Crash Analysis Studio

Session 11: Denver, Colorado
Held on November 21, 2023

Session Participants:

- **Adam Spiker**, Bus Rapid Transit (BRT) Design Engineer at the Colorado Department of Transportation; former Region Engineer with Maccaferri
- **Chris Harlan**, Investigator and investor relations specialist in the securities industry; urban design and architecture enthusiast; Denver Local Conversation participant
- **Nam Henderson**, District 8 Representative for the Greater Park Hill Community Regional Neighborhood Organization; traffic safety advocate; concerned local resident
- **Chuck Marohn**, President of Strong Towns
- **Tony Harris** (moderator), Action Team Coordinator at Strong Towns

Summary of Crash Event

- The crash occurred shortly after 10:00 p.m. (MT) on July 3, 2022 at the intersection of northbound Quebec Street and East 36th Avenue.

- A northbound motorist struck 60-year-old Gregory Robinson as he was crossing northbound Quebec Street, headed west on East 36th Avenue.
    - According to the crash report, Robinson was pronounced dead on the scene at 10:11 p.m.

    - The report states that the cause of death was multiple blunt force injuries.

- The crash report also indicates the following:
    - The motorist was issued a Unified Summons and Complaint (US&C) on scene for:
        - Careless Driving Resulting in Death
        - Driver a Motor Vehicle when License was Restrained
        - No Proof of Insurance

    - Damage to the vehicle and airbag deployment indicated this was a high-speed collision.

    - The motorist reported to be traveling between 45 and 50 miles per hour (mph).

    - Detective Bienemann conducted a HGN[1] field sobriety test with the motorist and declared they did not appear to be impaired or intoxicated.

    - There was at least one witness at the scene who heard the crash before first responders arrived.

    - Denver had cloudy weather with temperatures in the low 70s that evening.

- Local sources informed us that the speed limit on Quebec Street was 45 miles per hour (mph) at the time of the crash and has not changed since.

Primary Contributing Factors

The design of northbound Quebec Street demonstrates inadequate concern for the safety of pedestrians and non-motorists traveling outside of privately-owned and operated automobiles.

Designers acknowledge the presence of pedestrians at this location by constructing sidewalks; striping crosswalks, and including push buttons for pedestrian crossings. Lane widths, barren medians, and inadequate street lighting indicate that non-motorist safety and usage are not priorities.

Designers have recognized that motorists are fallible and have provided ample margin for error through select design features. One notable example is the expansion of this intersection to include five through traffic lanes, four of which are eleven feet wide or wider. While this expansion may have been appropriate when this portion of Quebec Street still served as a primary approach for Stapleton airport, Stapleton airport halted flight service on February 28, 1995. Lane widths, roadway expansion, and guide signage for nearby interstates and highways illustrate designers' recognition that Quebec Street facilitates enough traffic flow to justify concern for automobile-on-automobile crashes is worthwhile.

When evaluating collisions between motorists and pedestrians, designers did not elect to create a similar margin for error. Quebec Street–a roadway with a design speed that substantively surpasses the posted limit–is currently situated within a complex urban environment in between the Northeast Park Hill and Central Park neighborhoods, both of which are regularly frequented by pedestrians and cyclists. This design circumstance has contributed to disregard for pedestrian and motorist safety, especially given the fact that 83 crashes occurred at the Quebec and 36th Avenue intersection between March 2017 and March 2020.

Design and transportation professionals have chosen to expose non-motorists to unnecessary major risk by placing them in an atmosphere constructed to prioritize high-speed traffic flow. Substantive changes to Quebec Street and similar roadways are necessary to reduce fatalities and traumatic injuries.

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[1] Horizontal gaze nystagmus

Additionally, session participants identified the following primary factors that contributed to this crash:

1. **Both the documented travel speed and the design speed of Quebec Street are incompatible with people traveling on foot or by bicycle.**
    a. Northbound Quebec Street facilitates high speed automobile travel.
        i. Travel lanes at this intersection are wide enough to make drivers comfortable traveling at a design speed higher than the posted 45 mph limit.
            1. The far left lane where the crash occurred is 13.25' wide; this exceeds the typical 12' lane width found on high-speed roadways and highways.
            2. The three center northbound traffic lanes are each 11' wide; this exceeds the ten-foot width deemed appropriate in most urban areas.
        ii. Five through traffic lanes allow fast-moving cars to pass slow-moving traffic, even during brief periods of congestion.
            1. This maneuverability is further encouraged by the fact that, at its intersection with 29th Avenue, Quebec only has two through traffic lanes.
            2. Any volume congestion constraints present at 29th Avenue disappear during northbound travel as additional lanes are added to Quebec Street.
        iii. None of the five traffic lanes at this intersection are dedicated to left or right hand turns; this may further driver mentality that this space is not designed for slow-moving traffic or non-motorist usage.
    b. The current speed limit on this section of Quebec Street is 45 mph.
        i. A speed study indicated that 36% of motorists exceed the posted limit.
        ii. The study illustrated the 85th percentile speed, or the speed which 85% of drivers were traveling at or below, to be 48 mph.
        iii. The Insurance Institute for Highway Safety states that fatality rates climb for automobile collisions involving pedestrians at 25 mph. When automobile speeds exceed 40 mph, pedestrian collisions are likely to be fatal. It follows that a 45 mph speed limit is a lethal speed.
        iv. At least nine drivers were recorded to be traveling at or above 55 mph in this study. This data distribution suggests this space is communicating to motorists that excessive speeding is an acceptable–or even low-risk–behavior in this environment.
        v. The crash report indicates that law enforcement, the motorist, and a witness all stated the motorist was traveling at an estimated 45 mph when the collision occurred[2].

[2] Expert Chris Harlan and moderator Tony Harris reviewed the narratives and Crash Data Retrieval (CDR) information included in the police report to ensure the accuracy of these parties' estimates.

vi. Vehicle travel speeds on Quebec Street subject non-motorists, pedestrians, and cyclists to serious risk and danger.

2. **The design of Quebec Street encourages aggressive driving behavior and speeding, particularly due to visual cues and the absence of traffic-calming measures.**
    a. The median separating the northbound and southbound routes of Quebec Street between M.L.K. Jr Blvd and 39th Avenue present almost an entire mile of barrenness; these medians do not feature street trees or vertical elements that create optical narrowing for northbound motorists.
    b. The large green overhead guide signage just north of the intersection may take drivers' eyes off the road; it may also signal or communicate to them that this is an interstate-style space designed to prioritize their passage over other safety objectives.
        i. The large green guide sign placed south of the intersection on the west side of northbound Quebec may lead motorists to treat this space more like a highway and less like an intersection also utilized by cyclists and pedestrians.
    c. Assuming travel at the posted 45 mph speed limit, a motorist needs to make a decision on whether or not to slow down at approximately 470 feet from the intersection; this accounts for 360 feet of sight distance and the additional +/- 110 feet that the signal is placed from the stop bar on the intersection's south leg. From 470 feet away, neither pedestrians nor the traffic signal may be adequately visible.
        i. A motorist that makes the decision to accelerate through this intersection in preparation for merging onto the highway would likely not have the reaction time and distance necessary to stop for a pedestrian, especially if the motorist had limited visibility.

3. **The Quebec Street and East 36th Avenue intersection design does not prioritize pedestrian usage and safety alongside–or over–high speed automobile travel.**
    a. The absence of street trees, shelters, and other vertical elements on the western side of northbound Quebec means that pedestrians receive no buffer from wind, rain, or other forms of inclement weather; this may impact their decision-making behavior as they navigate the environment.
    b. Video footage indicates east-west traffic has a green light for 38 seconds during the signal phase at this intersection.
        i. A healthy, able-bodied adult could likely move 1.5 feet per second to cross this intersection within 38 seconds; this does not guarantee that it provides enough time for pedestrians that may move slower.
        ii. Video footage also indicated that traffic turning right to go north on Quebec was not restricted during that 38 seconds; this may decrease total crossing time for pedestrians.

c. Streetlights at this intersection have been configured to light up the traffic stream; these lights may illuminate pedestrians as they begin crossing from the east, but cast them in shadow as they finish crossing the west side of the intersection.

4. **Placement of a high-speed roadway like Quebec Street within a transportation system nestled amongst multiple neighborhoods is inherently unsafe, especially given high demand for pedestrian crossing and cyclist usability between Park Hill, Central Park and other communities on either side of Quebec Street.**
    a. The total pavement width of northbound Quebec Street at this intersection is 55.75' across five lanes; this may present visibility and crossing challenges, particularly for older pedestrians.
    b. The urban character, regulated through the adopted zoning at this intersection and the surrounding area is designated as commercial mixed-use (CMU). In practice, clusters of housing and commercial development are segregated by Quebec Street and its dangerous, stroad environment.

Related Contributing Factors

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

5. **Denver's car-centric transportation system may result in individuals being–or perceiving themselves to be–stranded if they are not free to operate their privately owned vehicles.**
    a. Limited public transportation options may not adequately account for the travel needs of individuals who have had their licenses suspended or otherwise restrained.

Recommendations

There are multiple ways to address these factors and minimize the likelihood of future collisions, traumatic injuries, and fatalities. At the intersection of Quebec Street and East 36th Avenue, the following practices should be adopted:

Immediate:

1. Make crossing northbound Quebec Street safer for pedestrians and non-motorists by adjusting this intersection's traffic signal timing. Specific actions would include:
    a. Adding a dedicated pedestrian phase for crossing Quebec Street.
    b. Adding a leading pedestrian interval to allow pedestrians a head start over left or right turning vehicles.
    c. Lengthen the period of all red lights at this intersection to support greater traffic safety.
2. Adjust signal timing along northbound Quebec Street to prevent vehicles from getting too many green lights in a row, as this condition allows them to accelerate through this intersection at excessive speeds.

3. Remove the highway sign on the west side of Quebec Street north of this intersection since it is redundant alongside the existing overhead highway signage.
4. Beginning at the 29th Avenue intersection and moving north, use cones and construction bollards to temporarily restrict Northbound Quebec Street to two lanes.
5. Erect an additional, temporary lighting structure at the northwest corner of the intersection to ensure pedestrians are visible to motorists.
6. Deploy an interdisciplinary team of city staff to act as rapid responders to automobile collisions. For this crash, charge the team to initiate modifications to the intersection that will increase pedestrian safety and usability. This team should be empowered to implement the temporary measures described above.

Near Term (within the next 12 months):

7. Make temporary lane reductions more permanent by using concrete section barriers to introduce protected bike lanes or walk areas.
8. Replace the temporary lighting structure at the northwest corner of the intersection with a permanent solution, likely an improved or additional streetlight.
9. Work with Denver Parks and Recreation staff to expand their existing revitalization project to more of the barren medians alongside Quebec Street, with the end goal of turning these prairie-style meadows into productive civic spaces such as parks and exploring infill development opportunities.

Long Term and Systematic:

10. Redesign Quebec Street by consolidating all traffic to one roadway between 29th Avenue and where current Northbound and Southbound Quebec Street rejoin after Smith Road, near I-70.
11. Partner with city and county government officials in transitioning existing medians and infrastructure into housing. This may include:
    a. Supporting (or volunteering with) the existing House1000 homelessness alleviation initiative that will convert the 4040 Quebec Street DoubleTree Hotel into a facility providing services for 450 individuals across 289 units[3].
    b. Selling off the existing medians to developers and working with them to build affordable housing that facilitates greater connectivity between the Northeast Park Hill and Central Park communities.

Concluding Statement

The series of design flaws present along Quebec Street and at the crash location are dangerous for Denver community members. As was the case with the Stapleton airport, it is not uncommon for U.S. transportation systems to leave dangerous circumstances in their wake when development patterns change. Design emphasis that prioritizes traffic flow at high speeds over non-motorist safety and usability has caused injuries and deaths in communities across Colorado and in locations throughout North America.

[3] Learn more about the House1000 initiative here.

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. In Denver, we believe substantive changes to this intersection should prioritize pedestrian safety alongside roadway usage by motorists.