



# Des Moines Area MPO Safety Performance

Targets and Methodology

February 2019

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## BACKGROUND

In April 2016, the Federal Highway Administration (FHWA) released the final rulemaking for safety performance measures for the Highway Safety Improvement Program (HSIP). Included in the rulemaking are definitions of key terms, the applicability of the rule, and guidance on how to establish performance targets, determine if progress is achieved, and reporting targets for the HSIP.

The safety measures required to be reported annually include:

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

Performance targets were established by states beginning in August 2017. A Metropolitan Planning Organization (MPO) has 180 days after the state sets its targets to either:

- 1) Agree to support the State Department of Transportation (DOT) target.
- 2) Establish target for each of the five performance measures specific to the MPO planning area.

MPO target achievement will be monitored through the continued planning efforts of the MPO; including, long-range planning, project evaluation, and performance monitoring reports

### **Safety Goals in *Mobilizing Tomorrow***

In 2014 the Des Moines Area MPO approved *Mobilizing Tomorrow* as the long-range, regional transportation plan for the year 2050. *Mobilizing Tomorrow* outlines four high-level goals to direct Greater Des Moines toward a more vibrant transportation system. Each of these goals identified several performance measures to help track the plan's progress. Goal 4 in *Mobilizing Tomorrow* seeks to "further the health, safety, and well-being of all residents in the region" and includes four of the five measures required by federal rulemaking.

In addition to setting baseline values for tracking the performance in the long-range plan, a target was set for the year 2050 to be used to evaluate the on-going performance of the transportation system. In *Mobilizing Tomorrow* each of the four measures have a 2050 target of decreasing from the baseline.

## STATEWIDE TARGETS

In August 2018, the Iowa DOT established statewide performance targets for the 2015-2019 time-period as shown in Table 1.

*Table 1: Iowa DOT Safety Performance Targets*

| Performance Measures                             | Five Year Rolling Averages |                     |
|--|----------------------------|---------------------|
|  | 2013-2017<br>Baseline      | 2015-2019<br>Target |
| Number of Fatalities                             | 338.0                      | 353.6               |
| Fatality Rate*                                   | 1.027                      | 1.047               |
| Number of Serious Injuries                       | 1,498.8                    | 1,483.7             |
| Serious Injury Rate*                             | 4.568                      | 4.391               |
| Non-Motorized Fatalities and<br>Serious Injuries | 146.4                      | 149.8               |

\*Rates are per 100 million vehicle miles traveled (VMT)

Per [23 § 490.209](#), the Des Moines Area MPO must establish safety targets within 180 days of the statewide targets being established, by February 27, 2019. The Des Moines Area MPO maintains two options for setting regional performance targets:

1. Support the Iowa DOT's targets by agreeing to plan and program projects so that they contribute toward the accomplishment of the State DOT safety target for that performance measure
2. Set a quantifiable target for that performance measure for the MPO

Originally the Des Moines Area MPO presented and discussed the first iteration of statewide targets with the MPO Technical, Executive, and Policy Committees in September 2017 to gather feedback on making the decision to support the State's targets or set targets for the Des Moines Area MPO planning area.

Based on discussion with the MPO Committees and the safety performance targets established for 2050 in *Mobilizing Tomorrow*, the MPO determined setting safety targets for the Des Moines Area MPO planning area was the appropriate action for the 2014-2018 time-period. For the 2015-2019 timeframe the MPO determined that setting targets for the MPO planning area was the appropriate course of action.

## DES MOINES AREA MPO SAFETY PERFORMANCE METHODOLOGY

### Des Moines Area MPO 2013 – 2017 Baseline

In order to determine the safety performance targets for the Des Moines Area MPO planning area, the 2013-2017 baseline measures needed to be established. Utilizing crash report data collected by the Iowa DOT and provided to the Des Moines Area MPO for the most recent 10-year period (2009-2018), the Des Moines Area MPO calculated the five-year rolling average for number and rate of fatalities, number and rate for serious injuries, and the number of non-motorized fatalities and serious injuries. Appendix A provides the number of fatalities, serious injuries, and non-motorized fatalities and serious injuries and five-year rolling averages.

Table 2 presents the 2013-2017 baseline values for the five safety performance measures for the Des Moines Area MPO planning area. Vehicle miles traveled data was generated for the MPO Planning Area using 2016 Iowa DOT GIMS traffic volumes.

*Table 2: Des Moines Area MPO Safety Performance Baselines*

| Performance Measure                           | Five Year Rolling Averages |
|---|----------------------------|
|   | 2013-2017 Baseline         |
| Number of Fatalities                          | 26.0                       |
| Fatality Rate*                                | 0.56                       |
| Number of Serious Injuries                    | 185.0                      |
| Serious Injury Rate*                          | 3.97                       |
| Non-Motorized Fatalities and Serious Injuries | 23.8                       |

\*Rates are per 100 million vehicle miles traveled (VMT)

### Safety Performance Forecast – Fatalities

To understand the current trend in the five-year rolling average for fatalities within the Des Moines Area MPO planning area, the number of fatalities per year and rolling five-year average were graphed (Figure 1). A linear trendline was then applied to the five-year rolling average and forecasted out one year.

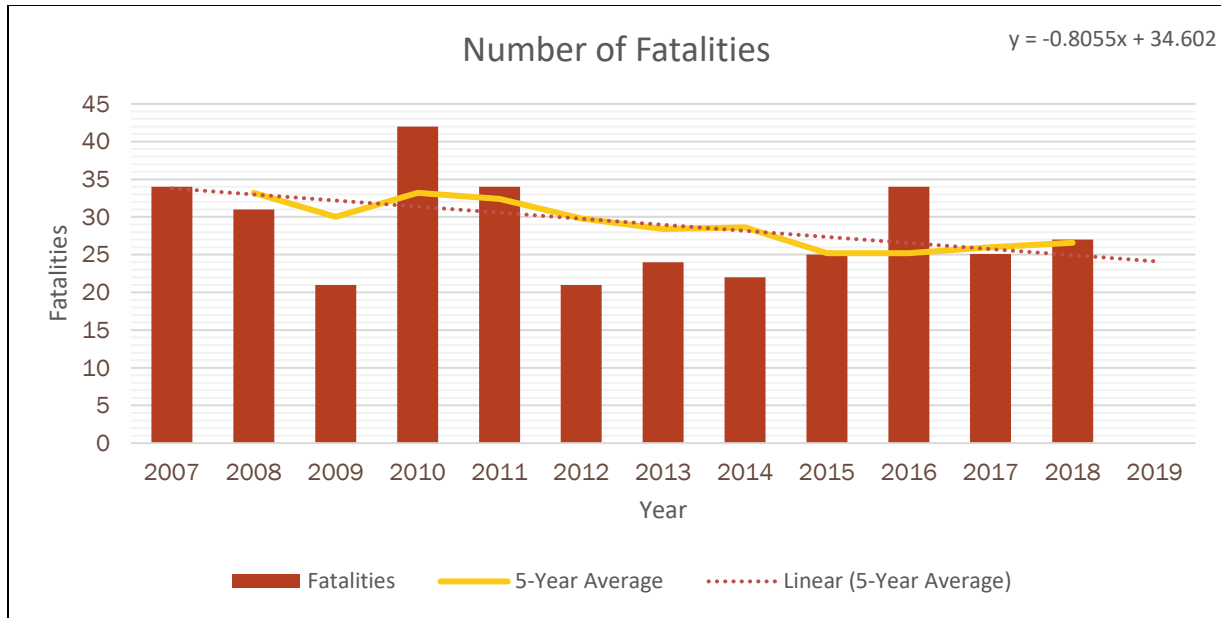


Figure 1: Historic Fatal Crashes 2007-2018

Upon reviewing historic crash data for the Des Moines Area MPO planning area, it is apparent that fatalities fluctuate from year to year. To provide multiple scenarios for target setting Des Moines Area MPO staff began tracking reported fatalities using Iowa DOT SAVER<sup>1</sup> throughout 2018 to provide the actual fatalities that occurred in 2018. Table 3 provides the 2018 crashes as of January 15, 2019.

Table 3: 2018 Crash Fatalities

|            |      |
|------------|------|
|            | 2018 |
| Fatalities | 27   |

MPO staff then developed a scenario to forecast the fatalities for the year 2019 using the 50<sup>th</sup>, 75<sup>th</sup>, 85<sup>th</sup>, and 90<sup>th</sup> percentiles of prediction intervals based on historic crash data and the 2018 value. The Iowa DOT utilizes prediction intervals analysis when setting their required targets. The Des Moines Area MPO also analyzes data with prediction intervals to maintain consistency with Iowa DOT analysis.

Table 4 provides the forecasted fatalities for 2019 using the 2009-2018 Fatalities.

Table 4: 2019 Crash Scenario Forecasts, Fatalities

|                       | Prediction Interval Percentiles |      |      |      | Straight Line Projection |
|-----------------------|---------------------------------|------|------|------|--------------------------|
|                       | 50                              | 75   | 85   | 90   |                          |
| Forecasted Fatalities | 25.0                            | 34.0 | 36.8 | 41.2 | 24.1                     |

<sup>1</sup> <https://saver.iowadot.gov/>

### Safety Performance Target – Fatalities

Using the forecasted fatality values for the above scenario, five-year averages were developed. Table 5 shows the forecasted five-year averages for fatalities in the Des Moines Area MPO Planning Area for 2015-2019.

*Table 5: 2019 Crash Scenario Forecasts, Fatalities Five-Year Average*

|                       | Prediction Interval Percentiles |      |      |      | Straight Line Projection |
|-----------------------|---------------------------------|------|------|------|--------------------------|
|                       | 50                              | 75   | 85   | 90   |                          |
| Forecasted Fatalities | 27.2                            | 29.0 | 29.6 | 30.4 | 27.0                     |

After reviewing the five-year averages for the three scenarios and the linear trendline projection, the Des Moines Area MPO determined that to continue to achieve improvement toward the goal set in *Mobilizing Tomorrow* a 2015-2019 safety performance target should follow the linear trendline while recognizing that fatalities in 2018 were between the 50<sup>th</sup> and 75<sup>th</sup> percentile of historic crash fatalities. Table 6 provided the five-year average fatalities target.

*Table 6: 2015-2019 Number of Fatalities Target*

| Performance Measure  | Five Year Rolling Averages |                  |
|----------------------|----------------------------|------------------|
|                      | 2013-2017 Baseline         | 2015-2019 Target |
| Number of Fatalities | 26.0                       | 27.0             |

### Safety Performance Forecast – Serious Injuries

To understand the current trend in the five-year rolling average for serious injuries within the Des Moines Area MPO planning area, the number of serious injuries per year and rolling five-year average were graphed (Figure 2). A linear trendline was then applied to the five-year rolling average and forecasted out one year.

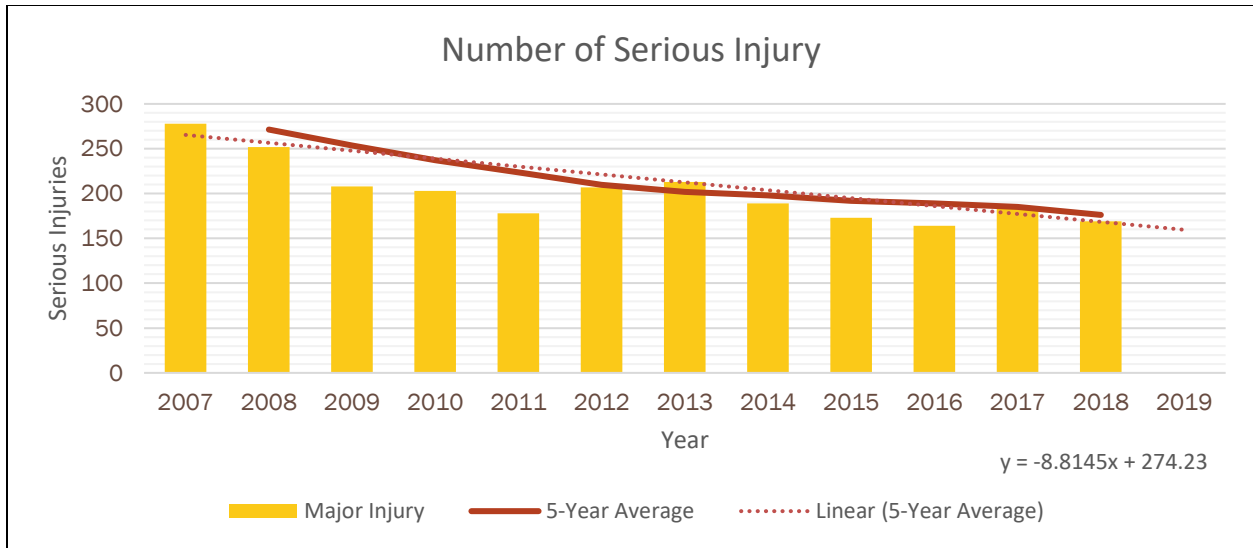


Figure 2: Historic Serious Injury Crashes 2007-2018

Upon reviewing historic crash data for the Des Moines Area MPO planning area, it is apparent that serious injuries have been trending downward over the last several years. To provide multiple scenarios for target setting Des Moines Area MPO staff began tracking reported serious injuries using Iowa DOT SAVER<sup>2</sup> throughout 2018 to provide a year to date total for serious injuries. Table 8 provides the 2018 crashes as of January 15, 2019.

Table 7: 2018 Crashes

|                  |      |
|------------------|------|
|                  | 2018 |
| Serious Injuries | 169  |

MPO staff then developed a scenario to forecast the serious injuries for the year 2019 using the 50<sup>th</sup>, 75<sup>th</sup>, 85<sup>th</sup>, and 90<sup>th</sup> percentiles of prediction intervals based on historic crash data and the 2018 value. The Iowa DOT utilizes prediction intervals analysis when setting their required targets. The Des Moines Area MPO also analyzes data with prediction intervals to maintain consistency with Iowa DOT analysis.

Table 8 provides the forecasted serious injuries for 2019 using the 2009-2018 serious injuries.

Table 8: 2019 Crash Scenario Forecasts, Serious Injuries

|                  | Prediction Interval Percentiles |       |       |       | Straight Line Projection |
|------------------|---------------------------------|-------|-------|-------|--------------------------|
|                  | 50                              | 75    | 85    | 90    |                          |
| Scenario 1: 2018 | 187.5                           | 207.3 | 209.8 | 212.5 | 159.6                    |

<sup>2</sup> <https://saver.iowadot.gov/>



### Safety Performance Target – Serious Injuries

Using the forecasted serious injuries values for the above scenario, five-year averages were developed. Table 9 shows the forecasted five-year averages for serious injuries in the Des Moines Area MPO Planning Area for 2015-2019.

*Table 9: 2019 Crash Scenario Forecasts, Serious Injuries Five-Year Average*

|                  | Prediction Interval Percentiles |       |       |       | Straight Line Projection |
|------------------|---------------------------------|-------|-------|-------|--------------------------|
|                  | 50                              | 75    | 85    | 90    |                          |
| Scenario 1: 2018 | 175.9                           | 179.9 | 180.4 | 180.9 | 170.3                    |

After reviewing the five-year averages for the three scenarios and the linear trendline projection, the Des Moines Area MPO determined that to continue to achieve improvement toward the goal set in *Mobilizing Tomorrow* a 2015-2019 safety performance target should follow the linear trendline while recognizing that serious injuries in 2017 are projected to be below the 50<sup>th</sup> percentile of historic crashes. Table 10 provided the five-year average serious injury target.

*Table 10: 2015-2019 Number of Serious Injuries Target*

| Performance Measure        | Five Year Rolling Averages |                  |
|----------------------------|----------------------------|------------------|
|                            | 2013-2017 Baseline         | 2015-2019 Target |
| Number of Serious Injuries | 185.0                      | 170.3            |

### Safety Performance Forecast – Non-Motorized Fatalities and Serious Injuries

To understand the current trend in the five-year rolling average for Non-Motorized Fatalities and Serious Injuries within the Des Moines Area MPO planning area, the number of Non-Motorized Fatalities and Serious Injuries per year and rolling five-year average were graphed (Figure 3). A linear trendline was then applied to the five-year rolling average and forecasted out two years.

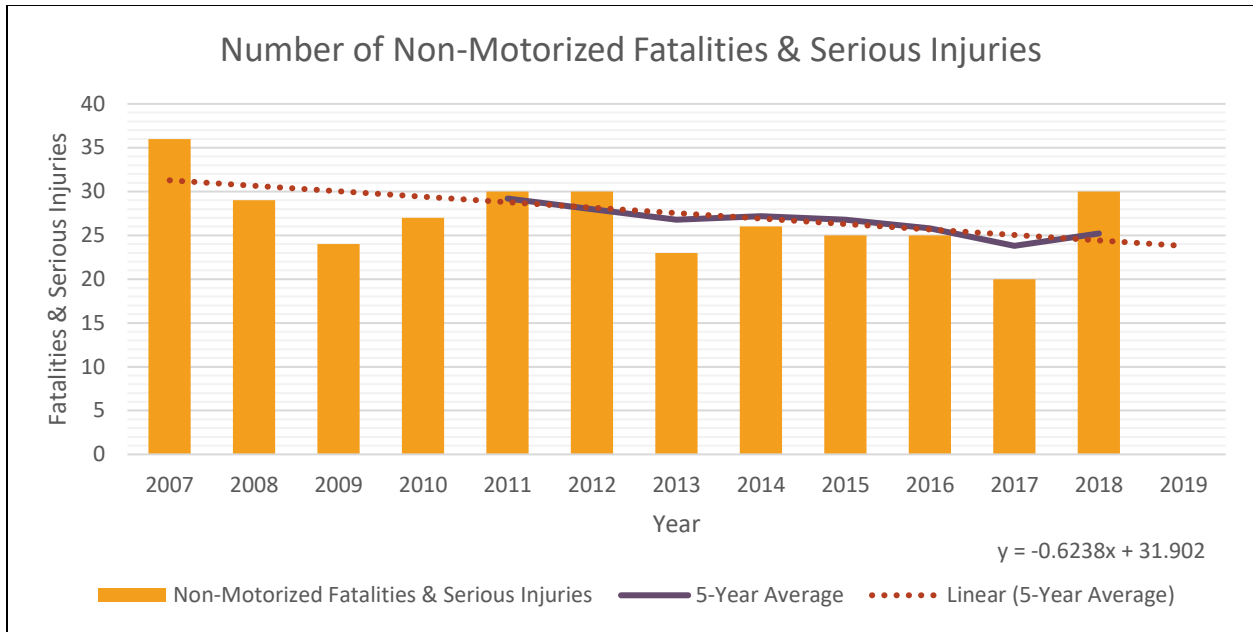


Figure 3: Historic Non-Motorized Fatal and Serious Injury Crashes 2007-2018

Upon reviewing historic crash data for the Des Moines Area MPO planning area, it is apparent that Non-Motorized Fatalities and Serious Injuries fluctuate from year to year. To provide multiple scenarios for target setting DMAMPO staff began tracking reported Non-Motorized Fatalities and Serious Injuries using Iowa DOT SAVER<sup>3</sup> throughout 2018 to provide a year to date estimate for forecasting Non-Motorized Fatalities and Serious Injuries. Table 11 provides the 2018 crashes as of January 15, 2019.

Table 11: 2018 Crashes

|   | 2018 |
|---|------|
| Non-Motorized Fatalities and Serious Injuries | 30   |

MPO staff then developed a scenario to forecast the Non-Motorized Fatalities and Serious Injuries for the year 2019 using the 50<sup>th</sup>, 75<sup>th</sup>, 85<sup>th</sup>, and 90<sup>th</sup> percentiles of prediction intervals based on historic crash data and the 2018 value. The Iowa DOT utilizes prediction intervals analysis when setting their required targets. The Des Moines Area MPO also analyzes data with prediction intervals to maintain consistency with Iowa DOT analysis.

Table 12 provides the forecasted Non-Motorized Fatalities and Serious Injuries for 2019.

Table 12: 2019 Crash Scenario Forecasts, Non-Motorized Fatalities & Serious Injuries

|                | Prediction Interval Percentiles |      |      |      | Straight Line Projection |
|----------------|---------------------------------|------|------|------|--------------------------|
|                | 50                              | 75   | 85   | 90   |                          |
| Scenario: 2018 | 25.5                            | 30.0 | 30.0 | 30.0 | 23.8                     |

<sup>3</sup> <https://saver.iowadot.gov/>

### Safety Performance Target – Non-Motorized Fatalities and Serious Injuries

Using the forecasted Non-Motorized Fatalities and Serious Injuries values for the above scenario, five-year averages were developed. Table 13 shows the forecasted five-year averages for Non-Motorized Fatalities and Serious Injuries in the Des Moines Area MPO Planning Area for 2015-2019.

*Table 13: 2019 Crash Scenario Forecasts, Non-Motorized Fatalities & Serious Injuries Five-Year Average*

|                | Prediction Interval Percentiles |      |      |      | Straight Line Projection |
|----------------|---------------------------------|------|------|------|--------------------------|
|                | 50                              | 75   | 85   | 90   |                          |
| Scenario: 2018 | 25.1                            | 26.0 | 26.0 | 26.0 | 24.8                     |

After reviewing the five-year averages for the three scenarios and the linear trendline projection, the Des Moines Area MPO determined that to continue to achieve improvement toward the goal set in *Mobilizing Tomorrow* a 2015-2019 safety performance target should follow the linear trendline while recognizing that the projected Non-Motorized Fatalities and Serious Injuries in 2018 are above the 90<sup>th</sup> percentile of historic crashes. Table 14 provided the five-year average Non-Motorized Fatalities and Serious Injuries target.

*Table 14: 2015-2019 Non-Motorized Fatalities & Serious Injuries Target*

| Performance Measure                                     | Five Year Rolling Averages |                  |
|---|----------------------------|------------------|
|   | 2013-2017 Baseline         | 2015-2019 Target |
| Number of Non-Motorized Fatalities and Serious Injuries | 23.8                       | 24.8             |

## Vehicle Miles Traveled Forecasting

Vehicle miles traveled (VMT) forecasting was completed using historic traffic count data provided in the Iowa DOT GIMS dataset through 2016. Using historic traffic count data, the MPO was able to calculate the VMT for each year of crash data used in the analysis period. Based on the historic VMT between 2014 and 2016, the Des Moines Area MPO saw approximately 2 percent VMT growth per year. As the Des Moines Area MPO planning area has continued to increase in population in that time-period and future growth projections are consistent with the 2 percent growth per year, the forecasted VMT for 2017, 2018, and 2019 followed that growth assumption. Table 15 shows VMT forecasts for 2017, 2018, 2019.

Table 15: Vehicle Miles Traveled 2014-2016

| Year          | Vehicle Miles Traveled (000s) |
|---------------|-------------------------------|
| 2014          | 4,558,909                     |
| 2015          | 4,666,797                     |
| 2016          | 4,764,701                     |
| 2017 Forecast | 4,859,996                     |
| 2018 Forecast | 4,957,195                     |
| 2019 Forecast | 5,056,339                     |

## 2015-2019 Safety Targets

After reviewing historic crash data to analyze the number of fatalities and serious injuries in the Des Moines Area MPO planning area, the final targets are recommended for the 2015-2019 time-period.

*Table 16: 2015-2019 Safety Performance Targets*

| Performance Measures                          | Five Year Rolling Averages |                     |
|---|----------------------------|---------------------|
|   | 2013-2017<br>Baseline      | 2015-2019<br>Target |
| Number of Fatalities                          | 26.0                       | 27.0                |
| Fatality Rate*                                | 0.56                       | 0.56                |
| Number of Serious Injuries                    | 185.0                      | 170.3               |
| Serious Injury Rate*                          | 3.967                      | 3.51                |
| Non-Motorized Fatalities and Serious Injuries | 23.8                       | 24.8                |

\*Rates are per 100 million vehicle miles traveled (VMT)

## Appendix A

Historic Crash Data

| Year          | 2004 | 2005 | 2006 | 2007 | 2008  | 2009  | 2010  | 2011  | 2012  | 2013  | 2014 | 2015 | 2016  | 2017  | Acutal     |
|---------------|------|------|------|------|-------|-------|-------|-------|-------|-------|------|------|-------|-------|------------|
|               |      |      |      |      |       |       |       |       |       |       |      |      |       |       | 12/31/2018 |
| Year          | 2004 | 2005 | 2006 | 2007 | 2008  | 2009  | 2010  | 2011  | 2012  | 2013  | 2014 | 2015 | 2016  | 2017  | 2018       |
| Fatalities    | 37   | 26   | 38   | 34   | 31    | 21    | 42    | 34    | 21    | 24    | 22   | 25   | 34    | 25    | 27         |
| 5- year Avg   |      |      |      |      | 33.2  | 30    | 33.2  | 32.4  | 29.8  | 28.4  | 28.6 | 25.2 | 25.2  | 26.0  | 26.6       |
| Major Injury  | 297  | 285  | 245  | 278  | 252   | 208   | 203   | 178   | 207   | 213   | 189  | 173  | 164   | 186   | 169        |
| 5- year Avg   |      |      |      |      | 271.4 | 253.6 | 237.2 | 223.8 | 209.6 | 201.8 | 198  | 192  | 189.2 | 185.0 | 176.2      |
| Non-Motorized |      |      |      | 36   | 29    | 24    | 27    | 30    | 30    | 23    | 26   | 25   | 25    | 20    | 30         |
| 5- year Avg   |      |      |      |      |       |       |       | 29.2  | 28    | 26.8  | 27.2 | 26.8 | 25.8  | 23.8  | 25.2       |

|               | 50                                  | 75    | 85    | 90    | 50                                  | 75    | 85    | 90    |
|---------------|-------------------------------------|-------|-------|-------|-------------------------------------|-------|-------|-------|
|               | 2018                                |       |       |       | 2019 (2018)                         |       |       |       |
| Fatalities    | 25.0                                | 34.0  | 36.8  | 41.2  | 25.0                                | 34.0  | 36.8  | 41.2  |
| 5-Year Avg    | 26.0                                | 27.8  | 28.4  | 29.2  | 27.2                                | 29.0  | 29.6  | 30.4  |
| Major Injury  | 196.0                               | 209.3 | 226.7 | 248.1 | 187.5                               | 207.3 | 209.8 | 212.5 |
| 5-Year Avg    | 192.0                               | 194.7 | 198.2 | 202.5 | 175.9                               | 179.9 | 180.4 | 180.9 |
| Non-Motorized | 25.5                                | 29.3  | 30.0  | 30.0  | 25.5                                | 30.0  | 30.0  | 30.0  |
| 5-Year Avg    | 24.3                                | 25.1  | 25.2  | 25.2  | 25.1                                | 26.0  | 26.0  | 26.0  |
|               | * Based on 10-year period 2008-2017 |       |       |       | * Based on 10-year period 2009-2018 |       |       |       |

| Year  | VMT           |
|-------|---------------|
| 2004  | 4,234,574,145 |
| 2005  | 4,245,291,640 |
| 2006  | 4,276,320,290 |
| 2007  | 4,272,506,770 |
| 2008  | 4,304,430,400 |
| 2009  | 4,328,873,355 |
| 2010  | 4,369,665,072 |
| 2011  | 4,363,487,765 |
| 2012  | 4,479,189,115 |
| 2013  | 4,467,722,275 |
| 2014  | 4,558,909,249 |
| 2015  | 4,666,797,655 |
| 2016  | 4,764,701,540 |
| 2017* | 4,859,995,571 |
| 2018* | 4,957,195,482 |
| 2019* | 5,056,339,392 |

\* Estimate




Ever mindful of future generations,

**we collaborate across  
political boundaries**

to achieve social, economic, and  
environmental resilience for

**Greater Des Moines**



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