



LIVING WITH TORNADOES

RESILIENCY IN MOORE, OKLAHOMA

QUICK FACTS – MOORE, OKLAHOMA

Suburb of the Oklahoma City; part of Cleveland County, Oklahoma

Incorporated in 1893; approximately 22 square miles

Population 63,462: 77.8% White; 10.9% Latino; 5.0% African American; 4.1% Native American

\$67,851 median income; 9.3% live in poverty;

Council-Manager form of government: mayor directly elected; six council members chosen from three wards

Fiscal Year 2022 General Fund Budget, \$47,642,484; all Funds, including Public Works Authority, \$82,305,636

INTRODUCTION

Moore, Oklahoma lies in what is referred to as “Tornado Alley,” a swath of geography that is prone to tornadoes, especially from April to June. According to the National Weather Service, the area experienced 175 tornadoes from 1893 to 2021.

Until the second half of the 20th century, Moore was a rural community. In 1950, the population was less than 1,000. By 1980, the population exceeded 35,000 due to the employment centers in and around Oklahoma City and its proximity to Norman. With its growing population and suburban character, tornado resilience has become increasingly important for Moore and its image as a place to live.

On May 20, 2013, Moore was hit with an F5 tornado in a path similar to another devastating F5 on May 3, 1999. Described by Moore as “35 terrifying minutes,” 212 people were injured and 24 died. The damage, estimated at \$2 billion, included 2,400

homes, 90 businesses, two schools, a regional hospital, and extensive public infrastructure (Moore 2016, 8).

Two responses by Moore are especially noteworthy. First, recognizing the continuing risk posed by tornadoes, Moore became the first city in the U.S. to adopt a tornado-specific building code. Secondly, to replace a mobile-home community destroyed by the 2013 tornado, Moore developed a master plan to redevelop the areas into a mixed-use community with over 200 units of affordable housing.

CHALLENGES AND CONCERNS: LIVING WITH CYCLES OF TORNADOES

The 2013 tornado impacted every economic aspect of the city. Over 200 businesses were affected, including 90 that received direct tornado damage. Businesses lost transportation access, water, power, and gas (Moore 2016, 13). Based on its history of tornadoes and the high probability of future tornadoes, the city partnered with a local university to identify actions that could mitigate the impacts of future tornadoes.

In March 2014, less than one year after the tornado, the Moore City Council (Council) unanimously adopted the code changes. The intent of the changes, as contained in the staff report (Moore, 2014 (c)), the Council, was to “reduce the loss of property and life in future severe weather events.” The recommendations were initially developed by a committee comprised of city staff, local homebuilders, city councilmembers, and Moore residents, which met four times. The committee concluded that the city needed to increase the wind endurance of residential structures from 90 miles per hour to 135 mph. To determine how to meet this goal, the city partnered with University of Oklahoma professors Dr. Chris Ramseyer, School of Civil Engineering, and Dr. Lisa Holiday, Construction Science Division, College of Architecture. They provided science-based solutions with a strong cost-benefit ratio.

Adoption of building code requirements is a challenge in the U.S., making the successful Moore case an exception. In 2018, research by scholars from multiple universities examined support for tornado mitigation in Oklahoma (Ripberger et al., 2018). They found that conservative political views and individualist tendencies work against adoption of mitigation requirements. They attribute Moore's success to the extent of the May 2013 losses, creating, in their words, a singular focusing event.

Indeed, Moore originally considered code changes as early as July 2013, but tabled the initiative pending further discussion. Noteworthy in the 2014 council consideration, the representative of the Moore Homebuilders Association expressed general acceptance for the changes, according to minutes from the meeting. When asked if the building code changes and the additional cost in construction would keep individuals from buying homes in Moore, the representatives said that they believed that the stronger building code would make people more comfortable coming to Moore. To this last point, real estate agent Marcia Billen recorded a video about the pros and cons of living in Moore for YouTube. The video includes the typical positives that one would expect, but begins with one big con, "tornadoes are terrifying," Billen says. As the only city with a tornado-specific building code and a larger region that shares the same risk, Moore may have created a positive differentiation in the new home market.

CHALLENGES AND CONCERNS: REPLACING LOST AFFORDABLE HOUSING

Among the homes destroyed by the 2013 tornado was the Royal Park mobile home community, which had 173 units of housing for families with low and moderate incomes. There were private sector plans to replace the lost affordable housing. This led the city to include replacement affordable housing as part of its application for CDBG-DR funds.

Focusing on the former mobile home community and surrounding area, the city used a community process to develop a master redevelopment plan for the area referred to as SW17th / Janeway, adopted in August 2016. With a planned CDBG-DR investment of \$19.2 million, the plan envisions "redevelopment on New Urbanist principles to create a healthy, walkable, well-functioning 'village center' that creates a unique identity and sense of place within the community...of a mixed income housing community that must be designed to interact with and support the employment, public facilities, recreational opportunities, shopping and transportation needs of the area and the city as a whole" (Moore, 2016).

Implementation of the project is now under way with the development of "The Curve," a mixed-income, mixed-use development, of over 14 acres. The total cost is over \$49 million, with almost \$16 million coming from the CDBG-DR grant and \$12 million from Low Income Housing Tax Credits (LIGTC). The city selected a master developer, Belmont Development, based on a competitive design-finance-build-manage procurement. This phase includes 244 rental units, 219 of which are affordable. Construction began in 2019 (Oklahoman). After some delays, the Curve opened in early 2022. As of June 22, two buildings were open and fully leased.

A third building is expected later in 2022 and is preleased according to the rental office.

APPROACH

While the building code changes and redevelopment of the mobile home community were innovative responses, they were only part of an extensive, multi-faceted response to the devastating 2013 tornado. At the core of the recovery was Moore's Disaster Recovery Action Plan, completed in March 2014, a requirement for the Community Development Block Grant Disaster Recovery program. In addition to housing, priorities in the plan included infrastructure, public facilities, economic revitalization, and mitigation and resiliency (Moore 2014(b), 46).

This initial planning effort led to more planning, including the following:

- Infrastructure Recovery and Implementation Plan
- Update to the Comprehensive Plan
- Stormwater Management and Drainage Plan
- Update to the Geographical Information System
- Benefit-Cost Analysis for Smart Water Meters
- Benefit-Cost Analysis for a Resiliency Center
- Feasibility study for interstate hazard mitigation wall.

The contract for developing the Infrastructure Recovery and Implementation Plan was issued approximately one year after the tornado, and was completed ten months later. The intent of the plan was to guide recovery and resiliency efforts for five years. The plan examined seven categories: streets, sidewalks, sanitary sewers, storm drainage, water distribution, bikeways, and gateways. The plan identified 158 priority projects at an estimated cost of \$162 million (Cardinal 2015). The detailed analysis of these projects provided the city with a blueprint for improvements as funding opportunities come available over the many years necessary to create a more resilient city.

FINANCIAL RESOURCES

The primary infusion of resources into Moore's recovery came from the Community Development Block Grant Program Disaster Recovery. Approved initially for \$26 million, the final award was \$52.2 million, was allocated as follows:

- \$30.1 million Infrastructure
- \$16.1 million Housing
- \$2.6 million Administration
- \$1.9 million Planning
- \$1.5 million Public Facilities

Moore was one of 22 applicants approved for a second-round application for the 2014 National Disaster Resiliency Competition (NRDC) but was not one of the final 13 grantees. Federal funds can expedite implementation of resilience plans but may require pursuit through multiple avenues over an extended time.

Moore, however, had a strong economy before the tornado and it recovered quickly. The General Fund did not suffer

lingering losses, while the utility fund recovered more slowly from accounts that lost water and sewer service. By 2017, the city reported that commercial and business sectors had largely recovered, and that the city's sales tax had stabilized by the end of fiscal year 2015. No new SBA loans were issued after 2013 within Moore (Moore 2017, 12).

TAKEAWAYS

In its application for the NRDC, Moore wrote about its cycle of disaster and recovery in a region stressed by repetitive droughts and tornadoes. Their various plans, developed or updated after the 2013 tornado, provide guidance for improved resiliency, but the high costs require a steady commitment over the long-term and taking advantage of opportunistic funding. Perpetual awareness and continuous improvements are critical for a community that must live with recurring threats.

Taking advantage of the widespread awareness about tornado destruction, the city exploited a rare window of opportunity to update its residential building code, which neither the state nor other cities had done. Improved housing standards should substantially mitigate losses from future tornadoes. The redevelopment of the mobile home community was a reaction to the community's destruction. The tornado risk to mobile homes, however, is well known. Moore can look at other communities like Monroe County, FL, where redevelopment after a hurricane has focused on a mitigation strategy; vulnerable manufactured homes have been replaced with storm-resilient affordable housing.

Finally, even for a stable city with capacity and resources, response and recovery were not easy. A variety of issues were identified in the compliance reports and audits, which are transparently available on Moore's website. No one could have foreseen that seven years after the tornado a pandemic would bring disruption to recovery efforts. Diligence and perseverance repeatedly emerge as essential characteristics for completing the long road to recovery from a major community disruption.

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