OKLAHOMA Transportation

2020 – 2045
Oklahoma Long Range Transportation Plan

Chapters 6: Safety, Security, Risk, and Resiliency

August 2020

Prepared by

HIGH STREET

Poe & Associates, Inc.
Consulting Engineers

Table of Contents

List of Figures

1. INTRODUCTION

Safety is a primary concern in long range transportation planning, with historical trends informing both progress from and potential for transportation strategies. ODOT's analysis of safety performance measures to be included in the 2019 Oklahoma HSIP serves as a primary reference for this section. This section also addresses the security of the transportation system, particularly as it relates to the introduction of new technology and the resulting risks. Understanding the risks associated with these hazards is key in planning for resilient systems.

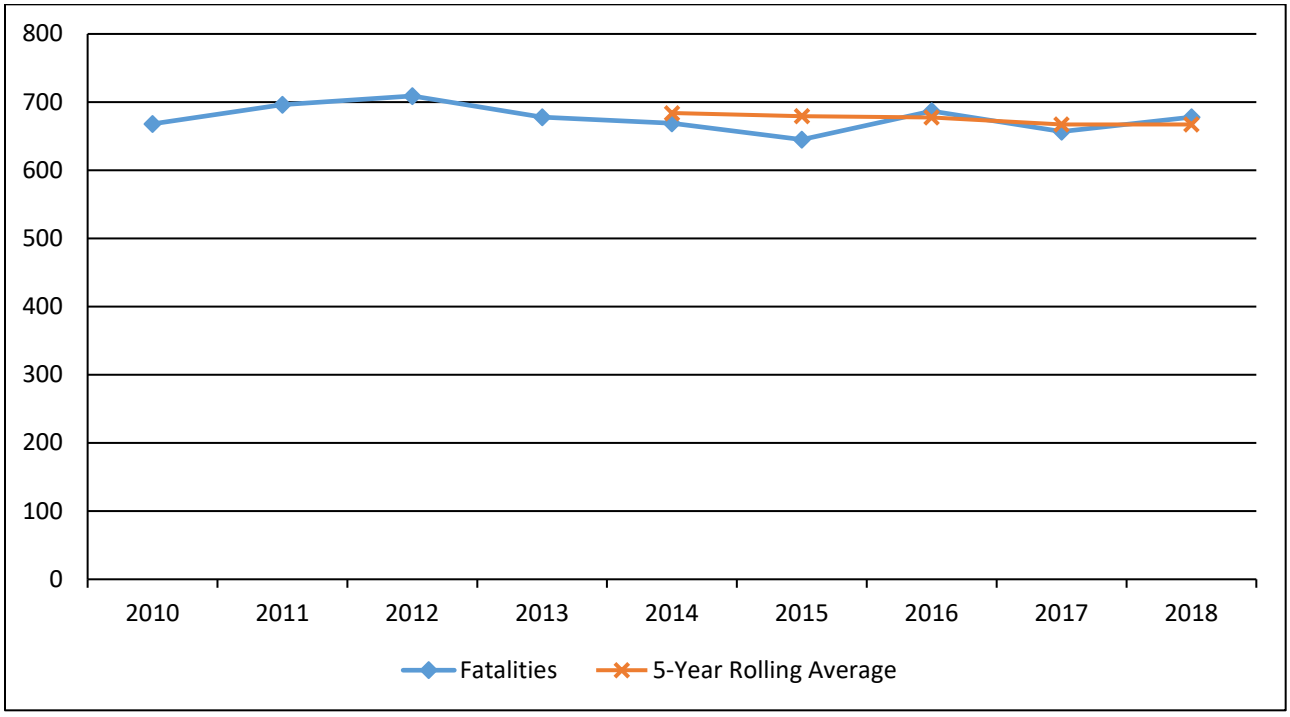
2. SAFETY

Improved transportation safety is a primary goal in Oklahoma and for the 2045 LRTP. ODOT values life and strives to minimize traffic fatalities and serious injury crashes. This section discusses ODOT's safety performance measures.

2.1. FATALITIES

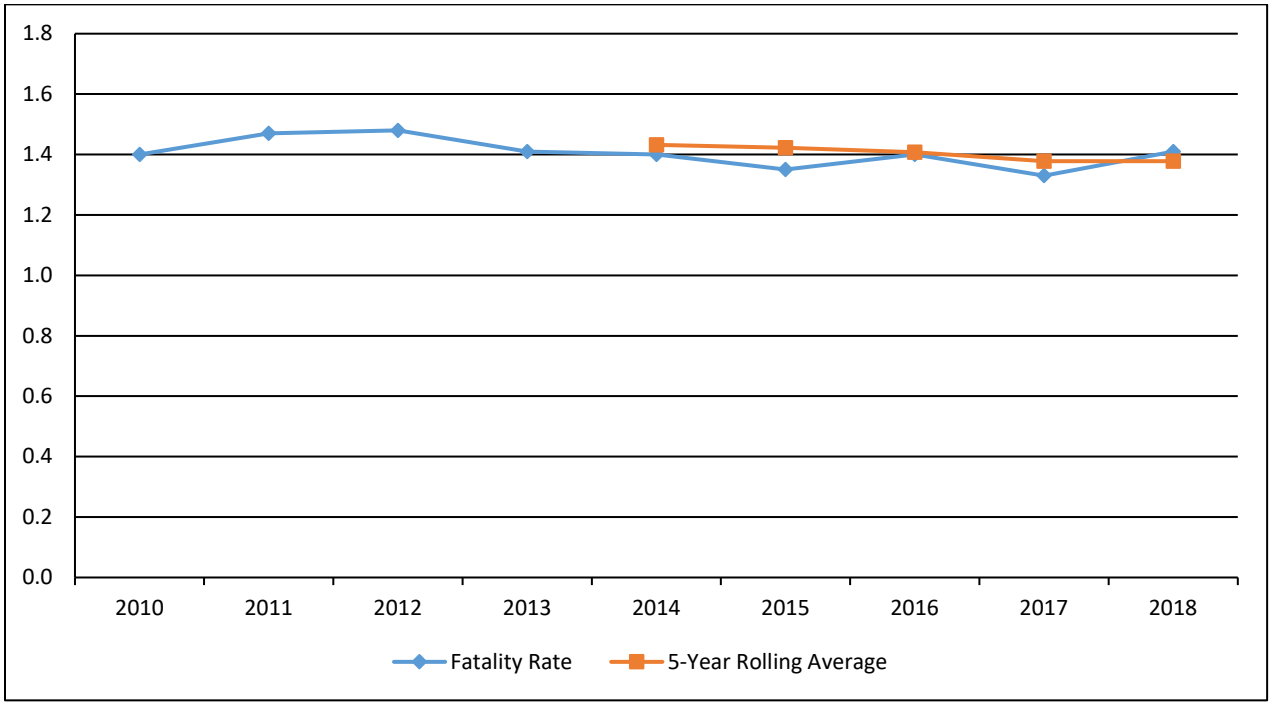
Oklahoma's fatality rate (number of fatalities per 100 million vehicle miles traveled (HMVMT)) and the number of traffic related fatalities have generally trended down since 2014 after peaking in 2012 (**Figure 2-1** and **Figure 2-2**). However, when compared against larger goals identified in Oklahoma's Strategic Highway Safety Plan (SHSP), the five-year averages for fatalities in the areas of pedestrians and older drivers have increased during this period (**Figure 2-3**).

Figure 2-1. Fatalities on Oklahoma Public Roads



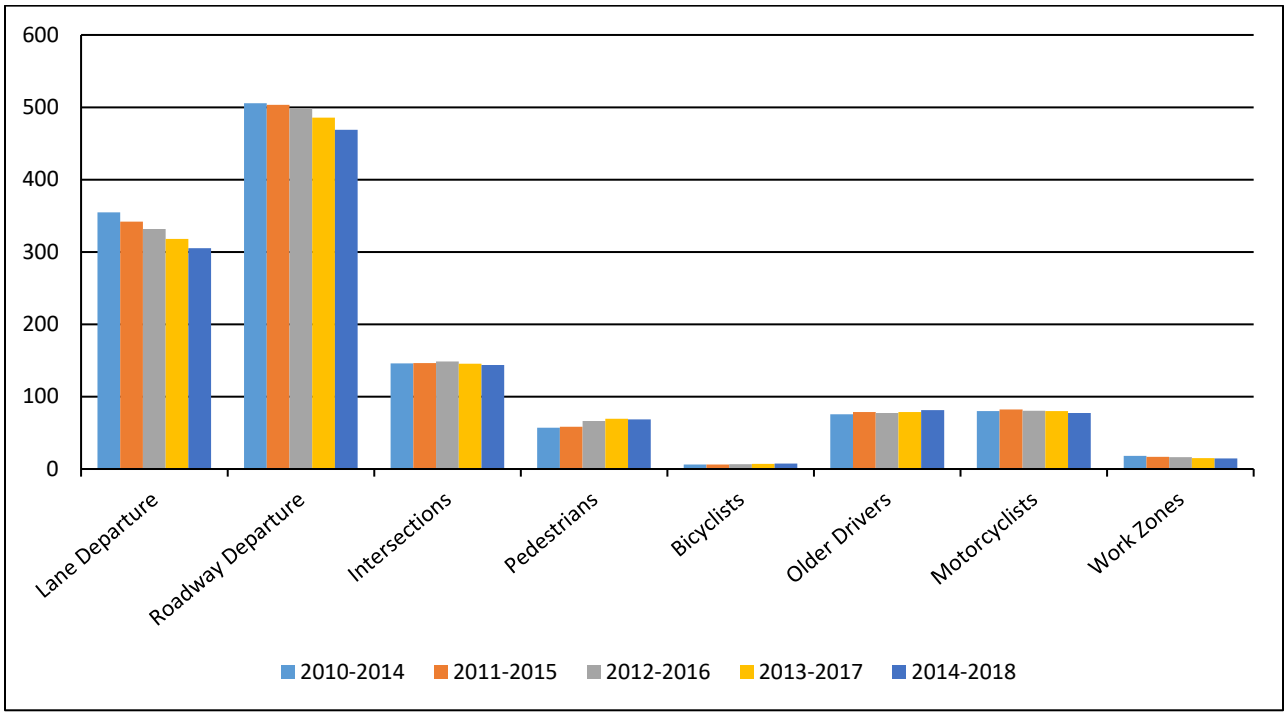
Source: ODOT Analysis, August 2019

Figure 2-2. Fatalities per HMVMT on Oklahoma Public Roads



Source: ODOT Analysis, August 2019

Figure 2-3. 5-Year Average for Fatalities by SHSP Emphasis Area

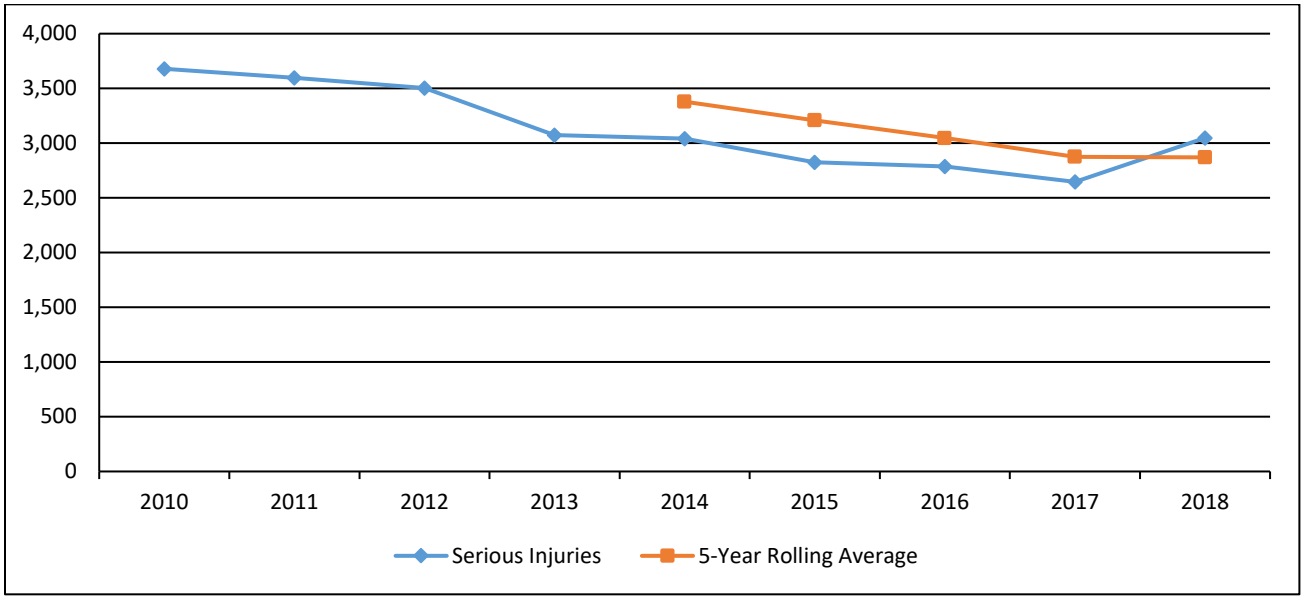


Source: ODOT Analysis, August 2019

2.2. SERIOUS INJURIES

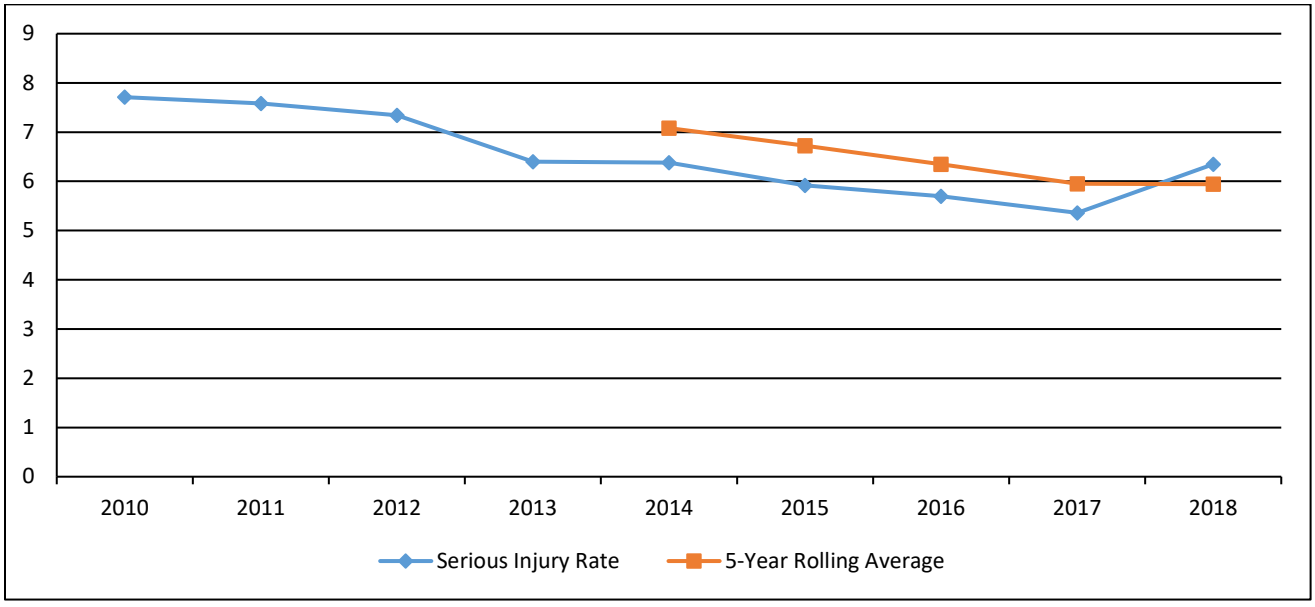
Similar to fatalities, the five-year rolling averages for serious injuries, both total and per HMVMT, have decreased since 2014, despite increases in both measures in 2018 (**Figure 2-4** and **Figure 2-5**). The 2018 five-year averages for serious injuries have decreased in all SHSP emphasis areas compared to 2014 (**Figure 2-6**).

Figure 2-4. Serious Injuries on Oklahoma Public Roads



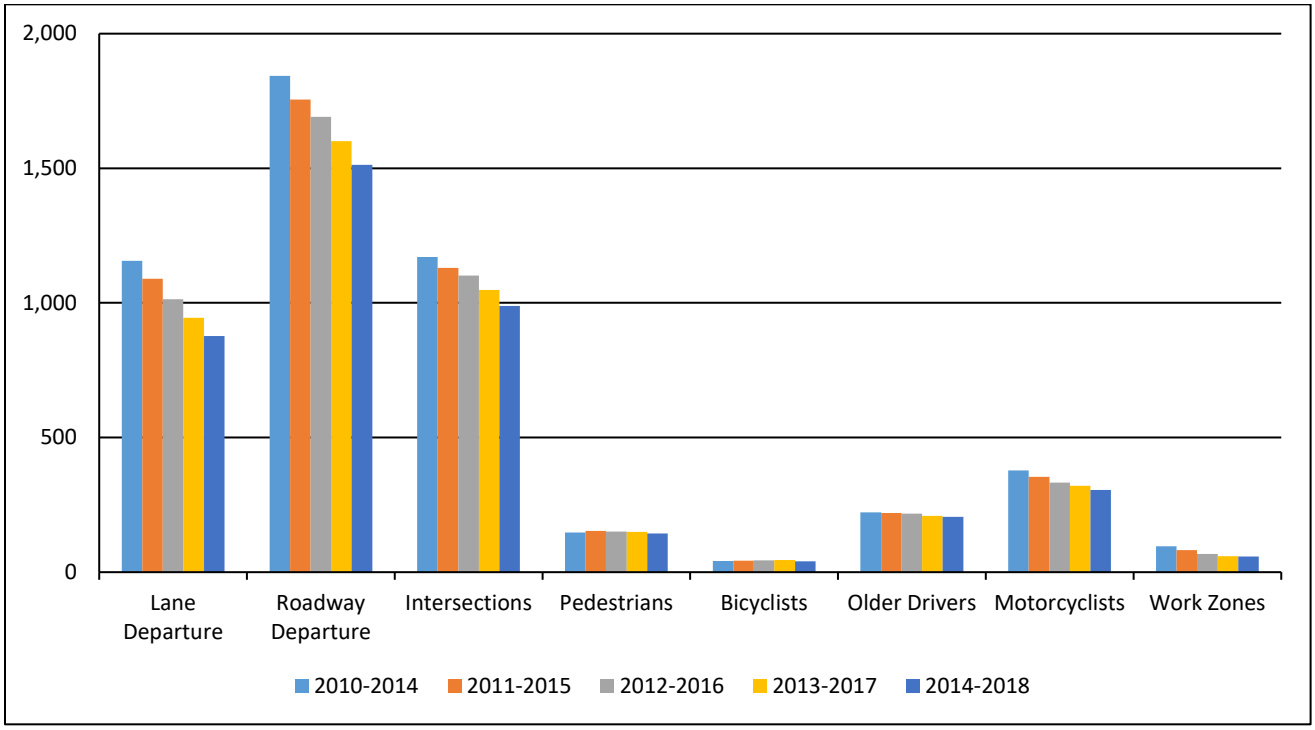
Source: ODOT Analysis, August 2019

Figure 2-5. Serious Injuries per HMVMT on Oklahoma Public Roads



Source: ODOT Analysis, August 2019

Figure 2-6. 5-Year Average for Serious Injuries by SHSP Emphasis Area



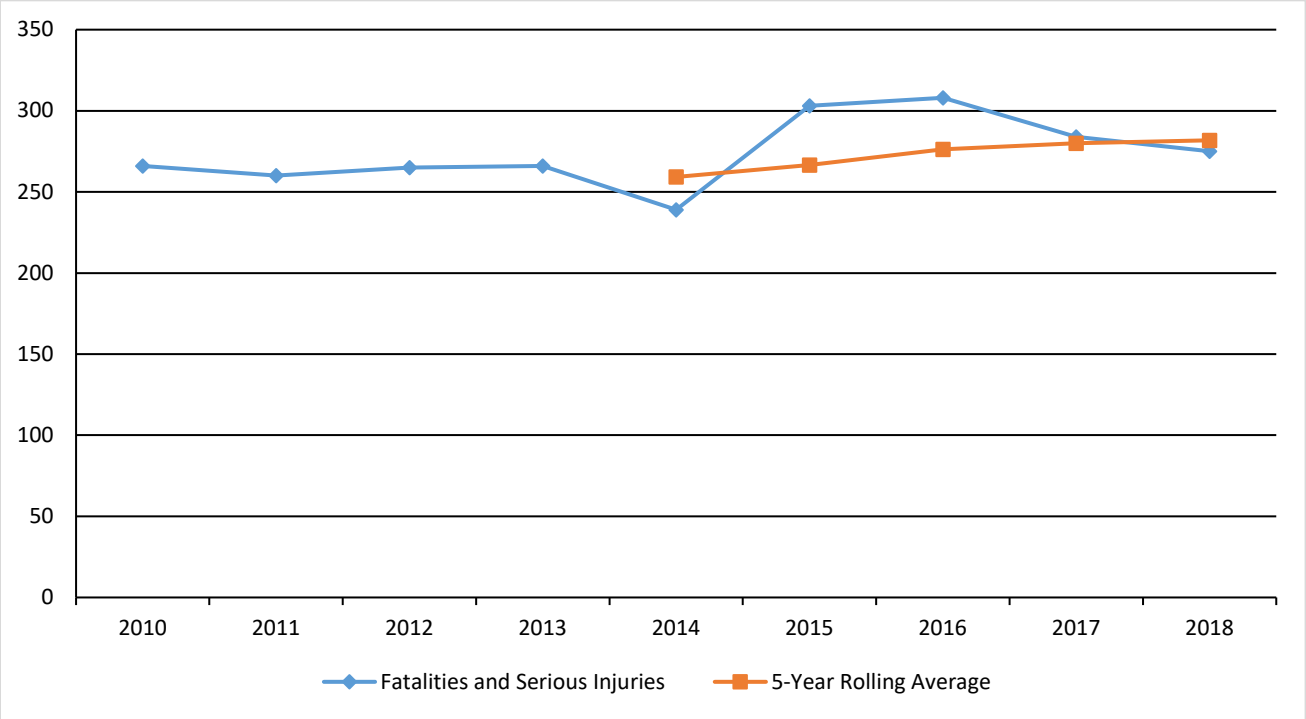
Source: ODOT Analysis, August 2019

2.3. PEDESTRIAN AND BICYCLE SAFETY

In reporting safety data, incidents involving both pedestrian and bicyclists are covered under non-motorized fatalities and non-motorized serious injuries as defined by the Fatality Analysis Reporting System (FARS)[1] and the American National Standard Institute (ANSI). **Figure 2-7** shows that the five-year average for non-motorized fatalities and non-motorized serious injuries has increased slightly from 2014, though total incidents have decreased from a peak in 2016.

[1] FARS is a nationwide census containing data on fatal injuries suffered in motor vehicle traffic crashes created by the National Highway Traffic Safety Administration (NHTSA).

Figure 2-7. Total Non-Motorized Fatalities and Non-Motorized Serious Injuries



Source: ODOT Analysis, August 2019

3. SECURITY

Providing safety and security on Oklahoma's transportation system is critically important and requires collaboration between numerous federal, state, and local agencies. ODOT works with the Oklahoma Department of Emergency Management (OEM) to respond to emergencies and natural disasters during times of crisis and to maintain the functions of vital assets. Cybersecurity will also increase in importance as more emerging technologies become operational.

3.1. CYBERSECURITY

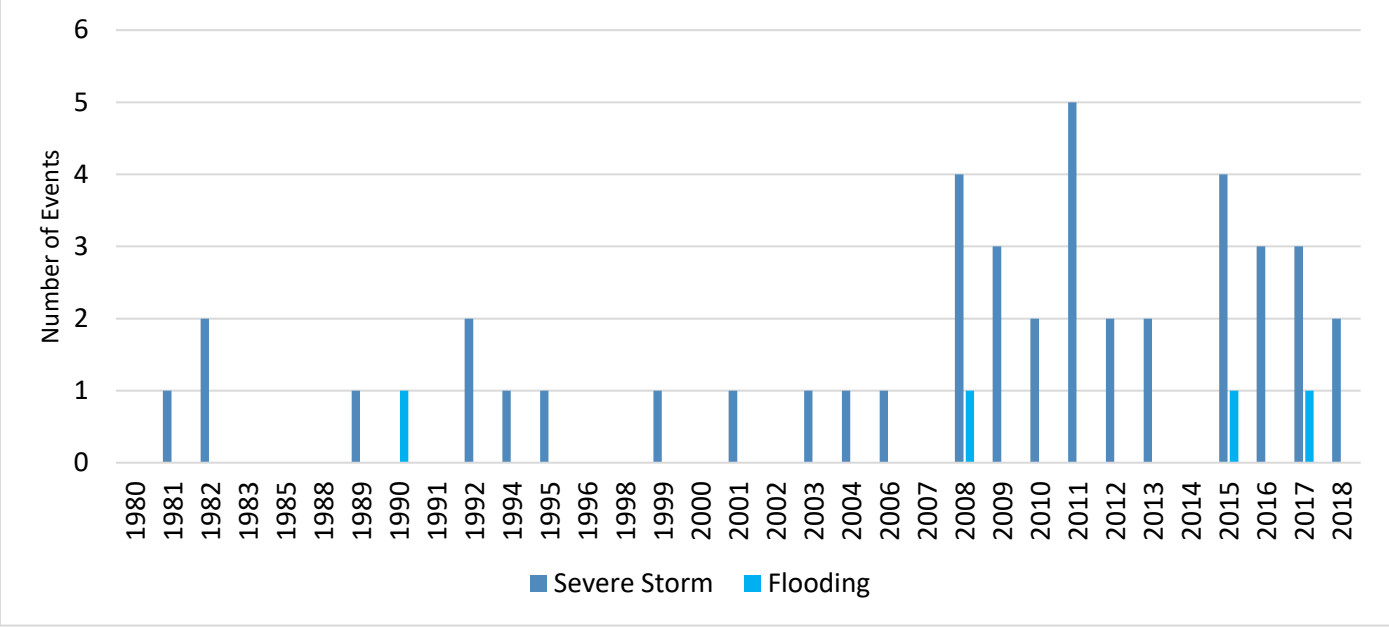
When introducing technology into the transportation infrastructure, cybersecurity concerns should be addressed. The advancement of intelligent transportation systems (ITS), which play a critical role in supporting safety and security during disasters, as well as the emergence of transportation trends identified in Chapter 5, are increasingly significant when discussing long term needs of Oklahoma's transportation system.

3.2. SEVERE WEATHER EVENTS

Since 1980, the U.S. has experienced a growing number of billion-dollar disasters, mostly attributed to severe weather-related events. These severe weather events, including extreme heat, tornadoes, and high-intensity rain, impact Oklahoma's multimodal transportation system.

Between 2008 and 2018, Oklahoma saw a surge in billion-dollar disasters resulting from flooding and severe storms (**Figure 3-1**), as well 159 tornadic events of an EF2 or greater[2]. **Figure 3-2** demonstrates the frequency of tornadoes.

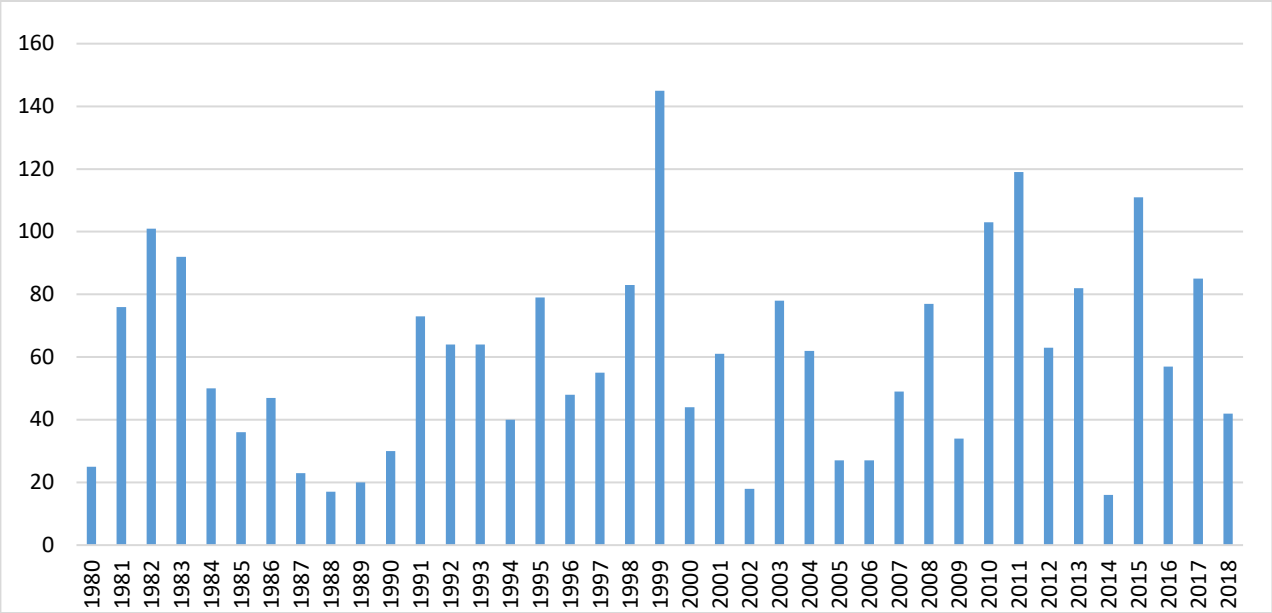
Figure 3-1. Billion-Dollar Disaster Events in Oklahoma from Flooding and Severe Storms, 1980 to April 9, 2019 (Inflation Adjusted)



Source: National Oceanic and Atmospheric Administration (NOAA)

[2] The EF-Scale, or Enhanced Fujita Scale, is a rating of how strong a tornado was and is calculated by comparing the tornado's damage to similar objects at certain wind speeds.

Figure 3-2. Tornadoes in Oklahoma, 1980 to 2018



Source: National Oceanic and Atmospheric Administration (NOAA)

3.3. SEISMIC ACTIVITY

In addition to the weather-related events, Oklahoma also faces the risks of earthquakes. A significant increase in seismic activity has been observed in Oklahoma since 2009. The U.S. Geological Survey (USGS) and Oklahoma Geological Survey (OGS) recorded 887 magnitude three or higher (M3+) earthquakes in 2015, an almost 52 percent increase from 2014. However, the number of events has decreased since 2015, with 639 and 272 earthquakes M3+ recorded in 2016 and 2017, respectively. This decrease can be attributed to a reduction in wastewater injections following tightened regulations on fracking.

In 2017, ODOT began using the USGS's ShakeCast program to assist in its efforts to prioritize bridge inspections immediately following an earthquake. **Figure 3-3 s**hows areas in the state with potential seismic activity along with chances for damage caused by shaking.

Figure 3-3. Oklahoma Area Seismicity and Chance of Damaging Shaking

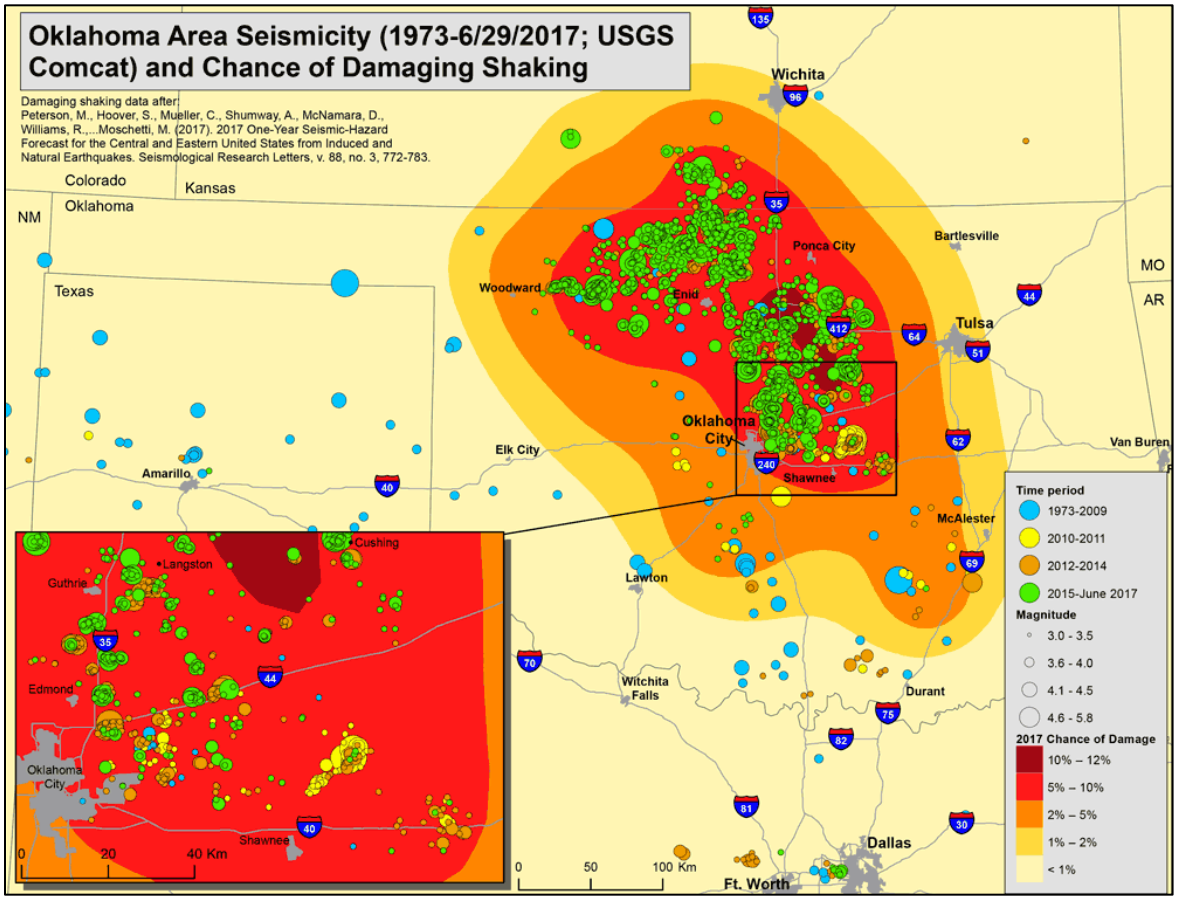


Image Source: U.S. Geological Survey (2017)

4. ENVIRONMENTAL MITIGATION

Environmental regulations require FHWA and other transportation agencies to consider potential environmental impacts to the social, cultural, and natural environment, while considering the public's need for safe and efficient transportation.

ODOT works with the FHWA to comply with the National Environmental Policy Act of 1969 (NEPA) and other environmental regulations and requirements. ODOT strives to constantly improve upon compliance with environmental rules and regulations, using a stewardship approach toward the environment. Environmental impacts are a consideration in delivering the Eight Year CWP as part of operating and maintaining an efficient statewide transportation system.

4.1. PROTECTION OF NATURAL, CULTURAL, AND HISTORIC RESOURCES

To meet the transportation needs of a growing population and to maintain and improve existing infrastructure, impacts to the natural and cultural environment are often unavoidable. ODOT strives to continue advancement of proven innovations to reduce environmental impacts, improve the life of transportation assets, lower costs, save lives and improve efficiencies for Oklahoma's transportation system. As such, ODOT's transportation programs and operations continue to evolve to integrate environmental considerations and regulatory requirements. To streamline and minimize potential delays in the environmental process portion of project development efforts, ODOT has instituted a series of programmatic agreements with various entities and resource agencies to define the expectations and roles related to addressing transportation project-associated environmental impacts. Chief among the agreements is a Programmatic Agreement for Processing Categorical Exclusion Actions between the FHWA and ODOT.

ODOT also strives to minimize impacts to endangered and threatened species using environmentally friendly construction methods to deliver projects that limit the impact of Oklahoma's transportation system on the natural and cultural environment. ODOT pursues and maintains partnerships with federal agencies such as the U.S. Fish and Wildlife Services and the U.S. Army Corps of Engineers, and routinely holds training and provides assistance for construction personnel to ensure compliance with environmental commitments during construction.

4.2. STORMWATER MANAGEMENT

Many transportation infrastructure projects affect wetlands and streams. ODOT has relied on an array of mitigation strategies as an effective way to preserve, enhance, and restore environmental resources. As a best practice, avoidance is the first alternative explored in developing transportation solutions. If impacts to these resources cannot be avoided, the next step is to develop mitigation strategies. These mitigation strategies typically include the acquisition of credits from commercially operated mitigation banks or in lieu fee programs, and consideration of partnership with other state or nonprofit agencies for offsite mitigation. The determination of need and the identification of appropriate mitigation—as early as possible in the transportation planning process—is critical to ensuring that the project can be completed on schedule.

ODOT uses best management practices to control and manage stormwater and maintain water quality. These include structural devices, maintenance procedures, and management practices that prevent or reduce the harmful effects of storm water runoff, such as pollution, erosion, and flooding.