By Transforming a ‘Stroad,’ Denver Can Move Forward on a Safer, More Inclusive Transportation System

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Safety-focused Lincoln Street redesign: Dedicated, red-paint bus lane, traffic-calming lane reduction, bollards, and pedestrian improvements create the conditions for a people-focused multimodal thoroughfare.

Like many rapidly growing cities across the United States, Denver wrestles with its car-prioritized legacy of interstate building and exit expansions through its increasingly traffic-snarled communities. Just off the Lincoln/Broadway exit today, the dangerous, multilane urban arterial roadway we know as Lincoln Street whisks cars as quickly as possible from I-25 into downtown. Not surprisingly, drivers take full advantage. They speed—and they crash—placing Lincoln in the High Injury Network.

Fortunately, Denver has adopted a Vision Zero Action Plan and has started to build out multimodal networks to address its growing traffic crash rate, dedicating bus lanes along downtown and adjacent streets such as Broadway. However, there is one last piece of the puzzle in this transit-oriented area that needs a safety-centric touch: that unique, urban, and mostly residential segment from I-25 to Speer, considered Baker on the west side and Washington Park West on the east side.

Today, it’s a car-centric “stroad”—a unproductive, unsafe hybrid of a street and a road, on the brink of decline in some areas. But, with a few improvements to the Corridor to increase access and safety for those walking, cycling and taking transit, it can be transformed into a community-first place worth arriving at.

Before Proceeding Forward, Let’s Take a Look Back at Denver’s Transit History
Lincoln Street today, facing north, just off the I-25 exit off-ramp. Though this is a transit-rich area, walking here is dangerous since buffer zones to protect pedestrians have been removed to ensure interstate traffic is whisked quickly downtown.

At one time, Lincoln, Broadway, and the surrounding areas were served by a robust streetcar system with walkable streets. But when I-25 was built and expanded, Lincoln and Broadway were converted to one-way and coupled for the sole purpose of moving interstate traffic, and remain that way today. The tree lawns on Lincoln Street, which were originally as deep as nearby streets such as Sherman and Grant, were removed to add car lanes, turning it from a narrow residential street into major thoroughfare with a highway-style design.

This history is important to consider, as it’s made an indelible mark on the landscape of the street we see today. Bus stop amenities are poor in many places, as there is not enough right-of-way space, particularly between the I-25 exit and Alameda, to install them, much less offer a safety buffer zone from speeding vehicles. In fact, these areas are listed as having an “inferior” site amenity in the Denver Assessor Records.
A walk down Lincoln today reveals just how much the street prioritizes cars over people. Drivers regularly travel at speeds well above the posted speed limit of 30mph—typically in the range of 40-50mph, and higher at night. Holding a conversation with another person with street noise at 75-80 decibels is a challenge. Vibrations from fast-moving heavy vehicles such as buses can be felt in adjacent structures, particularly where tree lawns were removed and the distance from doorways to speeding vehicles is minimal. While attempting to access grocery stores, shops, bus stops and light rail, or simply taking a stroll down the street, pedestrians are dodging cars, even in crosswalks. Cyclists have taken to riding on the sidewalks to stay safe.
The wide, multilane, one-way configuration characteristic of city streets like Lincoln creates the conditions for dangerously high speeds and too many opportunities for drivers to “jockey for position,” writes walkability expert and city planner Jeff Speck in *Walkable City Rules: 101 Steps to Making Better Places*. In fact, Denver’s crash statistics support this. According to Denver Vision Zero data, there are four historically dangerous intersections at Virginia, Ellsworth, 5th and 6th along the Corridor. In addition, there is a growing hot spot at Dakota and Lincoln, according to more recent data from the Denver Accident Map. These crashes continue, despite the Denver Police Department’s automated enforcement strategies.

**Dangerously High Speeds and Crashes Place It in the High Injury Network**

To make matters worse, crashes on Lincoln typically end up on the sidewalk, on people’s front lawns, through people’s fences, and at one cross-street (5th), in death. Not only is the Corridor unsafe for people living on it, it’s unsafe for people moving through it.

Crashes on Lincoln occur during all times of the day and often jump the curb, threatening the safety of people walking to transit, waiting at a bus stop, or simply sitting on their front porch. East-west turning conflicts, combined with drivers jockeying for position while heading north across multiple lanes, contribute to the increasingly chaotic, dangerous conditions.
Not surprisingly, research shows that one-way street designs can be more dangerous for kids than two-ways, making this problematic for families with young children growing up on the street. In addition to high traffic speeds, some of Lincoln’s hot spots exist because of left-turn conflicts, a characteristic of development built along a highway, according to Transportation for America’s report, The Congestion Con: How More Money and More Lanes Equals More Traffic.

While the problems of Lincoln’s dangerous design are numerous and complex, the solutions are already laid out in city plans: Blueprint Denver and Denver Moves: Transit.

**Combining Blueprint Denver and Denver Moves: Transit to Create a Safer “Complete Street”**

By reclassifying streets, Blueprint Denver communicates a key distinction between Lincoln and its one-way couplet partner, Broadway. While Broadway maintains its commercial thoroughfare status as a Main Street Arterial, Lincoln Street is reclassified as a Residential Arterial. This new classification takes into account the adjacent land use, and implies that Lincoln’s street design be similar to parallel north-south Residential Arterials in the area, Logan and Downing. Both of these streets are considered thoroughfares like Lincoln, yet they have two general purpose travel lanes instead of three, two-way traffic flow, and traffic calming elements such as medians and buffer zones with tree lawns and/or parking.

Lincoln Street, however, is unique: as part of the Lincoln/Broadway Corridor, it is also considered a High Capacity Transit Corridor by Denver Moves Transit. This means it’s a candidate for Bus Rapid Transit or rail, each of which require full bus or rail stop amenities.

Fortunately, implementing the goals of each of these documents is straightforward and in line with the City’s goals for Complete Streets Design, which are the city’s new “guiding principles for the city's public right of way, detailing how we allocate space to transportation, utilities and other public infrastructure.” Lincoln Street’s general travel lanes can be pared down from three to two, to bring it inline with its new street classification. To meet the city’s transit goals for the street, another lane can be dedicated for bus service. And the final lane—which was removed in the past to move cars and currently is a multi-purpose, difficult-to-manage “flex lane” that splits bus hours with car parking—can be permanently transformed into a transit-friendly, easy-to-manage buffer zone.
Red Carpet Lincoln: Dedicated Offset Bus Lane to provide adequate space for shelters, a buffer zone for a variety of parking types, mixed with in-street tree planters, bollards to limit curb-jumping from crashes, and an asphalt overlay to ensure the longevity of the red paint.

The advantages of this new transit-friendly configuration are numerous. First and foremost, repurposing a general travel lane for dedicated bus service reduces delays created by car congestion. This is true in cities across the United States, and has already been proven true in Denver—on Broadway, in fact, which, according to the Denver Department of Transportation and Infrastructure, “resulted in faster travel times and a ridership increase.”

For Safety, Dedicate It and Paint It Red

Tactical transit lanes, which are more affordable than full-scale Bus Rapid Transit projects, show research-demonstrated promise in terms of improving safety. In fact, corridors with “red carpets” for buses in San Francisco saw 24 percent fewer crashes that resulted in injury. This is not surprising, of course. Not only are street lane roles more clear to drivers and limit their ability to jockey for position, repurposing a lane for the bus effectively narrows streets, calming traffic. To paint tactical transit lanes red, it turns out, it’s best to do it on asphalt, rather than concrete, which wears away sooner. This has implications for the Lincoln/Broadway Corridor, a large portion of which is concrete.

Implement Offset Lane Configuration for People-Friendly Space Allocation and Vibration Reduction

If we dedicate a lane for buses, where should it be placed on a primarily residential street that is at its max in terms of buffer space? The answer is simple and already established: an Offset Transit Lane, also called a “floating” or “parking adjacent” lane. This lane configuration places buses in the right-most travel lane but are offset from the curb by street parking, curb extensions, or raised cycle tracks. For Lincoln, this offers the opportunity to create a safety buffer zone with permanent bus stop amenities by extending curbs to provide space for shelter amenities. It also allows for a more nuanced approach to parking here: some car and scooter parking mixed with bike parking to serve the Community Bikeway connections in the area, combined with in-street placemaking buffer elements similar to the Sante Fe Streetscape project and bollard installation where the tree lawn is nonexistent.
Moving the bus away from the curb also addresses the problem of vibrations to adjacent structures, which have prevented bus lane hours expansions in the past. According to a 2000 study of the environmental impact of vibrations on buildings, buses were found to be responsible for a high level of vibrations to adjacent structures, more so than trucks. These vibrations were recorded to be greater at the midpoint of a 2nd story structure, suggesting that increasing building heights won’t solve the issue. According to the study’s authors, “when a building is subjected to vibration for many years, fatigue damage (i.e., that caused by repeated loading) may occur if the induced stresses in the building are high enough.” To mitigate these potential destructive impacts, they suggest “increasing the distance between roads and houses” as a practical strategy, as well as “control of traffic flow and speed.”

By reclaiming some of the original tree lawn space to add separation between structures and the street, and repurposing a lane for dedicated, extended-hours transit to establish street lane clarity with traffic-calming benefits, the Offset Lane offers a workable, sustainable solution. Additionally, improving traffic signals and intersections along the Corridor can provide traffic flow control and speed mitigation.

**Improve Intersections: Pedestrian-Friendly Signals, Crosswalks and Daylighting**

Between I-25 and 5th along the Lincoln Corridor, there are too few traffic signals to regulate traffic flow or provide safe crossing opportunities for pedestrians to access transit. Typically, crashes on Lincoln are a result of drivers turning into each other’s lanes, and many drivers proceed through crosswalks that pedestrians are occupying.

In addition to adding new traffic signals at key conflict spots and retiming them to enforce slow speeds, all current and future signals can implement daylighting, protected left-turn signals and pedestrian-friendly leading intervals, not only to help regulate a safer traffic flow, but to encourage people to access transit and area amenities on foot, rather than by car.
Intersection Improvements for crash hot spot at Virginia & Lincoln: Clarify and limit turning movements and add curb extension and buffer elements, in addition to a leading pedestrian interval and protected left turn signal.

According to the Denver Vision Zero Action Plan, restricting parking near intersections, also called “daylighting,” has been shown “to reduce crashes by 30 percent and decrease aggressive driving.” Ample daylighting opportunities exist along Lincoln street and its east-west cross-streets to clear visual sight lines for all types of vehicles, including buses.

Additional, low-cost visual improvements include simply adding painted crosswalks, especially where there are curb ramps to local businesses across the street or pedestrian-to-transit pathways where people are currently dodging speeding cars.

A Transit Corridor Designed at Human Scale Can Help Save RTD by Increasing Ridership

It is no secret that RTD is struggling, and even more so in our current COVID era. Simply put, to survive, RTD needs riders to choose the bus and light rail over cars, particularly along popular routes in denser downtown areas of Denver. We simply cannot take a step backward in our progress towards a more inclusive, safe transportation system. At the very least, to opt out of cars and choose transit, people need:

- Adequate on-street space for safe social distancing while waiting, walking or cycling to transit
- Frequent, reliable service that allows people to comfortably spread out within buses and light rail vehicles across the system
To get larger numbers of people out of their cars and sustain our urban transit system long-term, we need to go a step further by designing it for human beings. I’ll leave this with some questions for consideration. Would you rather:

- Cross several lanes of speeding vehicles to access a bus stop or light rail station, or two lanes of slower-moving cars?
- Stand at a bus stop just a foot or two away from drivers whizzing around corners, or wait in an area with adequate curb space under a protective shelter?
- See fewer speeding cars on Denver’s streets—including residential local streets which are fed by busy collectors and arterials across the urban street grid—or more cars, more speeding, more crashes, and more deaths?

To address transportation pollution impacts and rising traffic deaths head-on, we need to make the entire experience of transit something that large numbers of people can safely and comfortably opt into. That means we need to invest in repairing the urban spaces that have been cut away in the past to move cars, and redesign our public streetscapes for people so they will choose healthier, safer modes.

The time to do this is now by replacing travel lanes with lower cost tactical transit lanes. Only when we take that step forward, will we see a safe, sustainable future for moving people in, out, and around Denver.