ABQ Streets Project: Creating Alternative Residential Street Designs

Assessing the viability of alternative residential street deisgns in terms of cost, safety, crime, and the environment

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This research evaluates opportunities for retrofitting residential streets with alterative designs with the overall goal of improving their function, reducing their negative impacts and reducing maintenance costs. This is accomplished through three main research tasks. First, we conduct a comprehensive review of street design literature with a focus on studies that report how designs affect travel behavior, traffic flow, safety, crime and environmental impacts. We then survey residential streets in several study neighborhoods to measure typical design features and cross sections. We then evaluate which alterative street designs could be used to retrofit typical Albuquerque residential streets within currently used right of way. For this subset of alternatives, we estimate the expected benefits and construction and maintenance costs using information from our literature review and the city's unit construction cost data.

Background

The residential or local street is a ubiquitous feature of communities small and large. Most roadway-related transportation research focuses on more congested roadways rather than low-volume residential streets. However, residential streets make up the bulk of the transportation network. In Albuquerque, NM there are about 1,800 miles of low-volume residential streets, making up about 75% of the roadway network. Understanding how this vast infrastructure affects communities and the environment and opportunities to reduce costs is important.

Project Summary

Our main research objective is evaluating alterative residential street designs for a typical Albuquerque neighbor and quantifying their potential benefits and costs. We organized our research into three main tasks to accomplish our research objectives.

We began our project by reviewing prior studies that have investigated how street design elements affect a wide range of important outcomes including, urban heat, stormwater runoff, traffic safety, active travel, and crime. Street design elements include geometric design, materials, traffic controls, lighting, parking, and amenities such as street trees. We reveiwed studies published in peer-reviewed journals, theses and dissertations, and reports and studies created by government agencies that discuss benefits and outcomes of various street designs (such as FHWA's "Proven Safety Countermeasures").

Next we evaluated the feasibility of implementing different street design changes in the Fair West neighborhood of Albuquerque (**Figure 1**). Consideration was given to available street right of way, city budgets, local climate and preferences of current residents. We focused on a neighborhood identified as needing maintenance, politically ready for change, and where the public has been receptive to change.

Figure 1. Fair West neighborhood.

Finally, we estimate the expected annualized benefits (including, the reduction in urban heat, runoff, traffic crashes and crime and increase in active travel and related public health benefits) and costs (e.g., construction and maintenance) of the conceptual designs identified in Task 2. Benefits are estimated based on the information gathered in our review of existing literature and studies and the use of the City of Albuquerque's City Engineer's Estimated Unit Prices document (contains unit prices for various street construction activities and materials). To the extent possible, benefits are also monetized to facilitate a rough cost benefit analysis.

Status Update

We evaluated seven street design alternatives with cost-benefit ratios ranging from -$127k to $367k in net annual benefits. Not all costs and benefits could be quantified and those that were quantified are subject to varying amounts of uncertaity. One challenge in our resarch was the limited amount of research that has quantified the costs or benefits or residential street design treatments.

The design alterative with the greatest net benefits was the woonerf alternative. A woonerf is a shared street design that limits the segratation of space between modes and purposes. There are typically no lane markings or sidewalks and design elements are included to indicate the space is shared and a slow speed environment. Woonerf designs can use less space and materials and if deisgned and used correctly, be a safer alterative to traditional residential street design. Although costs for the numerous curb extensions and street markings were high, we predict that the woonerf alternative will see significant benefits in terms of traffic safety and crime reduction, additional benefits in terms of the environment, and qualitative quality of life benefits, in addition to providing the greatest aesthetic and sense of place benefits as well.

The second highest net benefits were accrued by the street lighting alternative, which included two street lights to each north/south block and one street light to each east/west block for a total of 224 lighting installations. Benefits were driven primarily by estimated reductions in crime and traffic crashes, the only other alternative to accrue quantifiable benefits in both categories. The next most beneficial alternative was traffic circles. We expected traffic circles to result in traffic safety improvements while the long lifespan of the treatments resulted in relatively low annual costs.

The pavement markings had significant traffic calming benefits, but the short lifespan and the extensive roadway network resulted in high costs, making the pavement marking alternative fourth. The street tree alternative was fifth. Although the trees themselves would have had significantly higher benefits, the fact that curb extensions would need to be provided resulted in high annual costs. The costs of both material treatments outweighed their respective benefits. Both had relatively low benefits and relatively high costs thanks to the shear amount of roadway that needed to be treated (9.4 miles in length by 30 feet in width).

Figure 2. Example of before/after treatment rendering.

Unfortunately, neighborhood association meetings were canceled because of COVID-19. We hope to garner public input on our alternatives once public meetings resume.

Impacts

Ultimately, it will be the community's and the city's decision whether to move forward with any of our designs and complete more detailed engineering and design work. The goal of this project is to complete the background research on alternatives, estimate the potential community benefits and costs, complete preliminary design work, and facilitate early community and city participation in this process. By completing these objectives, our aim is to remove some of the barriers to trying something new and ensuring a plan is in place to know if it eventually works. We know that the city and its residents are looking for ways to make the city's streets safer, provide transportation alternatives, reduce crime, and improve the overall street environment and so we believe there is a real opportunity for this project's findings to contribute to those goals.

Tran-SET

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