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City of Springfield

From: Bill Troe / Stephen Osberg

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Subject: Franklin Boulevard Complete Street Reconstruction Project – 2015 TIGER Grant
BCA Memorandum

Introduction

The proposed reconstruction of Franklin Boulevard in Springfield, Oregon is a central element of a larger effort to revitalize the Glenwood Riverfront District. On its own, the project will provide substantial benefits in the areas of safety, operations and maintenance, economic competitiveness, quality of life, and environmental sustainability. More importantly, this truly multimodal project will catalyze the transformation of a largely vacant and otherwise underutilized land in the center of the Eugene-Springfield metropolitan area into a dense hub of employment and housing.

The reconstruction project represents a complete restructuring of the corridor and includes the conversion of several signalized intersections to multilane roundabouts, the installation of protected bicycle lanes, the separation of through traffic and local access traffic, the enhancement of pedestrian facilities, and improvements to the corridor's three bus rapid transit (BRT) stations. A more detailed description of the project can be found in the complete project application.

A formal benefit-cost analysis (BCA) was conducted in support of this project following best practices in transportation planning and current TIGER grant application guidance. Consequently, the benefits detailed herein do not reflect the entirety of benefits expected from the project's successful implementation. Rather, they represent a conservative estimate of just the benefits that can be monetized for quantitative analysis using an established and widely accepted methodology.

This memorandum documents the assumptions, methodology, and results developed for the BCA. After a thorough investigation, it is clear that the benefits of reconstructing Franklin Boulevard in the manner proposed greatly outweigh the costs of doing so.

Monetized Benefits Included in the Evaluation

- Automobile user travel time savings.
- Transit user travel time savings.
- Increased mobility for transit dependent populations.
- Savings from reductions in crashes.
- Mobility, health cost, and recreation benefits for bicyclists.

- Reduced automobile congestion due to a mode shift to bicycling.
- Reduced operations and maintenance costs for the road facilities
- Reduced social costs associated with greenhouse gas emissions and reductions in air quality.

Benefits Not Included in the Evaluation

- Reconstructed and upgraded stations for the corridor's BRT line.
- Increased pedestrian access to transit service and throughout the corridor.
- Enhanced pedestrian safety through redesigned facilities.
- Travel time savings and jobs access on weekends.
- Improved safety through the consolidation of access points to Franklin Boulevard.
- Land value increases due to improved access and atmosphere.
- Worker productivity gains and jobs creation.
- Access and environmental benefits resulting from the densification of development.

Primary Assumptions Underlying Analysis

The BCA process rests on a set of assumptions to provide consistent comparisons between project components. The following section highlights the critical assumptions and methods along with potential economic and social benefits resulting from the reconstruction of Franklin Boulevard into a multimodal corridor centered around a series of roundabouts at the intersections of Franklin Boulevard with the following streets:

- Glenwood Boulevard
- Henderson Avenue
- Mississippi Avenue
- Brooklyn Street
- McVay Highway

Discount Rates

Federal TIGER guidance recommends that applicants discount future benefits and costs to 2015 present values using a real discount rate of seven percent to represent the opportunity cost of funds in the private sector. TIGER guidance also allows for present value analysis using a three-percent discount rate when the funds currently dedicated to the project would be other public expenditures.

While the latter public funding scenario best reflects Franklin Boulevard project, the project benefits presented in this narrative use the more conservative seven-percent discount rate, which clearly demonstrates the extent to which the project's long term benefits outweigh its costs. The BCA spreadsheets display both three-percent and seven-percent figures.

Length of Analysis

Once funded, the Franklin Boulevard reconstruction will begin in 2016 and last through 2019. Construction costs are divided equally between the four years of construction. The project is expected to become operational in 2020.

The BCA compared the capital costs of construction to the quantifiable benefits accrued over the first 20 years of operation (through the end of 2039).

The traffic model used was based on weekday travel, so one year was assumed to be equal to 260 working days for all annual calculations involving commute trips. This value should be considered a conservative estimate due to the exclusion of benefit and costs accrued during weekend service. Recreational bicycle use was calculated based on a year of 365 days.

Year 2015 Dollars

This analysis was calculated in 2015 dollars.

Build/No-Build Assumptions

The BCA was developed by comparing a Build case to a No-Build case. The No-Build case assumed no improvements to bicycle or pedestrian facilities (beyond minimal improvements in line with the requirements set by the Americans with Disabilities Act) and no change in traffic signal operations or the cross-section of the street. All calculations were based on the increment of cost between the two cases.

Vehicle Miles of Travel (VMT)

Vehicle miles of travel were assumed to be constant at a regional level between the No-Build and Build scenarios. While a small mode shift was projected to take place to from automobile to bicycle commuting, it was assumed that the latent demand for trips counterbalanced the shift to produce a consistent VMT.

Project Benefits

Safety

A primary benefit offered by the project is the reduction of crashes along the Franklin Boulevard corridor through the conversion of six intersections to multilane roundabouts. Crash data from the most recent ten years available was examined to determine traffic-volume-based crash rates at the intersections that were assumed to be reconstructed as part of the project. These rates were then applied to forecasted traffic volumes to determine the cost of crashes over the 20-year evaluation period under the No-Build scenario. A crash modification factor was applied to the resultant value to determine the cost savings from crashes avoided under the Build scenario.

Over the 20-year evaluation period, the project is expected to provide \$17.3 million in benefits from avoided crashes. This estimate is conservative since it does not include the value of crashes avoided through access consolidation along the corridor or benefits directly related to the bicycle and pedestrian facility improvements.

State of Good Repair

The proposed project will improve conditions and significantly reduce operations and maintenance costs along Franklin Boulevard. In the BCA, the Build scenario was anticipated to decrease annual roadway maintenance costs by 25 percent, or \$5,000, and eliminate the need for five sets of traffic signals. In addition, the project eliminated the need for a scheduled road overlay and ADA improvements in 2021. Overall, these savings totaled \$1,180,000 over the first 20 years after project implementation.

Economic Competitiveness

The transformation of Franklin Boulevard into a multimodal corridor generated substantial economic benefits. Of these benefits, the BCA focused primarily on the travel time savings resulting from the conversion of signalized intersections to multilane roundabouts. Reductions in travel time bring down transportation costs, allowing people easier access to employment centers, education, and the services and retail goods they require. To calculate travel time savings, the BCA used vehicle hours of travel (VHT) estimates calculated using Synchro modeling software for the No-Build and Build Scenarios. VHT estimates were provided for years 2011 and 2035. The evaluation was performed using the increment between the two scenarios (i.e., the travel time saved by implementing the project), and estimates of the increment for all other years in the analysis were interpolated based on a linear growth rate. Oregon Department of Transportation vehicle classification counts were consulted to determine the mix of automobiles and trucks, and the values of time obtained in the *TIGER Benefit Cost Analysis (BCA) Resource Guide* (March 2015) for all purpose travel and truck drivers were applied to the resultant estimates of travel time saved for each type of vehicle. It was assumed that each automobile carries 1.07 people (Average Vehicle Occupancy in Eugene-Springfield Metro Area from the 2012 ACS 5-Year Survey) and each truck carries only the driver.

Overall, people traveling by automobile and truck saved a combined 918,000 hours over the first 20 years of the project at a benefit of \$4,585,000.

The above VHT calculations did not take into consideration the travel time savings of transit users. As Franklin Boulevard carries one of the region's EmX BRT routes, travel time benefits also greatly impact transit users. The Synchro modeling also estimated the transit passenger hours of the No-Build and Build Scenarios. Using a similar method to that described above, a value of time was applied to the saved travel time. Over the evaluation period, the project saved transit riders approximately 28,000 hours at a value of \$132,000.

In addition, the project is expected to dramatically increase the economic productivity of the land along the corridor. Reconstructing the corridor lays the foundation for the revitalization of the entire Glenwood neighborhood from a low density, largely vacant, between two economically strong cities to an area of dense mixed-use development. The vision for the neighborhood was developed with extensive community input through development of the *Glenwood Refinement Plan* (November 2014).

Quality of Life

The Quality of Life benefits derived from the project were broken down into two main categories: Transit Dependent Mobility and Bicycle Facility Benefits.

Transit Dependent Mobility

Transit plays a vital role in providing access to the goods and services necessary in life, and improvements to travel time for transit riders are felt most acutely by those disadvantaged populations dependent upon transit service. According to the *Lane County Transit 2011 Origin/Destination Study* (February 2012), of all EmX BRT passengers in the region, 36 percent do not have access to an automobile or are lack a driver's license. To recognize the additional benefit to this transit dependent population, 36 percent of all transit rider travel time savings was counted a second time for a value of \$47,000 over the evaluation period.

Bicycle Facility Benefits

The reconstruction of Franklin Boulevard will reduce the barriers to bicyclist and pedestrian travel, providing lower-cost access to jobs, education, and goods and services. The included protected bicycle lanes will fill a critical gap in the network of bicycle infrastructure between downtown Springfield, downtown Eugene, and the University of Oregon.

In estimating potential ridership along the corridor and the resultant benefits, the BCA relied on methodology developed in the National Cooperative Highway Research Program's (NCHRP) *Report 552: Guidelines for Analysis of Investments in Bicycle Facilities* (2006).

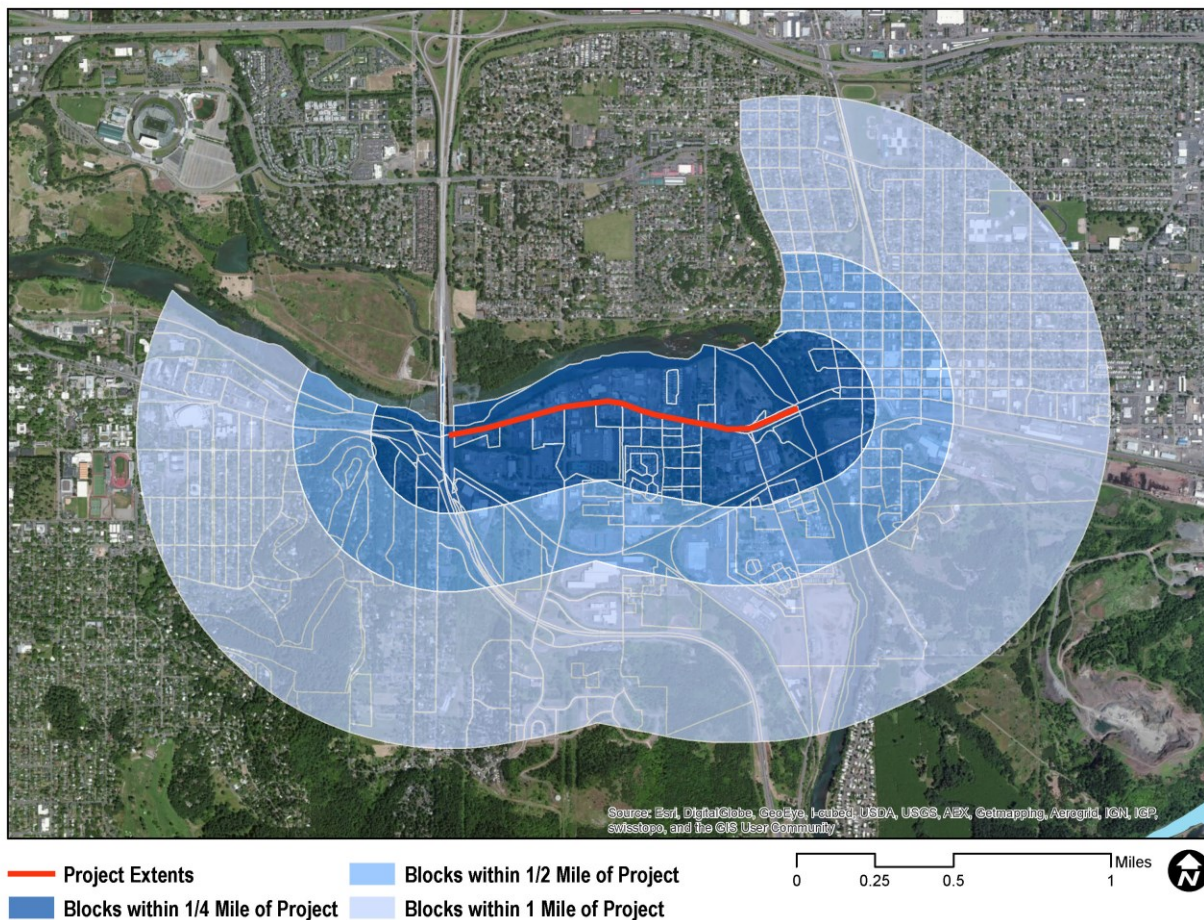
Demand

The first step to determine bicycle demand was estimating the population residing near the assumed facilities. A buffer analysis was performed around the project area using block-level US Census population data. Buffers were created at the quarter-mile, half-mile, and one-mile distances from the project. These buffers appear in Figure 1. The population residing within these distances of the project was the population assumed to use the new facilities at propensities that vary with distance, however, the presence of the Willamette River within a quarter-mile north of the project limits the ability of some residents to access the new facilities. Thus, Census blocks were removed from the study area north of the river to account for geographic barriers to access.

Of the population remaining in the buffers, the number of commuters of all modes was estimated and the regional share of bicycle commuters (4.8 percent) was applied. The NCHRP report supplied multipliers to estimate new commuters and existing and new recreational riders based on the number of existing commuters.

In 2039, it was assumed that approximately 1,000 commuter and recreational bicyclists used the facilities each weekday.

Figure 1 – Buffers Used to Estimate Use of Proposed Bicycle Facilities



Mobility Benefits

The proposed facilities will allow people on bicycles to access employment and educational facilities by a means that is less expensive to operate than an automobile, has less of an environmental impact and is less dangerous to the bicyclists than riding in areas without facilities. To estimate the value bicyclists place on this mobility, the NCHRP recommends applying the value of time to the additional travel time bicycle commuters are willing to travel out of their way to get to the facilities. In this case, it was estimated that bicyclists were willing to travel an additional 18.02 minutes to get to the facilities. When applied to new and existing commuters, this value yielded a total benefit of

\$5,203,000 over the 20-year evaluation period. Mobility benefits of weekend travel were not included in this estimate.

Health Cost Savings

Exercise helps to keep people healthy, thereby reducing their annual health costs. Based on an examination of ten studies, the NCHRP estimates that the daily physical activity of new bicycle commuters saves each of them \$128 per year. Over the first twenty years of after project implementation, it was estimated that these savings totaled approximately \$106,000.

Recreation Benefits

Examining the value people place on different recreational activities, the NCHRP estimates that one hour of bicycle recreation is worth \$10. The BCA assumed that a “typical” day of bicycling included one hour of activity. Applying this value to the new daily recreational riders yielded a total benefit of \$4,757,000 over the evaluation period.

Reduced Auto Congestion Benefits

As the new bicycle facilities encourage a mode shift to bicycle commuting from automobile commuting, it was assumed that the region would see benefits related to reduced congestion. These benefits include lower travel times through improved traffic flow, reduced emissions, and operational savings for bicyclists. The NCHRP estimated that the benefit derived per commuter is \$0.13 per mile. When applied to the metro area average trip length of 4.6 miles obtained in the *Eugene System Development Charge Methodologies* (July 2014), the project generated \$259,000 in benefits over the study period.

Environmental Sustainability

An important measure of project quality is its ability to curb the emission of greenhouse gases and other pollutants. While regional VMT was assumed to remain consistent between the No-Build and Build Scenarios, reductions in delay due to improved traffic flow through the project’s roundabout reduced emissions. These reductions were measured through regional VHT estimates. Using idling emissions rates for VOC and NO_x obtained from the United States Environmental Protection Agency’s *Idling Vehicle Emissions for Passenger Cars, Light-Duty Trucks, and Heavy-Duty Trucks* (October 2008) and a rate for CO₂ from the Argonne National Laboratory’s, *Which is Greener: Idle, or Stop and Restart?* (January, 2013), the BCA calculated a reduction in 2.30 metric tons of VOC, 3.02 metric tons of NO_x, and 1,816 tons of CO₂ over the 20-year evaluation period. Together, these emissions reductions were valued at \$83,000.

Beyond these monetized environmental benefits, a mode shift to bicycling and walking for transportation purposes brought about by facility improvements would also result in reduced emissions from automobiles.

Project Costs

It requires a substantial investment to reconstruct Franklin Boulevard into a multimodal corridor to reap the many benefits described above. Capital costs were expected to be approximately \$25,383,000, though many of the capital goods will have a significant lifespan stretching well beyond the 20-year evaluation period, particularly the purchased right-of-way. Once the residual capital value of these goods was taken into account, the net cost dropped to \$22,310,000.

Benefit-Cost Analysis Results

An examination of the monetized benefits resulting from the reconstruction of Franklin Boulevard relative to the project's costs reveals that it yields a benefit of \$1.51 for every \$1.00 invested. Again, this result is based on the conservative seven-percent annual discount rate and does not include the significant permanent benefits expected to accrue from the employment and property development within the Glenwood Riverfront District. It is grounded in a conservative set of assumptions underlying the projects benefits and costs. A full accounting of all project benefits and costs can be found in the BCA spreadsheets.