

# Designing Streets for Pedestrians & Bicyclists

**Michael Ronkin**

**1602 Center St NE Salem OR 97301**

**541-914-1401 [michaelronkin@comcast.net](mailto:michaelronkin@comcast.net)**



**1413 S. Howard Ave. • Suite 206 • Tampa, FL 33602**

**813.254-7708 • [www.livablestreetsinc.com](http://www.livablestreetsinc.com)**

## **University Avenue Project (Lamar Boulevard to Bramlett Street) Plans:**

The major topic for discussion for the University Avenue project is whether this section of roadway could be converted from 4 lanes to 3 lanes ("road diet") by restriping the roadway with one through lane in each direction, a two-way left turn lane, and bike lanes on each side of the street. In the westbound direction, the two through lanes would merge downstream of the Bramlett/18<sup>th</sup> intersection. At the approach to Lamar Boulevard, the two-way left turn lane would become a dedicated left-turn lane to turn onto Lamar Boulevard. In the eastbound direction, no merge is necessary, since the 2<sup>nd</sup> through lane currently begins at the intersection of Lamar Boulevard. At the approach to the Bramlett/18<sup>th</sup> intersection, the single through lane should diverge into two through lanes prior to the intersection, to allow for two lanes of vehicle storage at the signalized intersection. There are several issues related to this possible change to the project:

- **Capacity and motor vehicle level of service:** This section of University Avenue currently carries about 15,000 vehicles per day. At this volume, four- to three-lane conversions typically result in no reduction in capacity or level of service. However, a basic traffic study is recommended prior to making the conversion. In general, signalized intersections are where capacity concerns are most important. As described above, this conversion will not change the number of approach lanes at the two signalized intersections at the ends of this project. So the level of service at these intersections will be roughly the same as the existing condition as long as the lane development at each intersection provides enough length to provide good utilization of all approach lanes. The primary possible negative effect on traffic congestion is during peak traffic times, when queue lengths at each intersection may be longer than today. Based on staff descriptions of today's traffic conditions, traffic backs up a fair amount at each of these intersections during the peak, with queues too long to be cleared during an individual signal cycle. With slightly longer queues created by the lane reduction, traffic may back up further, potentially affecting traffic operations at other intersections. However, there is a potentially positive effect of longer queues. Longer queues are likely to discourage use of University Avenue, as drivers seek alternatives (which are available in this gridded section of Oxford), which could reduce travel demand and improve vehicle level of service.
- **Left turn safety at Lamar Boulevard:** Based on our observations of University Avenue, eastbound and westbound left-turn conflicts at Lamar Boulevard are a key safety concern. These two left-turn lanes are offset by nearly a full lane width, creating a potentially hazardous conflict: when drivers in both directions are waiting to make permissive left turns at the same time (on the green ball signal phase), their view of oncoming through traffic is blocked by the opposing vehicle. This can result in severe, high-speed right angle crashes with oncoming traffic in the adjacent through lanes. A review of crash history at this intersection will likely show crashes of this type. The proposed road diet will reduce this offset by at least 5 feet, greatly improving sight lines for opposing vehicles waiting to make a left turn, and providing a safer intersection. Changing the signal phasing to "protected only" would also help resolve this crash type, though it would add delay. The offset for westbound through vehicles at Lamar Boulevard would also be reduced, simplifying this intersection and reducing the likelihood of fixed object crashes on the northwest corner of the intersection.
- **Left-turn conflicts at unsignalized locations:** A similar problem exists at locations on University Avenue where motorists may be making turns from University Avenue into closely spaced driveways or minor intersections, which do not need to be directly across from each other for sight lines to be compromised. University Avenue has many driveways, and crashes resulting from left-turn sight line obstructions are very likely in this corridor. A related problem exists for vehicles crossing University Avenue or turning left onto University Avenue at unsignalized intersections and driveways. When waiting for upcoming traffic signals to turn green, drivers in the outside lane on University Avenue sometimes stop to allow drivers exiting driveways or streets to turn onto or cross University Avenue. Crashes are likely to occur between these drivers and approaching drivers in the inside lane. With only one through lane in each direction, these crashes are less likely to occur.

- Travel speeds: One of the major advantages of a road diet is the reduction of top end travel speeds. In the existing condition (two through lanes in each direction), drivers are able to pass each other at high speeds. With only one lane in each direction, prudent drivers set the speed. As a result, overall speeds are slower and more consistent, which enhances safety for all users.
- Pedestrian safety and accommodation: Bicyclists benefit from the addition of bicycle lanes, and there are significant benefits for pedestrians as well. For example, the bike lanes buffer the sidewalks from motor vehicle traffic. But the most significant benefits are for pedestrians who want to cross the street. Under the existing conditions, pedestrians have to look carefully in both directions to ensure it is clear to cross the street, and have to cross all four travel lanes at once if they don't want to be stranded on the double yellow centerline stripe. Pedestrians also face potential "multiple threat" crashes, where they have difficulty seeing past a stopped vehicle in one lane, resulting in a conflict with vehicles in the next lane. With the road diet, pedestrians only need to cross one through lane in each direction; the center lane generally only has slower-speed left-turning traffic. The center turn lane can provide opportunities to add short segments of raised median, providing a true refuge: this allows pedestrians to look in only one direction of traffic at a time. In the short term, the frequent driveways may make it difficult to identify appropriate locations for a refuge. But as properties on University Avenue redevelop, driveways should be consolidated and/or eliminated, allowing for placement of raised medians in the future.

The reconstructed sidewalks are a nice enhancement for pedestrians. There are a few details that are important to consider during the construction:

- The sidewalk ramp detail shows a 12% slope. The maximum allowable slope for accessibility is 8.3% (1:12). In addition, this detail shows the ramp connecting to the street at an angle other than 90°. Grade breaks are not allowed to take place at other than right angles. To remedy this situation, a right angle grade break should be made at the point where the ramp first contacts the curb and a triangular landing (2% maximum slope) should be placed in the remaining area.
- The concrete driveways must meet accessibility standards. The detail sheets do not show a driveway detail that matches the designs shown on the plan sheets. Because the planter strip between the curb and the sidewalk is so narrow, the correct solution is to drop the sidewalk to street level at the driveways, with no more than 2% cross slope. The plan sheets show a design that appears to meet these recommendations, but without a detail showing the slopes, the contractor may not build the driveways correctly. This can be dealt with by employing good construction management and inspection during the construction phase. The "ramps" down to the driveway aprons should be similar to the sidewalk ramp design described above. However, detectable warnings are not required at unsignalized driveways.
- There are other driveway design details that could be used at some of the driveways on this project. Where the area immediately behind the sidewalk is not being used for parking at a business, the sidewalk could be set back at the driveways. A 4-foot setback would allow for the driveway slope to take place in the setback, leaving the sidewalk at full height at the back of the sloped driveway apron. This design reinforces the notion that drivers are crossing the sidewalk, encouraging them yield to pedestrians as required by law. In addition, the driveway radii of 10 to 15 feet are too large for minor driveways. If the 4- to 3-lane conversion is made, the radii could be much smaller, as the bike lane provides additional maneuvering space, increasing the effective radius for vehicles turning into the driveways. Radii as small as 5 feet, or a simple angled "wing" would be possible. Smaller radii further encourage drivers to respect the sidewalk and appropriately yield to pedestrians.
- In general, it would be better if the entire sidewalk could be set back near the right-of-way line. Many locations on this project have private driveways and/or parking areas located on the public right-of-way. This makes it politically difficult to set the sidewalk back in these areas. However, the sidewalk does not need to be placed at the same setback from the curb throughout the entire project. There are some locations along University Avenue where the right-of-way is not in private use and the sidewalk could be set back as part of this project. This may be difficult to accomplish since the project has already been bid, but a change order could result in a much more comfortable and usable sidewalk. As mentioned above, a setback sidewalk makes it easier to

build the concrete driveways in an accessible manner as well. Even if this change is not to the project, the city should look for opportunities to have the sidewalk reconstructed in the better location as the properties along University Avenue redevelop.

- Many of the proposed ramp, sidewalk and driveway details recommended above can be found on line. The Oregon DOT has a wide variety of options that can be used for the situations found on this project:

[http://egov.oregon.gov/ODOT/HWY/ENGSERVICES/roadway\\_drawings.shtml#Roadway\\_700\\_Curbs\\_etc](http://egov.oregon.gov/ODOT/HWY/ENGSERVICES/roadway_drawings.shtml#Roadway_700_Curbs_etc)

Most applicable are RD 720-760. The latest information on national accessible sidewalk standards can be found on the Access Board website:

<http://www.access-board.gov/prowac/>