

Safety Performance Measures Target Setting

Road School 2017
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Why?



Why must we establish and meet Traffic Safety Performance measures? To understand that, we need a brief history lesson.

In 2012, the short-term surface transportation funding legislation, Moving Ahead for Progress in the 21st Century – better known as MAP-21 was passed. Passed at a time when the nation was fresh off “The Great Recession” and there was great interest in being strategically frugal. It established requirements that state’s use of federal transportation funds report on, for what is essentially, the “bang they get for their buck.” The National Highway Transportation Safety Administration and the Governor’s Highway Safety Association’s 2008 report on Traffic Safety Performance Measures became the source referenced in MAP-21 for safety measures. There were 14 measures, which centered on NHTSA focused traffic safety initiatives.

Jump ahead three years and the nation needed new transportation funding legislation, and we were presented with the Fixing America's Surface Transportation Act or "FAST Act." Advocates for non-motorized transportation lobbied for greater transportation funding, and so performance measures needed to be created to determine impacts of federal funds used to improve those modes.

With every new law, there comes new regulations, and after about a year of work, US DOT promulgated regulations on what states must monitor, establish target goals for, and report on progress to achieve those goals.

What?



When the regulations were published only three of the original 14 performance measures noted in MAP-21 were deemed appropriate for performance management involving DOT's. Two new measures were established for a total of five.

HSIP Five Safety Performance Measures

- Number of Fatalities
- Rate of Fatalities per 100 million (VMT)
- Number of Suspected Serious Injuries
- Rate of Suspected Serious Injuries per 100 million (VMT)
- Number of Non-motorized Fatalities and Non-motorized Suspected Serious Injuries



The first three come from 2008 NHTSA/GHSA Traffic Safety Performance Measures report.

The number of fatalities as determined by Final FARS counts, or if unavailable the FARS Annual Report File

The rate of fatalities per 100 million vehicle miles traveled.

The number "Suspected Serious Injuries"

The next two were added to address FHWA requirements.

The rate of suspected serious injuries per 100 million vehicle miles traveled.

Finally the number of Non-motorized fatalities and Non-motorized suspected serious injuries.

Where?



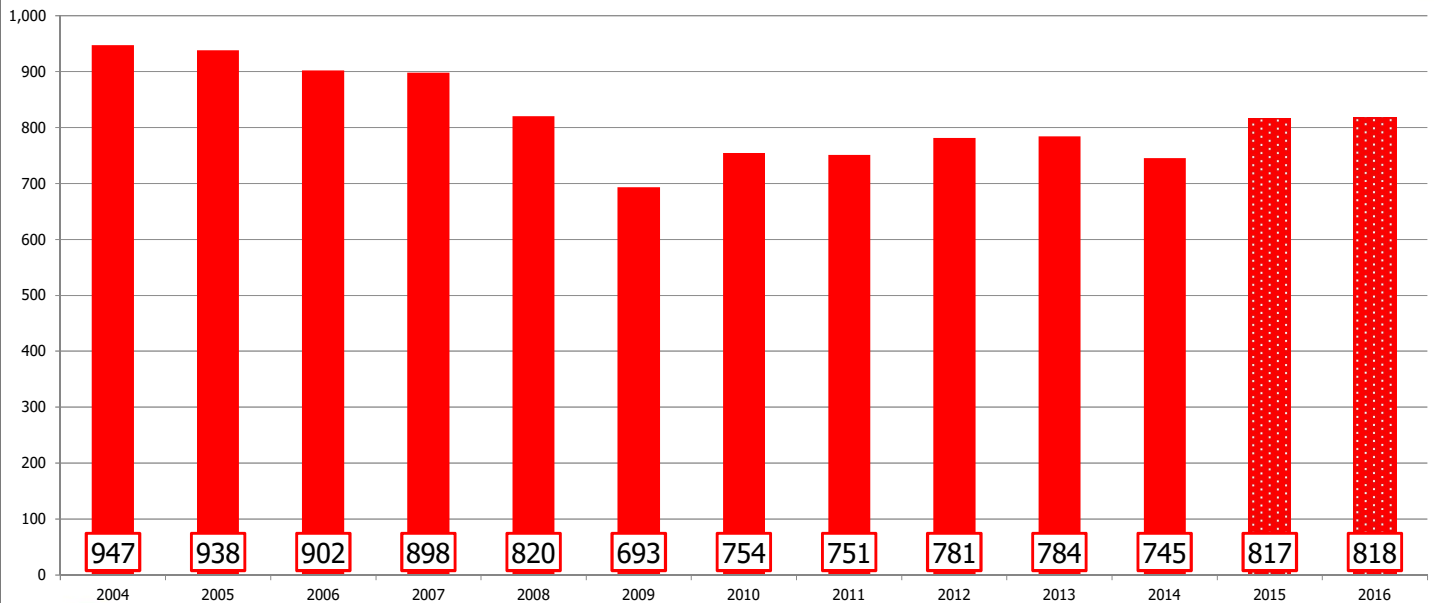
The counts are for all public roads.

How?



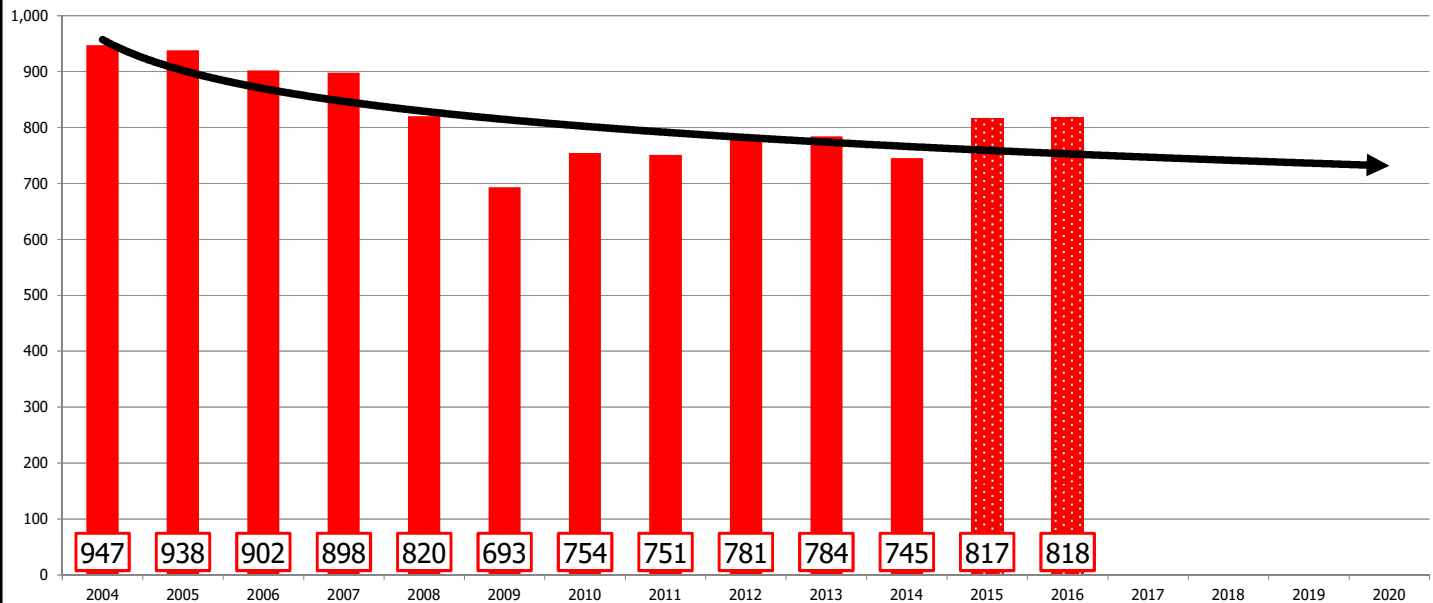
FHWA will use a five-year rolling average of the counts in determining if a state meets its target. But, since before you can have a five year rolling average you have to start with an annual total, For the purposes of this presentation we'll just explore this first step.

Number of Fatalities



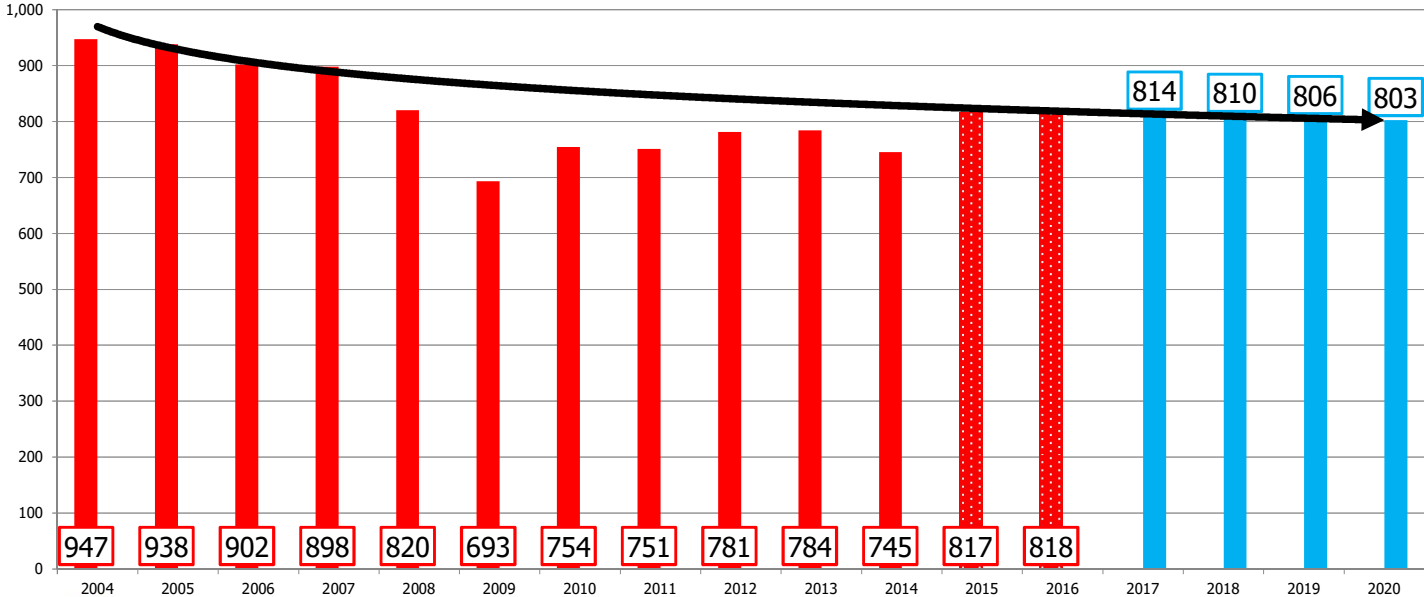
The first of the five measures, the number of traffic fatalities, is the most straight-forward. The NHTSA administered Fatality Analysis Reporting System provides the number for us. With data back to 1975, there is a wealth of historic precedent on which to base projections. Note, that the last published “Final FARS Count” was 2014, so those last two red bars show preliminary data. I would only note the common caveat of financial advisors, “Past performance is not a guarantee of future results.”

Number of Fatalities



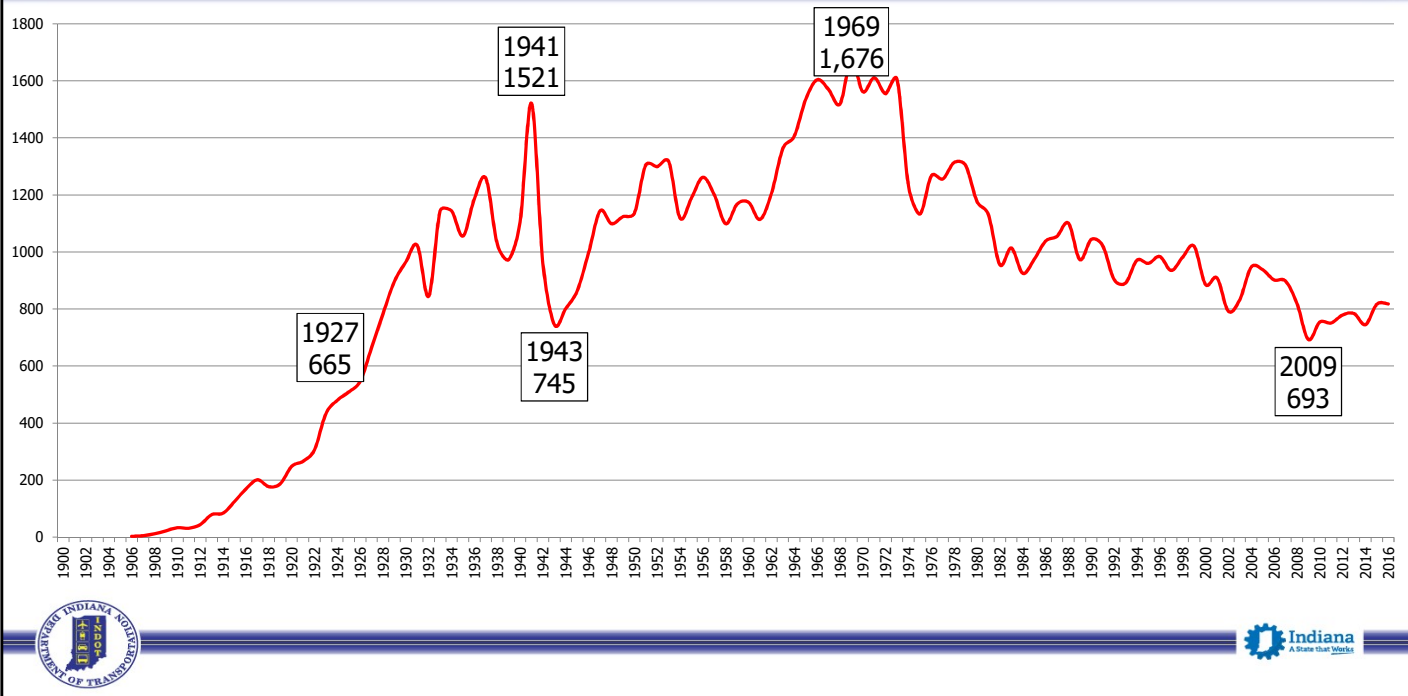
Let's apply a logarithmic projection for the years 2017-2020. Why logarithmic? As a starting point, it seems a reasonable fit to the actual historic counts. The projection seems a bit optimistic given the two most recent years. So let's apply an adjustment so that the trend line crosses the most recent years approximately at the same levels.

Number of Fatalities



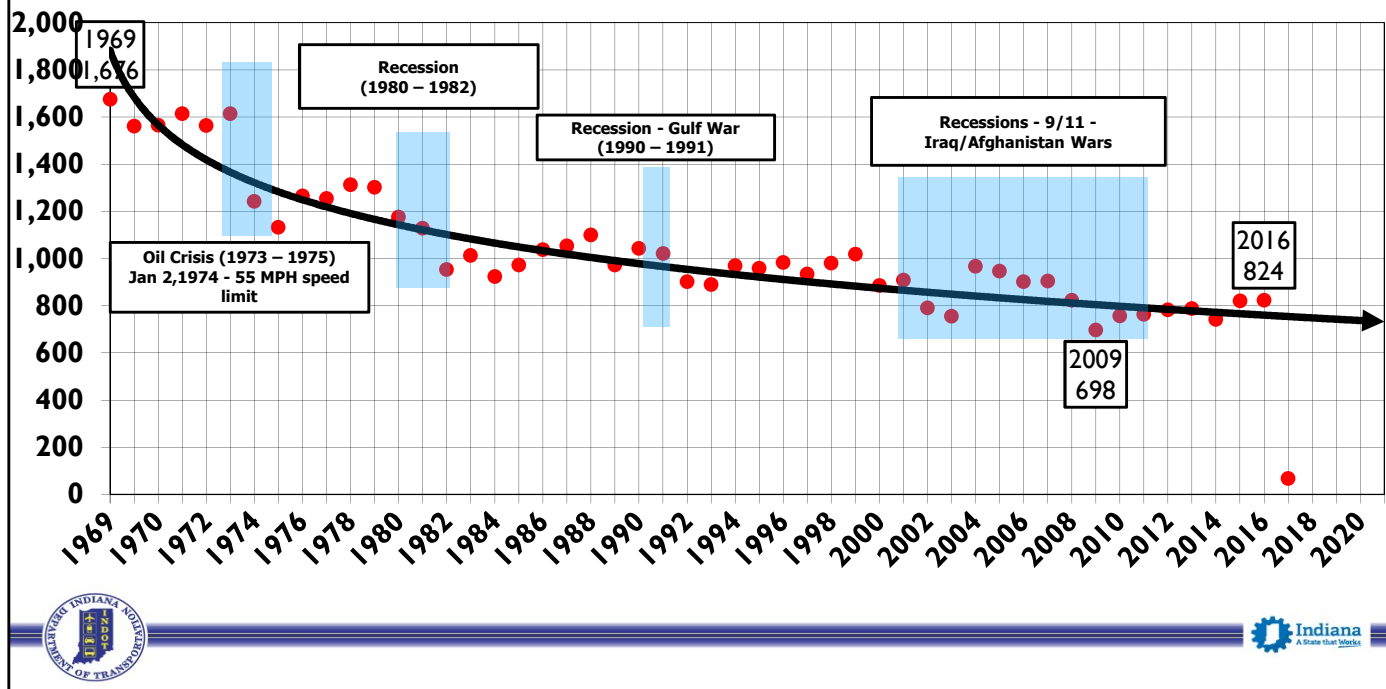
Is this a point to stop or are other factors that should be considered? That is the question.

Influences not under our control



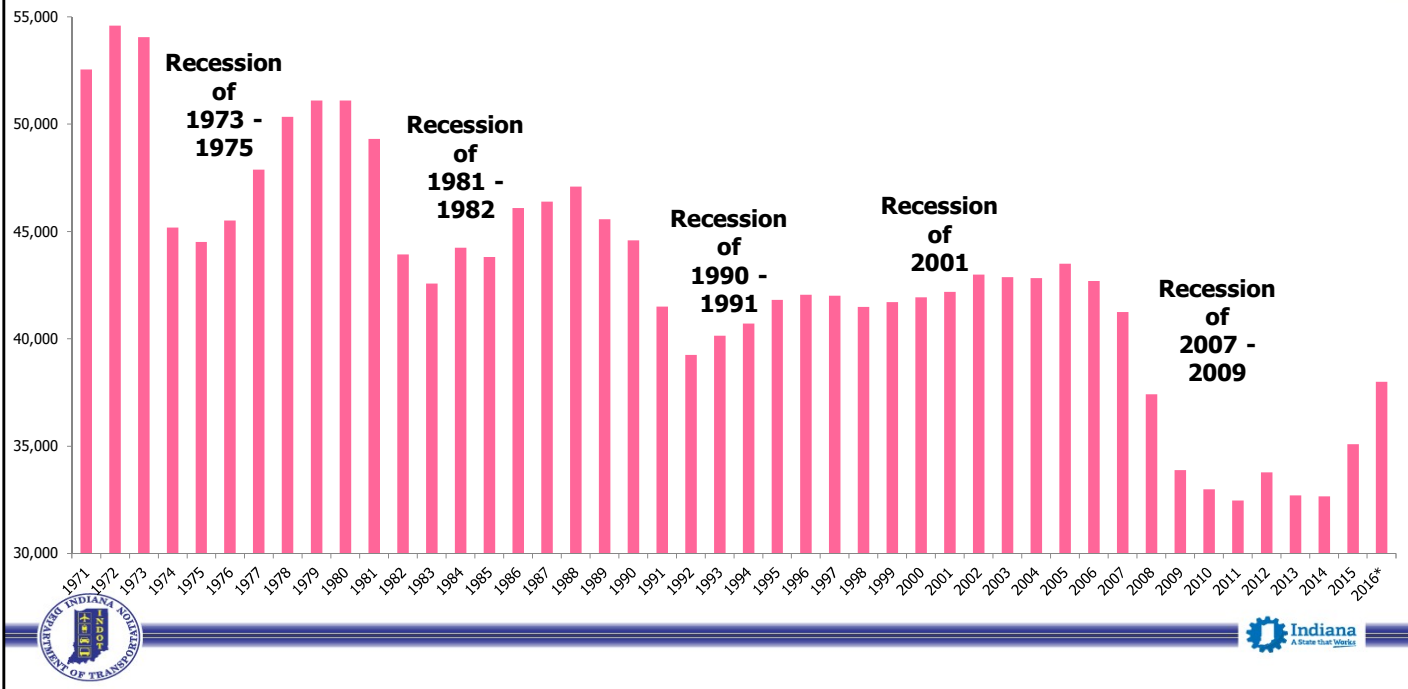
But then we are asked to evaluate and project factors beyond our control that influence traffic fatalities. I noticed this pattern back in 2006 when I began looking at the history of fatalities in Indiana. When times were good, fatalities increased, when times were tough, they went down.

Influences not under our control



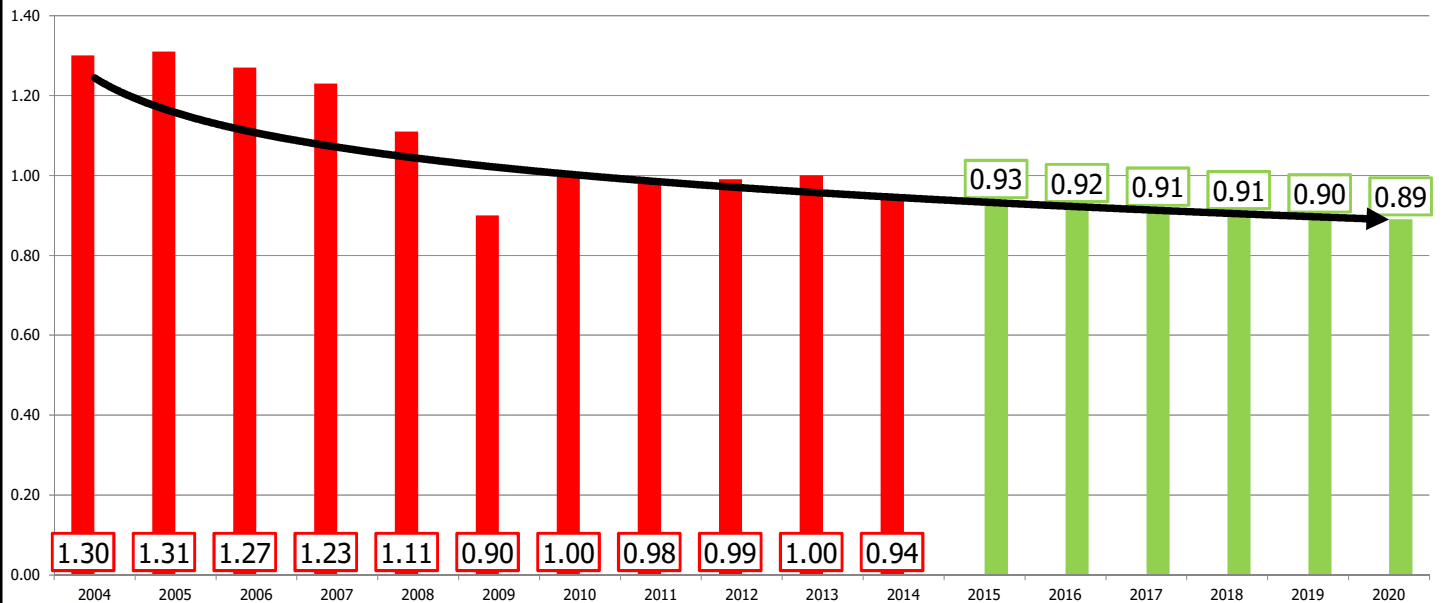
Looking at more recent years in finer detail beginning with the peak of traffic deaths in Indiana in 1969, it is fairly easy to see how the economy, world events, and legislative actions have some influence over the risks drivers are willing to take. The first recent fatality drop began in October 1973 when the members of the Organization of Petroleum Exporting Countries proclaimed an oil embargo. Fuel prices rose, and the next year a national 55mph speed limit was imposed to reduce fuel use, but it had a side benefit of reducing the severity of crash outcomes. The recession of early 1980's compounded the effect of rising fuel prices and the national 55 limit. The 55mph limit hung around, unpopularly, until the late 1980's, when Congress pushed the limit up to 65mph. After another recession and the first gulf war, Congress finally repealed the national limit entirely in 1995. Then we have the September 11, 2001 terror attack, another recession, and a war in Iran and Afghanistan.

Correlation between U.S. recessions and traffic fatalities



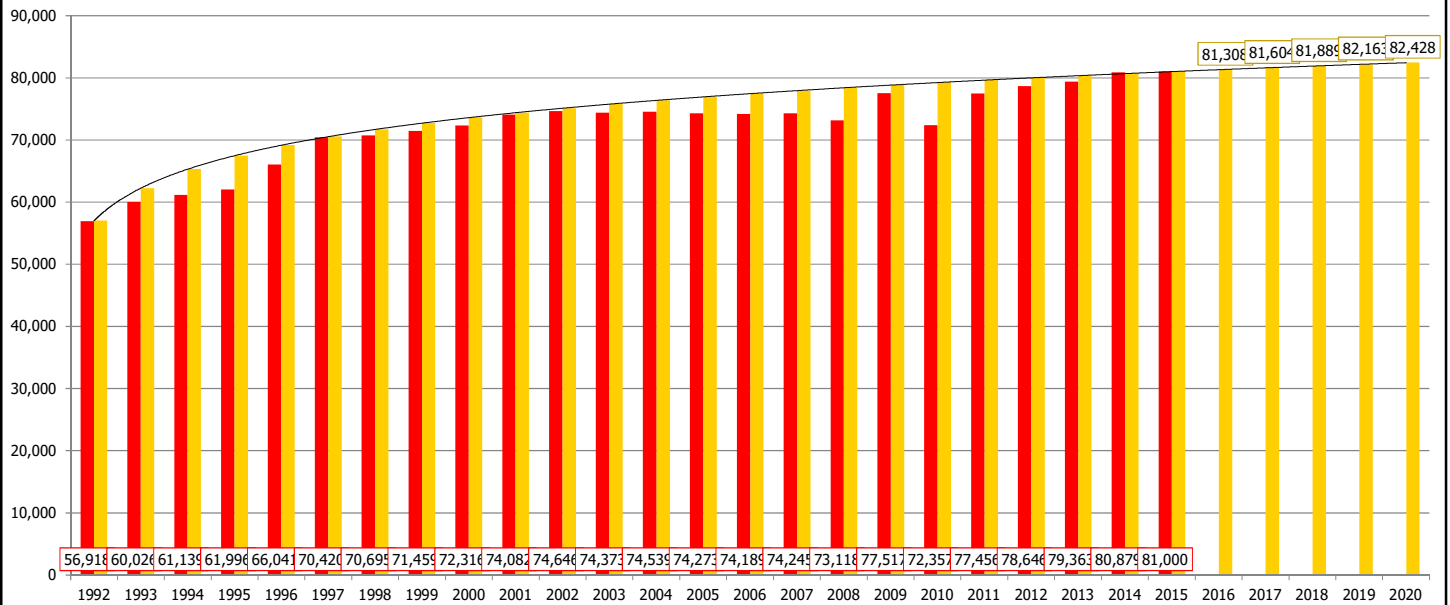
I am encouraged that the wider traffic safety community is recognizing these outside influences. Just this past January, the TRB Annual Meetings for the Transportation Safety Management Committee received a briefing on an NCHRP report 17-67 Identification of Factors Contributing to the Decline of Traffic Fatalities in the United States.

Rate of Fatalities



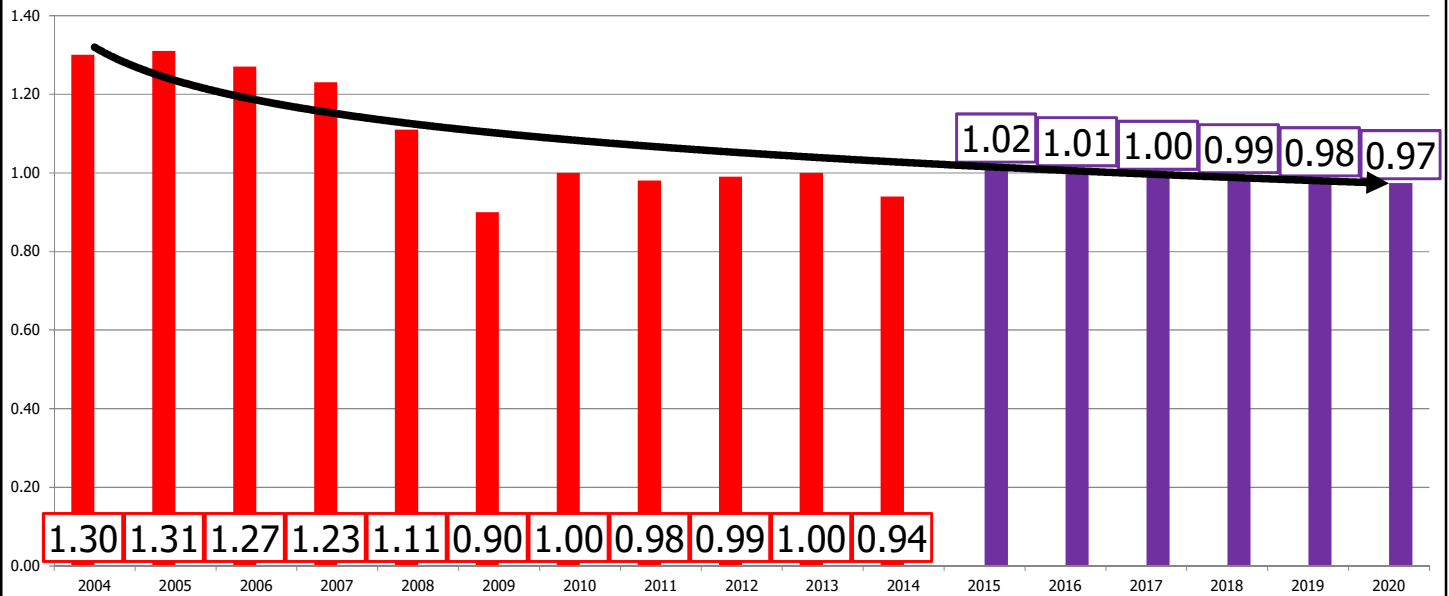
By using the same thinking in projecting fatalities, we can project fatality rate. Using past performance and applying a logarithmic trend adjusting the fit to the most recent calculated figure, we get this. However, unlike the FARS count, we have to also make assumptions about how traffic volume counts will change. So this is NOT a reasonable starting point! What would be better is to take the projected fatality counts and then apply a separately estimated projection of traffic volume? Let's take a look at that.

INDOT reported VMT



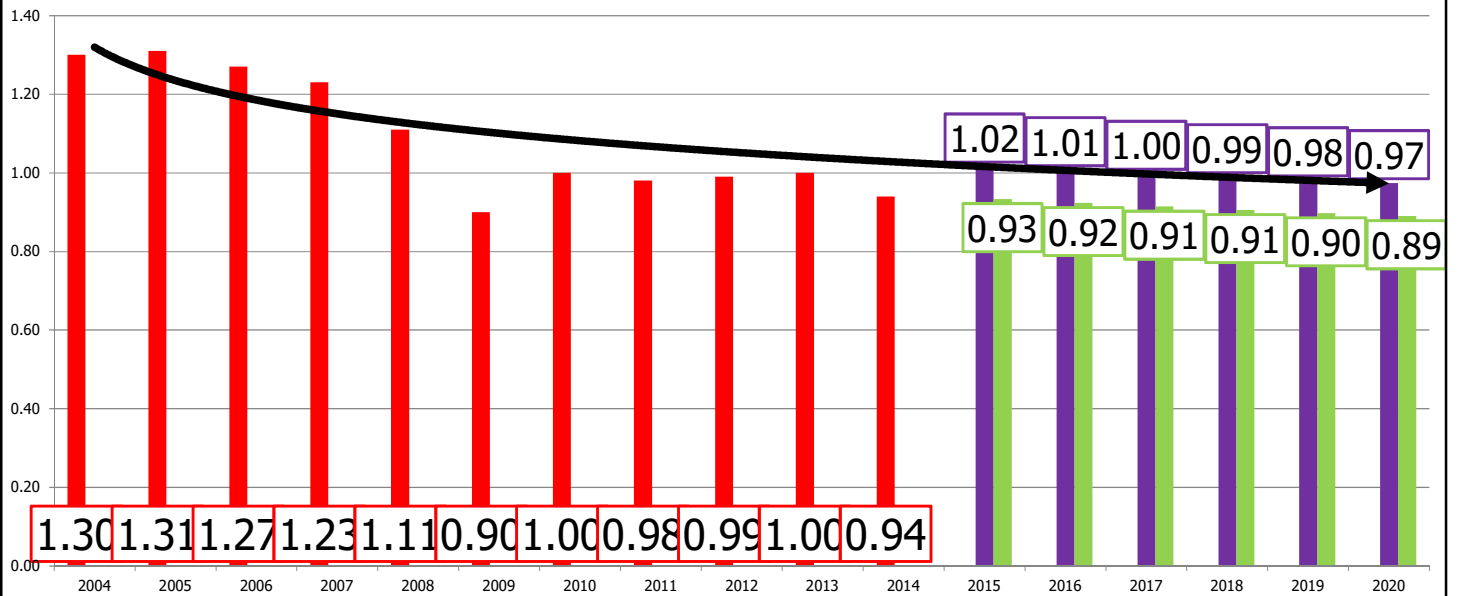
From the INDOT Web site you can reference Historic Indiana VMT from 1992 to 2015 so our projection can be based upon a much longer history. By applying a logarithmic trend and as before, adjusting the projection line to cross at the value established for 2015 you get the projection of increasing VMT values represented above.

Rate of Fatalities



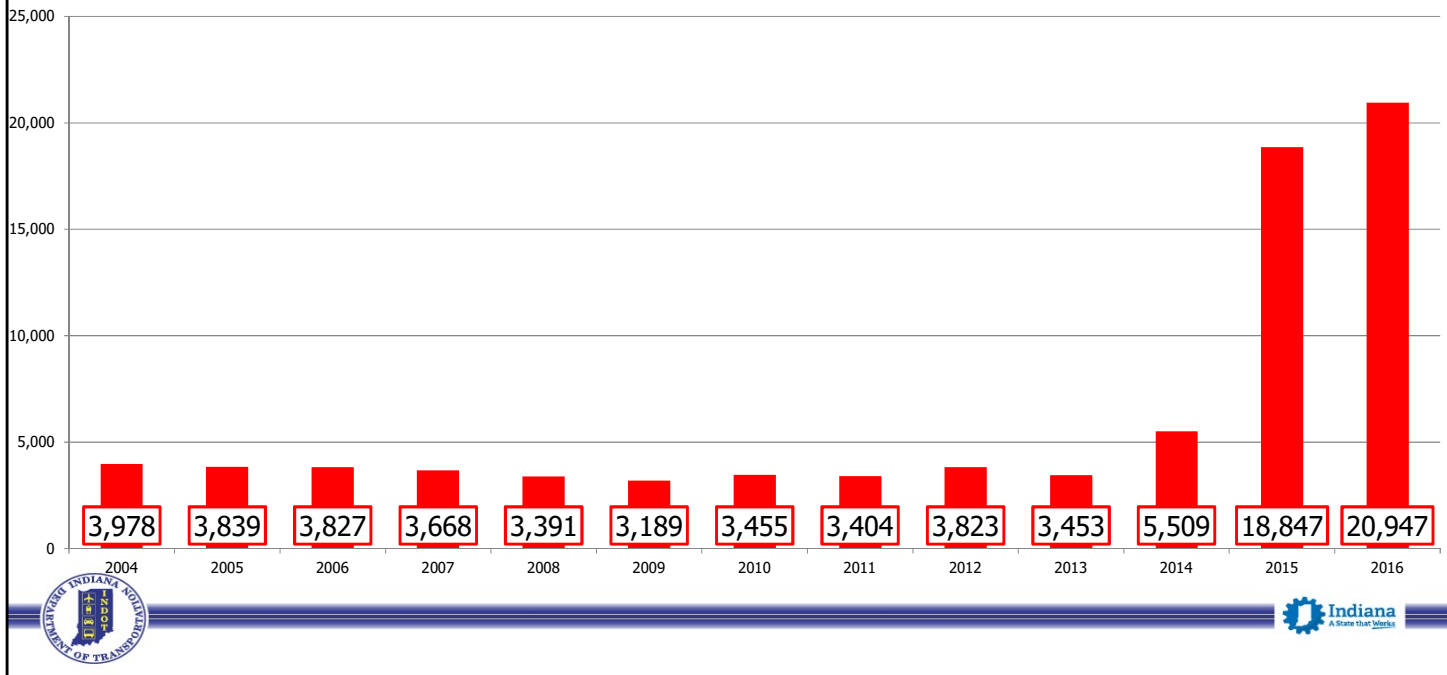
If we plug in the historic fatality rates, the red bars, and calculate new rates, using the projected values for slightly decreased fatalities and slightly increased VMT, for the years 2015-2020, the purple bars, we get projected fatality rates that are higher.

Rate of Fatalities



Here is a comparison of the two choices. On the face of the data, it appears the calculation of rate from two projections of fatalities and VMT is more reasonable than simply projecting the historic rates.

Number of Suspected Serious Injuries



If you think projecting fatalities is difficult, let's move to an even more problematic performance measure, especially for Indiana, the number of what NHTSA has named "Suspected Serious injuries," formerly known as "Incapacitating injuries." Reliable Indiana data only goes back to 2004, so there's that. And, even a quick glance at this chart makes it readily apparent something changed in 2014. What changed was how Indiana defined an "Incapacitating injury." To replace a reporting police officer's subjective rating of injury level, the Indiana Traffic Records Coordinating Committee and Indiana State Police agreed to make the immediate transport of any driver, passenger, pedestrian, or bicyclist from the scene of the crash for medical treatment constituted an "Incapacitating injury." The effect was an increase in "Incapacitating injuries" as now people are counted who are transported out of an abundance of caution seeking a doctor's evaluation of their unknown level of injury.

Number of Suspected Serious Injuries

- Increase older counts to levels seen after the change
- Or
- Reduce newer counts to levels seen before the change
 - The total number of Non-Fatal injuries is consistent, so
 - What % of non-fatal injuries are "Incapacitating"

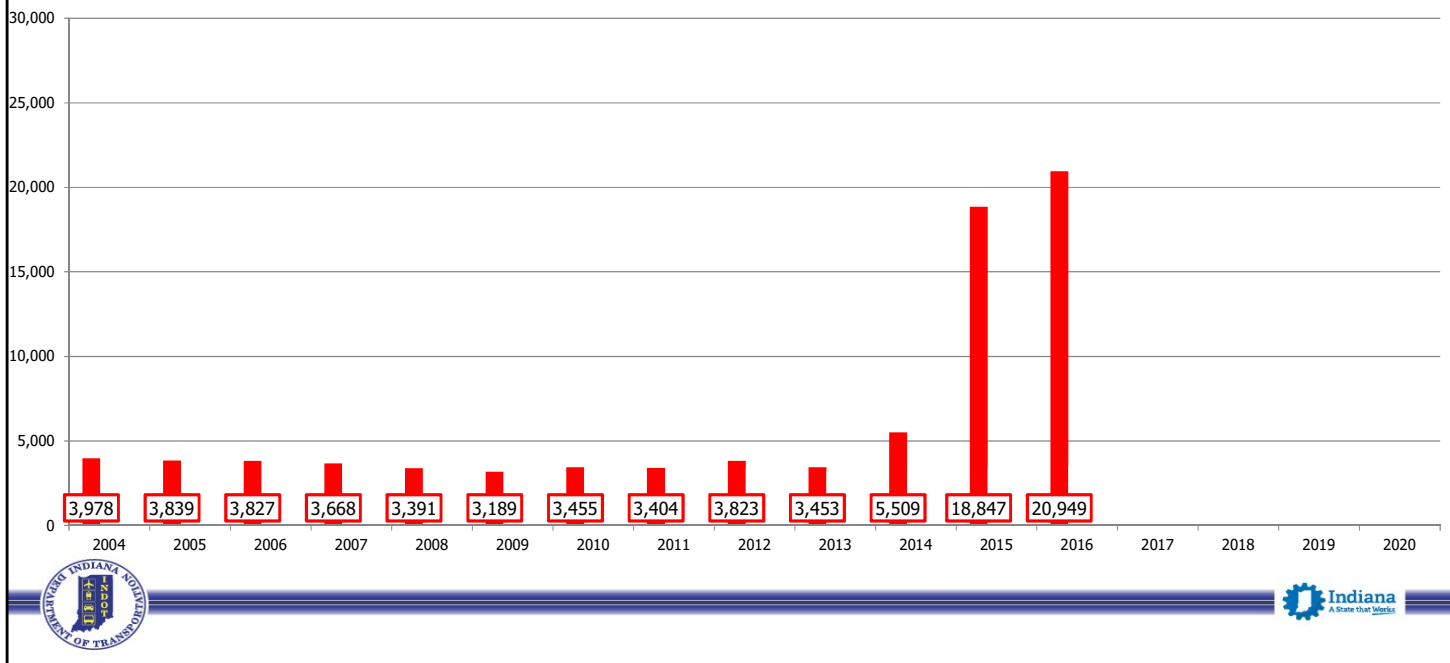
Average % of non-fatal injuries after 41.3%

Average % of non-fatal injuries before 7.1%



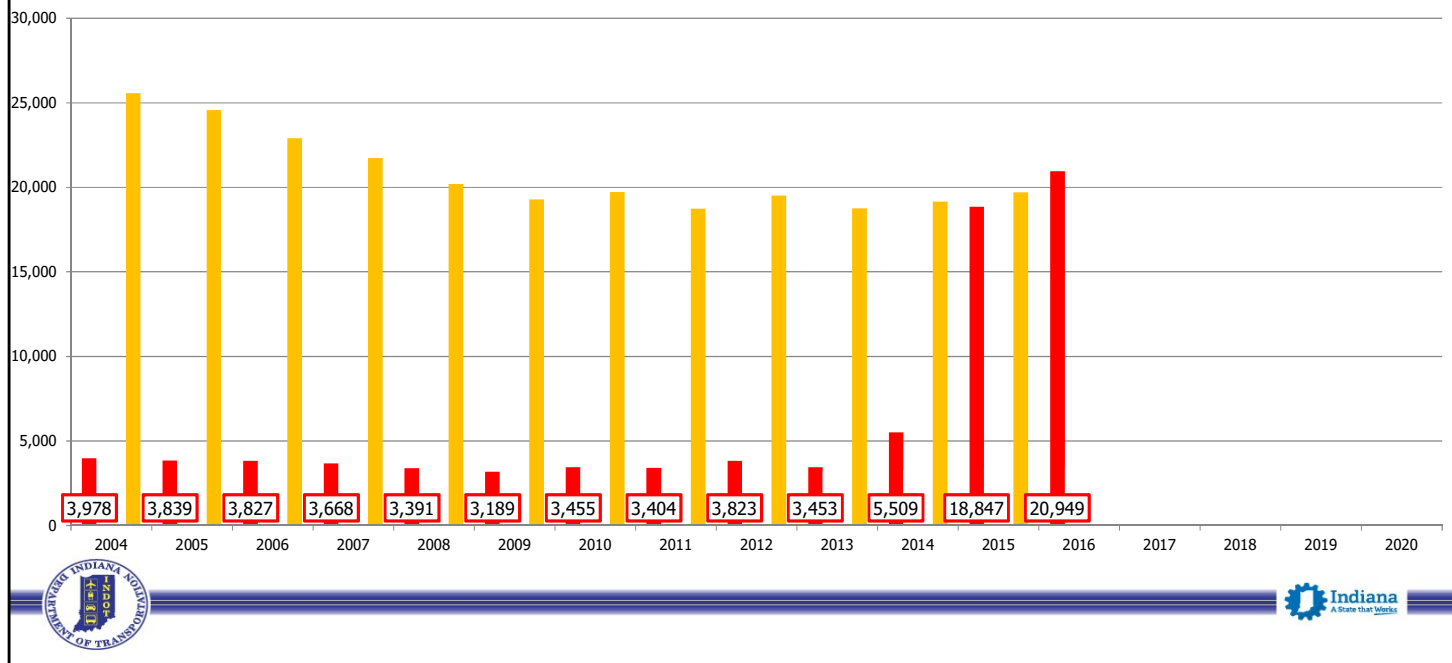
Without a way to identify a definitive count of "Suspected Serious injuries" since the definition changed in mid-October 2014, we are faced with estimating a count. One way to accomplish this is by looking at the total number of non-fatal injuries, which is consistent across all years. The number of KABCO "A" level injuries "Incapacitating injuries" makes up a percentage of non-fatal injuries. The average percent contribution of "A" injuries after the Incapacitating injury definition change in mid October 2014, is 41.3% of non-fatal injuries. Prior to the change the contribution was 7.1%. We can choose from adjusting upwards from old counts or adjusting downward from current counts.

Number of Suspected Serious Injuries



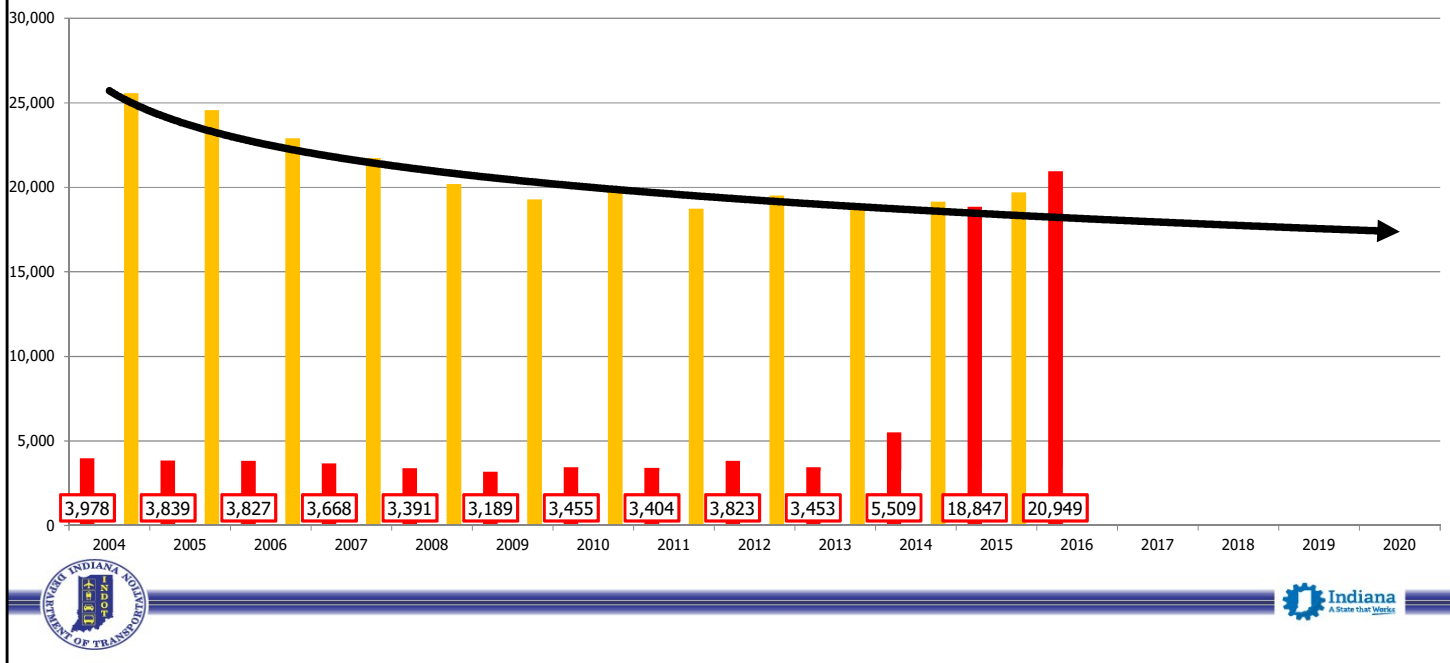
Here is what the raw count of “Incapacitating injuries” looks like over time. Let’s add estimates of 41.3% of all non-fatal injuries to normalize to recent counts.

Number of Suspected Serious Injuries



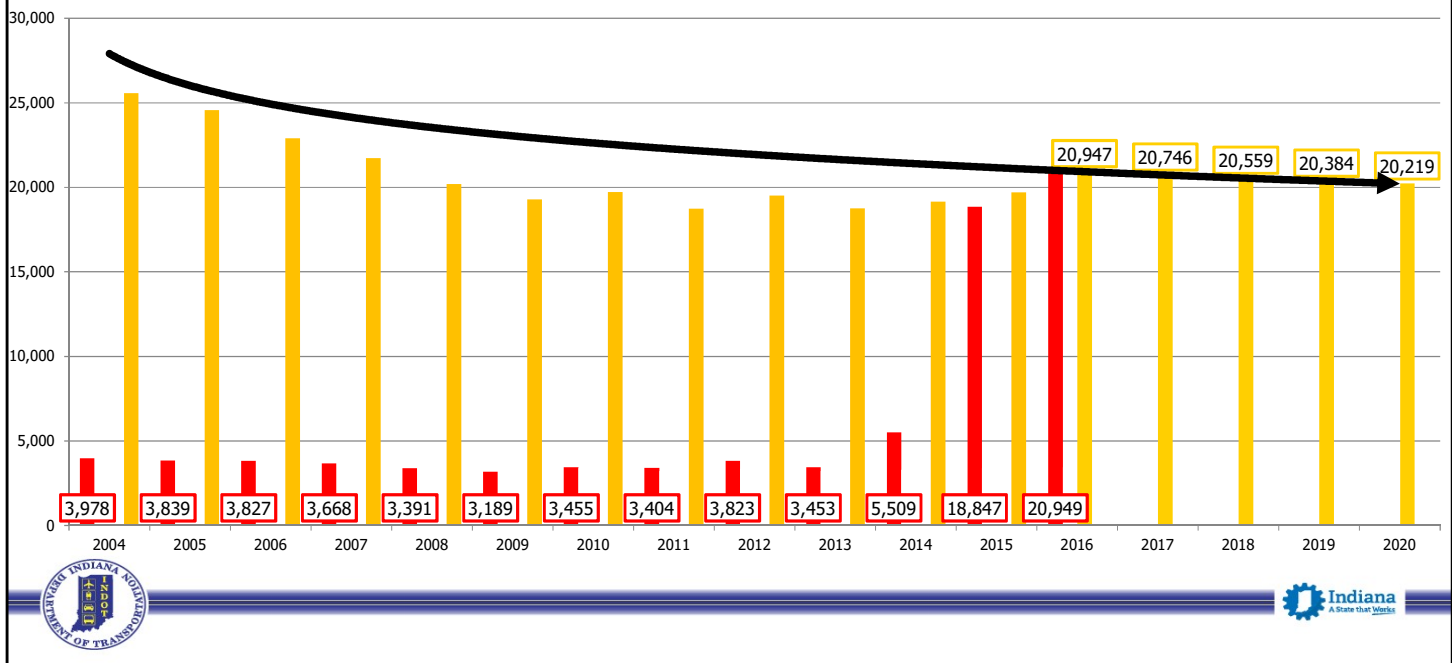
We get a result shown by the yellow bars.

Number of Suspected Serious Injuries



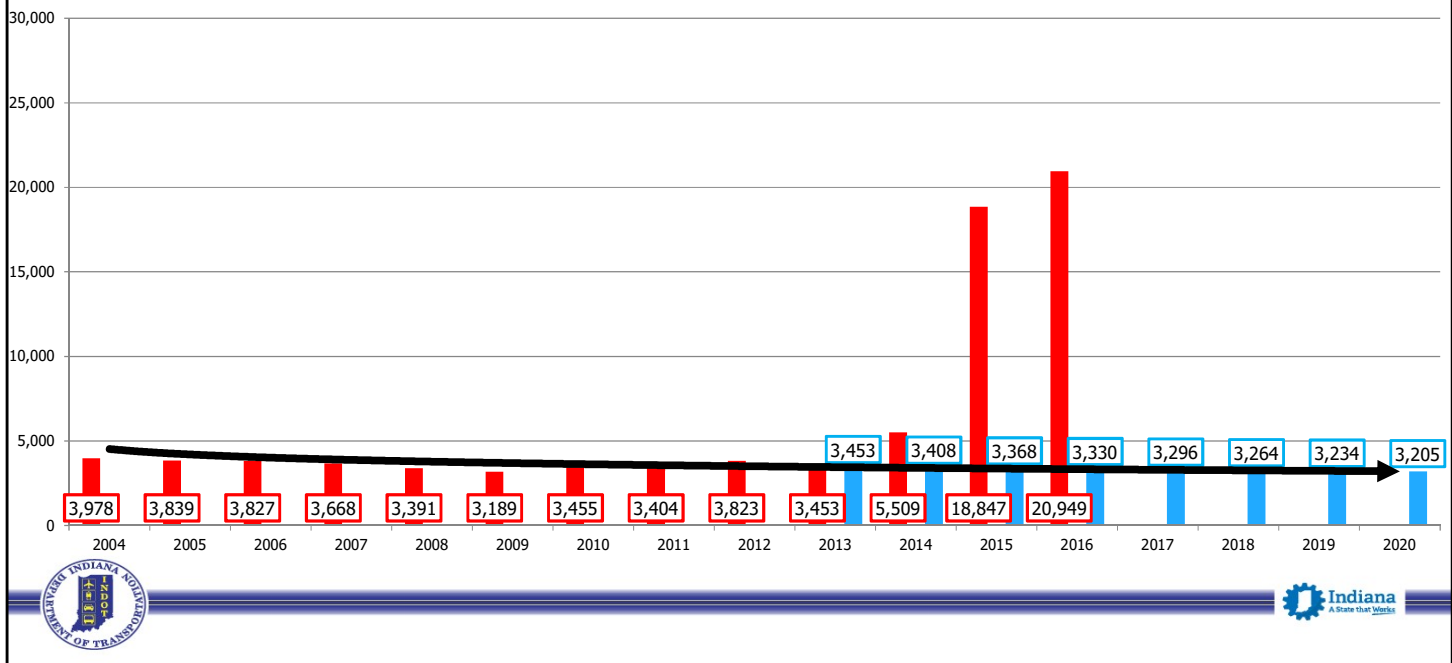
Add a Logarithmic trend line to the estimate and we see that the fit is pretty reasonable prior to the definition change, but is not as good a fit after the change.

Number of Suspected Serious Injuries



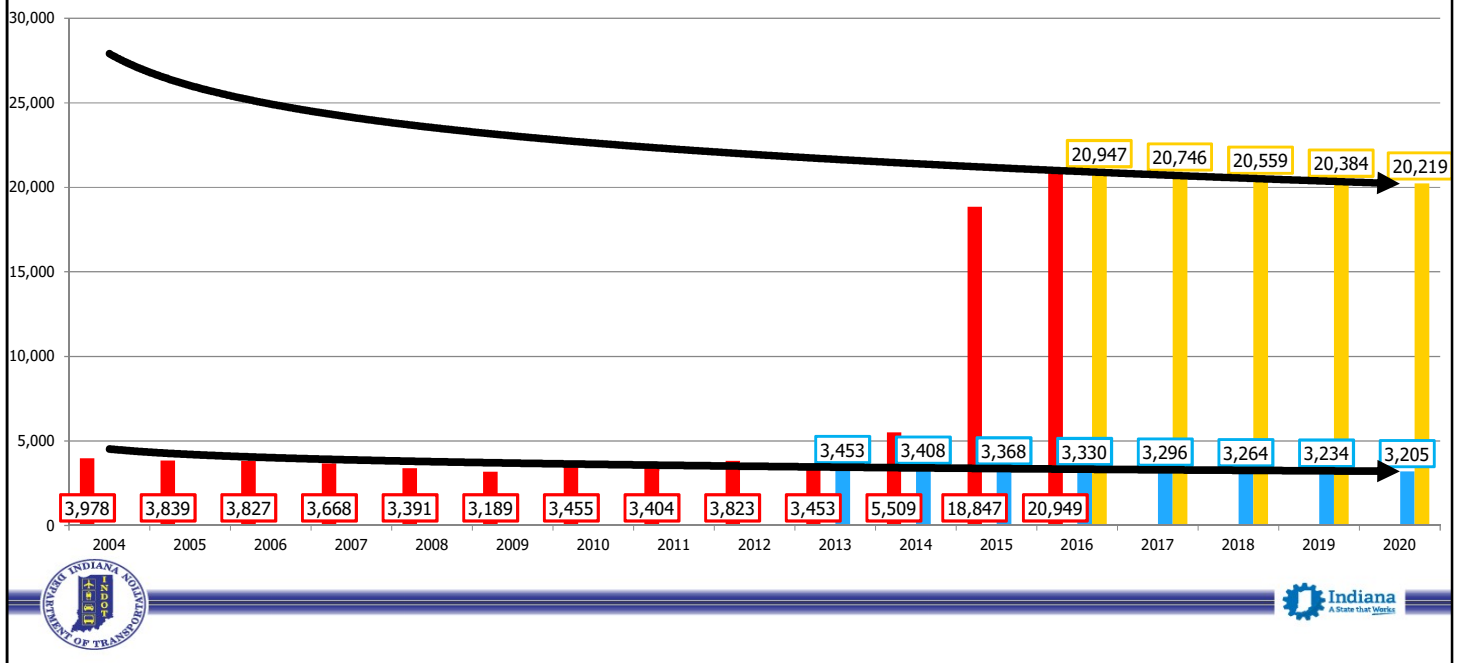
If we adjust the point at which the trend crosses the actual count last year, the projection may -MAY! be more reasonable.

Number of Suspected Serious Injuries



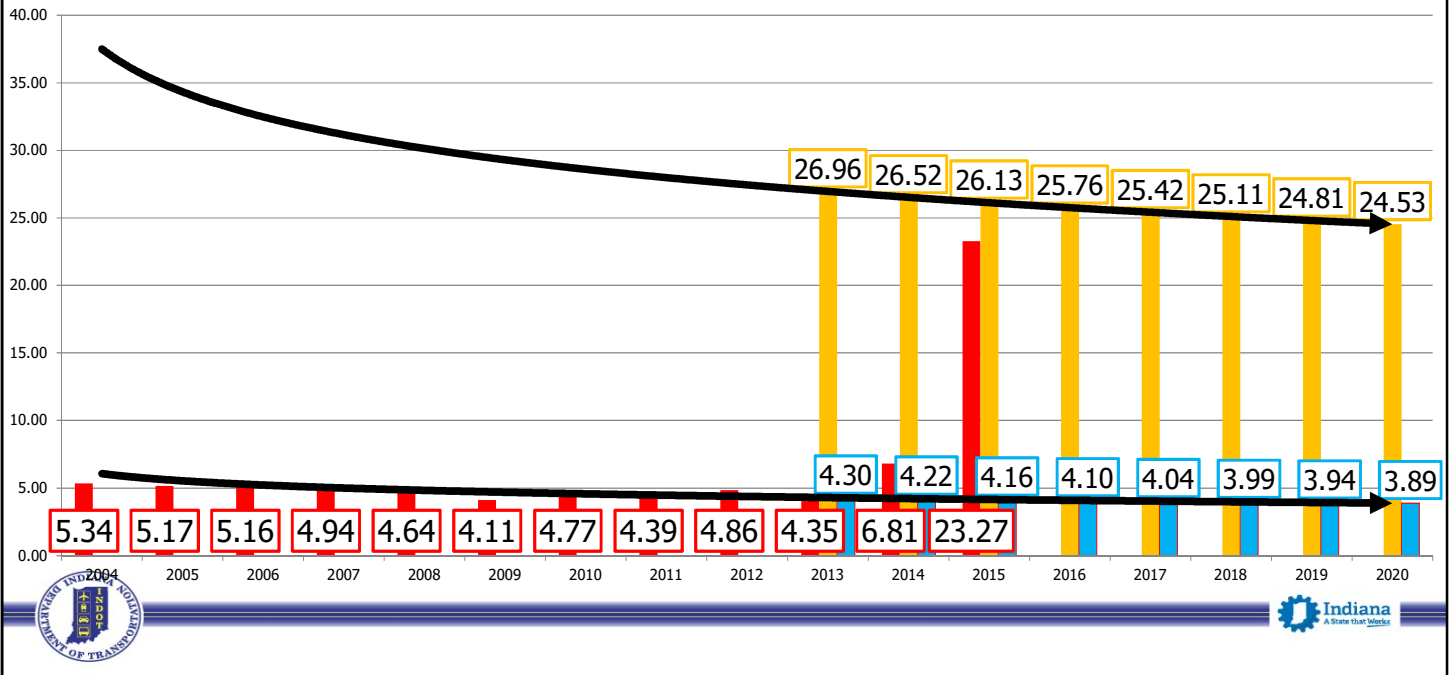
But if we use estimates at the historic contribution of “A” injuries at 7.1% of all non-fatal injuries, to normalize to the decade of data prior to the definition change, and shifting the trend so that it crosses the actual count in 2013, the last year before the definition change, we get a projection represented by the blue bars. I would argue, this may be MAY BE! more reasonable, as this is more representative of the “Suspected Serious injury” count the US DOT wants to see in the future.

Number of Suspected Serious Injuries



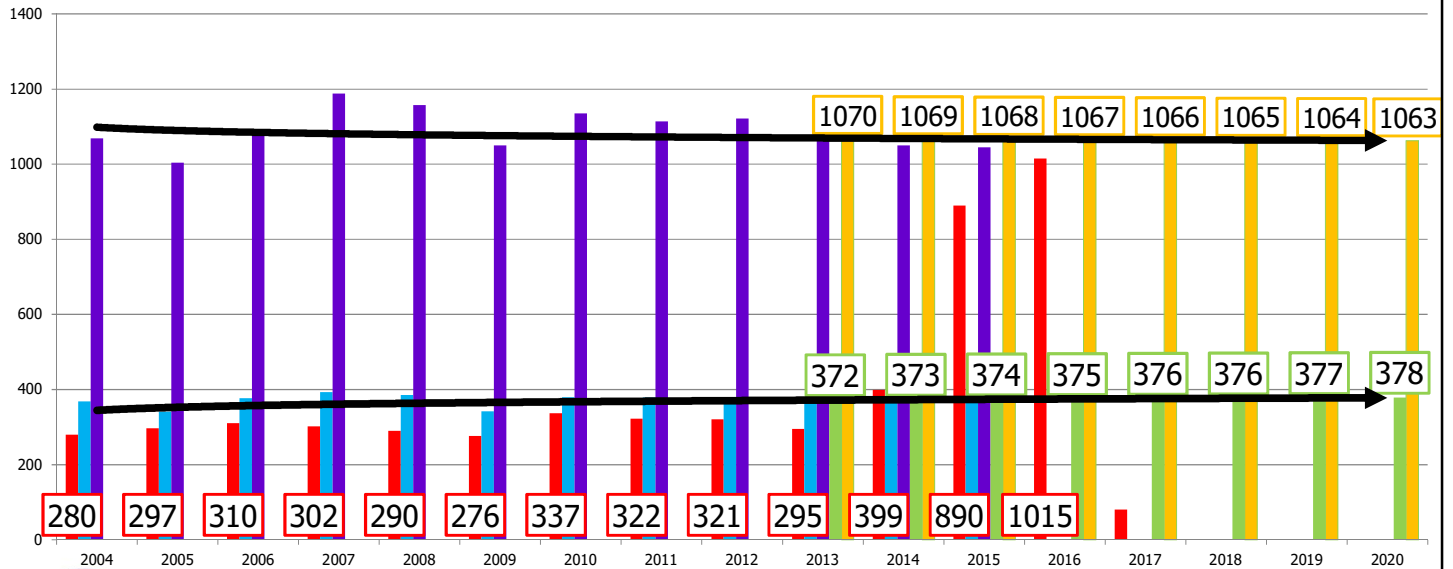
So for this performance measure, our choice is to estimate high using our consistent, unambiguous “Incapacitating injury” definition, or estimate low, closer to previous recorded subjectively determined injury levels and closer to what the feds expect in the future.

Rate of Suspected Serious Injuries per 100 million VMT



We are faced with the same choices, for the fourth performance measure the rate of Suspected Serious Injuries per 100 million VMT. Plugging in new calculations using the projected increasing VMT we established earlier we get this result. Again, the choice is between two projections with the lower projection possibly the more reasonable choice.

Non-motorized Fatalities plus Suspected Serious Injuries



The final performance measure is a combined subset of the first and third performance measures the number of fatalities and suspected serious injuries among Non-motorists – which includes pedestrians, bicyclists, AND operators/passengers of animal-drawn vehicles. Regardless of the estimating method, the trend projection is almost flat.

Aligning Safety Targets



Moving back to a point that was mentioned at the beginning of the presentation. The first three measures come from the 2008 NHTSA/GHSA Traffic Safety Performance Measures report mentioned earlier.

The number of fatalities - The rate of fatalities - The number "Suspected Serious Injuries"

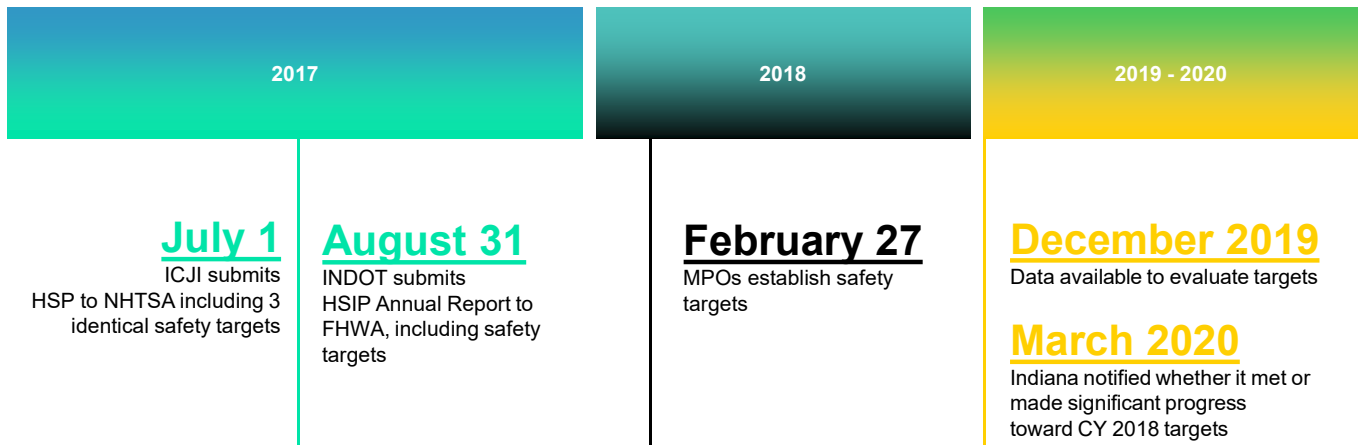
These three measures and projected targets must be the same in both the Indiana Criminal Justice Institute's Highway Safety Plan reported to NHTSA, and INDOT's Highway Safety Improvement Program Annual Report to FHWA

When?



When do we have to have this determination on measures and targets complete? Soon, VERY soon!

Coordination Cycle for 2018 Targets



Those first three targets have to be finalized in time for ICJI submit by the first of July. A month later INDOT has to report those three targets and the additional two by August 31.

MPO's also will be required to establish safety targets and measures by the 27th of February next year.

Suggestions?

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