

FINAL MEMO: ENVISION THE FUTURE

Introduction

This assignment focuses on 2.5 miles of Mountain Avenue in Tucson, AZ, from Speedway to Prince. In the larger context, it is a popular route for cyclists as it connects the university with the Rillito River Path and, ultimately, the Loop with its 130 miles of trails and paths. This memo will summarize the existing corridor and highlight future strategies that can be implemented to make it more bicycle and pedestrian-friendly.



Figure 1. Mountain Ave runs through Midtown Tucson from the UA north. Source: Google Maps

The defined corridor runs directly through or adjacent to 7 distinct neighborhoods: *North University, Jefferson Park, Mountain 1st Ave, Samos, Hedrick Acres, Mountain View, and Richlands Heights West.*

Summary of Existing Corridor

Existing Conditions

The corridor varies from a two-lane road near campus to the section from Ft. Lowell to Prince with raised medians in areas where space allows. This median design helps calm traffic by ensuring that Mountain stays relatively narrow. As Jeff Speck discusses in *Walkable City Rules*, people are likely to slow down when faced with unfamiliar/unknown traffic elements, whether it is new construction, new lane striping, or anything on the road out of the ‘norm.’

Throughout the corridor, there are consistent bicycle lanes on both sides with brick paver borders and concrete sidewalks. There is also a TUGO Bikeshare station at the Copper St intersection. However, cyclists face dangers from drivers parking in the bicycle lane, thinking a bicycle lane is a turn lane at minor intersections, and in some cases driving down the bicycle lane. The Cat Tran bus puts cyclists at risk when it merges into the bicycle lane to reach a stop. The curbside pull-out is not wide enough to clear the bus from the bicycle lane.

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There is good lighting between the University and Salpointe Catholic High School; however, the lighting becomes minimal further north, creating a stressful experience for pedestrians. Additionally, pedestrians may have to move around garbage and recycling cans on pickup days. Often, many homeowners put their bins in the middle of the sidewalks.

Regarding ADA users, there seem to be consistent ramps at every intersection and smooth driveway crossings. One potential issue is the amount of tossed gravel on the sidewalks, particularly around gravel driveways. There are plenty of ramps and space for a wheelchair under the cover to shelter from sun or rain near bus stops. The presence of garbage and recycling bins on the sidewalks also poses a issue for ADA users.

Finally, someone driving down Mountain may experience rough pavement and a 25 to 30 MPH speeds. However, the inconsistent speed limits often lead to speeding, and the faded marking on the road surface can lead some drivers to drive in the bicycle lane.

Zoning Designations

The North University area is designated as R-2 zoning until Chauncey Ln. From there to Grant, Jefferson Park is zoned as NR-1, indicating a Neighborhood Preservation Zone. This historic designation allows for special parameters to maintain the streetscape. Samos is designated as R-1 until Salpointe Catholic HS, while Mountain 1st Ave and Hedrick Acres are defined as R-2. Continuing north, the Fort Lowell intersection contains C-1 and O-3 zoning, with the corridor returning to R-2 up until the Prince intersection that is also zoned C-1. Besides those two intersections and the high school, the entire corridor is residential land use.

Traffic Volume

The entire length of Mountain Ave from Speedway to Prince is two-way and one-lane each direction, except for turn lanes at some major intersections. Pima Association of Governments

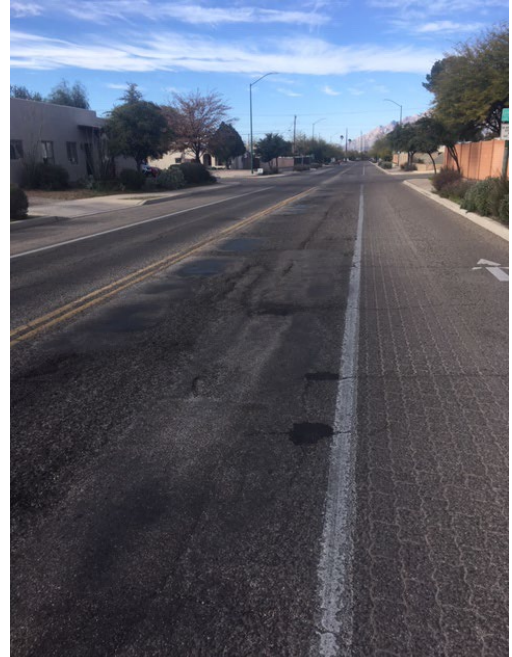


Figure 2. An example of the rough pavement and faded brick pavers north of Grant.

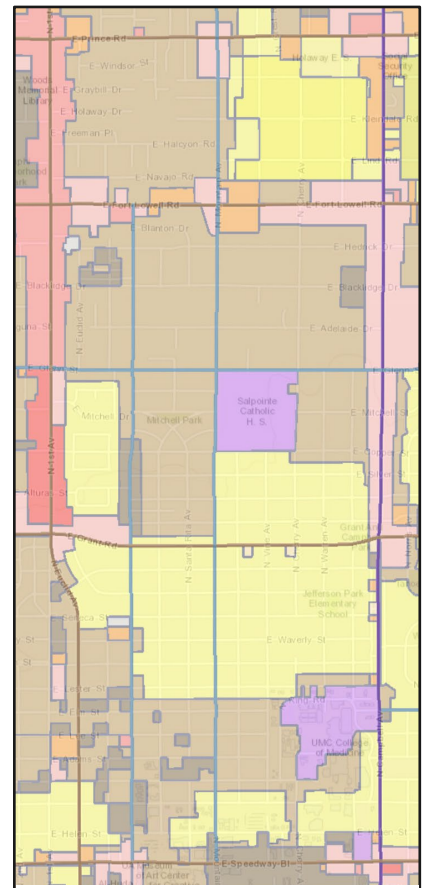


Figure 3. City of Tucson Zoning for Mountain Ave.

(PAG) traffic counts indicate 8,247 annual average daily traffic (AADT) near the UA down to 6,806 near Prince Rd. According to ADOT, Mountain Ave is classified as a major collector within the overall Tucson road system. It is critical to note that portions of the corridor south of Ft. Lowell are designated as an emergency route for emergency vehicles. This restricts the ability to incorporate traffic calming aspects.

PAG Bicycle Counts show 388 at Mountain and Helen in 2019 and 319 further north at Blacklidge. These high counts demonstrate how Mountain Ave is a leading bicycle route for students at the university. It is of utmost importance that this road accommodates cyclists.

Safety

There are not many notable safety features along this corridor. As mentioned, the bicycle lane is buffered from the travel lane with brick pavers. However, these are heavily worn down in many locations south of Ft. Lowell. At the intersection of Grant Road and Mountain Ave, the bicycle lane is separated from the traffic lanes by flexible poles, and the pavement is painted green to draw attention to cyclists' presence. This green paint treatment appears again at Glenn and Mountain. Near Salpointe High School, there is no clear school signage, leading to drivers obstructing the bicycle lane or using it as a right turn lane. As mentioned earlier, the lighting quality decreases north of Ft. Lowell, creating unsafe conditions for walking or cycling.

There are turn restrictions at Grant and Mountain, with right turns prohibited from northbound Mountain onto Grant. Left turns are restricted from Mountain during AM and PM rush hours in both directions. However, drivers frequently ignore these signs and restrictions, leading to traffic delays, near misses, and dangerous conditions for people walking or cycling.

The city recently installed small signs in the median of Mountain between Speedway and Grant at crosswalks reminding drivers to yield to those



Figure 4. An example of a driver ignoring the no left turn. The driver behind darted to the right, cutting off a cyclist

crossing. Many of these signs show signs of being hit and bent by drivers.

Crash Data

The Tucson Police Department has provided data for 440 traffic incidents between 8/20/2012 and 6/21/2020 within the Mountain corridor.

Overall, 58 out of the 440 incidents (13%) are labeled as hit-and-runs, with 38 occurring in or near intersections. For hit-and-runs leading to injuries, 10 happened among motor vehicles, 8 involved bicyclists, and none featured pedestrians. According to Curt Prendergast (Arizona Daily Star), there was one recent bicycling fatality in 2016 at Ft. Lowell and Mountain. The number within or related to intersections was 6 for both motor vehicles and bicycles. The remaining hit-and-run figures were primarily attributed to property damages that did not lead to injuries (31 for motor vehicles and 2 for bicycles).

A total of 221 non-fatal injuries were reported during the period. Of these, 23 involved pedestrians, with all but one within or related to an intersection. Bicycles were included in 55 crash-related injuries, with 45 associated with intersections. The remaining 60% of non-fatal injury cases were exclusive to motorists (132), with 12 remaining cases being labeled as either *other* or *unknown*. Overall, 162 of the 221 injury crashes were located either in or near an intersection (73%).

Of the 221 crashes featuring injuries, 38 required a transfer to immediate medical care. Pedestrians accounted for 6, with all but one being at the Speedway or Helen intersections. Bicyclists made up 11 emergency trips (8 within and 3 related to intersections) and motorists the remaining 21 trips (12 associated with intersections).

Future Vision

Many of the issues seen along the Mountain Avenue corridor stem from high traffic volume and high traffic speeds. A simple solution is the addition of speedbumps or other traffic slowing measures (like the ones present on many streets in Tucson). However, there is a reason for their absence: Mountain Avenue is a secondary emergency route for ambulances and emergency vehicles. Due to this designation, there cannot be any traffic calming measures. The blocked measures include, but are not limited to, chicanes, speedbumps, and four-way stop signs. However, with improvements to Elm Street and Ring Road at UMC, it may be possible to re-evaluate the need for this designation on Mountain and remove it or move it to another road such as Park Ave.

In the meantime, while we cannot opt for blatant traffic slowing devices, there are several steps the city can take to improve conditions.

Pedestrian Improvements

Poor Quality Crosswalks

The crosswalks between Speedway and Grant have faded markings and pavers. The striping has been worn down and needs to be repainted. The city should remedy this immediately as this is a quick and easy improvement.

Light-up Crosswalks

There is a serious need for signage for predetermined crossings. The signs placed at crosswalks in the median between Speedway and Grant are good, but more can be done. One idea is light-up signage and crosswalks for increased safety after sundown. Pedestrians use a signal button to initiate lighting at an established crossing, alerting motorists of pedestrian traffic. The signal sign and the crosswalk itself would be lined with LED lights that only flash when pedestrians press the signal button.



Figure 5. An example of a lighted crosswalk

Bicycle Improvements

Protected Bicycle Lanes

There are frequent bicycle accidents at the Grant Road and Mountain Avenue intersection, where turning cars have hit cyclists because drivers were not paying attention. This problem has also been identified in many intersections between Lester and Speedway Blvd and at Ft. Lowell.

In other areas of the city experiencing similar issues, implementing green boxes with bollards helped reduce accidents. Additional green paint along Mountain Ave at intersections could remind drivers to watch for cyclists. However, there is a need for more than paint. The City of Flagstaff implemented bollards with concrete curbing, allowing turns onto driveways (Figure 4). This design is highly recommended for Mountain Ave.



Figure 6. Example of a curb protected bicycle lane with driveway gaps on Butler Ave in Flagstaff.

Protected Bicycle Intersection

The intersection of Grant Rd and Mountain Ave would benefit from incorporating a Dutch-style intersection as a part of the Grant Rd RTA project. This design provides a protective island for bicyclists navigating through the corridor and forces traffic to make wider right-hand turns.

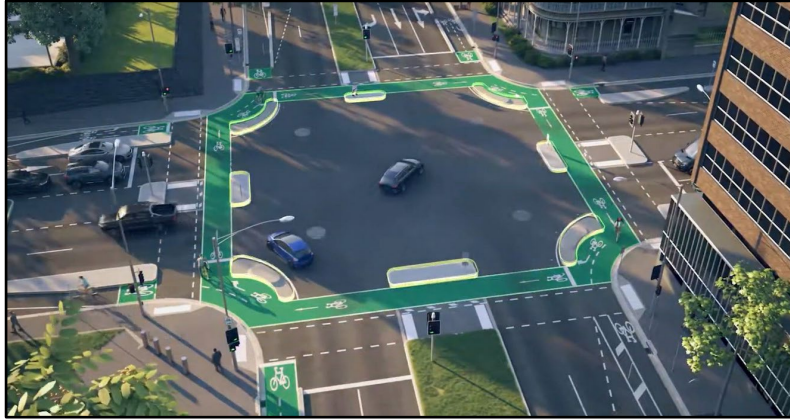


Figure 7. Example of a protected bicycle intersection (CyclingTips).

Other Improvements

Consistent Speed Limits

One simple improvement is lowering the speed limit to 25 MPH from Speedway to Ft. Lowell. Doing so makes the entire corridor the same speed and could slow drivers down closer to campus where there are more crossings. Flashing speed limit signs are another option to catch drivers' attention.

Roundabouts

Since intersections with Glenn Rd and Helen Rd are located within a school zone along this heavily-traveled corridor, it could be beneficial to incorporate roundabouts to control traffic. Initially, raised crosswalks were discussed as ideal traffic calming devices; however, these are not allowed on emergency routes. Roundabouts are allowed and could incorporate the flashing pedestrian signals and crosswalks as previously discussed. This design would alert motorists of crossing pedestrians from every direction of traffic while allowing emergency vehicles to navigate the corridor as needed quickly.



Figure 8. Example of a roundabout with mountable center curb and lighted crosswalks.

Traffic Routing

Many residents have reported that the 2nd Street Parking Garage and Highland Garage contributes to most of the rush hour traffic on Mountain. Those walking notice that many cars frequently do not stop for pedestrians trying to cross the street. Forcing outgoing garage traffic towards Campbell or Park could help reduce the traffic volume on the Mountain Corridor.

Additionally, the Grant intersection has been experiencing substantial traffic back-ups due to the lack of left-turn support (as well as no left turns allowed at peak times during the week). It is unclear if left turns will be allowed from the design renderings on the Grant Road Project website (see: http://www.grantroad.info/pdf/Grant_5-6_30_Plans.pdf page 77). Diverting garage traffic to Campbell or Park would lessen congestion at Grant Road.

Conclusion

Mountain Avenue is a corridor with a lot of potential for improvements for walking and cycling. Much of the congestion stems from university-related parking and the high school. Forcibly diverting this traffic flow towards Park or Campbell is an option for the city to consider if it wants to make Mountain a model biking corridor. Doing so would help lower traffic numbers and ease congestion at some intersections.

The biggest obstacle to changing the corridor is its designation as a secondary emergency route. It is unclear if or how this designation could be changed. The status prevents traffic calming measures (such as speed bumps and 4-way stops) that could make it more bicycle and pedestrian-friendly. However, even with this designation, options are available to make the cycling experience more comfortable and enjoyable for everyone. Immediate and easy improvements include setting a consistent speed limit of 25 MPH and refreshing the paint at

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crossings. More costly improvements include implementing lighted crosswalks, roundabouts at Glenn and Helen intersections, implementing a protected bicycle lane, and building a protected bicycle intersection at Grant. While much of the infrastructure fares well compared to the rest of the city, more can be done to ensure that Mountain becomes less stressful, more community-oriented, and safer overall.

References

Arizona Department of Transportation Road Classification:

<https://apps.azdot.gov/files/maps/functional-classification/cities-towns-places/tucson-fc-map.pdf>

City of Tucson Zoning:

<https://gisdata.tucsonaz.gov/datasets/zoning-city-of-tucson-open-data/explore?location=32.245244%2C-110.948267%2C15.42>

PAG Bicycle Counts:

<https://gismaps.pagnet.org/bikepeddataexplorer/Map.aspx>

PAG Traffic Counts:

<https://pag.public.ms2soft.com/tcds/tsearch.asp?loc=Pag&mod=>

Prendergas, C. (2016). "Tucson Bicyclists Dies from Injuries after Wreck Last Week." *Arizona Daily Star*. https://thisistucson.com/news/local/tucson-bicyclist-dies-from-injuries-after-wreck-last-week/article_b2a6a52e-4d34-11e6-9fd1-2f08e8fecca5.html

Speck, J. (2018). *Walkable City Rules: 101 Steps to Making Better Places*. Island Press.

Tucson Police Department Crash Data:

<https://www.arcgis.com/home/item.html?id=f83a509e59f045eda63750f665a3b002>

Image Sources:

Figure 1. Google Maps

Figure 2. Faded pavement markings at Grant and Mountain. Joey Iuliano

Figure 3. City of Tucson Zoning: <https://gisdata.tucsonaz.gov/datasets/zoning-city-of-tucson-open-data/explore?location=32.245244%2C-110.948267%2C15.42>

Figure 4. A near accident at Grant and Mountain. Joey Iuliano

Figure 5. Lighted Crosswalk: <https://www.tapconet.com/product/in-road-warning-light-system>

Figure 6. Protected Bicycle Lane in Flagstaff, AZ. I Bike Flagstaff:

<https://www.facebook.com/groups/ibikeflagstaff/>

Figure 7. Protected Bicycle Intersection: <https://cyclingtips.com/2019/11/melbourne-is-getting-its-first-dutch-style-protected-intersection-for-cyclists/>

Figure 8.

Special thanks to Joan Hall of Jefferson Park for highlighting the community concerns and suggestions for improvement regarding the corridor.

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