Crashes on the Layfayette Bridge (Hwy 52), 2007-2018

A comparison of crashes before and after the 2011-2016 Layfayette Bridge project

John Henderson, jw.hendy@gmail.com

2019 September

Background

I take the Layfayette Bridge for my daily work commute, getting on Hwy 52N at Plato and merging onto I-94E. Since the Layfayette Bridge project completed in early 2016, I have been extremely frustrated with this section of my commute. There are a few notable aspects which have led me to believe the new design is poor, and to suspect increased traffic crashes. To read a summary of my reasons, please see my original email requesting attention from MnDOT on June 2017 below.

Data analysis

Because this commute is part of my daily routine, I think about it almost once a day. Over time, I've grown from thinking it's a nuisance and poor use of funding, to suspecting that it's downright dangerous. Now and then, I've wondered if there were accessible crash statistics. I found some promising leads via the St. Paul Police Department, but was not able to find data going back far enough. More recently, I stumbled on crash data at the MN Department of Public Safety and reached out to see if I could obtain crash data spanning this time frame.

After a followup and an explanation of my aim, I was given a download of 125,109 records between 2007-01-28 through 2018-12-26. I just explored the data, and found the results rather surprising. The data and all code used to generate the following are hosted on my github site.

Methodology

- read in two sets of data provided, spanning 2007-2015 and 2016-2018
- remove rows with missing dates or locations
- keep data from the following date ranges, leveraging the Wayback Machine for examination of archived project pages.[1]
  - before 2011-01-01: my estimate of the project start date via this archived MnDOT page
  - after 2016-04-01: my estimate for project completion, with the project page on 2016-03-10 being the last to list the project as "current", and the page on 2016-04-13 being the first to list it as "complete."
- Google Earth was used to verify the location of the old and new bridge locations, finding them to be essentially identical. This avoided the risk of either missing crashes (filtering by a location that is no longer a bridge) or falsely including crashes (including those now on a different road).

May 2010

April 2017

[1] The Internet Archive, a 501(c)(3) non-profit, is building a digital library of Internet sites and other cultural artifacts in digital form. Website: https://archive.org/about/

- Google Earth was also used to estimate the width of the bridge using two additional pins by substracting their longitudes

- each point in the data was checked to see if it occurred on the bridge:
  - check if the point lat is within the top/bottom pins shown above; if so, continue
  - calculate the longitude of the bridge at the point's latitude, then verify that the point is within $\pm$ `bridge_width/2`; if so, keep the point in the data

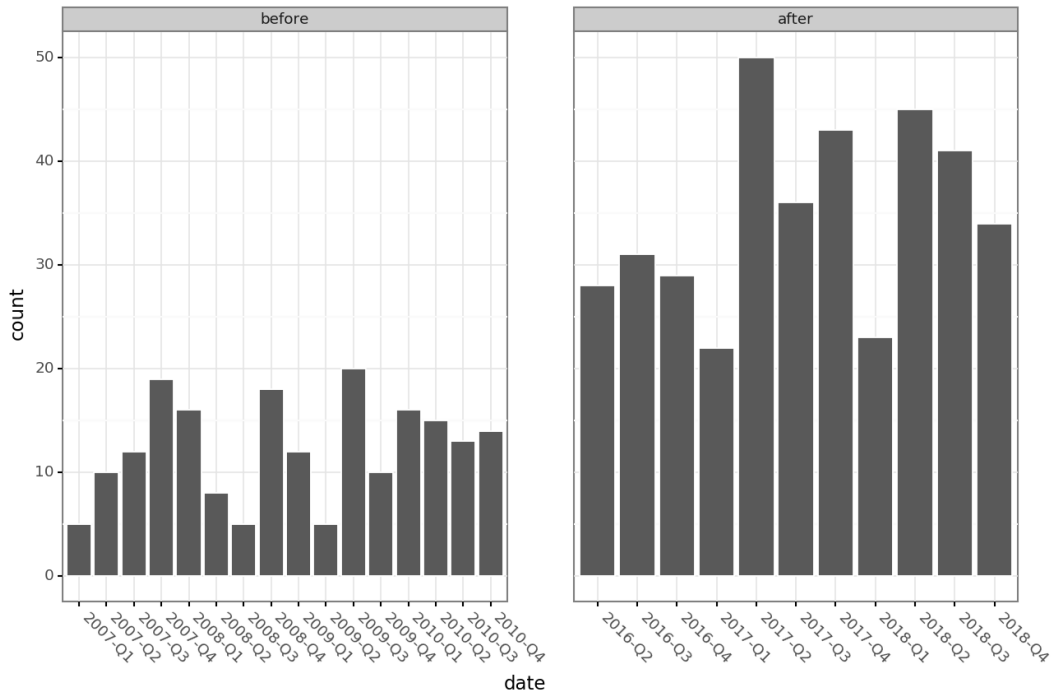
Results

Summarizing by count of crashes in the before vs. after date range was the primary goal of interest, and secured my belief that the new bridge has dangerous aspects:

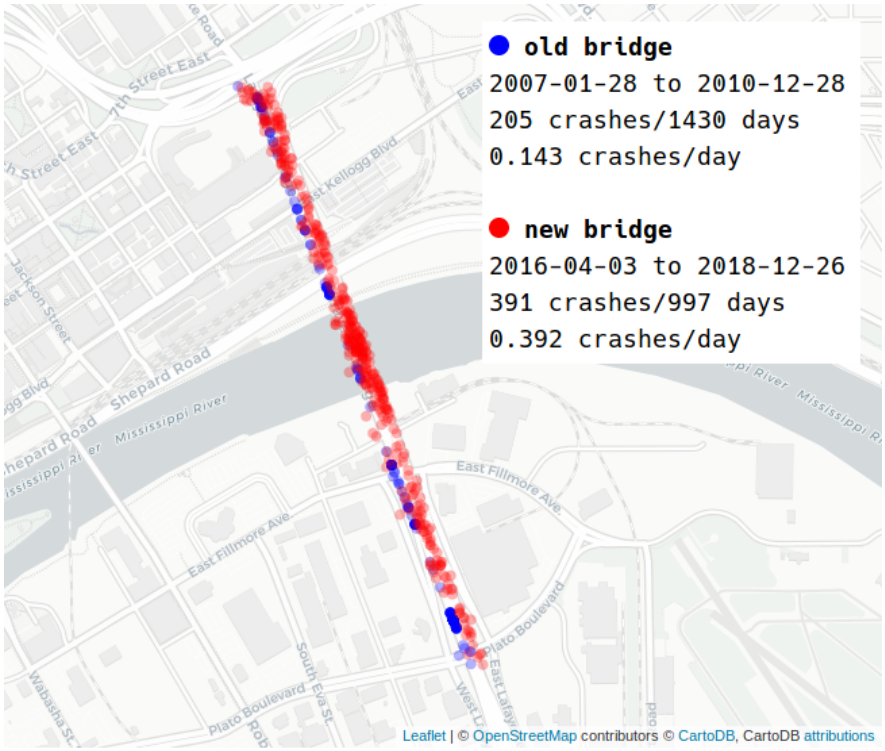
	date			**crashes**	
period	start	end	range, days	count	count/days
before	2007-01-28	2010-12-28	1430	205	0.143
after	2016-04-03	2018-12-26	997	391	0.392

The ratio of crashes per day between the two seasons is `2.741`. Crashes have increased 2-3x since the Layfayette Bridge redo.

Grouping crashes by year/quarter, here is a bar plot of the two time periods:



And here all crashes in this data are overplotted on the map:



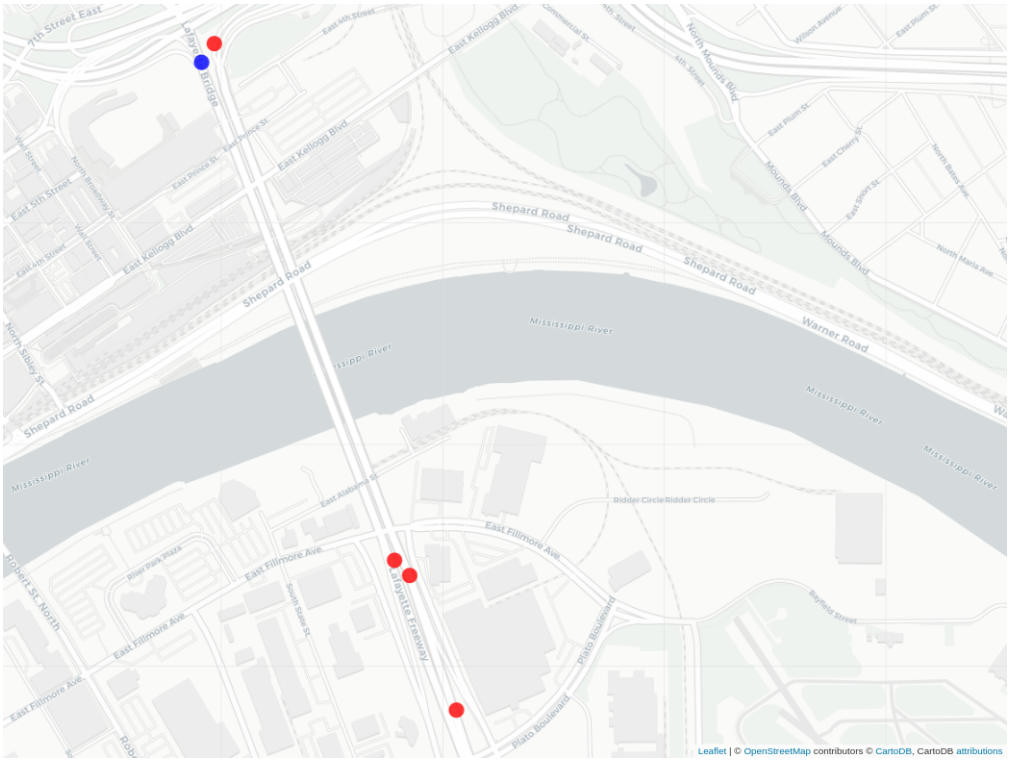
Severity scores were also included in the data with the following mapping:

- 1: Fatal Crash
- 2: Serious Injury Crash
- 3: Minor Injury Crash
- 4: Possible Injury Crash
- 5: Property Damage Only Crash

By before/after status, here is the breakdown by crash type (count, %):

	1	2	3	4	5
before	0	1, 0.5%	11, 5.4%	49, 23.9%	144, 70.2%
after	0	4, 1.0%	11, 2.8%	96, 24.6%	280, 71.6%

The rates are largely identical, though the increase from 1 to 4 serious injuries during a shorter time span may warrant attention. It is unclear which side of the bridge the crashes are on, but three are near the Plato on ramp to 52N where I believe the most chaotic conditions occur.



Conclusion

I believe this to be a well-reasoned, data-driven approach to support my personal experience since the bridge project completion in 2016. Crashes on the Layfayette Bridge have increased 2-3x since the project, which is significant. Please listen to the data.

I would reiterate my previous requests to make the rules clear and help taxpayers safely endure this stretch of road in the future. In particular, I would strongly consider:

- finding a way to reduce the extreme speed disparities between lanes
- guiding the merging process with signage to reduce: closing gaps to prevent someone from merging, merging immediately following an onramp, drastically reducing speed to merge at the last minute, and passing an individual on the shoulder out of impatience

Past communications

Here are emails from me to MnDOT with one courteous reply, but no further response/action.

from: John Hendy <jw.hendy@gmail.com>
to: ken.johnson@state.mn.us, ethan.peterson@state.mn.us, heather.lott@state.mn.us
date: Jun 7, 2017, 9:22 PM
subject: Signage on Hwy 52 N from Plato to 94/7th exits

Feel free to pass this along to someone more appropriate. I looked up contacts for markings and signage and found you three.

I work at 3M and each morning I enter the recently redone Hwy 52 at Plato avenue and merge two lanes left to take 94 East to McKnight. I was quite excited to finally gain this route back after waiting 2+ yrs, but have been quite disappointed with the traffic flow at this interchange.

The issue is that the middle lane is *always* at a stand still at nearly any time of day, while the left (94E) and right (W 7th) lanes are nearly empty. This creates extreme differences in speed and drivers are very unpredictable. They either stop right away to merge where Plato joins, or may plod along at 30-40 mph until they see a gap. Then they'll quickly slow and dive in (causing a quick braking if I'm following).

Initially I intuitively wanted to merge as soon as I entered, but cars seem to want to express their impatience and will zoom around in the shoulder. I have since adopted a sort of "zipper merge" strategy and go mostly until where the three exits go their separate ways before doing my merge. If I get all the way to the end I have perhaps 20ft to merge across two lanes.

My apologies for the long winded email, but I wanted to highlight what it's like to use this roadway and the issue I observe. I think unambiguous instructions via signage on where folks should merge would help *immensely*. I don't think it matters where it is (right when Plato joins, or somewhere toward the split), just that everyone is clear on what we're all doing to reduce confusion and erratic behavior.

Thanks for your consideration,
John Henderson

from: Lott, Heather (DOT) <heather.lott@state.mn.us>
to: John Hendy <jw.hendy@gmail.com>, "Johnson, Kenneth (DOT)" <ken.johnson@state.mn.us>,
    "Peterson, Ethan (DOT)" <ethan.peterson@state.mn.us>
cc: "Tayse, Josephine (DOT)" <josie.tayse@state.mn.us>,
    "Peterson, Eric (DOT)" <eric.peterson@state.mn.us>
date: Jun 8, 2017, 6:29 AM
subject: RE: Signage on Hwy 52 N from Plato to 94/7th exits

John,
Thank you for sending in your observations and experiences. We do appreciate
detailed emails:)

I'm including the Metro District Traffic office in this email so that they are
aware of this and can take a look into your concerns.

Thank you again,
Heather

Heather Lott, PE
State Signing Engineer
Minnesota Department of Transportation

from: John Hendy <jw.hendy@gmail.com>
to: "Lott, Heather (DOT)" <heather.lott@state.mn.us>
cc: "Johnson, Kenneth (DOT)" <ken.johnson@state.mn.us>,
    "Peterson, Ethan (DOT)" <ethan.peterson@state.mn.us>,
    "Tayse, Josephine (DOT)" <josie.tayse@state.mn.us>,
    "Peterson, Eric (DOT)" <eric.peterson@state.mn.us>
date: Dec 8, 2017, 11:01 PM
Greetings!

It's been ~6mos and Hwy 52 northbound between Plato and the 7th St/94
splits is still atrocious. Two people today sort of "bullied" me from
merging into my lane by maintaining bumper to bumper distances. I had
my blinker on and there *was* some space... but they zoomed up to
close it. As explained far below, the options are as follows:

- merge early after entering 52 from Plato. This results in people
stopping right at the top, or near, an entrance ramp. It confuses
those merging. Some are actually staying in the lane to 7th, so they
go around into the shoulder to pass.

- zipper merge late, which is what I've basically opted to since
there's no indication otherwise. Basically, why should I pick an

arbitrary spot early or mid lane? Might as well slowly plod along until I *have* to merge, and then people will let me in. Since there's no signage to this effect, people assume I'm an a**hole and just want to get ahead 50 car lengths. In reality, I get right out of the middle (somehow *always* slow) lane into the 94 E exit anyway.

Has anyone looked at this yet?

My travel, which affects my life satisfaction, is in your hands. As an engineer, I'm creative. My brainstorm on the way to work resulted in the idea of dash cam footage of my daily commute and how awful it is. Then I can post them to try and publicly shame someone into doing something to make this expensive bridge redo better.

I hate to be a jerk... but have any of you traveled this stretch and seen how confusing it is? This isn't just me complaining about rush hour. It's an issue with communication of what drivers should do on this stretch of road.

Thanks for taking a look,
John