Crash Analysis Studio

Session 19: Madison, Wisconsin
Held on July 19, 2024

Session Participants:

- **Dean Chamberlain**, Engineering Group Manager at Toole Design; former City Engineer in the Twin Cities metropolitan area; graduate of University of Wisconsin–Madison and former Madison resident
- **Josh Olson**, Madison resident for over 7 years; coordinator of the Madison Strong Towns Local Conversation group; frequent biker; community advocate for safe infrastructure
- **Alex Thomason**, Neighborhood Association President; safety enthusiast; concerned citizen
- **Edward Erfurt**, Director of Community Action at Strong Towns
- **Tony Harris** (moderator), Community Engagement Coordinator at Strong Towns

Summary of Crash Event

- The crash occurred at 1:41 pm Central Time (CT) on August 1, 2023.

- A non-motorist in their late seventies was struck by a motorist alongside Raymond Road.

- The motorist, who was either 22 or 23 at the time, was making a right turn on red at the intersection with Prairie Road.

- The quarterly report to the transportation commission states inattentive driving and failure to yield were both causal factors.

- The crash report states the following:
    - The non-motorist passed away in the hospital at 1:12am on August 2nd.

    - The motorist was listed as “not distracted” and indicated that he did not see the pedestrian until the crash had already happened.

    - The pedestrian is listed as being at the intersection, which was described as either unmarked or “unknown if marked crosswalk”.

    - Law enforcement did not suspect the motorist had been using drugs or drinking, though blood test results were listed as pending when the report was accessed.

- Madison had clear weather and was dry on the day of the crash.

Primary Contributing Factors

Raymond Road and its intersection with Prairie Road is used by pedestrians, cyclists, and vehicles. The travel movement of these users are impacted by multiple key design deficiencies that heighten the likelihood of collisions.

The design of Raymond Road and its intersection with Prairie Road illustrates inadequate concern for the safety of non-motorist users and drivers by attempting to prioritize traffic flow over other design objectives such as safety. Transportation professionals and designers have elected to use design standards–including dedicated left turn lanes with a wide landscaped median on Raymond Road and dedicated right turn lanes on Prairie Road–to make higher travel speeds possible. The signalization at this intersection has created multiple visual obstructions; these include mature trees and signal panel boxes that reduce sightlines for all road users. Harmful impacts of these flaws are compounded by driver behavior.

Designers have acknowledged that motorists make mistakes and have provided reasonable margin for error through forgiving design features along Raymond Road, including extremely wide parking lanes and the limitation of vertical elements that create friction. These roadway components speak to designers' caution concerning automobile-on-automobile collisions.

When assessing crashes between motorists and non-motorists, designers elected to not create a similar margin for error. Sharrows are located in the parking lane on Raymond Road but the bike lanes on Prairie Road are absent from the intersection; the bike lanes that do exist along both streets are unprotected and are removed to accommodate the movement of vehicles. Pedestrian crossing times–some reported to be as short as twenty-four seconds–may encourage or force risky behavior by users with differing physical abilities who might otherwise exercise additional caution.

Providing dedicated right turn lanes and allowing right hand turns at red lights is a practice that continues to be scrutinized, particularly when permitted on high-speed arterials like Raymond Road. Researchers have found that drivers making right hand turns on red are prone to inattentional blindness; their focus on identifying gaps in oncoming traffic often results in them overlooking non-motorists trying to cross the road.

Transportation professionals and designers have chosen to expose non-motorists to unnecessary major risks by placing them in an environment constructed to prioritize high-speed through traffic.

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

1. **The motorist driving the DHL delivery truck failed to yield to–or stop for–oncoming pedestrian traffic during his right hand turn on red off of Prairie Road.**
    a. The crash report, the quarterly report to the transportation commission, and media coverage all indicate this crash would have been prevented if the motorist had yielded or stopped.
    b. This failure to yield may be attributable to other contributing factors, specifically the roadways' travel speed incompatibilities and possible sight line obstructions.
    c. The motorist likely experienced inattentional blindness[1], the psychological phenomenon where one fails to notice unexpected stimuli in their vision due to their focus on another task.
        i. The motorist's inclination to look left for oncoming traffic likely competed with–and overpowered–their inclination to also look to the right for non-motorists traveling by foot.
        ii. A motorist experiencing inattentional blindness may be particularly dangerous to non-motorists and other drivers that enter their field of vision unexpectedly or without warning; this danger compounds according to how fast the motorist in question is traveling.

2. **Drivers familiar with this intersection fail to come to a complete stop or stop within the crosswalk when making right turns from Prairie Road on Raymond Road.**
    a. Panelists and Strong Towns Staff visited the intersection and observed driver behavior prior to the studio.
        i. The DHL Delivery driver's actions are not unique or a one-off incident at this intersection.
    b. It was observed that drivers going north on Prairie Road that intended to make a right turn onto Raymond Road fail to fully stop prior to the crosswalk.
        i. Several drivers continued through the red light and intersection as if the right lane was a slip lane, failing to stop or yield to pedestrians.
        ii. If the driver made a full stop at the red light, the stopped vehicles encroached well into the crosswalk.
        iii. These patterns were repeated by almost every driver, and the abnormal behavior was for a driver to stop behind the crosswalk.
    c. Other contributing factors in this report may explain why drivers are failing to stop prior to the crosswalk.

3. **Visibility within the Raymond Road and Prairie Road intersection is limited and decreased by design aspects of the built environment.**
    a. A signal pole and equipment pedestal box on the southeast corner of the intersection–where the non-motorist was crossing from– decrease the visibility of pedestrians, cyclists, and other non-motorists for motorists traveling north or turning right on red.

[1] "Understanding Driver Distraction", National Safety Council (2020)

        i. The view of a pedestrian attempting to cross the street is completely blocked, requiring the pedestrian to enter the street to obtain a clear view.
        ii. A pedestrian waiting to cross is completely hidden from a northbound driver on Prairie Road by the pedestal.
    b. Parked cars on Raymond Road compounded with the vertical curvature of the street decrease line of sight for motorists at the Prairie Road intersection, especially those attempting to monitor oncoming traffic before turning right on red.
        i. Drivers were observed stopping in or past the crosswalk to have a clear view of oncoming traffic on Raymond Road.
    c. Northbound motorists on the blocks of Prairie Road just south of this intersection encounter trees and visual clutter that may prevent them from clearly seeing traffic signals, pedestrians, and cyclists.
        i. The slight grade on northbound Prairie Road approaching the intersection may cause motorists' sight lines to be focused upward and to the right, where signals are placed; this may limit or fully prevent awareness of pedestrians at designated crossing areas.
        ii. The signal that is visible is on the other side of the intersection located on the northwest corner. The location of this light moves the driver's vision away from the corner.
    d. The overhead traffic signal was obscured by tree clippings during a visit to the crash location two days before this session's recording; this may be representative of maintenance upkeep challenges regularly experienced in this area.

4. **Both the documented travel speed and the design speed of Raymond Road are incompatible with pedestrian traffic that occurs along Raymond Road.**
    a. The current speed limit on Raymond Road is 30 miles per hour (mph).
    b. A speed study conducted specifically for this analysis indicated that 98% of motorists exceeded the posted limit.
    c. One outlier during the speed study was traveling at 73 mph; law enforcement at the scene also indicated they recently pulled someone over for traveling at 68 mph.
    d. This study stated the 85th percentile speed, or the speed which 85% of drivers were traveling at or below, to be 37 mph.
    e. Of the 269 motorists tracked during the study, 55 motorists were driving at or above 41 mph. This study shows that more than one fifth of tracked motorists were traveling ten miles per hour or faster over the posted speed limit. This data distribution suggests that this space is communicating to drivers that speeding is a low-risk behavior in this environment.
    f. The Insurance Institute for Highway Safety states that fatality rates climb for automobile collisions involving pedestrians at 25 mph. Smart Growth America also indicates that 45% of crashes involving pedestrians are fatal when cars are traveling at 30 mph, while 85% are fatal at 40 mph travel speeds. It follows that a

30 mph speed limit still subjects pedestrians to automobile travel that is dangerous and often lethal.

g. Fifty-five drivers were recorded to be traveling beyond 40 mph in this study. This data distribution indicates that 208 drivers–or 77% of motorists tracked–were driving beyond 30 mph and under 40 mph; this space may be communicating to motorists that traveling up to ten miles per hour over the speed limit is a low risk–or even acceptable–behavior in this environment.
h. High percentages of drivers along Raymond Road traveling up to ten miles per hour beyond the posted limit may exert increased pressure on other motorists to quickly join traffic flow after completing right turns on red.
i. By design, vehicle travel speeds on Raymond Road subject both motorists and non-motorist users–including pedestrians and cyclists–to substantive danger.

5. **Raymond Road is designed with vehicle throughput as a priority despite the needs for multimodal transportation present along Raymond Road, Prairie Road, and within the residential areas that surround the crash location.**
    a. Average weekday traffic (AWT) counts for Raymond Road in 2021 total approximately 13,000 vehicles per day; this accounts for approximately fifteen to twenty-two percent of roadway capacity for an arterial like Raymond that has four through traffic lanes and dedicated left turn lanes.
    b. Travel lanes are wide enough to make motorists comfortable traveling at a design speed higher than the posted 30 mph limit.
        i. One of the two through traffic lanes on Eastbound Raymond is twelve feet wide; this width is typical on highways and other high-speed roadways not nestled amongst multiple neighborhoods.
        ii. Observation of driver behavior during a site visit reveals that the eleven foot wide parking lane on Eastbound Raymond is regularly used for turning maneuvers and navigating around congestion.
    c. There are at least three schools and two parks within walking distance[2] of the crash location; destinations that normalize walkability and bikeability in this area are at odds with the design emphasis on vehicle throughput.

6. **Both Raymond Road and its intersection with Prairie Road feature design components that demand motorists making right hand turns on red engage in complex decision-making; minimal margin for error–paired with deviant conduct by other drivers–means these decisions may result in high-risk behavior.**
    a. Traffic observation reveals that the parking lane along Raymond Road is commonly used for acceleration, deceleration, and turning maneuvers.
    b. Traffic observation also illustrates there is disregard for obeying traffic signals–some of which have only been installed within the past five years–by failing to come to complete stops.
    c. Misuse of a parking lane, disregard for traffic signals, and travel at speeds more than twice the posted 30 mph limit increase the actual and perceived risk of

[2] Approximately half a mile to a mile.

motorists joining traffic flow; higher levels of unpredictability demand motorists engage in more complex risk management, which may decrease their peripheral awareness while driving.

7. **Raymond Road is a thoroughfare that is a mix between a street and a road, a type of hybrid road design commonly referred to as a stroad[3].**
    a. Common in the United States and Canada, stroads are wide arterials that often provide access to suburban subdivisions, strip malls, drive-through fast food restaurants, and other automobile-oriented commercial establishments.
    b. The physical design of Raymond Road–which carries truck route designation and is reminiscent of a highway–attempts to simultaneously accomplish two aims that likely conflict with each other:
        i. Encourage fluid connectivity to move people from one location to another.
        ii. Satisfy the needs of non-motorists–traveling both on foot and by bicycle–that interact with the space as a neighborhood street.
    c. Multiple private driveways and historic reductions to the number of through traffic lanes may hinder the design intent of this roadway, since drivers are required to stop to make turns either unexpectedly or with little warning.

Recommendations

Madison city leadership, technical staff, and community members should all agree upon the desired user behavior along Raymond Road–particularly at its intersection with Prairie Road and similar cross streets–as the first step toward improving safety at the collision location for all road users. Elected officials must provide direction and guidance to staff and community members that the design intent of Raymond Road is to prioritize safety for all users.

Safety on this corridor will continue to be a community concern for as long as Raymond Road simultaneously tries to move large volumes of vehicles and accommodate pedestrian and cyclist usage. According to traffic counts publicly available on the City of Madison's Open Data Website, the traffic counts for Raymond Road are well below the capacity that the roadway section has been designed to accommodate; this enables the excessive speeding observed at this intersection.

Based on historical images visible through Google Street View, the City has invested in numerous improvements to this intersection. These investments include accommodations to encourage both walking and bicycling. Continued public investment should focus on designing conditions that make pedestrians feel safe as they walk along–and cross–the street. The design of these investments may be difficult and incompatible if the design of Raymond Road remains focused on the throughput of traffic that encourages high speeds. The fatality caused by this crash is representative of outcomes produced by the current design approach.

[3] The Stroad (October 2017)

Several community members actively voiced to session panelists that Raymond Road is not a connector that should prioritize efficient vehicle throughput, but is in fact a neighborhood street and should be treated like one where safety should be the top design objective above all other objectives.

The Raymond Road and Prairie Road intersection is currently designed and built in a way that makes this intersection dangerous for even the most careful of drivers. There are many things that the city can do–a lot of them quickly and cheaply–to make this intersection substantially safer. The panelists of the studio shared numerous recommendations that could be taken in both the near term and long term at the intersection of Prairie Road and Raymond Road.

Immediate:

1. The City of Madison's Common Council should agree and provide direction and guidance to municipal staff that the vision for Raymond Road and Prairie Road is to be slow speed, local streets with a design priority of safety above all other design priorities. This should be memorialized through a resolution to this effect and shared throughout the community and with state and regional transportation agencies.
2. Solicit city staff–including engineers, planners, and law enforcement officers–to conduct a walk audit of the area around the crash location so that they can observe the existing conditions and driver behaviors first-hand.
3. Install and enforce a "No Right Turn on Red" sign at the intersection of Prairie Road and Raymond Road.
4. Remove the dedicated right turn lane on Prairie Road and extend or bump out existing curb lines into more robust refuge areas where pedestrians and cyclists would be more visible. This can be achieved quickly and cheaply using temporary features such as paint and bollards.
5. Daylight the Prairie Road crosswalk by removing the parking lanes on Raymond Road adjacent to the intersection. Temporary materials such as bollards and temporary curbing to extend the curb and physically prevent drivers from using this space.
6. Optically narrow Raymond Road with paint, high visibility crosswalks, delineators, or other temporary materials; these will increase motorists' awareness of designated crossing areas and help lower speeds.
7. Extend the existing light cycle from its current 24 second duration to 35-40 seconds; given traffic volume counts, this will create additional time for pedestrians to cross Raymond Road without majorly inconveniencing expected motorists.
8. Review current maintenance practices and their real-time implementation within Madison.
    a. Increase frequency of tree and shrubbery trimming around this intersection as a way to increase road user visibility and sightlines.
    b. Prioritize trimming any growth that obscures traffic lights or other forms of signage.
9. Review the standards and design that resulted in the placement of this particular signal equipment box to prevent repeating this type of visual obstruction of pedestrians and non-motorists waiting to cross the road in future projects.

10. Form an interdisciplinary team of staff from multiple city departments to act as rapid responders[4] to automobile collisions. This team should be responsible for documenting contributing factors of a crash; grant responders agency to immediately implement short term or temporary improvements to the street. Respond to this crash by charging the team with immediate recommendations from this report and action to support more systematic, long-term changes.

Near Term (within the next 12 months):

11. Erect permanent curb extensions in places where temporary measures were deemed to successfully assist non-motorists with safely crossing the road.
12. Implement raised crosswalks as an intervention that will increase pedestrian visibility–particularly by motorists navigating in trucks or other large automobiles–and force vehicles to slow down.
13. Collect more data on traffic patterns, safety concerns, and overall truck usage to assist you with making a case to remove Raymond Road's designation as a truck route; gather support from local residents and businesses and submit a formal request to the City's Traffic Engineering Division.
14. Update city standards to include development details that create better accommodation for all users and include the use of temporary low-cost, quickly deployable materials.
    a. Develop a city standard for a kit of parts specifically for temporary improvements that can be deployed quickly when a safety issue or a contributing factor to a crash is identified. This would include items such as–but not limited to–temporary bollards, temporary curbing materials, and temporary paint.
    b. These details may include permanent visions of temporary measures, such as–but not limited to–mini traffic circles, curb extensions, and protocols for right-sizing lane widths.
15. Update or amend current city street design standards which were identified as contributing factors to this crash, including but not limited to:
    a. Roadway classifications.
    b. Dedicated right turn lane usage in places where pedestrian and cyclist presence is anticipated.
    c. Locations of pedestals and switch boxes for new or upgraded signals
16. Evaluate a full redesign of Raymond Road that changes the street section by:
    a. Transforming roadway character through temporary and permanent measures that support a design speed of no more than 25 mph.
    b. Removing the dedicated left turn lanes during upcoming repaving projects to facilitate right sizing of Raymond Road; this should be feasible regardless of designated truck route status.
    c. Continue accommodation for all users through maintenance of sidewalks, medians, and designated crosswalks.

Long Term and Systematic:

---

[4] For more information on rapid response models, see Pedestrian Safety Gets Big Boost From New Cincinnati Initiative (January 2023).

17. Implement permanent changes to Raymond Road that right size the roadway to accommodate desired driver behavior and safe accommodation for all users.
    a. Reducing the number of through traffic lanes from four to two.
    b. Narrowing the remaining lanes to standardized widths that satisfy the needs of trucks and emergency vehicles, yet also reduce the speed of through traffic.
    c. Broaden the existing median into a landscaped median that creates a space for non-motorist refuge and helps make Raymond Road more pedestrian friendly.
18. Transform all successful temporary changes to Prairie Road into permanent changes.

Concluding Statement

The series of design flaws present along Raymond Road and at the collision location are dangerous and common, both within Madison and in other locations. Design emphasis that prioritizes traffic flow at high speeds over pedestrian usability has caused injuries and deaths in communities across Wisconsin and in areas throughout North America. Right-hand turns on red are also widely recognized as traffic maneuvers that increase the likelihood of crash occurrences, especially in places where pedestrian walkability is more commonplace.

By evaluating the numerous factors that contribute to a crash, we believe that decision-makers, designers, and the general public can move beyond the current approach, which seeks only to assign blame to involved parties, to a model that helps change the way these spaces are developed and cared for. In Madison, we believe substantive changes to this intersection should prioritize non-motorist accessibility and safety over high-speed traffic flow.