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Selected Research on Road Diets

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Pedestrian and bicyclist injury and mortality is a common occurrence in California. Data from the Transportation Injury Mapping System found that serious injuries among bicyclists and pedestrians increased between 2017-2019, with 3,174 recorded in 2017 and a peak of 3,495 serious injuries in 2019[1]. Along with serious injuries, there has also been an increase in mortality among these active transportation options reported by the National Highway Traffic Safety Association, which recorded 940 fatalities in 2017, and an increase to 972 by the end of 2019[16].

One of the strategies that has been shown to be effective in reducing traffic injury is the implementation of road diets, which are also known as road reconfigurations, road re-chanellizations, road reallocations, or lane reductions[2]. This intervention is a popular tool for city planners to improve the safety for bicyclists and pedestrians on high capacity roads at low costs. Burden and Largeway(1999)[3] refer to road diets as "right-sizing" of roads because they reallocate the existing right-of-way to better support all transportation modes, including biking and walking. A large majority of interventions involve converting four-lane undivided roads into three lanes, one lane going each direction and one turning lane in the middle. Along with this lane reduction, many recent road diet projects involve utilizing the extra space provided to add new bike lanes, sidewalks, on-street parking, wider shoulders or concrete center islands[4].

There are many dangers to all road users associated with multi-lane roads including speeding, unpredictable behavior, rear-end and side-swipe collisions, as well as an overall increased severity of injuries due to larger blindspots and a larger number of collisions[3]. Along with these risk factors, these large roadways are also dangerous for those walking and biking, due to the lack of adequate facilities (e.g., crossings and bicycle lanes), people driving at high speed, which is associated with higher pedestrian and bicyclist mortality, and the increased risk to pedestrians due to the large number of lanes to cross.

Road diets are meant to address these dangers. Studies have shown that the addition of a two-way left turn lane helps to reduce the chance of rear end collisions [5, 6]. Along with this, the reduction of lanes has also been shown to lower overall driving speeds on these roadways that have undergone the 4-to-3 lane transformation, leading to a decrease in crash severity [7,8]. Lane reductions also directly benefit pedestrians in several ways, including: reducing the lanes a pedestrian has to cross, the possibility to introduce concrete islands for pedestrians in the middle, and an overall reduction in vehicle speed [7,9].

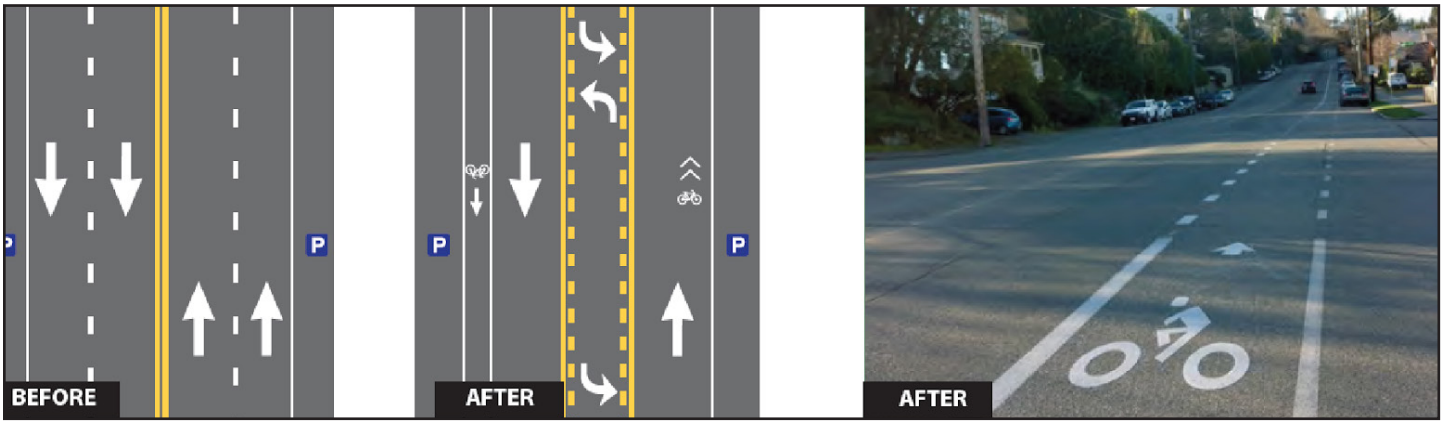

Fig. 1 Road Diet Project Nickerson Street, Seattle, Washington[4]

Common benefits of road-diet projects in the U.S. [4,10,11]

- Reduced overall crashes
- Reduced speeds and aggressive driving
- Improved safety and routes for bicycles, increased bicycle ridership
- Improved pedestrian safety
- Improved livability
- Improved economic development
- Fewer pedestrian/bicycle injuries
- Improved public transportation

Studies of road diet projects implemented across the U.S. show that collisions, overall, were reduced by up to 70% in some locations. Along with this, other metrics associated with traffic safety were noted in areas that implemented road diets, including: up to a 32% decrease in traffic speed, a reduction in drivers exceeding the speed limit by up to 40%, and a decrease in traffic volume by up to 29%. Many reports throughout the country reveal that, once implemented, road diets received overwhelming public support from drivers, pedestrians, public officials, and traffic safety advocates [4, 10, 11].

One road diet project implemented on Valencia Street in San Francisco in 1999 is a good example of the benefits of road diets, as it provided a comprehensive approach to encouraging bicycling, lowering driver speeds and improving safety [12, 13]. The implementation of this road diet resulted in a reduction of pedestrian collisions by 36%. Additionally, although there was a 50% increase in the number of bicycle collisions, there was also a 140% increase in ridership. The success of this road diet project rested on key factors that assessed impact including a series of community meetings, a one-year test trial, and a thorough before and after survey.

Future research should be done to assess the effect road diets can have on vehicle queuing times and emission levels, due to these problems being reported in some areas that have implemented road diets [4].

REFERENCES

1. TIMS California Safety PM. (n.d.). Retrieved March 31, 2021, from https://tims.berkeley.edu/tools/safetypm
2. Sanders, R.L., Judelman, B., and Schooley, S. NCHRP Synthesis 535: Pedestrian Safety Relative to Traffic-Speed Management: A Synthesis of Highway Practice. Transportation Research Board, Washington, DC, 2019.
3. Burden, D. and Lagerwey, P. Road Diets: Fixing the Big Roads. Walkable Communities, Inc. March 1999. (Retrieved from https://nacto.org/docs/usdg/road_diets_fixing_big_roads_burden.pdf)
4. Federal Highway Administration. Road Diet Case Studies. FHWA-SA-15-052. Washington, DC, 2015. (http://safety.fhwa.dot.gov/road_diets)
5. Harwood, D. W. Effective Utilization of Street Width on Urban Arterials. NCHRP Report, (330), 1990.
6. Hovey, P., Chowdhury, M., Zhou, Y., and Fries, R. Evaluating the Safety Performance of Adding a Two-Way Left-Turn Lane to an Undivided Cross-Section. Journal of Public Works and Infrastructure, 2(4), pp. 360 – 373, 2009.
7. Knapp, K., Chandler, B., Atkinson, J., Welch, T., Rigdon, H., Retting, R., et al. Road Diet Informational Guide (No. FHWA-SA-14-028), FHWA, 2014.
8. Stamatladis, N., Kirk, A., Wang, C., Cull, A., and Agarwal, N. Guidelines for Road Diet Conversions. Kentucky Transportation Center, 2011.
9. Zegeer CV, Richard Stewart J, Huang H, Lagerwey P. Safety Effects of Marked Versus Unmarked Crosswalks at Uncontrolled Locations: Analysis of Pedestrian Crashes in 30 Cities. Transportation Research Record. 2001;1773(1):56-68. doi:10.3141/1773-07.
10. Rosales, J.A. Road Diet Handbook: Setting Trends for Livable Streets. Parsons Brinckerhoff, Second Edition, January 1, 2006.
11. Knapp, K., Welch, T., and Witmer, J. Converting Four-Lane Undivided Roadways to a Three-Lane Cross Section: Factors to Consider. Presented at the 1999 Annual Meeting of the Institute of Transportation Engineers, Las Vegas, Nev., Aug 1-4, 1999.
12. Valencia Street Bicycle Lanes: A One Year Evaluation, Michael Sallaberry, San Francisco Department of Parking and Traffic, December 14, 2000.
13. Sallaberry, M. Building on Success: Road Diet, Streetscaping, and Signal Improvements for Bicyclists on Valencia Street. San Francisco Municipal Transportation Agency. (2014 updates by Jill Mead, UNC Highway Safety Research Center) Retrieved from http://www.pedbikesafe.org/BIKESAFE/case_studies/casestudy.cfm?CS_NUM=103.
14. Roth, M. "San Francisco Planners Proud of Long List of Road Diets". Streetsblog San Francisco, 31 March 2010. Retrieved from https://sf.streetsblog.org/2010/03/31/san-francisco-planners-proud-of-long-list-of-road-diets/.
15. Knapp, K. and K Giese. Guidelines for the Conversion of Urban Four-lane Undivided Roadways to Three-lane Two-way Left-Turn Facilities. Iowa State University/Center for Transportation Research and Education for the Iowa Department of Transportation, April 2001.
16. Fatality Analysis Reporting System (FARS): 2005-2018 Final File and 2019 Annual Report File (ARF) Report Generated: Thursday, April 22, 2021 (5:27:30 PM)

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