that they will be able to get out (if with some assistance) after the storm verses being buried alive with no means of escape and no assistance.

There is a saying, “with knowledge comes power”. That being said, knowing (knowledge) where safe rooms are located gives emergency responders the ability (power) to reduce the amount of time it takes to rescue people who are trapped inside the safe rooms. Oklahoma City established a registration program for tornado safe rooms as a result of major damage from a tornado on May 3, 1999. The F5 tornado was devastating to the community and brought to light

the need for the registering all tornado safe rooms. They recognized that tornado safe rooms were great places to go when a tornado touched down but the possibility of people being trapped in the tornado shelters from the debris of structural members and vegetation was a strong possibility (Meldrum, n.d, p. 1). Norman, Oklahoma followed the example of Oklahoma City in developing a program for registration of tornado safe via a web page where they made it the safe room owner's responsibility to register the safe room on line ("Shelter registry," 2011, p. 1). Ada, Oklahoma also pursued registration of safe rooms in an effort to quickly assist emergency responders in carrying out their search and rescue operations to free trapped victims from their tornado safe rooms ("ADA safe room registration," 2010, p. 1). Madison, Alabama, was one of the first known counties in the State of Alabama to have a tornado safe room registration program. It, like the other registration programs, was developed with an online registry with the intent of making it the safe room owners responsible for insuring that they notified the Emergency Management Agency that they have a safe room ("Madison shelter registration," 2011, p. 1).

The tornado safe room registration programs identified above have been found to be beneficial to those communities. The need for a similar program in Autauga County and the City of Prattville became apparent. Statistically the increased installation of tornado safe rooms in the county and city would mean there would be a greater chance for overlooking someone who could be trapped in a tornado safe room if the locations of the safe rooms were not known. Registration of safe rooms, identifying that data in the CAD and mapping their locations in the GIS map layer increases the rescue of people trapped and the efficiency of responders . This applied research project developed a program for tracking the location of all tornado safe rooms in Autauga County and the City of Prattville. All available information has been installed in the

CAD and is on the GIS map for Autauga County and the City of Prattville (refer to Appendix E and Appendix F).

Recommendations

This applied research project has identified the problem that there were no means for accurately tracking the location of tornado safe rooms in Autauga County and the City of Prattville. It now enables the tracking the location of tornado safe rooms in the CAD and on the GIS mapping programs for the city and county. Twelve new safer rooms were located while doing this project. Ongoing safe room registration protocol has been established on the city web page with that data automatically being forwarded to the appropriate agencies for data entry into their own systems. The first recommendation is to have the Autauga EMA continue monitoring this system to insure that the process continues. Annually, before tornado season, articles needs to be placed in the newspaper requesting that if someone had a tornado safe room installed (not FEMA funded) to contact the appropriate authority to keep the data base up-to-date. All FEMA funded tornado safe rooms will have already been processed through the Autauga EMA and automatically be added to the CAD and the GIS map layer.

The next recommendation is to continue to monitor advances in technology that could enhance the tornado safe room program. An example, but not researched, installing solar power satellite tracking device into tornado safe rooms that would automatically feed data to the local communication dispatch center (E-911) as to the location. Additionally, these devices could have the capability of signaling E-911 if someone was trapped in a safe room. The capabilities of tornado safe rooms will rapid change with advances in technology.

These recommendations are positive steps towards locating tornado safe rooms and providing better customer service to the citizens of the community. People will gain better

confidence in the capabilities of emergency responders to locate them when they are trapped as existing owners talk and success stories are publicized. Collectively, the combined effect will result in more people getting tornado safe rooms. For that reason, more people will buy them and use them when threatened by tornadoes. The end result will be a decrease mortality rate from tornadoes.

Finally, to those wanting to implement a tornado safe room program in your community, conduct a thorough analysis of the lines of communication and coordination between participating agencies. Failure in these areas will be the downfall in the development of a successful program. Continue to monitor data insuring it continues to flow to the appropriate people. The end result will be accurate and up-to date tornado safe room registries and maps that can be relied upon when confronted with the devastation of a storm, leading to a successful and efficient rescue operations.

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Appendix A

From: **Jeremy Arthur** (jarthur@prattvillechamber.com)
Sent: Tue 7/19/11 5:25 PM
To: Robert Van Valkenburg (vanvalk@hotmail.com)

Robert,

The information you requested is listed below*.

Prattville City population 2010: 33,960

Prattville City population 2015: 34,153 (estimate)

Autauga County population 2010: 54,571

Autauga County population 2015: 54,752 (estimate)

Autauga County Business Establishments 2009: 10,989

(the figure for 2010 has not been updated)

*Source: U.S. Census Bureau

Please let me know if you need anything else.

Thanks,

Jeremy

Jeremy L. Arthur, IOM
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Appendix B

Fujita Tornado Damage Scale

Developed in 1971 by T. Theodore Fujita of the University of Chicago

SCALE	WIND ESTIMATE *** (MPH)	TYPICAL DAMAGE
F0	< 73	<u>Light damage.</u> Some damage to chimneys; branches broken off trees; shallow-rooted trees pushed over; sign boards damaged.
F1	73-112	<u>Moderate damage.</u> Peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos blown off roads.
F2	113-157	<u>Considerable damage.</u> Roofs torn off frame houses; mobile homes demolished; boxcars overturned; large trees snapped or uprooted; light-object missiles generated; cars lifted off ground.
F3	158-206	<u>Severe damage.</u> Roofs and some walls torn off well-constructed houses; trains overturned; most trees in forest uprooted; heavy cars lifted off the ground and thrown.
F4	207-260	<u>Devastating damage.</u> Well-constructed houses leveled; structures with weak foundations blown away some distance; cars thrown and large missiles generated.
F5	261-318	<u>Incredible damage.</u> Strong frame houses leveled off foundations and swept away; automobile-sized missiles fly through the air in excess of 100 meters (109 yds); trees debarked; incredible phenomena will occur.

*** IMPORTANT NOTE ABOUT F-SCALE WINDS: Do not use F-scale winds literally. These precise wind speed numbers are actually guesses and have never been scientifically verified. Different wind speeds may cause similar-looking damage from place to place –

Appendix B

Fujita Tornado Damage Scale

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even from building to building. *Without a thorough engineering analysis of tornado damage in any event, the actual wind speeds needed to cause that damage are unknown.* The Enhanced F-scale will be implemented February 2007.

Appendix C

Enhanced F Scale for Tornado Damage

An update to the the original F-scale by a team of meteorologists and wind engineers, to be implemented in the U.S. on 1 February 2007.

FUJITA SCALE			DERIVED EF SCALE		OPERATIONAL EF SCALE	
F Number	Fastest 1/4-mile (mph)	3 Second Gust (mph)	EF Number	3 Second Gust (mph)	EF Number	3 Second Gust (mph)
0	40-72	45-78	0	65-85	0	65-85
1	73-112	79-117	1	86-109	1	86-110
2	113-157	118-161	2	110-137	2	111-135
3	158-207	162-209	3	138-167	3	136-165
4	208-260	210-261	4	168-199	4	166-200
5	261-318	262-317	5	200-234	5	Over 200

*** IMPORTANT NOTE ABOUT ENHANCED F-SCALE WINDS: *The Enhanced F-scale still is a set of wind estimates (not measurements) based on damage.* Its uses three-second gusts estimated at the point of damage based on a judgment of 8 levels of damage to the 28 indicators listed below. These estimates vary with height and exposure. Important: The 3 second gust is not the same wind as in standard surface observations. Standard measurements are taken by weather stations in open exposures, using a directly measured, "one minute mile" speed.

Appendix C

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Enhanced F Scale Damage Indicators

NUMBER (Details Linked)	DAMAGE INDICATOR	ABBREVIATION
<u>1</u>	Small barns, farm outbuildings	SBO
<u>2</u>	One- or two-family residences	FR12
<u>3</u>	Single-wide mobile home (MHSW)	MHSW
<u>4</u>	Double-wide mobile home	MHDW
<u>5</u>	Apt, condo, townhouse (3 stories or less)	ACT
<u>6</u>	Motel	M
<u>7</u>	Masonry apt. or motel	MAM
<u>8</u>	Small retail bldg. (fast food)	SRB
<u>9</u>	Small professional (doctor office, branch bank)	SPB
<u>10</u>	Strip mall	SM
<u>11</u>	Large shopping mall	LSM
<u>12</u>	Large, isolated ("big box") retail bldg.	LIRB
<u>13</u>	Automobile showroom	ASR
<u>14</u>	Automotive service building	ASB
<u>15</u>	School - 1-story elementary (interior or exterior halls)	ES
<u>16</u>	School - jr. or sr. high school	JHSH
<u>17</u>	Low-rise (1-4 story) bldg.	LRB
<u>18</u>	Mid-rise (5-20 story) bldg.	MRB

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Enhanced Fujita Tornado Scale

<u>19</u>	High-rise (over 20 stories)	HRB
<u>20</u>	Institutional bldg. (hospital, govt. or university)	IB
<u>21</u>	Metal building system	MBS
<u>22</u>	Service station canopy	SSC
<u>23</u>	Warehouse (tilt-up walls or heavy timber)	WHB
<u>24</u>	Transmission line tower	TLT
<u>25</u>	Free-standing tower	FST
<u>26</u>	Free standing pole (light, flag, luminary)	FSP
<u>27</u>	Tree - hardwood	TH
<u>28</u>	Tree - softwood	TS

Appendix D

Grants to build safe rooms available

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Grants to build safe rooms available



Written by
Marty Roney

11:56 PM, Jun. 15, 2011

PRATTVILLE -- Emergency management agencies in the tri-county area are accepting applications for safe room grants.

A safe room is a reinforced area of the home that doubles as a storm shelter when severe weather strikes, Crystal Ousley of the Autauga County EMA said. The state receives FEMA funds to pay for the shelters, and the grants are available to people living in Montgomery, Autauga and Elmore counties who do not live in a flood zone.

The safe room grants are available to homeowners for their primary residence; renters or secondary homes aren't allowed, Ousley said. The grants will reimburse 75 percent or up to \$4,000 for the cost to install the safe room. The room must meet FEMA specifications, and can't be installed until the grant is awarded.

There are about 80 known shelters or safe rooms in the county right now, but Lt. Robert Van Valkenburg wants to know the location for all shelters/safe rooms in

Prattville and Autauga County. A veteran member of the Prattville Fire Department, Van Valkenburg said the information collected will be forwarded to the county's E-911 agency.

"We need to know the locations of shelters and safe rooms to aid emergency response and rescue efforts," he said. "The folks at 911 will have the locations in the computer, so first responders will know if that address has a shelter or safe room. That can save valuable time if we respond to a home that is destroyed or badly damaged."

Van Valkenburg said such information will help first responders know where to look first to try and find the homeowners.

"Knowing the location is especially helpful if someone has an outdoor shelter that's buried underground," he said. "They may be trapped in the shelter and need help getting out."

A tornado outbreak on April 15 saw as many as eight tornadoes strike Autauga

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Appendix D

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Grants to build safe rooms available

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County, including an EF3 storm that struck the Posey's Crossroads and Boone's Chapel communities. Three people were killed in Boone's Chapel when their mobile homes were destroyed.

Information about the safe rooms/shelters needs to be completed as soon as possible, Van Valkenburg said, adding the information won't be made available to the public.

He is working on the project as part of his training with the Executive Fire Officer Program at the National Fire College in Emmitsburg, Md. Each participant must come up with a yearly project as part of the course.

"We find a risk in the community and come up with a plan to mitigate that risk," he said.

HOW TO APPLY

Following are details on how to apply for a safe room grant:

Autauga County

Contact Crystal Ousley at the Autauga County Emergency Management Agency, 361-3758. The local EMA also is gathering information on locations of safe rooms/shelters in the county that will be forwarded to the E-911 agency.

Deadline for grant applications is July 15.

Elmore County

The Elmore County Emergency Management Agency is operating from a waiting list for safe room applications. No other names will be added to the list at this time.

Montgomery County

Contact the Montgomery County Emergency Management Agency at 241-2339. The grant application deadline is July 8.

-- Source: Local EMA offices

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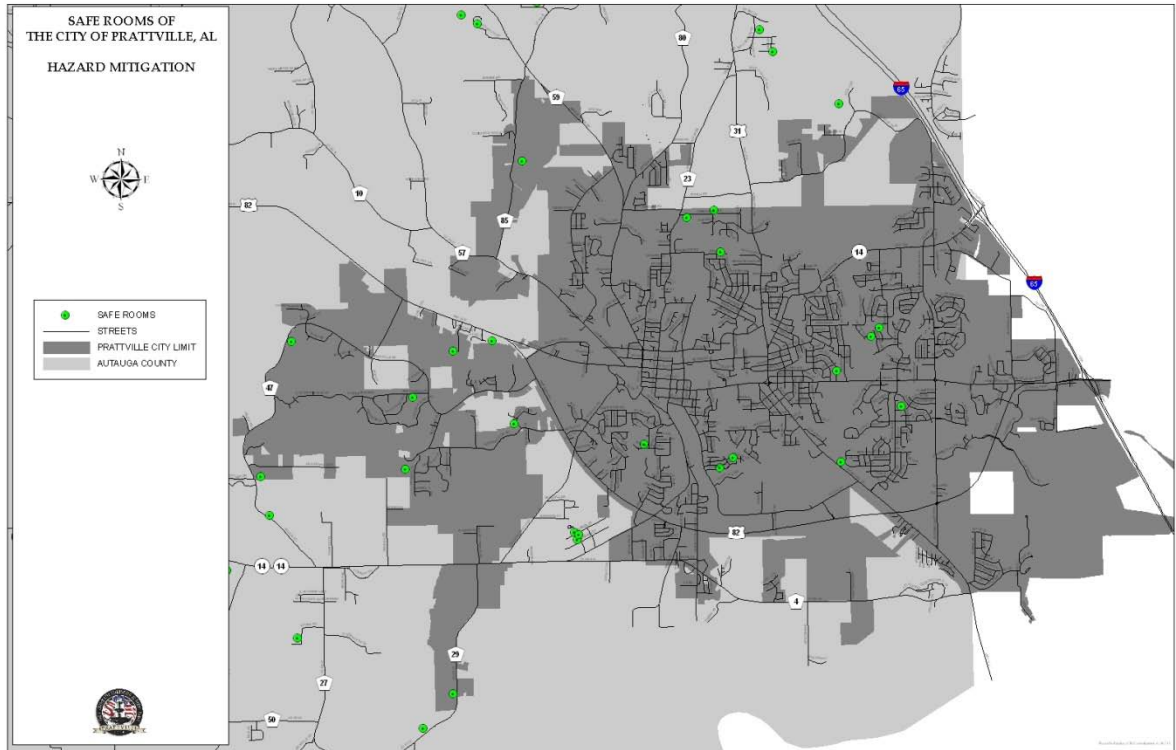
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Appendix E

City of Prattville Map of Tornado Safe Room Locations (June 2011)



Appendix F

Autauga County Map of Tornado Safe Room Locations (June 2011)

