

Scope of Work

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I. PROJECT SUMMARY

The City of Kasson, Minnesota, the sub-grantee for this Pre Disaster Mitigation Grant Program (PDM) application, is requesting funding to develop a concrete, domed structure which will serve as a public library, a multi-purpose community meeting center for the City of Kasson, and most importantly, a disaster safe room for the residents of the City of Kasson and Dodge County.



The City of Kasson actively participated in the development of the Hazard Mitigation Action Plan (HMAP) for Dodge County, MN. The specific mitigation strategy of constructing a public library / safe room for the City of Kasson is not identified in the current Plan. However, mitigation strategies listed on pages 120-121 include several shelter-related severe weather mitigation strategies. The Project Officer believed the Mitigation Objectives, as currently stated, would be sufficient for the City to meet the mitigation action requirement. For this reason, Kasson was instructed to not proceed with an amendment to the HMAP at this time.

The project is cost effective, with a benefit-cost ratio of 6.71 to 1. After an in-depth environmental and historical resources review and correspondence with relevant natural resource agencies, it was determined that the proposed construction project will not have an adverse impact on the quality of the natural or human environment on site or in the immediate project vicinity.

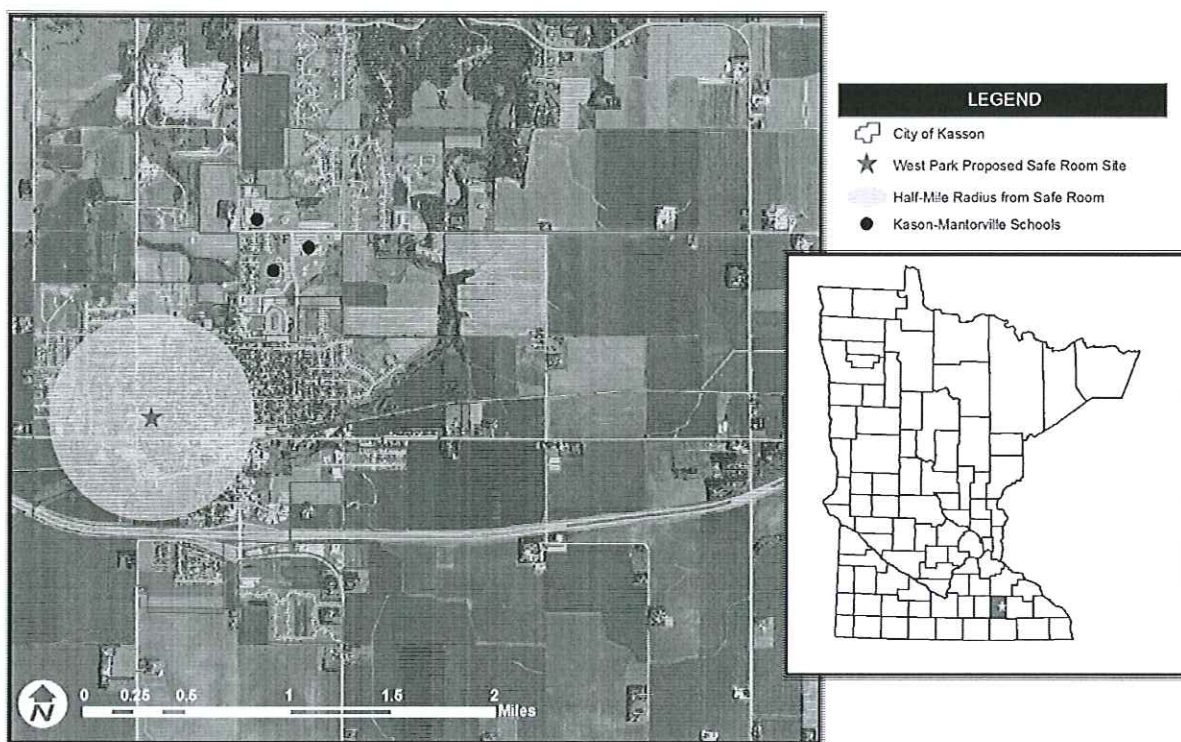
A. Proposed Location

The City of Kasson, MN is the sub-applicant for this Pre Disaster Mitigation Grant Program (PDM) application. Located in Dodge County, this area of southeast Minnesota is situated in the northern portion of the most severe tornado risk area in the United States, known as Tornado Alley.

The City of Kasson lies within a three-square mile area in Dodge County, Minnesota (Figure 1). As of the 2010 Census, the city population was 5,931. Total County population was 20,087 (2010). As the largest city in the County, Kasson is situated 13 miles west of Rochester, Minnesota along U.S. Route 14 and is one of the endpoints of Minnesota State Highway 57. The Dakota, Minnesota, and Eastern Railroad's main freight rail line runs through the City of

Kasson, hauling mostly grain and grain products through South Dakota and southern Minnesota.

Figure 1. Map showing the location of Dodge County, MN and the proposed location of a dual purpose safe room/public library in the City of Kasson, MN. The yellow circle represents the population to be protected when provided a 20 minute warning of severe weather.



B. Sub-Applicant Eligibility

The City of Kasson was actively involved in the development of the Hazard Mitigation Acton Plan (HMAP) for Dodge County (FEMA approved October 3, 2012). Construction of a safe room / public library is not listed in the current Plan as a specific mitigation strategy. However, there are several mitigation strategies listed in the HMAP (pages 120-121) that involve the construction of shelter-related facilities. For completeness, the City and County began the process of amending the HMAP to include this specific mitigation strategy, but the Project Officer at the State of Minnesota Department of Public Safety believed the Mitigation Objectives, as they were stated in the existing HMAP, would be sufficient for the City to meet the mitigation action requirement of Federal Emergency Management Agency (FEMA). For this reason, Kasson was instructed to not proceed with an amendment to the Plan at this time.

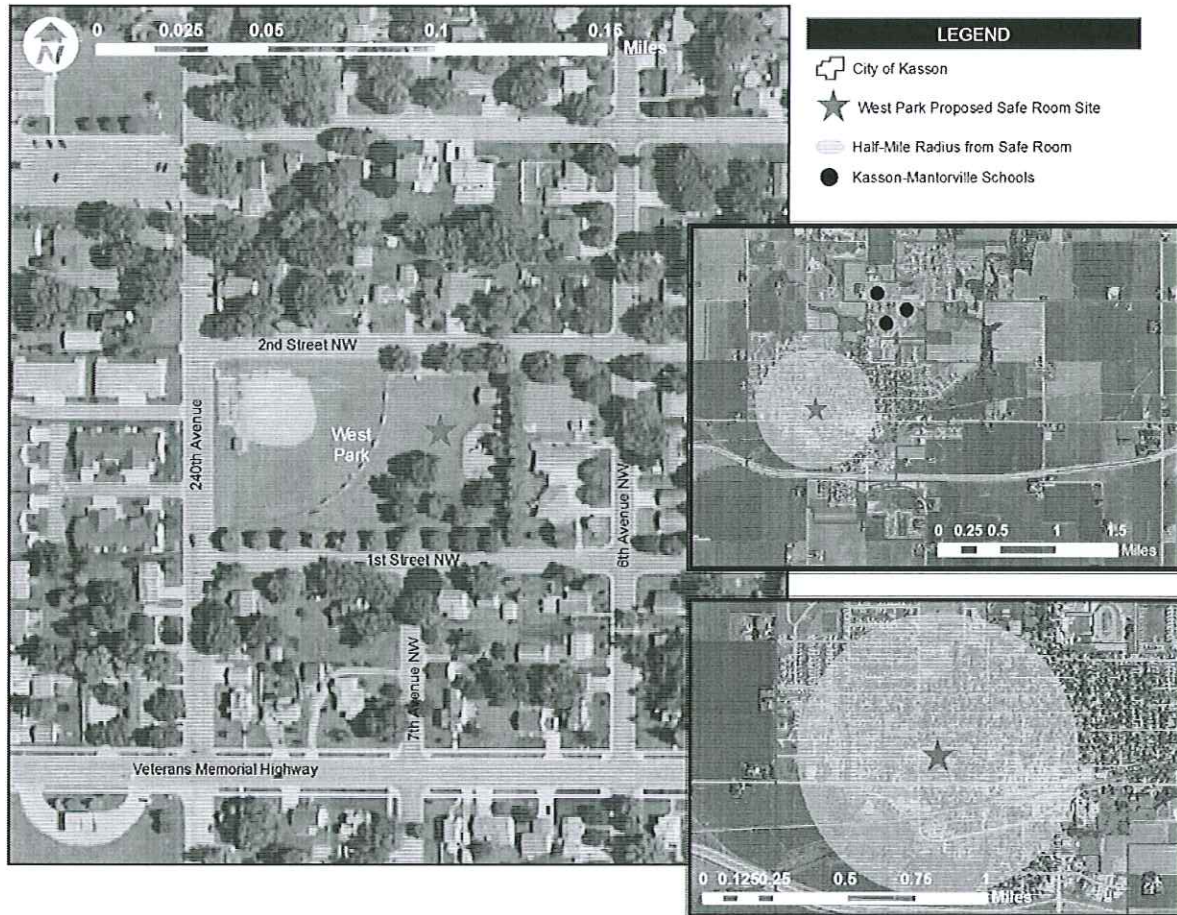
C. Project Description

The City of Kasson is requesting funding to develop a concrete, domed structure which will serve as a public library and most importantly as a tornado safe room for residents of the City of Kasson and Dodge County. It was unknown to the City until the hazard mitigation planning process that their new public library project, which had been in development since 2005, could also be designed to resist strong winds and serve as a temporary shelter during extreme weather events. Following this revelation, an optimal dual-use community safe room / public library concept was born. The safe room will meet the FEMA criteria for near-absolute protection from high wind events and tornadoes. When not in use as a safe room, the structure will serve the community as a public library.

The proposed project location for the construction of the dome community safe room is within the Kasson City limits at West Park, which is located at cross streets 1st St. NW and 7th Ave NW (potential address: 607 1st St. NW; coordinates: 44.030991° N, 92.756859° W) (Figure 2). Adjacent land use is mainly residential to the north, west, and south. The First Presbyterian Church is located directly to the east, and the Central Business District is less than a half mile to the southeast.

A city park with little league baseball field, bleachers, concession stand, playground, and warming house is currently located on the proposed project site (Figure 2). The baseball field and associated structures (bleachers and concession stand) will not be impacted by the project. If necessary, the playground and swing set may be moved closer to the ball field or to the southwest corner of the Park. The warming house on the property was once used in conjunction with a seasonally available ice rink. Neither have been used in over six years and will be demolished prior to construction of the safe room. The rest of the area is open with trees located primarily on the south side of the site and mostly outside of the project footprint.

Figure 2. Map showing the proposed location of the dual purpose safe room/public library at West Park.



II. PROJECT ELIGIBILITY

A. Benefit Cost Analysis

The project is cost effective, with a benefit-cost ratio of 6.71 to 1. A detailed Benefit Cost Analysis was performed using FEMA's BCA software version 4.8.

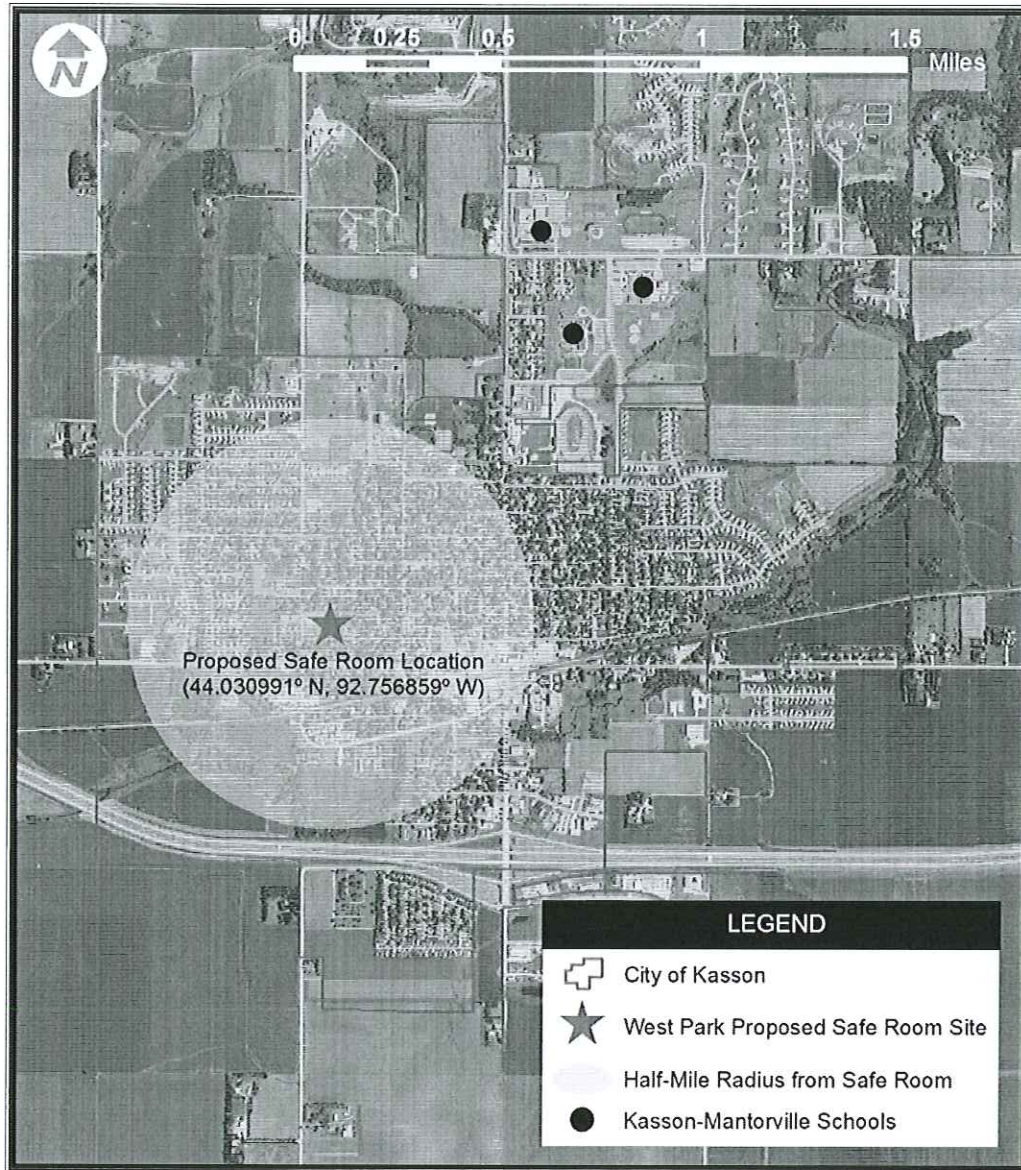
The population to be protected is an important consideration when evaluating the benefit of a safe room structure like the one proposed. In July 2013, the City of Kasson received notice from the State Demographer, that the City had grown to over 6,022 people; an increase from the 2010 estimate of 5,931. While it may still be considered a small town, the area surrounding the proposed safe room location is densely populated. The population that will be protected by the safe-room structure is located within one half mile of the safe room (Figure 3).

Within this half-mile radius is both residential housing and the City of Kasson Central Business District. Figure 3 (above) shows the half-mile radius around the safe room structure and the

population to be protected with a 20-minute warning of an extreme weather event. During the daytime and nighttime this half-mile area could include 3,000 people. The Kasson-Mantorville School campuses are located approximately 13 blocks to the northeast of the proposed project site (black circles, Figure 3). Land use within the community of Kasson is primarily residential. Farmland extends beyond the town's centrally located residential development area.

In addition to protecting the full-time residents of Kasson, the proposed safe room will also protect the numerous visitors that travel to and through the City of Kasson on a regular basis. Kasson is the largest city in Dodge County, and many residents from surrounding areas travel to Kasson in order to shop and visit the Central Business District. The Mayo Family Clinic Kasson also serves individuals from outside of the City of Kasson and draws in numerous visitors. People who are visiting Kasson or going through Kasson will need a safe place to go if a severe weather warning occurs. The safe room location at West Park is ideally situated near the Central Business District and the Mayo Family Clinic Kasson and would provide Kasson visitors with the protection they would need during an extreme weather event.

Figure 3. Map showing the proposed safe room location at West Park (red star) with half-mile radius (indicated in yellow).

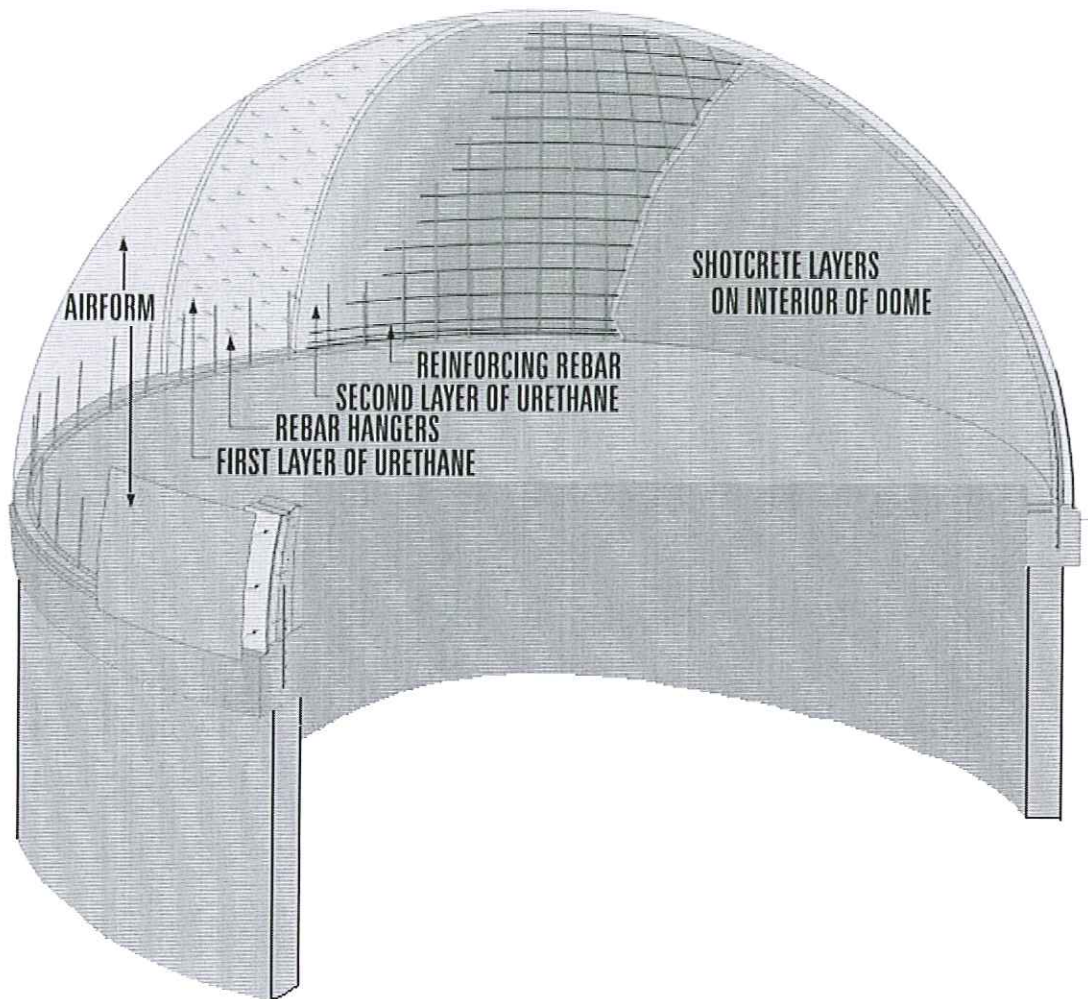


The proposed project dome safe room will be 15,000 square feet and constructed according to design standards specified in FEMA Safe Room publications, including FEMA 361, *Design and Construction Guidance for Community Safe Rooms* (2008). The proposed dome safe room will offer “near absolute life safety protection” from extreme wind events, meaning that the occupants of the safe room will be protected from injury or death when the structure is built to the FEMA 361 standard¹. Concrete dome technology was co-developed by David South of Monolithic Institute, Inc. Monolithic domes are constructed following a specific method that requires a tough, inflatable airform, steel-reinforced concrete, and polyurethane foam insulation (Figure 4). The dome safe room will be created by inflating a dome airform and spraying shotcrete on to the exterior, layer upon layer. Once dry, the airform is deflated and steel rebar is

¹ FEMA 361, *Design and Construction Guidance for Community Safe Rooms* (2008)

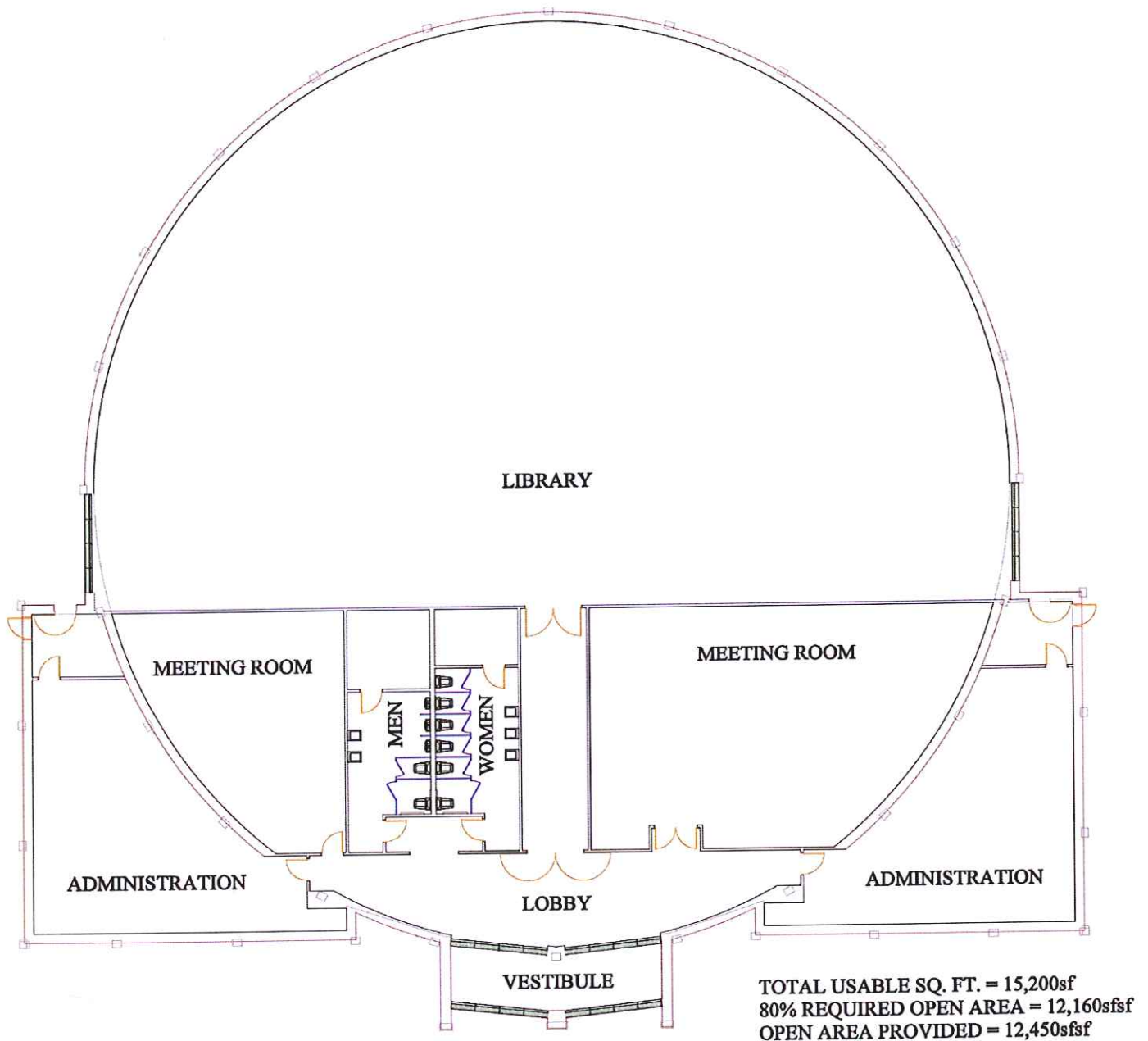
installed before additional shotcrete is sprayed on the dome's interior, layer upon layer. Finally, polyurethane foam insulation is sprayed on the interior before the interior is framed out and dry wall is eventually installed.

Figure 4. Schematic showing a cutaway of the monolithic dome technology.



The 15,000 square foot dome is almost entirely safe room area. A conservative estimate of usable floor space would be 12,000 square feet (Figure 5). To determine the population at risk and the population that the shelter will protect from the threat of a severe weather event, it is realistic to include the populations of the closest businesses and residents. Assuming five square feet per person and 10 square feet for every 200th person (statistically wheelchair bound), it is estimated that the dome will hold 3,000 people. This is the safe room maximum occupancy that is used in the benefit-cost analysis.

According to a structural engineer, the dome is designed to meet 2006 IBD, FEMA 361-08, and ICC/NSSA Standard ICC 500-2008 requirements. The design provides protection from 250 MPH winds and debris impact of a 15 pound 2x4 board traveling 90 MPH straight into a vertical surface and 60 MPH traveling into a horizontal surface.



B. Budget

The detailed budget is provided in *Section 9 – Cost Estimate*, but a summary table of eligible costs is provided below (Table 1).

Table 1. Line item budget showing eligible costs for proposed safe room in the City of Kasson, MN.

Cost category	Cost estimate
Pre-award costs	\$40,000.00
Architecture/ Engineering Design	\$148,400.00
Permits and Fees	\$ 7,000.00
Construction and Materials	\$1,674,550.00
Ancillary Safe Room Items	\$ 7,705.00
TOTAL	\$1,877,655.00

As with all dual-purpose safe room grant applications submitted to PDM for consideration, the funding determination is based on the eligible project costs.

The dual purpose of the City of Kasson monolithic dome is to (1) offer the population with access to a location with near absolute life safety protection during tornadoes / severe storms and (2) to provide the City with a public library. There is no better benefit to the community. Safe room structures often serve schools as band rooms/storage sheds or cities as community centers, but the project at hand is rich in community benefit. To attain the full benefit, the City is prepared to be responsible for the ineligible costs.

III. PROBLEM TO BE SOLVED

The problem to be solved is a shortage of safe shelter locations for residents of the City of Kasson, MN to use during the threat of tornadoes and other severe weather events.

The City of Kasson is the largest city in Dodge County, MN and is located well within the highest tornado risk zone in the U.S. (i.e., Tornado Alley). Construction of a storm shelter will help solve the problem of the potential loss of life that can occur during these inevitable events. The potential for damages will grow as population increases in the City of Kasson over the next 10

years. Based on 2000 census data, the City is predicted to be part of a significant statewide population increase from 2000 to 2030 (approximately 28.2% statewide).

Existing shelter locations in Dodge County include a church basement and school cafeterias. In Kasson, there are currently two temporary shelters: St. John's Lutheran Church and Kasson-Mantorville ISD #204. Together both temporary shelters only have a maximum capacity of 540 people, and neither of these structures are built to protect people from severe weather events, such as tornadoes or strong winds.

Dodge County recognized the need for additional community shelter facilities during the development of the Dodge County, MN All-Hazard Mitigation Action Plan, which states specifically that the City of Kasson does not have adequate storm shelter facilities that are large enough to accommodate the number of people that could potentially require shelter during a severe weather event(p. 64). Public shelters (such as community safe rooms) are identified as a goal, objective, or strategy 38 times in the Plan. Additionally, a Community Assessment Study completed in January 2012 found the need for and community support of the construction of a new public library.

IV. DAMAGES REDUCED OR ELIMINATED

The City of Kasson is working to construct a dual purpose safe room / public library. The purpose of the project is to reduce the potential danger of high wind hazards to residents within a half mile radius of the building (3,000 people). The dome structure provides the level of protection described by FEMA as near-absolute (i.e., based on current knowledge of tornadoes, there is a very high probability that the occupants of a safe room built according to this guidance will avoid injury or death).

Other hazards are often associated with tornadoes and can be just as harmful as the actual tornado itself. During a tornado, or prior to one, large hail is often produced, causing damage to crops, structures, and humans. Tornadoes also cause a large amount of debris, creating road blockages and dangerous hazards for rescuers and citizens. By providing a community safe room in a centralized, residential location that is situated very close to the Central Business District, the City of Kasson would be able to focus their post-tornado efforts on clearing main streets, rescue efforts, and reducing hazardous situations. The safe room / library would be equipped with backup generators that provide energy during power outages which are often associated with tornadoes. This structure would also provide access to communication (i.e., NOAA radios) for a greater number of people and increased access to law enforcement and medical treatment. By concentrating a greater number of people in a secure location, law enforcement would be able to account for a larger percent of the population, reducing the need to search for and rescue unaccounted people.

V. PROJECT JUSTIFICATION

As a community located in Tornado Alley, tornadoes are a fact of life for the residents of Kasson, MN. Historically, they have had to deal with the impacts caused by tornadoes, and they will continue to deal with these impacts well into the future. As the population of the City of Kasson continues to grow, more and more people will be located in an area without proper protection during high wind events. There is an obvious need for a shelter facility that provides near-absolute life protection in this growing community. Not only will this dual purpose dome structure mitigate the impacts from high-wind events by protecting the lives of nearly 3,000 residents, but it will also provide a dynamic, versatile community center in the form of a public library.

A. How the Project Will Solve the Problem

The proposed dual purpose safe room / public library will help meet multiple needs identified for the growing City of Kasson. By locating a safe room facility in West Park, near-absolute life protection will be provided in the most populated area of the City. This will reduce the vulnerability of an estimated 3,000 residents to hazardous, high wind events. Locating the safe room near the Central Business District means that it will also help to protect the many visitors that travel to and through Kasson on a regular basis for shopping, health care, and special events.

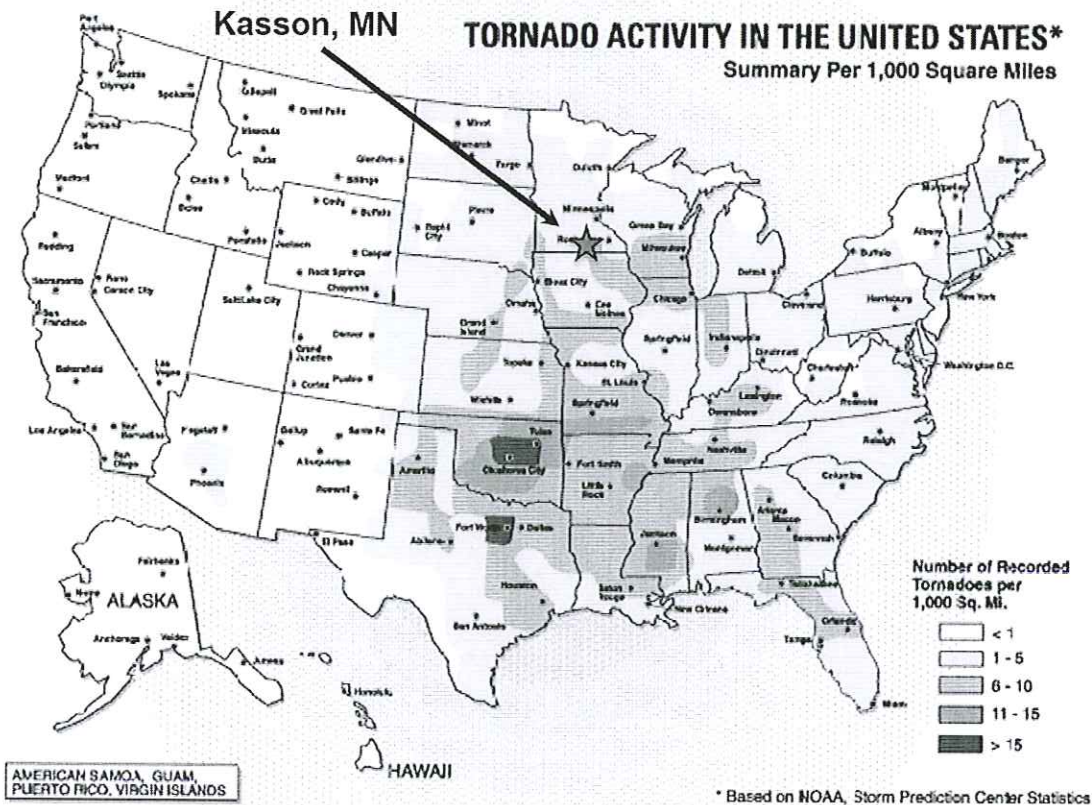
B. Why the Project Is Needed

Currently, there is no safe room for the general public in the City of Kasson, yet the vulnerability for the area to tornado and high wind events is moderate to high (Figure 6).

In the City of Kasson and surrounding area, historical tornado activity and high wind speeds are not only above the state average but they are above the national average as well. In 1883, two larger tornadoes touched down in Dodge County. They were rated as F4 tornadoes and they killed four people. One month later, on August 21st, an F5 tornado killed five people on the first touchdown. On the second touchdown, the F5 took the lives of 33 people and injured 200.

According to the National Climatic Data Center, Dodge County has experienced 15 tornadoes from 1953 to 2012. These tornadoes have resulted in no deaths or injuries, but they have caused over \$520,000 dollars in property damage. The National Oceanic and Atmospheric Administration's (NOAA) Storm Prediction Center Statistics place the City of Kasson in the bracket that can expect 6-10 tornadoes per 1,000 square miles. Tornado activity in the U.S. has been geographically depicted by NOAA on a map of the US: Tornado Activity in the United States.

Figure 6. Map showing tornado activity within the United States.



In recent years, the economy of Kasson has grown. As the Rochester urban area grows, so will the City of Kasson and the neighboring communities. Without sufficient facilities to provide protection during hazardous storm events, more and more people will be vulnerable to a very real threat.