Crash Analysis Studio

Session 1: Indianapolis, IN

Held on January 27, 2023

Session Participants:

- Connie Szabo Schmucker, Advocacy Director at Bicycle Garage Indy.
- Melany Alliston, PE, Civil Engineering Practice Director at Toole Design.
- Damon Richards, Executive Director at Bike Indianapolis.
- Matt Duffy, Project Manager at the Indianapolis Public Transportation Corporation (IndyGo).
- Edward Erfurt, Director of Community Action at Strong Towns.
- Charles Marohn, President at Strong Towns.
- Rachel Quednau (moderator), Program Director at Strong Towns.

Summary of Crash Event

- This crash occurred at 8:26 a.m. on October 28, 2021, at the intersection of East 86th Street and the Monon Trail in Indianapolis.

- A motorist struck Frank Radaker as Radaker was cycling across the crosswalk; the motorist was traveling west in the left lane of 86th street. The collision killed Mr. Radaker.

- The police report states the following:

    - Disregard of signal was the primary cause of the crash.

    - At the time of the collision, Frank Radaker was traveling north; *however, local experts reported that he was most likely traveling south since that was the direction of his usual commute.*

    - The driver claimed the light was green when their vehicle entered the intersection, but three witnesses state the signal was red.

    - The driver was administered a blood test and there were no indications that impairment from drug use or alcohol was a factor.

Primary Contributing Factors

Session participants identified the following primary factors that contributed to this crash:

1. **The traffic signal is not adequately visible to drivers.**
    a. The traffic signals are hung from wires that stretch across the driving lane. The wires blend in with the numerous electrical wires and make the signals less conspicuous, especially in the cloudy conditions that were reported on the day of the collision.
    b. The signals have no back plating and so they blend in with the background, especially in cloudy conditions.
    c. The lights used in each signal are low intensity, making them less visible to a driver than an LED light, especially in cloudy conditions.
    d. The lane where the collision occurred did not have its own signal light, but instead the signal light was moved south to “share” it with the turn lane. This will make the signal less conspicuous to the driver as they approach the intersection.
    e. Signs hung from the wire on the east side of the intersection create visual clutter that distracts from the traffic signals on the west side of the intersection.
    f. Signs, lighting poles, and electric poles in the area adjacent to East 86th Street create additional visual clutter that make the traffic signals less conspicuous.

2. **At the distance in which a driver needs to make a decision to slow down, the traffic signal is not adequately visible.**
    a. Given the speed limit of 35 mph, a driver needs to make a decision on whether to slow down at least 350 feet from the intersection. At this distance, the traffic signal is barely visible to the driver.

3. **Drivers are not alerted to the presence of a major trail crossing and the high potential for people crossing the traffic stream on bike and by foot.**
    a. The Monon Trail is a significant trail with a large number of bikers and walkers using it each day. The crossing at 86th Street East is a major crossing.
    b. Despite being a major crossing, there is no signage or signal lighting on East 86th Street to alert drivers to this unique situation.
    c. Despite being a major crossing, there are no changes to the design of East 86th Street in this location to slow speeds or heighten driver awareness.

4. **The travel speed on East 86th Street is incompatible with a major trail crossing.**
    a. The enforced speed limit on East 86th Street is 35 mph. A human walking or biking that is struck by a vehicle traveling at or near that speed is unlikely to survive.
    b. The expectation that traffic will travel at 35 mph creates a situation with little margin for error.
    c. Directing a significant number of people that are walking and biking to a crossing with little margin for error is inherently dangerous.

5. **The long timing intervals for cross traffic is incompatible with the presence of a major trail crossing.**

a. The signal at East 86th Street is designed to facilitate the unhindered flow of through traffic at speeds reaching 35 mph. People seeking to cross on a bike must wait for an extended period of time in all weather conditions.
b. Extended wait times increase the level of impatience experienced by a person waiting to cross. This will frequently induce those crossing to not wait for the signal to change or to dart out as soon as they receive the walk signal.
c. Signal timing that frustrates people crossing by bike is incompatible with the lethal automobile speeds and low margin for error on East 86th Street.

6. **The call button for southbound cyclists and pedestrians is situated in such a way that it is underutilized.**
    a. The call button for southbound cyclists and pedestrians is situated in an unusual position at the back of sidewalk/trail and faces away from the crossing. As a result, video observations collected for this study show that many cyclists and pedestrians do not press to call for the signal when traveling in the southbound direction.

Related Contributing Factors

Session participants identified the following related factors that contributed to this crash:

7. **As a stroad (a street–road hybrid), East 86th Street is inherently dangerous and incompatible with a major trail crossing.**
    a. The design of East 86th Street is attempting to meet two incompatible objectives: (1) facilitate the rapid movement of a high volume of traffic, and (2) facilitate access to multiple businesses, residences, and public facilities.
    b. The presence of multiple accesses invites drivers to enter and exit the traffic stream at multiple points along East 86th Street.
    c. The rapid movement of traffic reduces the margin of error for everyone present in this space.
    d. The rapid movement of traffic combined with the frequency of turning movements creates a dangerous environment, where the low margin of error ensures a statistically significant collision rate.
    e. The design speed of East 86th Street ensures that many of these collisions will occur at fatal speeds.

8. **The land use approach along East 86th Street intensifies the danger inherent with a major trail crossing.**
    a. The land use along East 86th Street is auto-oriented commercial. Each structure has its own parking lot and/or drive-thru facility. It is assumed that nearly all patrons will drive an automobile.
    b. Automobile connections between different sites are almost exclusively via East 86th Street. This correlates to a high number of automobile access points along East 86th Street.

c. Patrons wishing to visit multiple establishments on East 86th Street are expected to travel by automobile between them. This land use pattern induces more trips, especially local trips, than other patterns where patrons can park once and walk between establishments.
d. The artificial increase in the number of automobile trips, combined with the dangerous design (see Factor #6), creates an unnecessary increase in the opportunity for collisions.

9. **The land-use pattern utilized in the vicinity of the Monon Trail and East 86th Street increases the likelihood of collisions.**
    a. The neighborhoods within a mile of the East 86th Street and the Monon Trail have an auto-oriented land use with a hierarchical street network that channels traffic to major arterials such as East 86th Street.
    b. The lack of local trip options means that automobile trips that could otherwise be local are forced to traverse East 86th Street and other major arterials in the area.
    c. The artificial increase in traffic along East 86th Street due to the lack of other options, combined with the dangerous design (see Factor #6), creates an unnecessary increase in the opportunity for collisions.

The Crash Analysis Studio is designed to identify the multiple factors that contributed to the crash. Session participants found that the above nine factors contributed to the collision that killed Frank Radaker. Supplemental research and study may identify additional factors that contributed to this collision.

Recommendations

There are multiple ways to address these factors and minimize the likelihood of future collisions, fatalities, and traumatic injuries. At the intersection of East 86th Street and the Monon Trail, the following practices should be adopted.

Immediate:

1. Replace the bulbs in the traffic signal with high-intensity LED bulbs to improve visibility to drivers.
2. Install a contrasting backplate on all signal lights that are hung from wires across East 86th Street to ensure the lights stand out amid other visual clutter.
3. Remove extraneous signage hanging from the wires strung across East 86th Street.
4. Use construction cones and temporary bollards to create adequate edge friction so as to slow automobile traffic to an 85th percentile speed of 15 mph through the intersection.
5. Utilize temporary construction signage to alert drivers to the presence of the Monon Trail and the likelihood of people crossing East 86th Street on bike.
6. Modify signal timing to shorten the green throughput time on East 86th Street to balance it with the crossing signal intervals on the Monon Trail. Wait times for people on the arterial bike trail should be no greater than wait times for automobile drivers on East 86th Street.

7. The traffic signals should be altered to provide a three- to five-second “all red” condition before prompting those traveling along the Monon Trail to cross East 86th Street.
8. A temporary sign should be installed for bikers and pedestrians seeking to cross East 86th Street alerting them to the presence of the call button.

Near Term (within the next 12 months):

9. Ensure that each travel and turn lane has its own designated signal light.
10. Replace the temporary cones and bollards with a permanent redesign that slows automobile traffic to an 85th percentile speed of 15 mph through the intersection.
11. Install permanent signage along East 8th Street to alert drivers to the presence of the Monon Trail and the high potential for people on bikes to be crossing the traffic stream.
12. If East 86th Street is to remain at a 35-mph speed, a flasher alerting drivers to the upcoming trail crossing should be installed 350 feet prior to the intersection. The timing on this warning flasher should be coordinated with the crossing signal (not permanently flashing).
13. Install a new call button for cyclists and pedestrians that is conspicuous and within their natural path of travel.

Long Term and Systematic:

14. On major arterials, refrain from hanging signals from wires. Where signals are warranted, utilize full mast arms for signal placement. Hanging signals from wires should never be used as a permanent approach on an arterial roadway.
15. For major arterials such as East 86th Street, a policy-level decision needs to be made on whether to emphasize the mobility of through traffic or the intensity of adjacent land development.
    a. If the policy is to emphasize mobility of through traffic, that is incompatible with intense land use. In order to provide a safe environment for automobile drivers and passengers, as well as others in the corridor, accesses along East 86th Street should be consolidated or eliminated to reduce conflicts, and land use policies should be adjusted to reduce or eliminate land development oriented toward the arterial roadway.
    b. If the policy is to emphasize land development, that is incompatible with high-speed traffic movement. In order to provide a safe environment for automobile drivers and passengers, as well as others in the corridor, East 86th Street should be redesigned to reduce 85th percentile traffic speeds to 20 mph through the corridor and 15 mph at major intersections.
16. To reduce the overall number of dangerous automobile interactions, land-use regulations should be modified to reduce or eliminate dead-end streets and provide as many through-connections options as possible between neighborhoods.
17. To reduce the overall number of dangerous automobile interactions, restrictions that artificially limit the number of non-residential uses throughout neighborhoods should be removed to allow the market to respond to local service demands with localized options.

Concluding Statement

The collection of foundational design flaws present at East 86th Street and the Monon Trail are not an anomaly. The issues that plague this intersection are commonplace along roadways in urban, suburban, and rural environments throughout North America. Through collective assessment that incorporates multiple forms of knowledge and questions blame assignment protocols, the Crash Analysis Studio instigates a paradigm shift in how we see and execute urban planning. Identifying and implementing recommendations with varied scope and duration is a crucial step to building systematic responses that improve future design, prevent traumatic injuries, and ultimately save lives.