Road Diet Guide

Johnson Drive, Mission, KS

April 2017

Challenges on Johnson Drive

Johnson Drive is a major thoroughfare for traffic through Mission, as well as an active commercial street and home to dozens of small businesses that serve area residents. Recently, the street has attracted new businesses and new investment. **Johnson Drive's popularity is bringing more people and more traffic to the street.** With increased vehicle, foot, and bike traffic in the corridor, the City of Mission is interested in addressing:

Traffic speed

Many motorists drive along this stretch of Johnson Drive at higher than the posted 30 mph speed limit. This increases the likelihood of crashes, diminishes the business environment, and puts pedestrians at risk.

Pedestrian safety

Pedestrian safety and comfort is important in places where businesses depend on foot traffic. Recent streetscape improvements include enhancements for pedestrians, but traffic speeds and the safety of pedestrian crossings continue to be concerns.

Parking operations

The many businesses along Johnson Drive create a high demand for parking. Any solution to address traffic or pedestrian challenges will need to be balanced with demands for parking.

Business access

Any design of Johnson Drive should permit easy access to the businesses in the corridor. This means accomodating vehicle traffic while allowing for parking operations and pedestrian infrastructure.

Traffic Calming Solutions

An increasingly popular approach to addressing traffic concerns while fostering a pedestrian friendly environment is to implement "traffic calming" measures along a road. These measures are **designed to slow vehicle traffic in order to reduce crashes and increase safety and comfort for pedestrians and cyclists.** Traffic calming techniques can be classified into the following categories[1]:

Vertical treatments

These treatments use vertical elements in the street that force motorists to slow in order to comfortably traverse them. They include speed humps, lumps and tables; raised crosswalks; and raised intersections. The intersection of Johnson Drive and Woodson Ave is a raised intersection.

Horizontal treatments

These elements are meant to block and divert or slow vehicle traffic. They include mini traffic circles, roundabouts, lateral shifts, chicanes, and realigned intersections.

Road narrowing

These approaches are designed to slow traffic by extending curbs or center medians in order to narrow the vehicle travel lane. These have the added benefit of reducing crossing distance or providing refuge islands for pedestrians. The treatments include neckdowns or bulbouts, chokers, and center islands.

Other treatments

Additional less-intensive approaches can achieve traffic calming benefits, especially when used with other treatments. These include pedestrian crossing treatments[2], parking design[3], and restriping[4].

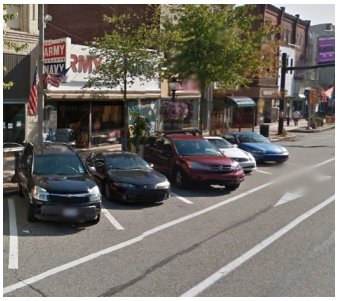
Source: FHWA


Source: FHWA


Source: FHWA


Source: FHWA


Source: FHWA


Source: Google Street View

Road diets

This traffic calming treatment typically involves converting a road from four lanes to three lanes, with one through lane in each direction and a center two-way left-turn lane, or TWLTL.

The treatment has been shown to slow traffic, reduce crashes, and enhance pedestrian safety. Road diets also open up additional space that can be used for bicycle facilities, widened sidewalks, or parking.

1 Institute of Transportation Engineers; FHWA, February 2008, p. 1
2 Transportation Research Board, *Improving Pedestrian Safety at Unsignalized Crossings,* Chapter 3
3 Project for Public Spaces, *Traffic Calming 101*
4 NACTO, *Relationship Between Lane Width and Speed Review of Relevant Literature*

What is a Road Diet?

Simply put, **a road diet is a reduction in the number of lanes on a road.** Most road diets are a conversion of four lanes to three lanes, although there are successful examples in many different configurations[5].

For a long time in the United States, a minimum of four lanes was the norm on major streets. Roadways were built to move car traffic and to move as much of it as possible. Often little space was left for pedestrians or bicycles.

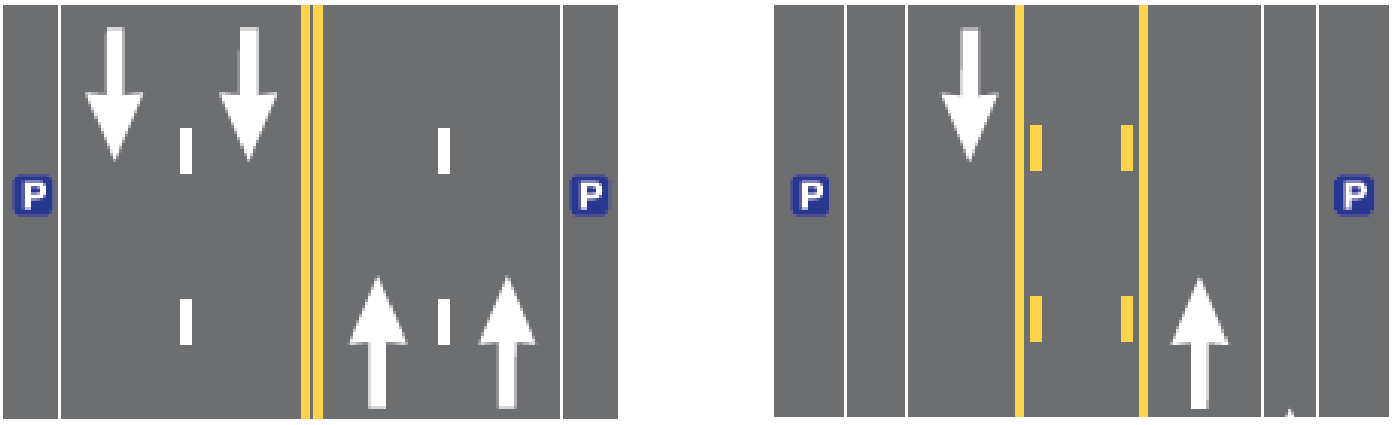
Recently, better pedestrian and cycling environments have become more desirable, and research has revealed that building more lanes doesn't necessarily result in the safest conditions for motorists. Traffic engineers and urban designers have increasingly turned to road diets as a low-cost way to adapt existing four-lane roads to meet shifting community desires and changing engineering standards[6].

How does it work?

In the case of a four lane road (with two travel lanes in each direction), a typical road diet works by converting four lanes to three: one travel lane in each direction and a center two-way left-turn lane, or TWLTL[7].

The design of a road diet reduces the potential for collisions. The center turn lane reduces conflicts between turning traffic and through traffic, while the fewer number of lanes overall reduces the number of potential conflict points for turning traffic and vehicles entering from side streets[8].

Most road diets take advantage of the new space created from lane reductions to add improved pedestrian infrastructure, bicycle facilities, and/or parking[9].



Before and after of a road diet conversion. The previous four travel lanes were converted to two travel lanes, a two-way left-turn lane (TWLTL), two bike lanes, and wider parallel parking lanes. Source: FHWA

5 Rosales, p.1. FHWA, *Road Diet Informational Guide,* p. 4; Kentucky Transportation Center, *Guidelines for Road Diet Conversions*, p. 1
6 FHWA, p. 5
7 See note 5
8 FHWA *Road Diet Informational Guide*, pp. 7-9
9 Rosales. p. 1-2

Road Diet Benefits

Done right, a road diet represents a cost-effective way to achieve a multiple benefits. The approach allows a city to feasibly **manage traffic speeds and volumes, as well as enhance multimodal facilities and foster more vibrant street life**.

- **Many road diets see reduced speeds and most result in less "aggressive" driving.**
- **Road diets reduce pedestrian crashes by as much as 80%.**
- **Road diets net an overall crash reduction of 19% to 47%.**
- **More room means bike lanes and other features can be added to a road diet conversion.**

As Easy as a Coat of Paint

Because road diet projects are mostly restriping of a street, they're a relatively low-cost approach to calming traffic – especially if they are implemented during a previously planned restriping or reconstruction project [16].

Calmer traffic

With just one travel lane in each direction, road diets often cut down on speeding vehicles, as all vehicles are forced to travel the speed of the lead vehicle[10]. Most case studies of road diets report less erratic, aggressive driving, as vehicles also cannot weave between lanes to pass slower vehicles[11]. Average speed can be reduced about 3 to 5 mph on average[12].

Better pedestrian environment

Slower and calmer vehicle traffic reduces the risk of crashes and severity of crashes, and produces a more pleasant experience for those walking. With a reduced number of travel lanes, a pedestrian has a shorter distance to cross and just one lane of traffic in each direction to cross at a time. Case studies show road diets reducing pedestrain crashes 19% to 80% [17].

Fewer crashes

Road diets consistently reduce the likelihood of a variety of crash scenarios and reduce crashes overal 19% to 47% [14]. On a four-lane road, left-turning traffic causes vehicles behind it to queue, producing a risk of rear-end collisions. Sideswipe crashes can occur when vehicles attempt to change lanes quickly to avoid queueing or avoid slower vehicles. With a road diet, the center lane and the elimination of a second travel lane reduce the risk of these types of crashes[15].

Room for more features

Reducing a four-lane road that is 40 feet wide to three lanes at 30-33 feet wide opens up space for additional features on the road. Many recent examples of road diets in urban and suburban settings include bike lanes as part of the conversion. Bike lanes and other features like new on-street parking can have an additional traffic calming effect[18].

10 FHWA, *Road Diet Informational Guide*, p. 7
11 Ibid., p. 7; Gates, p. 15
12 FHWA, p. 7; Gates, p. 11
13 FHWA, p. 9
14. Ibid, p. 6
15. FHWA, p. 7; Kentucky Transportation Center, p. v; Gates
16. FHWA, *Road Diet Informational Guide*, p. 28; Case Studies, "*Genessee Co., MI*
17. FHWA Road Diet Case Studies, "Wells Ave," "Stone Way," "Empire Blvd"
18. Project for Public Spaces, Traffic Calming 101, "Diagonal Parking"

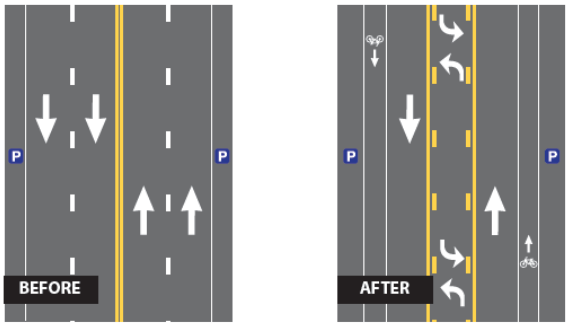
Road Diet Benefits to Business

Because road diets slow and calm traffic, business owners near a road diet often voice concerns that the project will affect the flow of customers to their establishments. However, case studies often show that road diets are ultimately well-received by the business community, who see safety benefits or increased customer traffic.

Ingersoll Avenue – Des Moines, IA

2 miles
Average Daily Trips: 11,000-17,000

In Des Moines, the business community that initially opposed a road diet conversion along the major thoroughfare ultimately came to support the project after it was completed, feeling the road was safer.



Source: FHWA

This road diet conversion was intended to calm traffic and improve conditions for cyclists and pedestrians. It was initially planned as a temporary trial and faced some community skepticism when it was implemented from people who feared it would increase congestion.

Source: Google Street View

The original four travel lanes were reduced to two with a center turn lane. Bike lanes were added in both directions, and existing parking lanes were retained. After a six-month trial, the diet was found to have not only achieved its goals of improving conditions for multimodal travel, a 50% reduction in crashes was recorded. Community reception of the project ended up being positive overall, and the new configuration was retained[19].

Valencia Street – San Francisco, CA

1.9 miles
Average Daily Trips: 10,000-15,000

In a survey of businesses owners along the road diet project in San Francisco, two-thirds reported a beneficial impact on business.

Source: Google Street View

A road diet was originally installed along several blocks of this vibrant commercial corridor in San Francisco's Mission District in 1999. Four lanes were reduced to one travel lane in each direction plus a center left turn lane. Existing parallel lanes on either side of the street remained. Car traffic declined along the street by 10%, while bike traffic grew 144%. Public opinion surveys showed that 94% of respondents approved of the conversion, and the project won praise in the press[20]. About two-thirds of business owners surveyed said that business improved after implementation of the road diet[21].

19. FHWA, *Road Diet Informational Guide,* p. 25
20. Drennen, E. Economic Effects of Traffic Calming on Urban Small Businesses. p. 29
21. Ibid., p. 46

Will a Road Diet Make Traffic Worse?

Because a road diet conversion reduces the number of through lanes, there is a common misconception that road diets result in more congested and difficult to travel roadways. However, when applied in the right locations, road diets can maintain the effective capacity of the roadway for automobiles while improving levels of service for other modes of travel. Generally, traffic flow along a road diet conversion is not only safer, but smoother and more predictable for a variety of users.

Four lane roads often operate like three-lane roads

For corridors like Johnson Drive with numerous unsignalized side streets and access drives, through traffic will often utilize outside lanes to avoid delays by left-turning vehicles. Whenever vehicles stop to turn left, the four-lane road effectively functions like a three-lane road. This means that a conversion from four to three lanes is unlikely to have a major impact on automobile capacity[22].

Intersection design may determine true capacity

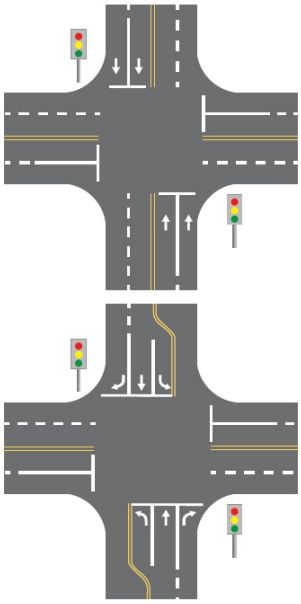
Often, it is not the number of through lanes that is the constraining factor for movement of traffic but rather the design and operations of intersections. Road diet conversions from four to three lanes free up space at intersections to provide dedicated turn lanes. For intersections with large numbers of turning vehicles this design can help reduce delay. On Johnson Drive the signalized intersection at Nall already operates in a three-lane configuration. The signalized intersection at Lamar expands to provide capacity for five total lanes[22].

Fewer conflict points and crashes

With a conversion of four lanes to three, drivers no longer have to pull across multiple lanes of traffic to turn left. Conflict points associated with cars stopping in through lanes or changing lanes are removed as well. Issues with visibility of oncoming traffic for left turning vehicles are also eliminated. Because they have fewer conflict points and increased visibility, three lane configurations allow for safer, smoother traffic[22].

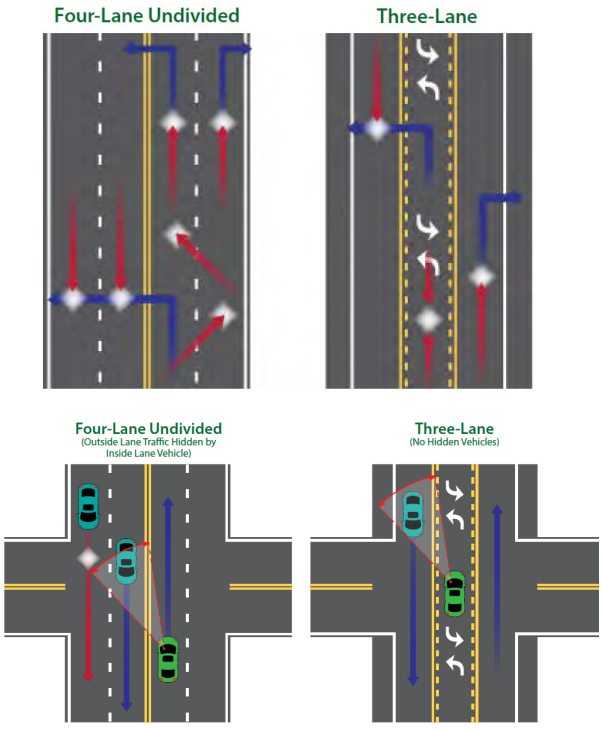
Smoother traffic flow

By removing stopped and turning vehicles from through lanes, road diet conversions result in a more consistent traffic flow, with less "accordion-style" or "slow-and-go" traffic[23].



Example of intersection with added turning movements.

Source: FHWA Road Diet Mythbusters



Source: FHWA Road Diet Informational Guide

22. FHWA, *Road Diet Mythbuster*
23. FHWA, *Road Diet Informational Guide,* p. 9

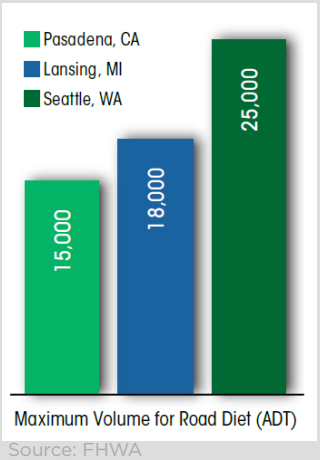
Is a Road Diet Right for Johnson Drive?

Johnson Drive is in need of a traffic calming measure like a road diet. But is a road diet conversion feasible? While every road should be considered on a case-by-case basis, several basic measures exist for analyzing the feasibility of a road diet conversion.

Traffic volume

Road diets are thought to be effective on roads that serve up to a certain number of vehicles, though the standards vary. A 2006 study recommended a maximum average daily traffic of between 15,000 and 17,500 vehicles per day [24]. Other jurisdictions have standards that allow for road diets where ADTs are between anywhere from 6,000 to 25,000 vehicles per day [25]. Data available through Johnson County shows that volumes along Johnson Drive between Lamar and Nall fall below most jurisdictions' upper limit for road diets, at between 11,000 and 17,000 [26].

+ Feasible – volumes fit standards for road diets



Source: FHWA

Intersections

The number and nature of intersections (side streets and driveways) is another basic consideration for road diet feasibility. The presence of too many high-volume side streets or driveways can increase the likelihood of crashes and diminish the effectiveness of a road diet. Offset intersections increase the chances of head-on conflicts in the center left-turn lane. Meanwhile, too many signals coupled with poor sequencing can reduce the effectiveness of a road diet[27].

+ Feasible – no problematic intersections exist along Johnson Dr


Source: Google Street View

Transitions and project extent

The design of transitions between road diets and different road cross sections can affect the safety outcomes of a road diet conversion. The FHWA states that "transition points should occur at locations where the only decision a driver needs to make is related to the lane drop or addition" [28]. Ultimately, intersections are considered poor locations for transitions as an intersection with a signal and turn lanes can add to the maneuvers a driver might need to make. The FHWA recommends considering a larger project extent so that a transition occurs beyond an intersection[28]. Johnson Dr. east of Nall is already two lanes plus a center lane; only a transition at Lamar needs careful scrutiny.

+ Feasible – with careful design, transitions can work

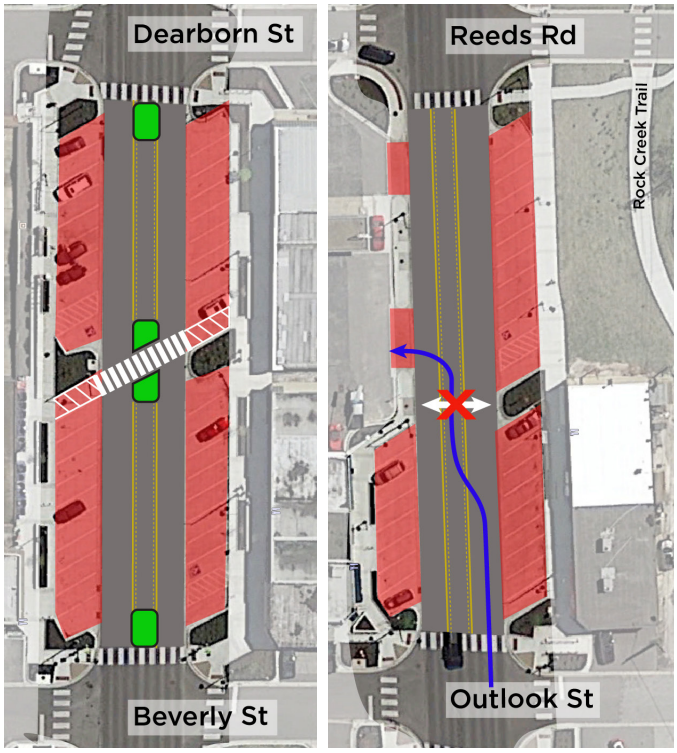

Source: Google Earth

24. Gates, p. 17
25. FHWA, *Road Diet Informational Guide,* pp. 24-28
26. Johnson County, KS AIMS, Johnson Drive at Lamar Avenue, Woodson St, and Nall Avenue
27. FHWA, *Road Diet Informational Guide,* p. 42; Kentucky Transportation Center, p. 92
28. FHWA, *Road Diet Informational Guide,* pp. 36-37

Additional Considerations

Pedestrian crossings

Road diet conversions are an opportunity to improve conditions for pedestrians. In addition to space created by eliminating traffic lanes, the center lane created from a road diet offers an opportunity for pedestrian enhancements. The center lane offers space for islands and medians that can provide pedestrians a safer, more comfortable crossing[29, 30]. (In fact, such features might be recommended where a large volume of turning vehicles and crossing pedestrians are anticipated.) Refuge islands and medians must be carefully located to avoid obstructions where turning movements are desired[30]. Midblock islands are feasible along Johnson Drive, taking advantage of the planted curb extensions halfway along each block. A marked crosswalk between the extensions would provide an additional safe crossing for pedestrians.



These diagrams compare the feasibility of midblock crossings along two stretches of Johnson Drive. Midblock crossings, potentially including pedestrian refuge islands, could take advantage of midblock curb extensions that already exist. Where turn-off maneuvers might occur (blue line), crossings and islands would need to be designed carefully.

Parking

The existing diagonal parking arrangement provides access to the many businesses along Johnson Drive. It also creates an additional traffic calming effect, as vehicles exiting a space momentarily block passing traffic[31]. A possible improvement to the existing arrangement would be to make the diagonal spaces "back-in" instead of "back-out." With back-in parking, as drivers exit a space, they can clearly see approaching vehicles or cyclists to the left before entering traffic. Meanwhile, the loading of vehicles is safer and more comfortable because trunks are oriented towards the sidewalk instead of the street[32].

Bicycle facilities

Road diet conversion projects open up space on a roadway for bicycle facilities. When diagonal parking is present as it is along Johnson Drive, the most common approach with a road diet is to add a bicycle lane between the travel lane and parking. The current pull-in parking configuration, however, is not recommended along a bike lane, as visibility of a cyclist for a driver backing out of a space is limited. If bike lanes are added, a back-in/pull-out parking arrangement should be considered[33].

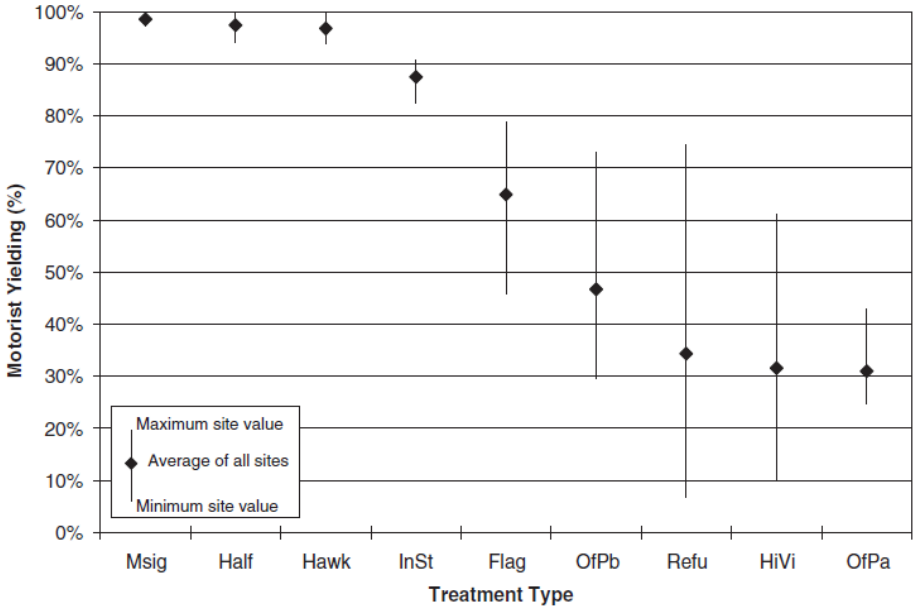
29. FHWA *Road Diet Informational Guide,* p. 9-10
30. FHWA Safety, *Effects of Marked vs. Unmarked Crosswalks at Uncontrolled Locations,* p. 55
31. Project for Public Spaces, Traffic Calming 101, "Diagonal Parking"
32. Nelson\Nygaard Consulting Associates. *Back-in/Head-out Angle Parking.*
33. FHWA *COURSE ON BICYCLE AND PEDESTRIAN TRANSPORTATION*, p. 19-6; Nelson\Nygaard, p. 4

What about Signs and Signals?

Pedestrian-oriented signage and signals are traffic calming interventions that are relatively inexpensive alternatives to more intensive infrastructure modifications.

Johnson Drive already employs high-visibility pedestrian signs and signs known as "rectangular rapid flash beacons," or RRFBs. These signs have lights that are activated by a pedestrian with the push of a button and are intended to encourage motorists to yield to the pedestrian. They are considered a less expensive alternative to larger, overhead traffic signals. When placed on both sides of a street, as they are when used on Johnson Drive, they have been shown to increase yielding to pedestrians to 88% of the time, versus 18% with no signs[34]. This is similar to the impact of overhead signals, as seen in the chart below. Meanwhile, small, in-street signs are about as effective as RRFBs and overhead signals, causing just under 90% of vehicles to yield[35].

While signage might seem like an attractive alternative for traffic calming, Mission's experience suggests that additional signage would likely have minimal effect on traffic. The city has implemented proven measures, but traffic issues persist. Other sign and signal treatments to protect pedestrians have higher costs and higher impacts on traffic flow compared to what has already been deployed, but are not significantly more effective. For these reasons a modification of the roadway design through a road diet represents an economical, logical next step to creating a safer and more inviting Johnson Drive.



Abbreviations: Msig=midblock signal; Half=half signal; Hawk=HAWK signal beacon; InSt=in-street crossing signs; Flag=pedestrian crossing flags; OfPb=overhead flashing beacons (pushbutton activation); Refu=median refuge island; HiVi=high-visibility signs and markings; OfPa=overhead flashing beacons (passive activation)

Top left: Rectangular rapid flash beacon (RRFB) already installed along Johnson Drive

Middle left: An overhead "High-intensity Activated crossWalK" or "HAWK" signal
Source: PedBikeImages.org \ Sree Gajula

Bottom left: In-street crossing sign
Source: Institute of Transportation Engineers

Above: "Site average and range for motorist yielding by crossing treatment," See note 35.

34. FHWA *Rectangular Rapid Flash Beacon*
35. Transportation Research Board, *Improving Pedestrian Safety at Unsignalized Crossings,* p. 49 (Figure 24)

More Case Studies

Wells Avenue – Reno, NV

This project was built as part of a local complete streets initiative and was intended to reduce crashes and improve safety for bicyclists and pedestrians along a commercial corridor. The four lane road was narrowed to one lane in each direction. The center lane was dedicated to a combination of turn lane, pedestrian island, and median. Bike lanes were added, and existing parking lanes were retained. Sidewalks were extended from eight feet to ten. The project reduced crashes by 30% overall, including a 54% drop in pedestrian crashes. Average speeds along the conversion dropped by 5 to 9 miles per hour[36].

1 mile
Average Daily Trips: 15,900

Source: Google Street View

Stone Way – Seattle, WA

Connecting several neighborhoods in Seattle, Stone Way is a north-south arterial that carries approximately 13,000 vehicles per day and numerous bus routes. Local business owners initially opposed this four-lane to three-lane road diet conversion, based on concerns about traffic flow, business access, and displacement of traffic to neighborhood streets. A before-and-after study evaluated the effects of the road diet, alleviating business owners' major concerns. Top speeders decreased by more than 80%. Total collisions were reduced by 14% and injury collisions decresed by 33%. Pedestrian collisions were reduced by 80%. Peak hour capacity was maintained on the street, despite traffic counts on parallel streets declining 12-34% [37].

0.9 miles
Average Daily Trips: 13,000

Source: Google Street View

Mission Road – Prairie Village, KS

Neighbors began lobbying for a road revamp in 2015 after a crash in which a vehicle jumped the sidewalk. Residents noted that many students from a nearby elementary and high school walked along the road every school day. They were concerned that the narrow sidewalks, unbuffered from fast-moving traffic lanes, were dangerous to students[39]. In 2016 the City of Prairie Village completed a road diet along a half-mile stretch of Mission Road between 71st and 75th streets. The existing four travel lanes were reduced to two plus a center TWLTL. The new space made available was used for a buffered eight-foot path on one side of the road. The *Shawnee Mission Post* reported that the project cost about $1 million, of which $500,000 came in assistance from the Johnson County CARS program[40].

0.5 miles
Average Daily Trips: 14,000[38]

36. FHWA, *Road Diet Case Studies*, "Wells Avenue"
37. Ibid., "Stone Way"
38. Johnson County AIMS, Mission Road at 75th and 73rd. Retrieved from http://maps.jocogov.org/ims/
39. Senter, J. "Prairie Village council approves reduction of Mission Road to 3 lanes from 71st to 75th"
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LIVEWELL JOHNSON COUNTY

an initiative of

JOHNSON COUNTY KANSAS
Health & Environment

BIKE WALK KC

Our mission is to redefine our streets as places for people to build a culture of active living.