# Crash Analysis Studio

Session 15: Grand Junction, Colorado
Held on March 22, 2024

## Session Participants:

- **Conor Semler**, Principal Planner at Kittelson & Associates; national leader in planning and designing innovative bicycle facilities; contributor to both the *FHWA[1] Separated Bike Lane Planning and Design Guide* and the *NACTO[2] Urban Bikeway Design Guide*
- **Henry Brown**, Mobility Planner with the City of Grand Junction; professional background in product design; active transportation enthusiast and safety advocate; concerned community member
- **Diana Rooney**, Urban Trails Committee leader; licensed Civil Engineer; local advocate for multimodal and active transportation
- **Charles Marohn**, President of Strong Towns
- **Tony Harris** (moderator), Action Team Coordinator at Strong Towns

## Summary of Crash Event

- The crash occurred at 8:53 p.m. (MT) on October 8, 2023 at the intersection of North Avenue and 29 Road.

- A westbound motorist named Trisha L. struck northbound cyclist Joseph E. as he was crossing North Avenue.
    - Joseph E. was traveling a few feet outside of the east crosswalk that runs along North Avenue at this intersection.

    - The crash report states Trisha L. entered the intersection with a green signal light.

- The crash report also indicates the following:
    - The collision location was dark-lighted and dry; weather in Grand Junction was clear on the night of October 8, 2023.

    - Joseph began passing through the intersection by traveling east across the 29 Road; he then cut diagonally to begin his northbound crossing of North Avenue.

    - Joseph E. was not wearing a helmet and was transported to the hospital with serious injuries just after the collision took place.

[1] Federal Highway Administration
[2] National Association of City Transportation Officials

    - Joseph was not tested for alcohol or substances.
    - Trisha L. indicated she believed she was traveling at 32 miles per hour (mph), though the estimated vehicle speed is listed as 28 mph.
    - Trisha L.'s Chevrolet Tahoe was towed from the crash location due to disabling damage.
- The speed limit at the crash location is 40 mph.

## Primary Contributing Factors

North Avenue and its intersection with 29 Road is an intersection that has been designed in accordance with requirements outlined in various roadway and highway design manuals, yet it fails to meet the desired outcomes for the city of Grand Junction and adjacent parcels. The community is not yielding optimum outcomes in driver behavior, economic development, and safety; along this particular corridor, there is a heightened likelihood of fatal and serious collisions.

The city of Grand Junction maintains control over 29 Road, while the Colorado Department of Transportation (CDOT) has jurisdiction over North Avenue[3]. North Avenue is designated as a highway with two limited-access roadways nearby. Interstate 70–or I-70–runs to the north, and Interstate 70 Business–I-70B–runs to the south.

The design of North Avenue illustrates inadequate concern for the safety of both motorists and non-motorist users by attempting to prioritize traffic flow over other design objectives. Transportation professionals and designers have elected to use design standards such as wide through traffic lanes, a dedicated left-turn lane, and a dedicated right-turn lane to make higher travel speeds possible. These features conflict with the land use pattern in the area; they create tension as motorists utilize the multiple access points created by driveways into and out of North Avenue's commercial establishments. The 40 mph speed limit exacerbates this tension by setting the expectation that motorists can swiftly navigate along this corridor. Though speeding was not an issue in the examined crash, speeding was recognized as common during recent thorough speed data collection conducted for the purposes of this crash analysis.

29 Road invites cyclist usage through infrastructure that is implemented inconsistently south and north of the intersection with North Avenue. The northbound bike lane south of the intersection disappears and does not restart until approximately 200 feet north of the collision location; this existing unprotected bike lane is sandwiched between a through traffic lane and dedicated right turn lane. The southbound bike lane south of the intersection is placed between the sidewalk and outer lane of through traffic without any protection for cyclists. The southbound bike lane north of the intersection terminates nearly 300 feet north of the collision location, where the traveled width of the roadway broadens to transition from 1 travel lane to 2.

[3] Also referred to as US 6.

Along North Avenue and its intersection with 29 Road, transportation systems for motorists, cyclists, and other non-motorists have been planned and implemented with dangerous levels of incompatibility. This conflict is one underlying cause of the collision and trauma endured by both involved parties.

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

1. **Both the documented travel speed and the design speed of North Avenue are incompatible with cyclist and pedestrian traffic that is actively encouraged along 29 Road.**
    a. The current speed limit posted on North Avenue is 40 mph.
        i. A speed study conducted for this studio indicated that 41% of eastbound motorists–and 37.2% of westbound motorists–exceeded the posted speed limit.
        ii. This study stated the 85th percentile speed, or the speed at which 85% of drivers were traveling at or below, fell between 40 and 44 mph.
        iii. A pedestrian safety analysis states that fatality rates climb for automobile collisions involving pedestrians at 25 mph. When automobile speeds exceed 40 mph, 45% of pedestrian collisions are found to be fatal. Though Joseph E. was traveling as a cyclist through this intersection, the posted limit already approaches the edge of lethality.
        iv. Of the 1034 motorists tracked during two hours on a Sunday evening, 81 of them (~7%) were driving over 50 mph. This data distribution may suggest that this space communicates to drivers that excessive speeding is a low-risk behavior in this environment.
        v. By design, vehicle travel speeds on North Avenue subject non-motorist users–including pedestrians, cyclists, and public transit riders–and motorist users to substantive danger.

2. **The intersection lacks cyclist infrastructure that may have facilitated Joseph E. turning left off of eastbound North Avenue as a vehicular cyclist; as a result, he failed to yield to oncoming traffic while traveling north along North Avenue as if he were a pedestrian.**
    a. Along eastbound North Avenue, there is neither a bike lane nor sharrows to designate shared lane usage by motorists and cyclists.
    b. Additionally, the northbound bike lane along 29 Road is sandwiched between its through traffic lane and dedicated right-turn lane; this bike lane then disappears and does not reappear until after passing the Walgreens parking lot approximately 205 feet north of where the crash occurred.
    c. The absence of adequate cyclist infrastructure increased Joseph's vulnerability while he navigated the intersection using crosswalks intended for pedestrians.

3. **North Avenue is designed with vehicle throughput as a priority despite the needs for multimodal transportation present along North Avenue, 29 Road, and within the residential areas that surround this intersection.**
    a. There are many motorist access points on the northside of North Avenue.
        i. Near the northside of this particular intersection, motorists will find driveways for Bookcliff Gas & Groceries, Big O Tires, Walgreens, the First National Pawn Shop, and the Rose Park mobile home community.
        ii. Frequent signalization for destinations like these along North Avenue mean motorists may not travel the length of the corridor very quickly, even though the 85th percentile speed falls within the range of 40 to 44 mph–a range likely lethal to pedestrians involved in a car crash.
    b. The intersection includes pedestrian signals with push button activators. Longer pedestrian wait times are required, however, due to prioritization of traffic throughput as the primary objective on North Avenue.
    c. The census indicates that five to ten percent of households in the neighborhood where the crash occurred do not have access to a private vehicle.
    d. Public transportation in this area is robust; four bus routes make movements around this intersection, meaning eight buses regularly travel within a one to two block radius of this area every hour.

4. **Visibility within the North Avenue and 29 Road intersection is limited–and likely decreased–by design aspects of the built environment.**
    a. The dedicated left-turn lane for westbound traffic off of North Avenue may reduce line of sight for both motorists and non-motorist users navigating through the intersection along the crosswalk.
        i. According to one expert's review of crash footage[4], a vehicle was occupying the turn lane during this collision.
        ii. This vehicle may have obscured Joseph from Trisha's view, Trisha from Joseph's view, or both parties from each other's respective views.
    b. Street lighting that illuminates only from the top-down may do a poor job of making pedestrians and cyclists more visible to motorists; this style of lighting could create blind spots for both drivers and cyclists.

5. **North Avenue and its intersection with 29 Road feature design elements that force motorists and non-motorists to engage in decision-making with minimal margin for error; road users engaged in ongoing complex deliberations may be prone to higher-risk behavior.**
    a. North Avenue grows to be a six-lane highway around 29 Road, permitting eastbound and westbound motorists' use of dedicated turn lanes to move both south and north onto 29 Road.
    b. Institutions like the Federal Highway Administration and the Transportation Research Board frequently cite research stating that non-compliant crossing

[4] This footage was shared by law enforcement for contained viewing purposes only; it was not made available to the public.

behaviors start to rise significantly when cyclist and pedestrian delay at signals exceeds thirty seconds.

i. A delay of seventy seconds is considered a level of service failure for vehicular traffic, and would be a particularly long wait for cyclists or pedestrians who may be exposed to the elements.
ii. Based on the signal time patterns, Joseph would have been delayed by seventy to seventy-one seconds if he had waited for the next signal phase.
iii. This wait time in combination with a lack of cyclist infrastructure may have contributed to Joseph's decision to engage in high-risk behavior.

6. **Neighborhoods surrounding the crash location lack alternative east-west connections and thus remain dependent on North Avenue and its many access points for travel, including local trips.**
    a. Local, interconnected streets amongst the surrounding neighborhoods are lacking enough that car trips via North Avenue may be unavoidable, even for local errands; this increases the probability of crashes similar to this one occurring in the future.
    b. Travelers are more likely to use their cars when they do not have access to separated bike lanes and have limited access to interconnected sidewalks and bikeways between community establishments.
        i. Infrastructure built to prioritize automobile throughput increases reliance on privately operated vehicles over other modes of transportation.
    c. East-west trips through this part of the city are difficult to complete on foot or via bicycle without some duration of travel along North Avenue; this travel leads to heightened exposure.
    d. North Avenue itself currently loses any sidewalk infrastructure approximately 340 feet east of the collision location, making 29 Road the last chance for an east-bound pedestrian or cyclist to head north to their destination or to Orchard Avenue (½-mile north) to continue east upon separated infrastructure.
        i. Given the wider and more continuous nature of the sidewalk/trail infrastructure on the south side of North Avenue versus north, east-west travelers are relatively more likely to cross at 29 Road than if those facilities were mirrored on the north side of North Avenue or if another corridor offered connections through.

7. **North Avenue 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[5].**
    a. Common in the United States and Canada, stroads are wide arterials that often provide access to drive-throughs, suburban subdivisions, strip malls, and other automobile-oriented commercial establishments.

[5] The Stroad (October 2017)

b. The physical design of North Avenue–which carries highway designation–attempts to encourage fluid connectivity to move people from one location to another.
c. Frequent signalization, an overabundance of parking, and multiple private driveways may hinder the design intent of this roadway, since drivers are required to stop to make turns either unexpectedly or with little warning.

8. **The North Avenue corridor lacks a consistent lighting design; lack of adequate lighting in the intersection was exacerbated since the crash occurred during evening hours under low lighting conditions.**
    a. According to Safe Streets Research and Consulting, 75% of pedestrian fatalities in 2021 occurred between the hours of sunset and sunrise; this source states cyclist deaths at nighttime are on the rise as well.
    b. The North Avenue & 29 Road intersection does include some lighting. However, this lighting illuminates the ground of the intersection and does not bounce light off of cyclists or pedestrians crossing the street.
    c. Lighting placed above the roadway does better illuminating the tops of people than their sides; overhead highway style lights make it difficult for motorists to see the profiles of pedestrians during approach at this intersection and others like it.

## Recommendations

Grand Junction City leadership, Colorado Department of Transportation (CDOT), and technical staff, should agree upon the desired user behavior along North Avenue. All of the boxes have been checked as required in the design manual for this intersection yet Grand Junction is not getting the desired outcomes for North Avenue. The city is not yielding optimum outcomes in driver behavior, greater return on economic development than what has been invested in the roadway, and the safety on this corridor continues to be a community concern.

The current design is being asked to do two things at once and it is doing both of these things very poorly. The design and roadway section of North Avenue is attempting to move vehicles very quickly through Grand Junction while intersections like 29 Road are attempting to accommodate pedestrians and cyclists. The public investment in both of these objectives is resulting in suboptimal conditions where drivers are frustrated they cannot drive fast and pedestrians and cyclists do not feel safe crossing the street at these intersections. This crash is representative of the outcome of the current design approach.

The design character and objective for North Avenue needs to be made clear by the elected leadership of Grand Junction. To make sufficient provisions for the safety of all users traveling on North Avenue, specifically at the location of this crash, a policy-level decision needs to be made regarding the intent and goals of the corridor. Elected officials need to provide direction and guidance to technical staff on whether the design intent of North Avenue prioritizes safety

for all users, or if this is a connector prioritizing the efficient throughput (volume) of vehicles over other design objectives.

If the safety of all users of North Avenue and its intersection with 29 Road is to be prioritized over all other design objectives, the following recommendations and practices should be adopted:

**Immediate:**

1. Elected officials of Grand Junction should provide direction and guidance that the design and character of North Avenue is to prioritize safety for all users above all other design objectives. This can start with a resolution from the city. This vision should be shared with Colorado Department of Transportation (CDOT) and included in all planning and maintenance projects for the corridor.
2. Explore with Colorado Department of Transportation (CDOT) a shift of the designation of Interstate 6 from North Avenue to I-70 Business. I-70B is a limited access roadway that is designed for the fast movement of traffic and better suited for the intent of this designation.
3. Explore reducing the posted and design speeds for North Avenue to less lethal speeds appropriate where motorists and non-motorists share the right of way.
4. Review and adjust signal timing along the corridor
    a. Reduce signal timings and cycle length to discourage high-risk crossing behavior by pedestrians and cyclists that may be making two-stage left turns.
    b. Test two-stage or multi-stage crossing along North Avenue to see how effectively it shortens pedestrian clearance intervals from the current 70 sec wait time.
    c. Ensure signals along North Avenue are coordinated so that motorists can navigate the corridor fluidly, even when operating at lower speeds.
5. Install temporary lights on the signalized poles in a manner that better illuminates pedestrians and cyclists moving through the intersection.
    a. Observe and analyze existing street lights to see how much glare they may be creating and if they are increasing blind spots experienced by motorists and cyclists.
    b. Additional lighting should illuminate the profile of the pedestrian within the intersection.
6. Use temporary features such as bollards or barriers to extend or bump out existing medians into more robust refuge areas for pedestrians and cyclists. Utilize delineators, curb rails, or other materials to install temporary curb extensions at this intersection.
7. Use temporary features such as bollards, delineators, curb rails, barriers, and paint, to:
    a. Raise awareness and better delineate the existing bike lanes and medians in the intersection on 29 Road.
    b. Build out a continuation of the wide trail that already exists along the south side of North Avenue to encourage safe two-stage left turns by cyclists.
    c. Explore using these temporary measures to remove dedicated right turn lanes that would allow for more robust refuge areas and shorter crossings for pedestrians and cyclists.

**Near Term (within the next 12 months):**

8. Where temporary measures are successful, make these features permanent.
9. Determine if temporary curb extensions and removal of right turn lanes effectively calm traffic; in the event that they do, pursue more permanent installations.
10. Engage elected officials and neighborhood organizations to help open up alternate east-west routes, especially those that facilitate pedestrian and cyclist connections, as alternatives to traveling on North Avenue.
    a. Update land development requirements so connectivity is required for development and redevelopment of parcels along the corridor.
11. Explore the narrowing of travel lanes to encourage slower speeds and adjust using temporary measures or when the road is re-stripped.
12. Retrofit this intersection with mid-crossing refuge areas for pedestrians and cyclists

**Long Term and Systematic:**

13. Overhaul the infrastructure and design of this intersection by:
    a. Building a protected intersection[6] that fully separates walking and biking movements from automobile traffic flow.
    b. Incorporating continuous bike lanes, reducing vehicle lane widths, and improving existing paths for pedestrians.
    c. Adding a mid-block pedestrian refuge area.
14. Advance planning and policies to reclassify North Avenue as an urban street that prioritizes public transit, biking, and walking over high-speed traffic.
15. Use temporary barriers to construct protected bike lanes along North Avenue and reconfigure the existing bike lane along 29 Road into a protected space for traveling cyclists.

# Concluding Statement

The series of design flaws present along North Avenue and at the crash location are dangerous for Grand Junction community members. Design emphasis that prioritizes traffic flow over both motorist and non-motorist safety and usability has caused injuries and deaths in communities across Colorado and in locations throughout North America. In Grand Junction, policy level decisions may need to be made to determine if North Avenue should be treated as a residential street or a roadway capable of facilitating high-speed traffic flow; road user expectations and behavior can be better determined based upon that decision.

By evaluating the numerous factors that contribute to a crash, we believe that designers, decision-makers, 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 designed, developed, and cared for. Substantive changes to the North Avenue and 29 Road intersection should prioritize cyclist and pedestrian safety alongside motorist roadway usage.

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[6]See this panoramic photo and this map location for an example intersection from the city of Delft in the Netherlands.