From Arterial to Asset:

Using Multiway Boulevards to Link Transportation and Land Use

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"Cities that were once considered the most-desired places to live or for businesses to locate are now seeking ways to unclog their increasingly congested roadways and regain their quality of life."

U.S. Department of Transportation Strategic Plan

Abstract
Cities struggling with congestion need options to auto-dependent transportation and land-use patterns. Multiway boulevards are one alternative that can support a wide array of land uses. These boulevards have through lanes in the middle separated by landscaped medians from side access lanes for bicycles and slow moving local traffic. Using a case study from Oregon's Eugene-Springfield metropolitan area, this project considers what could happen if cities built arterials as multiway boulevards. This interdisciplinary study, which included widespread stakeholder and public participation as well as detailed land use and transportation modeling, was instrumental in the Eugene Planning Commission's decision to endorse the conversion of a portion of the arterial into a multiway boulevard. Although the case study arterial, with its existing Bus Rapid Transit lanes, requires an unusually wide right-of-way, the results show that the arterial could better accommodate residential and mixed-use buildings at the edges if reconfigured as a multiway boulevard. Projected benefits include the possibility of supporting 8,400 dwelling units, reducing annual VMT (vehicle miles traveled) by nearly 100 million miles (161 million km), and reducing annual carbon emissions by over 100 million pounds (45.4 million kg). Development along the boulevard can preserve up to 1,680 acres (680 ha) of farmland and lead to an annual transportation savings per household of nearly $1,500. New residences could generate over $17 million annually in additional property tax revenue. In the end, this study offers lessons for communities interested in promoting environmental protection, enhancing quality of life, and reducing energy consumption.

BACKGROUND

According to the US Department of Transportation (USDOT), by 2030, vehicle miles traveled (VMT) in the United States will increase by approximately 60 percent, which will lead to increased congestion, greater fiscal costs, and negative environmental impacts (1). Congested cities across the U.S. resort to remedies that are increasingly difficult to implement. Adding capacity is more challenging given limited land availability, greater environmental constraints, and fiscal barriers. And USDOT has found that environmental concerns may limit transportation network expansions (1). Public transit has seen limited success in replacing individual trips and can typically only be justified at greater levels of density than many communities currently support.

Existing arterials that combine local and through traffic contribute to this problem. Turning movements of local traffic along the arterial slow through traffic. They allow speeds that jeopardize pedestrian safety and negatively impact the quality of life along the arterial. And these streets attract auto-oriented commercial land uses. The resulting urban form includes deeply setback strip malls, single story big-box stores, gas stations, and garages. Hence, these arterials offer little incentive to developers, planners, or property owners interested in alternative land use types supportive of more efficient morphologies. Their negative attributes help push development to the edges of metropolitan areas, which threatens valuable farmland and contributes to the social, environmental, and economic costs of sprawl.

An Alternative to Sprawl

To combat sprawl, cities need to attract a greater proportion of projected urban growth to urban cores rather than edges. Unfortunately, in most cities, land within the developed core is already dedicated to existing uses, including low-density housing and commercial development adjacent to strip arterials. Redefining these arterials offers an opportunity for infill development that can relieve growth pressures on farmland and capitalize on the benefits of greater residential densities. If arterials can be redesigned to accommodate efficiently both through and local traffic, they may also start to attract commercial and multi-family residential developments. One method is to convert these arterials into multiway boulevards that promote transportation variety and a broader range of land uses and building types. These boulevards, which are common throughout Europe, have dedicated through lanes separated from slow-moving local access lanes by landscaped medians. The access lanes can provide bike lanes as well as on-street parking to support ground floor retail uses. With the many opportunities for landscaping in the multiple medians, these boulevards also become attractive settings for mixed-use buildings and medium-density housing.

Like many communities across Oregon, Eugene is faced with projected growth, and development patterns currently employed will force that growth to the metropolitan edge. By 2030, Eugene's population is projected to grow from roughly 140,000 to 240,000. If that growth is accommodated using current patterns of development, with single-use strip arterials surrounded by low-density subdivisions, the city's Urban Growth Boundary (UGB) will need to expand from approximately 43 square miles (111 sq km) to over 72 square miles (186 sq km) (2).

OBJECTIVES

This study examines the transportation and land use potential of replacing the ubiquitous arterial with a multiway boulevard. This is an applied research project that, through a series of public workshops and detailed analysis, examines the opportunities and constraints to converting an auto-oriented five-and six-lane arterial into a multiway boulevard. The study area includes a 3.5-mile (5.6 km) stretch of Franklin Boulevard from downtown Springfield to Eugene's Ferry Street Bridge. Specifically, this study investigates the potential benefits of converting Franklin Boulevard from a typical arterial into a multiway boulevard that can accommodate greater residential and commercial densities as well as projected through and local traffic. One key objective was to analyze what could happen if growth could be diverted away from the edges and towards the developed cores.

LITERATURE REVIEW

The Transportation Land Use Link

The link between transportation and land use is well established (3). Of significance to this study is the direct relationship between density, transit options, and VMT rates as described by Holtzclaw (3). Holtzclaw's study of 28 communities in California evaluated the effects of neighborhood characteristics on motor vehicle usage per household and annual VMT per household. Holtzclaw identified four neighborhood attributes that influence household transportation costs: residential density, transit accessibility, mixed use (as measured by distance between shopping and residential areas), and pedestrian accessibility (as measured by factors that encourage walking). His model to predict annual VMT rates is used in this study.

Most land around arterial streets today is zoned for commercial use. These zones exhibit well-documented auto-oriented characteristics, including deep setbacks, single-use buildings, ample parking lots between and in front of buildings, and little used sidewalks (4). These arterials and their land use designations work together to discourage alternative modes of transportation, more balanced development, and pedestrian accessibility. The result is increased congestion, increased VMT, and increased environmental impacts associated with this auto-focused landscape (5).

From a transportation and land use perspective, communities should support greater options for mobility, reduced reliance on automobiles, and improved pedestrian accessibility. When residents can bike from their home to their place of work, when they can take public transit instead of their private automobile, and when they can walk to a local market, their mobility options are increased, and their vehicle miles are decreased (6). Reduced vehicle use has benefits in terms of improved air quality and improved personal health (7).

Multimodal Transportation Facilities

The 2005 surface transportation act dubbed SAFETEA-LU (Safe, Accountable, Flexible, Efficient Transportation Equity: A Legacy for Users) emphasizes multimodal transportation options. Franklin Boulevard is an emerging multimodal facility. It currently supports vehicles and a Bus Rapid Transit system (BRT), which based on the experience of other communities with BRT systems, may increase customer loyalty and satisfaction with transit (8). But transit alone will not transform an arterial into a multimodal facility. At best, adding transit to typical urban arterials will make it bi-modal. As Mejias and Deakin note "…transit is only one of many influences on development and a transit-served site must compete with other sites in the region that may be more desirable in other respects" (9). Multimodal facilities should also safely incorporate bicycles and pedestrians. Although Franklin Boulevard has marked bicycle lanes, these are rarely used given the volume and speed of traffic on the arterial. Similarly, even though the arterial has sidewalks in most locations, these are infrequently used for the same reasons. Paint and paving do not result in increased bicycle and pedestrian use. The sidewalks are especially problematic given that they are attached directly to the curb and unusually narrow for an arterial (4 to 6 feet, or 1.22 to 1.83 meters wide). To be effective for bicycles and pedestrians, research has found that one of the most critical factors is lateral separation of the mode and vehicle speed and volume (10). Multiway boulevards are an effective way to achieve this lateral separation.

Urban Arterials

Urban arterials offer great settings for infill development if reformed into multiway boulevards, though they present challenges to overcome. In a survey of developers working in the San Francisco Bay Area, Mejias and Deakin concluded that for their case study arterial (San Pablo Avenue) the unattractive streetscapes, high speeds (35 to 45 miles or 56 to 72 kilometers per hour), and large setback requirements limited development potential. Developers noted that this auto-oriented building pattern limited infill and mixed-use development (9). San Pablo Avenue is like many urban arterials, including Franklin Boulevard; it is a multilane roadway that accommodates through and local traffic and it is paralleled by auto-oriented strip development that links several jurisdictions. Not surprisingly, property owners along

Franklin Boulevard view their limitations similarly. Freedman (11) offers a description of urban arterials that also applies to Franklin Boulevard:

> On the strip, auto-dependent development has long been paired with a conventional arterial typology…strip buildings are set back behind expansive parking lots, with only a minimal need for architectural quality. In such environments, pedestrian movement is normally only poorly accommodated: crosswalk distances are long and without refuge; tree canopies are sparse or nonexistent; sidewalks are narrow (where they exist at all); and intermittent, bare-bones street furnishings convey the impression that no one would walk, bicycle, or sit at a transit stop there unless they had no other choice. A successful restructuring plan must therefore also include the reconfiguration of the public way.

Multiway Boulevards

Perhaps the best way to address the limitations of the urban arterial and to transform it in a way that is supportive of multimodal transportation options is to convert it into a multiway boulevard (11). These boulevards, which are common across Europe, have several lanes of faster moving through traffic in the middle separated by medians from parking and access lanes on the sides (see Figure 1).

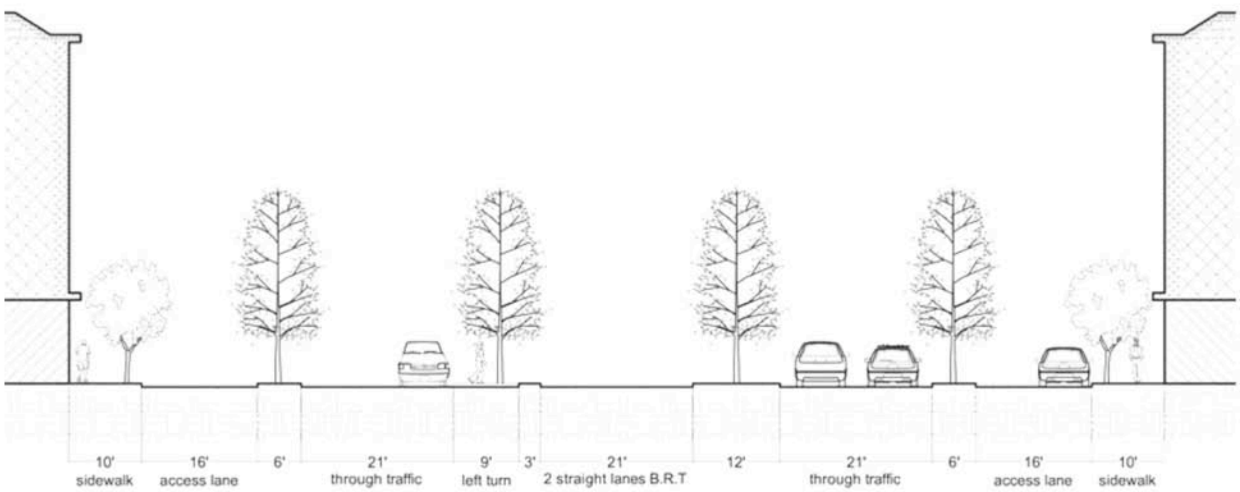

Figure 1. Multiway boulevard section with 151-foot (46 meter) right-of-way (image courtesy of Carey Stone)

Multiway boulevards have been shown to support infill development, reduce congestion, and improve pedestrian safety (12, 13, 14). Ground level retail uses can take advantage of on-street parking in the access lanes, and residential uses are attracted to the park-like quality of the landscaped boulevards. Given that slower vehicular speeds can reduce pedestrian fatalities (15), slower moving local access lanes in multiway boulevards can also enhance pedestrian safety without reducing throughput. The ability to support greater residential densities can contribute to greater housing affordability. As Dunham-Jones (16) notes, retrofitting suburban patterns of development to allow for more housing options improves affordability. But given the wide right-of-way requirement, this street type is uncommon in the United States (14). Nevertheless, where adequate widths exist, these street types may help cities meet USDOT objectives for improving pedestrian safety and reducing congestion.

Franklin Boulevard

Franklin Boulevard is like many urban arterials across the country. It connects two jurisdictions (Springfield to the east and Eugene to the west) with four to six lanes for through traffic and has a mix of unprotected center left turn lanes and median-protected left turn lanes. The latter occur along roughly one third of the arterial. Adjacent land uses support auto-oriented commercial development, including restaurants, auto-related businesses (repair shops, gas stations, used car lots), and motels. The arterial also connects Eugene directly to Interstate 5 and is the main entry for northbound I-5 traffic into Eugene. Current traffic volume on the East Eugene segment ranges from 26,320 to 36,940 average daily trips. On-street parking is not allowed along the length of the arterial. Posted speeds are generally 35 miles (56 km) per hour but traffic routinely travels at speeds up to 45 miles (72 km) per hour. Numerous curb cuts and parking lots front the arterial. The BRT system runs along two-thirds of the arterial in a mix of dedicated center lanes and in mixed traffic. Where dedicated lanes exist, BRT stops are in the center median, otherwise stops are at the edges in pull-outs. Where it exists, the median is a defining attribute of the arterial and provides room for the BRT lanes as well as space for landscaping. Another unique feature of the arterial is that the University of Oregon (UO) owns property along the south frontage in East Eugene. This property supports a mix of classroom and administration buildings that have turned their back to the streets – loading docks, dumpsters, and parking lots are typical along the arterial and are screened by narrow bands of landscaping. The existing right-of-way along much of the arterial is 120 feet (36.58 meters).

RESEARCH METHODS

This project capitalized on the capabilities of a wide array of participants. It was interdisciplinary, featuring the involvement of professionals and students from the fields of planning, architecture, and landscape architecture. The project also bridged the gap between academia and practice. The City of Eugene, the University of Oregon, and the American Institute of Architects have worked together on aspects of this study. Perhaps most importantly, stakeholders and other members of the public participated in the study through a series of public workshops and open meetings. The study focused both on the 3.5-mile long (5.6 km) Franklin corridor that connects Eugene and Springfield and in detail on a smaller section of the corridor in East Eugene's Walnut Station area.

Precedent Studies

Two University of Oregon studio-based research teams conducted field investigations of multiway boulevards in California (San Francisco, Berkeley, and Chico). The teams measured, mapped, and observed the boulevards on weekdays and weekends, during rush hours and late in the evenings. They interviewed people along the boulevards and met with the designer of the newest one (Octavia Boulevard) and discussed the boulevards' performance with local police officers and bicycle advocates. These precedent studies and accompanying scale models were essential components of the public process.

Public Participation

A key feature of this project was widespread and diverse public participation. Three parallel and mutually supportive processes benefited the project. The first was an initial study of East Eugene's Walnut Station area, a half-mile segment of the overall corridor. The City of Eugene and the Oregon Department of Transportation's Transportation and Growth Management program jointly funded this effort. The second was a series of public charrettes sponsored by the American Institute of Architects (AIA). These charrettes focused on the entire 3.5-mile (5.6 km) length of Franklin Boulevard, from Springfield to downtown Eugene. The third component was an ongoing series of urban design studios conducted at the University of Oregon that researched alternative development scenarios for the entire corridor and for the smaller Walnut Station area.

The City of Eugene

The City of Eugene began their study of a portion of Franklin Boulevard in 2005 as part of a process designed to create a master plan for East Eugene's Walnut Station Mixed Use Center. The city initiated the study in response to a $24 million public investment in the country's first BRT system for a small metropolitan area, which opened in December 2006. In the East Eugene section of Franklin Boulevard, apart from a short passing lane, BRT buses must share one dedicated lane in the center, which limits headways and system-wide BRT capacity. During discussions with the local transit agency (Lane Transit District), LTD planners expressed a clear interest in adding a second dedicated lane. The Lane Transit District's approximately 4-mile long (6.4 km) Emerald Express (EmX) is a BRT system that includes dedicated lanes, prioritized signaling, customized low-floor buses with doors on both sides, limited stops, and unique center island station designs. Unfortunately, the system was designed and built without regard to adjacent land use patterns. The city, LTD, and ODOT recognized this limitation and began to consider land use and urban form patterns that could take advantage of the EmX. In 2006, the city's consultants developed three alternatives for upgrading the arterial and making it more compatible with the EmX and more pedestrian-oriented: 1) adding on-street parking on the outside lanes; 2) using a parallel street as part of a couplet system that would reduce vehicle trips on Franklin Boulevard; and 3) converting the arterial to a multiway boulevard. At the end of the first phase of the study, there was no clear consensus on the redesign and the process shifted to detailed focus studies and transportation modeling of the various street sections. As part of the process, to help guide planning and design decisions, the city established several committees with public participation, including a Technical Advisory Committee and a stakeholders group. The city also sponsored numerous open houses and the city's planner on the project made numerous presentations to neighborhood groups and participated in UO studio reviews that also focused on the Walnut Station area.

The AIA Workshops

While the city's process was underway, the AIA Southwestern Oregon chapter began planning its own public process to consider the corridor as a whole. The public events were held as part of the AIA150, its 150-year celebration. Hundreds of participants focused on the Franklin Corridor and riverfront for four days and they found themselves agreeing on a surprising number of issues. At Friday night receptions in February (in downtown Eugene) and April (in downtown Springfield), over 300 people gathered first to learn how other communities have developed their boulevards. They benefited from the precedent study research presented by UO students and were able to learn about multiway boulevards in other communities as well as other issues of relevance to the corridor. The following Saturdays, over 150 participants worked in diverse groups with local residents, business owners, designers, students, and city officials. They spent hours crafting their own ideas for the corridor. The groups dealing with transportation linkages proposed nearly identical solutions for rebuilding the arterial in a way that accommodates its varied users – local and through traffic, pedestrians, bikes, and buses. After studying the precedent boards and study models, and after discussing the strengths and liabilities of various street configurations, all of the groups proposed converting Franklin into a multiway boulevard. They recognized that this boulevard type could help transform Franklin from an eyesore that development shuns to an amenity that attracts appropriate infill and mixed-use buildings. One group called it a "great boulevard for a great city." Several other groups studied the East Eugene area, which spans from Walnut Street to the Agate Street. They also wanted a multiway boulevard to attract mixed-use and pedestrian-scaled development, while also accommodating through traffic.

The University of Oregon Urban Design Studios

In addition to preparing the precedent studies, the UO research teams met with members of the Fairmount Neighborhood Association (the neighborhood includes the Walnut Station section of the corridor) and with property owners and other stakeholders in the area. They presented their research findings and their research-based alternatives for a multiway boulevard and supporting development. Although the neighborhood association enthusiastically supported the concept of a multiway boulevard after presentations that outlined the strengths and weaknesses of the street type, property owners along a key stretch of the existing arterial were not supportive at all. Based on the initial multiway boulevard alternative developed by consultants for the City of Eugene, which required significant property acquisition along the north side, these property and business owners sent letters to the Eugene Planning Commission expressing opposition to the idea. Using the results of the field research, the UO teams were able to develop alternative sections that eliminated the need for north side property acquisition by creating an asymmetrical section with an access lane on one side and the possibility of an access lane on the south side, to be built at a later date, that could take advantage of underdeveloped property. The UO multiway boulevard sections also supported two dedicated lanes for the existing EmX.

Transportation and Urban Form Modeling

Since the concept of a multiway boulevard was new to the area, participants raised legitimate concerns throughout the public process about its carrying capacity, configuration, and corresponding urban form patterns. The Eugene Planning Commission was especially interested in the impacts of the boulevard on through traffic. Since Franklin Boulevard has three lanes in each direction through the Walnut Station area, the initial proposal for reducing the number of through lanes in each direction to two to accommodate side access lanes within a minimum right-of-way caused some concern. Transportation engineering consultants working for the City of Eugene conducted the detailed traffic modeling of the portion of the boulevard in the Walnut Station study area.

While some members of the public worried about the future Level of Service (LOS), many others worried about the scale of development that would be attracted to the amenities of a multiway boulevard. Early in the planning process, economic consultants for the city determined that the half-mile section in the Walnut Station study area should accommodate up to 1,400 dwelling units and an additional 50,000 square feet (4650 sm) of commercial space over the next twenty-five years. This represents a significant increase, especially in terms of residential units. These consultants based the figures on projected future growth for the area and on the assumption that a multiway boulevard would be attractive to residential mixed-use development. The urban design consultant for the city then showed conceptual sketches for 120-foot (36.5 m) tall buildings immediately adjacent to the Walnut and Agate Street EmX stations. The consultant justified such tall buildings (for Eugene at least) based on the need to accommodate the projected residential units near the station areas so that the half-mile area between stations could remain single-story auto-oriented uses. Several prominent local architects thought this height variety would be “interesting” and “dramatic” and they supported this approach. But it did not sit well with neighbors, many of whom live within one block of the study area in single-story, single-family bungalows and cottages.

Given the concern over 120-foot tall (36.5 m) buildings and the uneven development heights proposed by the consultant, the UO urban design studios studied alternative urban form patterns to determine if there was an acceptable way to meet the projected densities while also accommodating the desires of the neighbors. The students developed detailed scale models to illustrate the urban form attributes of a variety of options. Surprisingly, neighborhood activists, who had recently opposed any development taller than two or three floors, supported development heights of up to five floors at the boulevard provided new construction stepped down to three floors when it approached existing residential uses. The scale models were instrumental in showing the public how a multiway boulevard worked, how it could be phased in over time, and how five-floor buildings could be an asset rather than a liability.

Image Studies

Figures 2-5, developed by Urban Advantage for the City of Eugene and the Oregon Department of Transportation, illustrate the evolution of a section of Franklin Boulevard from a typical strip arterial into a multiway boulevard. These image studies helped the public see the potential created by converting Franklin into a multiway boulevard.

Figure 2
Existing conditions:
Franklin Boulevard

Figure 3
Step 1: Public
improvements

Figure 4
Step 2: Landscaping
matures

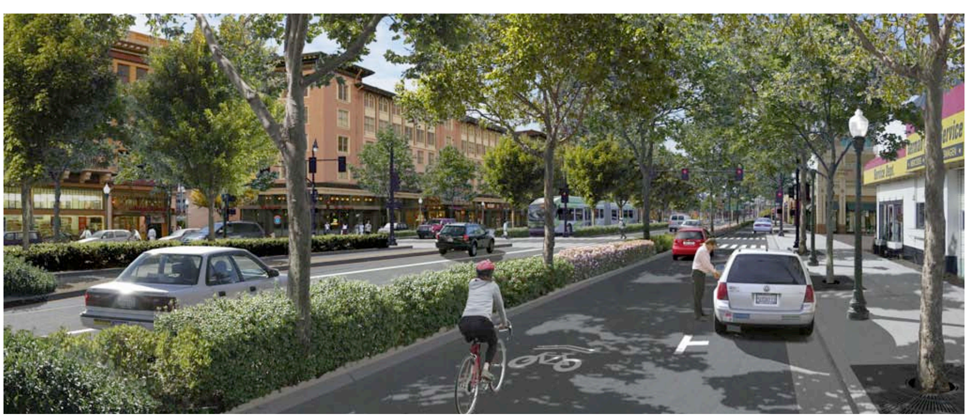

Figure 5
Step 3:
Redevelopment occurs

FINDINGS

Over the course of this project, members of the community - including business owners, neighborhood activists, and planning commissioners - have gone from knowing nothing about multiway boulevards to being supporters of this innovative transportation solution in part because the boulevard type has numerous potential benefits.

Right of Way

The existing right-of-way of up to 120 feet (36.5 m) is inadequate to accommodate a multiway boulevard with two dedicated BRT lanes. A right-of-way of at least 151 feet (46.0 m) would be required (see figure 1), which could be accommodated without impact to any existing buildings. Without dedicated BRT lanes, a right-of-way of 125 feet (38 m) would be required. Where BRT lanes exist along the arterial in East Eugene, the additional 31 feet (9.45 m) would come from the south side properties, which currently have underused parking lots in this zone. In other locations, additional right-of-way could be acquired in a similar fashion.

Level of Service and Volume

As part of the Walnut Station study sponsored by the City of Eugene and the Oregon Department of Transportation, detailed traffic modeling was conducted by David Evans and Associates. The modeling found that converting the existing arterial into a multiway boulevard would have a minimal impact on LOS (18). Along the half-mile (0.8 km) stretch covered by this detailed analysis, the boulevard performs at a LOS C/D with volume to capacity (v/c) ratios of .59 to .70. Traffic volume is expected to increase by 101% (north side PM peak) and 35% (south side PM peak) by 2025. With a multiway boulevard, the LOS is projected to remain at C/D, which is better than the city standard of LOS E, and v/c ratios are projected to be between .79 to .92.

Urban Form and Residential Capacity

Detailed studies by UO design studios found that the entire corridor could support 8,400 dwelling units at densities not exceeding 30 dwelling units per acre and in buildings not exceeding five-stories in height. At this level of density, all residential parking could be at-grade in parking areas located behind the buildings, which is an important economic consideration given the prohibitive cost of structured parking. Moreover, the five-story maximum height was the most acceptable to many of the stakeholders and allows for ground floor retail and four levels of housing above, which could be developed as stacked townhomes, condominiums, and apartment flats. Higher buildings would generate opposition among adjacent neighbors concerned about the impacts development would have on their properties.

Forecasting Environmental and Economic Benefits

While economists routinely make forecasts based on a set of assumptions, planners and other professionals responsible for the configuration of the built environment rarely take advantage of this approach to estimating the costs and benefits of development alternatives. As part of this project, preliminary environmental forecasting helped identify possible impacts of converting the arterial into a multiway boulevard. While these forecasts are simply projections and may not reflect actual events in the future, they do help policy-makers, members of the public, and professionals assess the possible impacts of development decisions. These forecasts start with the position that, as currently configured, Franklin Boulevard will not attract residential development. Traffic speeds, land use patterns, building forms, and landscaping are simply not conducive to mixed-use development. However, if converted to a multiway boulevard, the street would very likely attract mixed-use development. After all, this has been the case with Octavia Boulevard in San Francisco and it is the pattern for multiway boulevards in Europe that carry similar levels of through traffic.

Vehicle Miles Traveled

Forecasting VMT is done using the model developed by Holtzclaw (3) where the variables are bus schedule and residential density. For the study area, at full build out with densities at 30 dwelling units per acre and 10 buses per hour, the model forecasts annual VMT per household of 12,292 (19,790 km). This compares to a forecasted annual VMT of 24,157 (38,892 km) in a suburban location with 5 dwelling units per acre and 0.5 buses per hour. This figure is conservative compared to projections by Lane Council of Governments, which determined that driving rates at the edge of Eugene are more than double rates in the center of Eugene (cited in 2). The potential savings could then be forecasted using the following formula where VMT-S is annual VMT savings per household and HH is the forecasted number of households in the study area:

$$(\text{VMT-S}) \times (\text{HH}) = \text{VMT Savings}$$

$$11{,}865 \times 8{,}400 = 99{,}666{,}000 \text{ miles}$$

Hence, with 8,400 units in the study area, the projected VMT reduction totals nearly 100 million miles (160 million km) per year when compared to standard suburban development patterns.

Carbon Dioxide Emissions

With a forecasted VMT savings per household, a similar forecast could be made for carbon dioxide emission reductions. Based on an average fuel consumption of 21.5 miles per gallon, carbon dioxide (CO_2) emissions would be approximately 1.1 pounds (.5 kg) per mile (17). CO_2 emission reductions could then be forecasted using the following formula where VMT-S is annual vehicle miles traveled savings per household and HH is forecasted number of additional households:

$$(\text{VMT-S}) \times (\text{HH}) \times 1.1 = \text{C02 Savings (lbs)}$$

$$11{,}865 \times 8{,}400 \times 1.1 = 109{,}632{,}600 \text{ pounds (49.7 million kg)}$$

Hence, with 8,400 units in the study area, the projected carbon dioxide emission reduction totals nearly 110 million pounds (49.7 million kg) per year when compared to standard suburban development patterns.

Household Savings

The average costs of owning and operating an automobile, calculated by the Federal Highway Administration are $2,203/auto annually and $0.127/mile (3). The predicted annual household auto costs would then be as follows:

$$(\text{VMT-S}) \times (\text{savings per mile}) = \text{Annual cost savings}$$

$$11{,}865 \times 0.127 = \$1{,}506$$

So each household in the study area could anticipate a savings of just over $1,500 per year because of reduced transportation costs associated with their locational decisions.

Property Valuations

Although the costs of converting the existing arterial into a multiway boulevard could be substantial and would include construction costs, right-of-way acquisition costs, and possible financing costs, the increased tax revenue resulting from increases in property values could offset all or part of this cost. For example, the construction cost for one half-mile length of the multiway boulevard would be approximately $5 million (18). Forecasted tax revenue could be estimated using the following formula where HH is the number of households, SFavg is the average unit size, AV is assessed value per square foot of new construction, and TR is the approximate tax rate.

HH x SFavg x AV x TR = Potential Property Tax Revenue

8,400 x 1,200 x 175 x 0.01 = $17,640,000

Thus, for the study area, the added residential capacity could translate into additional potential property tax revenue of over $17 million per year.

Farmland Preservation

One last area of concern in Oregon is the cost of sprawl in terms of farmland consumption. Continued low-density development at the edge of town is consuming prime farmland. New demands by homebuilders for expansion of existing Urban Growth Boundaries to accommodate projected residential demand has already led one jurisdiction (Springfield) to begin the process of UGB expansion. Forecasts for farmland preservation are imprecise but can be viewed within a range that recognizes most development at the edge of town will continue to be low-density, single-family construction regardless of altered demand. In fact, married households with children represent less than 25% of the US market. Changing demographics, with retirees, singles, and varied household compositions making up the majority of future households, will lead to changing housing demands. Already, the demand for mid-town condominiums and townhomes in Eugene is increasing. To forecast farmland preservation, it is best to consider a range of possibilities. On one end, an argument could be made that households moving onto an improved Franklin Boulevard would otherwise be living in apartment complexes with the same net densities at the edge of town. On the other end, an argument could be made that most development at the edge of town takes the form of low-density single-family homes regardless of the household composition of the buyers (which is currently the case) and that the housing typology along an improved Franklin Boulevard would be more responsive to future demographic demands. Thus, the range could be established using the following formula where HHtot is the total number of households in the study area and SD is the suburban density at the edge of town in terms of dwelling units per acre:

(Total HH)/(SD) = Preserved Farmland

Low end: 8,400/30 = 280 acres (113 ha)
High end: 8,400/5 = 1,680 acres (680 ha)

Hence, with 8,400 households in the study area, this could translate into farmland preservation of up to 1,680 acres (680 ha). Note that this does not include the additional area required to support the expanded transportation network or commercial development that would be attracted to new households at the edge of town. Strip shopping centers, gas stations, wide arterials, collectors, and local streets would add to the demand for prime farmland.

CONCLUSION

This project advances our understanding of how land uses and transportation solutions can be better integrated to support more livable communities. Oregon has a long history of innovations in land use and transportation but that history has largely bypassed the urban arterial. As an alternative to these arterials, multiway boulevards can be one of many strategies that can help communities struggling with congestion, environmental degradation, and livability. Environmental forecasts presented here make a compelling case for considering multiway boulevards. An improved arterial that separates through and local traffic, allows for on-street parking, supports Bus Rapid Transit, and enhances the bicycle and pedestrian experience could be a magnet for new development. This development could support up to 8,400 dwelling units, reduce annual VMT rates by nearly 100 million miles (161 million km), and reduce annual carbon emissions by over 100 million pounds (45.4 million kg). Development along a multiway boulevard may preserve up to 1,680 acres (680 ha) of farmland and lead to an annual transportation savings per household of nearly $1,500. Collectively, the residences could generate over $17 million annually in additional property tax revenue. To be sure, some of these benefits may be achievable without a multiway boulevard, but this street type may best meet the complex needs of arterials designed to integrate transportation and land use. The case study presented here offers some initial lessons for communities interested in improving their arterials. Community involvement is a prerequisite given the level of investment and change a multiway boulevard represents. Detailed transportation and urban form modeling is needed to address legitimate concerns. And precedent studies are important benchmarks that build local knowledge and understanding. But the study does have limitations. Namely, it was of one arterial in one Oregon metropolitan area. Moreover, the findings are only forecasts of possible benefits to enhanced arterials. And the forecasts are based on one alternative – the multiway boulevard – and do not address the range of competing alternatives. Further research of other boulevard types and in a more diverse range of communities is needed to broaden the applicability of the findings of this initial study.

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