

## Iowa DOT FHWA 2026 Safety Targets

September 2025

In June 2025, the Iowa DOT began the process of reviewing data to set performance targets for the five safety performance measures required by FHWA in 23 CFR 490 (also referred to as “PM1”). For the traffic safety area, these targets are required to be five-year rolling averages and must be set annually. The five required measures are:

1. Number of fatalities
2. Rate of fatalities per 100 million vehicle miles traveled (VMT)
3. Number of serious injuries
4. Rate of serious injuries per 100 million VMT
5. Number of non-motorized fatalities and non-motorized serious injuries

These targets must be set as five-year rolling averages for 2022-2026 and will be submitted as part of the State’s Highway Safety Improvement Program (HSIP) annual report, due August 31, 2025. The first round of target setting for these measures occurred in 2017 using timeseries modeling. A similar approach has been used each year since. Because of the relatively short-term nature of the targets, the methodology being utilized uses historical information and creates a forecast based on trends. The approach relies on the use of prediction intervals around the trend model forecast to inform a “risk-based” target setting method.

A prediction interval is an estimate of a range within which future data points will occur, with a specific probability, based on past data. A prediction interval approach enables a focus on the acceptable risk of meeting, or failing to meet a target, which allows stakeholders at all levels of the organization to understand the targets in better context. Since 2017, the safety targets working group has recommended a prediction interval of either 75% or 85%. This year an 85% confidence level is used for target setting, meaning that there will be 85% confidence that the actual number of fatalities and injuries will be at most equal to the targets.

To help set data-driven safety targets, ARIMA (AutoRegressive Integrated Moving Average) models were applied to forecast a range of transportation safety outcomes. The modeling process began with automatic model selection using `auto-arma()` function in R and its equivalent in Python to identify optimal model structures based on standard selection tools. In some cases, the models were adjusted to account for upward or downward trends. When data showed unusual patterns, or large swings, mathematical adjustments such as taking log of values were used to stabilize the results and improve accuracy.

After choosing the best models, checks were run to make sure they were reliable – such as confirming that the results were not overly influenced by past values or extreme data points. Only models that passed these tests were used for the final forecasts.

Forecasts were generated for a five-year horizon, and 85% prediction intervals were constructed to support conservative performance target setting. The goal was to ensure that the forecasts were not only statistically sound but also clear and useful for decision-making.

Descriptions for figures:

- **Historical Series:** the blue line represents the historical data.
- **5-Year Moving Average:** the black dashed line smooths out annual fluctuations.
- **Model's Forecast Values:** the dark blue dots show the forecasted values.
- **85% Prediction Intervals (PI):** this reflects the uncertainty in the forecast.

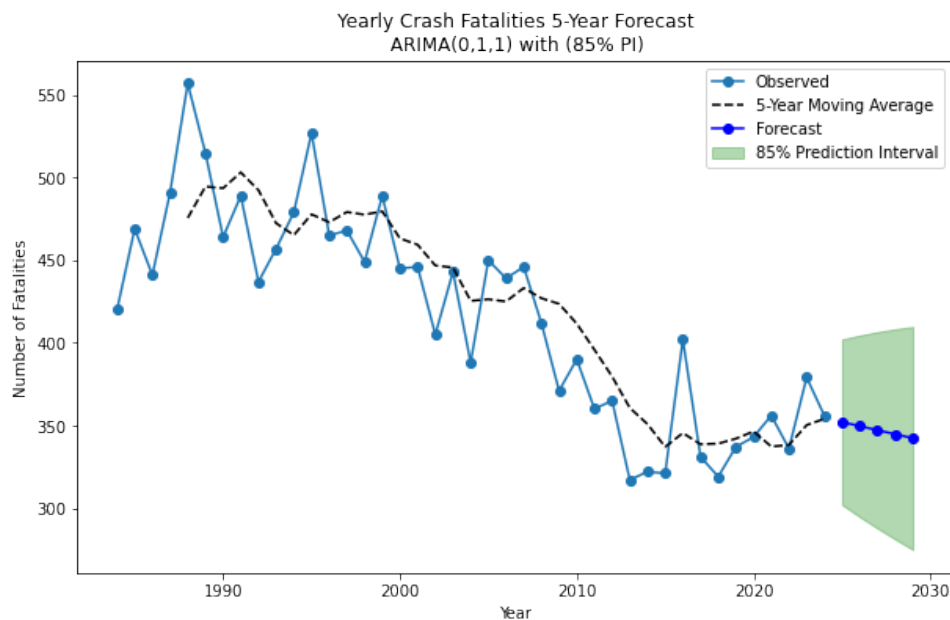
A strict use of the upper bound is recommended as this accounts for uncertainties while computing a conservative 5-year average target rather than using the point forecast values.

The safety data used can be obtained from the Iowa Crash Analysis Tool (ICAT, <https://icat.iowadot.gov/>) and Motor Vehicle Division daily fatality count (<https://iowadot.gov/media/7221/download?inline=v>).

## Measure 1: Number of Fatalities

The log transformed ARIMA (0,1,1) improved model fit and helped stabilized variance. The model assumptions were fully satisfied. This model looks at how fatalities are changing over time and makes forecast for the next 5 years. It does not just look at the numbers – it learns from past patterns and mistakes. This model suggests fatalities are gradually going down by 0.6% per year, although this estimate is not statistically significant. The forecast for the next 5 years shows a gentle decline. However, the prediction interval is wide indicating potential variability. The values from this model will be incorporated into the 5-year target as shown in the table below.

**Figure 1: Fatalities – annual observed, 5-year rolling average, and forecast**



**Table 1: Historical and forecast traffic fatalities**

Year	Fatalities	Forecast	Prediction Interval (85%)
2022	336		
2023	379		
2024	356		
2025		352.63	396.99
2026		350.52	399.34

**5-Year Rolling Average Target: 364.6**

The 5-Year rolling average target for 2022-2026 was set using the following:

- Actual fatality data from three most recent years (2022-2024)
- Forecast number of fatalities for year 2025
- Upper bound of 85% Prediction Interval forecast number of fatalities for year 2026

This method looks 3 years back and 2 years into the future to estimate a conservative performance target of 364.6 fatalities for 2022-2026.

The 5-year rolling average target for fatalities is presented in Table 1 and all targets are presented in Table 7.

## Measure 2: Fatalities per Hundred Million Vehicle Miles Traveled

This measure is a rate conversion, using the forecast developed for Measure 1 and the estimated Vehicle Miles Traveled (VMT) for the forecast period. The forecast values of VMT were provided by the Systems Planning Bureau using their preferred methodology, linear ETS, which is an exponential smoothing approach. The linear ETS method provides the most reasonable results and adjusts for seasonality or fluctuations in the data. The annual VMT forecast by this method for 2026 is expected to be 34.4 billion (34,431,000,000).

**Table 2: Historical & forecast traffic fatality rate**

Year	Fatalities	HMVMT	Fatality Rate*	Forecast	Prediction Interval (85%)
2022	336	332.66	1.01		
2023	379	336.25	1.13		
2024	356	343.97	1.03		
2025	352.63	344.14		1.026	1.200
2026	350.52**	344.31		1.018	1.263

**5-Year Rolling Average Target: 1.092**

\*Per Hundred Million Vehicle Miles Traveled (HMVMT).

\*\*2026 fatalities value based on forecast value, not 85% prediction interval value, which is applied to the rate.

The 5-Year rolling average target for 2022-2026 was set using the following:

- Actual data from three most recent years (2022-2024)
- Forecast for year 2025
- Upper bound of 85% Prediction Interval for year 2026

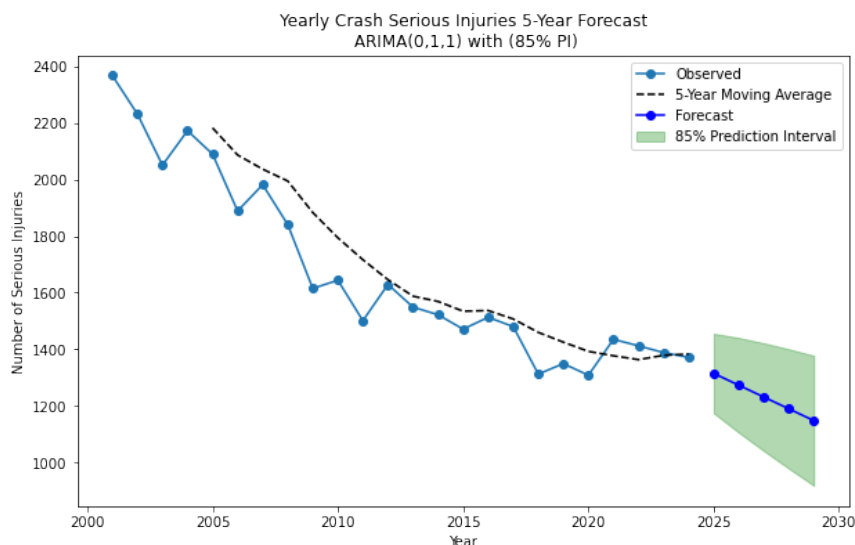
This method looks 3 years back and 2 years into the future to estimate a conservative performance target of 1.092 fatality rate for 2022-2026.

The 5-year rolling average target for fatality rate is presented in Table 2 and all targets are presented in Table 7.

## Measure 3: Number of Serious Injuries

The log-transformed ARIMA (0,1,1) model indicates a significant annual decline of 2.3% in serious injuries, with a p-value of less than 0.003. The forecast for the next five year shows a gentle decline, and the upper prediction interval looks promising. These values will be incorporated into the 5-year target.

**Figure 2: Serious Injuries – annual observed, 5-year rolling average, and forecast**



**Table 3: Historical and forecast serious injuries**

Year	Serious Injuries	Forecast	Prediction Interval (85%)
2022	1,412		
2023	1,388		
2024	1,371		
2025		1,328.63	1,439.96
2026		1,298.05	1,426.61

**5-Year Rolling Average Target: 1,385.3**

The 5-Year rolling average target for 2022-2026 was set using the following:

- Actual data from three most recent years (2022-2024)
- Forecast for year 2025
- Upper bound of 85% Prediction Interval for year 2026

This method looks 3 years back and 2 years into the future to estimate a conservative performance target of 1,385.3 suspected serious injuries for 2022-2026.

The 5-year rolling average target for suspected serious injuries is presented in Table 3 and all targets are presented in Table 7.

## Measure 4: Serious Injury Rate per Hundred Million Vehicle Miles Traveled

This measure is a rate conversion, using the forecast developed for Measure 3 and the estimated VMT for the forecast period. The forecast values of VMT were provided by the Systems Planning Bureau using their preferred methodology, linear ETS, which is an exponential smoothing approach. The linear ETS method provides the most reasonable results and adjusts for seasonality or fluctuations in the data. The annual VMT forecast by this method for 2026 is expected to be 34.4 billion (34,431,000,000).

**Table 4: Historical & forecast serious injury rate**

Year	Serious Injuries	HMVMT	Serious Injury Rate*	Forecast	Prediction Interval (85%)
2022	1,412	332.66	4.245		
2023	1,388	336.25	4.128		
2024	1,371	343.97	3.986		
2025	1,328.63	344.14		3.925	4.264
2026	1,298.05**	344.31		3.864	4.344

**5-Year Rolling Average Target: 4.126**

\*Per Hundred Million Vehicle Miles Traveled (HMVMT).

\*\*2026 serious injuries value based on forecast value, not 85% prediction interval value, which is applied to the rate.

The 5-Year rolling average target for 2022-2026 was set using the following:

- Actual data from three most recent years (2022-2024)
- Forecast for year 2025
- Upper bound of 85% Prediction Interval for year 2026

This method looks 3 years back and 2 years into the future to estimate a conservative performance target of 4.126 serious injury rate for 2022-2026.

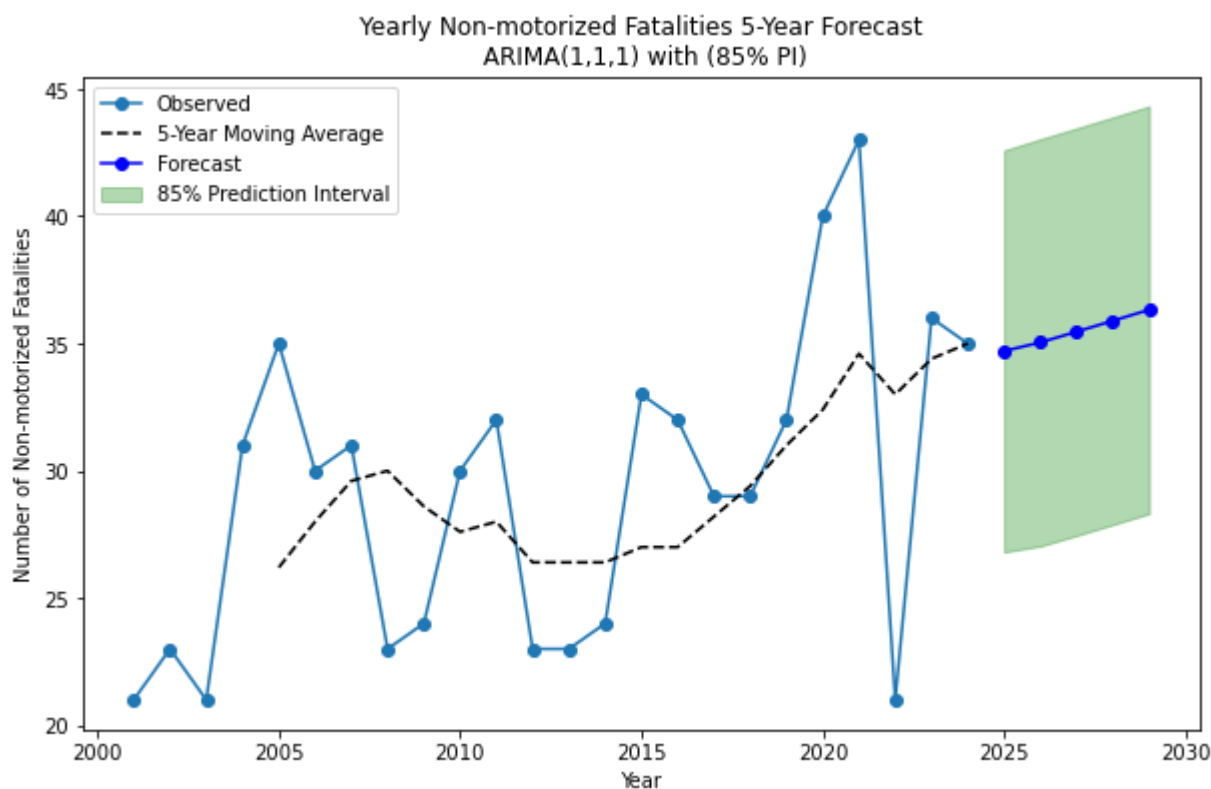
The 5-year rolling average target for serious injury rate is presented in Table 4 and all targets are presented in Table 7.

## Measure 5: Number of Non-Motorized Fatalities & Serious Injuries

### Number of Non-Motorized Fatalities

The log transformed ARIMA (1,1,1) model is statistically robust, meeting all necessary assumptions. The model forecasts an increasing trend over time. The model suggests non-motorized fatalities are going up by 1.4% per year. This estimate is moderately significant with a p-value of less than 0.043. The values from this model will be incorporated into the 5-year target as shown in the tables below.

**Figure 3A: Non-motorized fatalities – annual observed, 5-year rolling average, and forecast**



**Table 5A: Historical and forecast non-motorized fatalities**

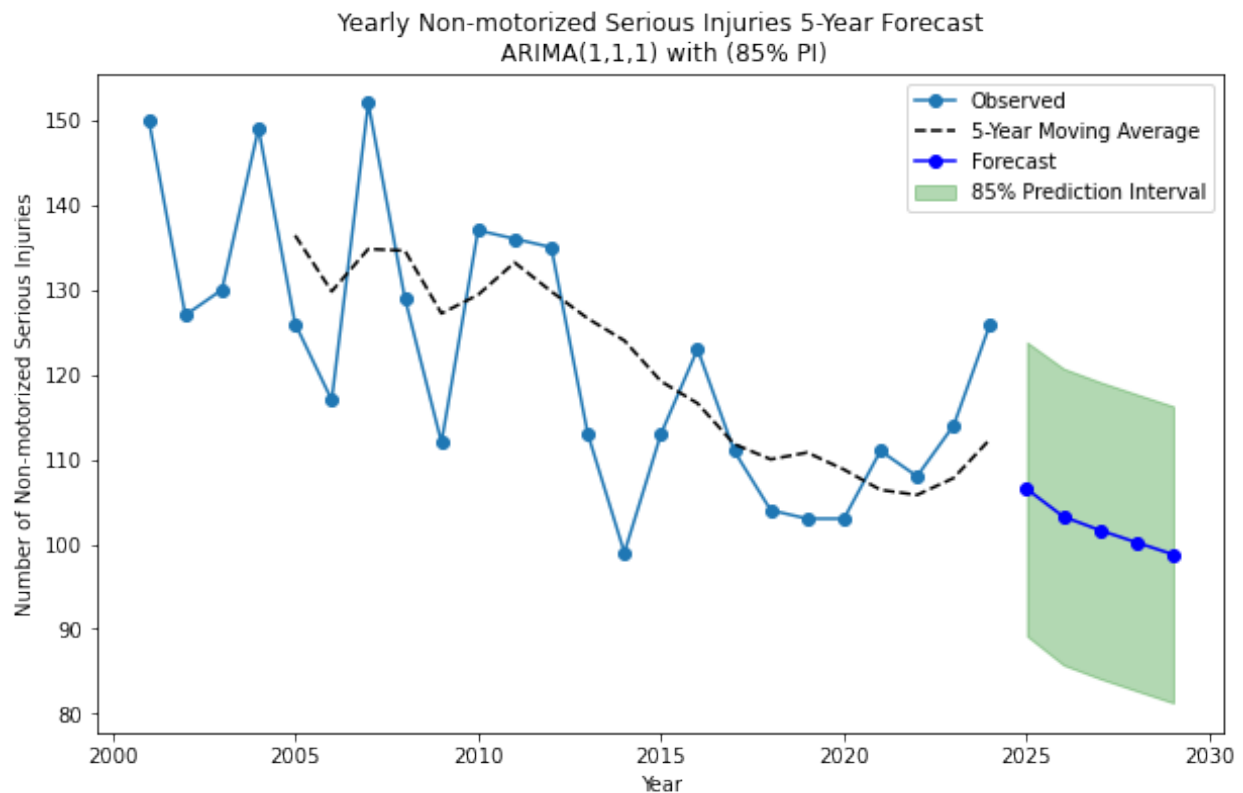
Year	Fatalities	Forecast	Prediction Interval (85%)
2022	21		
2023	36		
2024	35		
2025		34.40	45.18
2026		34.75	45.81

**5-Year Rolling Average: 34.42**

### Number of Non-Motorized Serious Injuries

The log transformed ARIMA (1,1,1) model is statistically sound, meeting all necessary assumptions. The model forecasts a decreasing trend over time, and suggests non-motorized injuries are going down by 1.1% per year. This estimate is significant with a p-value of less than 0.01. The values from this model will be incorporated into the 5-year target as shown in the table below.

**Figure 3B: Non-motorized serious injuries – annual observed, 5-year rolling average, and forecast**



**Table 5B: Historical and forecast non-motorized serious injuries**

Year	Serious Injuries	Forecast	Prediction Interval (85%)
2022	108		
2023	114		
2024	126		
2025		108.21	124.39
2026		104.59	120.54

**5-Year Rolling Average: 115.35**



**Table 5C: Historical and forecast non-motorized fatalities and serious injuries**

Year	Fatalities & Serious Injuries	Forecast	Prediction Interval (85%)
2022	129		
2023	150		
2024	161		
2025		142.61	169.57
2026		139.34	166.35

**5-Year Rolling Average Target: 149.8**

The 5-Year rolling average target for 2022-2026 was set using the following:

- Actual data from three most recent years (2022-2024)
- Forecast for year 2025
- Upper bound of 85% Prediction Interval for year 2026

To satisfy the requirement of Measure 5 representing a combined number of non-motorized fatalities and non-motorized serious injuries, 34.42 and 115.35 are combined for a 5-year rolling average of 149.8.

This method looks 3 years back and 2 years into the future to estimate a conservative performance target of 149.8 non-motorized fatalities and serious injuries for 2022-2026.

The 5-year rolling average target for non-motorized fatalities and serious injuries is presented in Table 5C and all targets are presented in Table 7.

## Iowa DOT 2022-2026 Safety Performance Targets

While the preceding forecasts were developed for each year, the targets are required to be set as five-year rolling averages, as crashes are subject to significant year-to-year variability. The following table gives the actual numbers of fatalities, fatality rate, serious injuries, serious injury rate, non-motorized serious injuries and fatalities, and the vehicle miles traveled (VMT, in millions) for each respective year, which are the basis for the five-year rolling averages presented in Table 7.

**Table 6: Annual data summary**

Year	Fatalities	Fatality Rate	Serious Injuries	Serious Injury Rate	Non-Motorized Fatalities & Serious Injuries	VMT (millions)
2015	321	0.970	1,471	4.443	146	33,109
2016	402	1.209	1,513	4.549	155	33,263
2017	331	0.984	1,480	4.385	140	33,751
2018	319	0.952	1,312	3.916	133	33,507
2019	337	0.998	1,349	3.994	135	33,779
2020	343	1.148	1,308	4.377	143	29,882
2021	356	1.066	1,435	4.298	154	33,384
2022	336	1.010	1,412	4.245	129	33,266
2023	379	1.127	1,388	4.128	150	33,625
2024	356	1.035	1,371	3.986	161	34,397

Table 7 shows the historical five-year rolling averages for the five performance measures from 2015-2019 through 2020-2024 based on Table 6. The highlighted rows represent the 2021-2025 performance measure targets as reported in CY 2024 and the proposed 2022-2026 85% prediction interval performance measure targets. As prior year crash data is updated each year in Table 6, five-year rolling averages in Table 7 may vary slightly from prior/future memos and baseline comparisons.

**Table 7: Historic 5-year rolling averages with 2025 and 2026 targets**

Year	Fatalities	Fatalities per HMVMT	Serious Injuries	Serious Injuries per HMVMT	Non-Motorized Fatalities & Serious Injuries
2015-2019	342.0	1.022	1,425.0	4.257	141.8
2016-2020	346.4	1.058	1,392.4	4.244	141.2
2017-2021	337.2	1.030	1,376.8	4.194	141.0
2018-2022	338.2	1.035	1,363.2	4.166	138.8
2019-2023	350.2	1.070	1,378.4	4.208	142.2
2020-2024	354.0	1.077	1,382.8	4.207	147.4
2021-2025 (targets set in CY 2024)	365.8	1.085	1,496.1	4.391	148.4
<b>2022-2026 Targets</b>	<b>364.6</b>	<b>1.092</b>	<b>1,385.3</b>	<b>4.126</b>	<b>149.8</b>