

Appendix A: Methodology

Introduction

The intent of this demonstration program was to develop a menu of low-cost options for increasing transit ridership. In many respects it was an opportunity assessment that set out to find what low-cost options were possible in these activity centers. The term "low-cost" being relative, it was defined for the demonstration program as anything less than building fixed guideway, and included facility improvements, such as adding bus shelters, and service improvements that would operating expenses, as well as the capital costs of additional buses if needed in the peak periods.

As the intent was to increase ridership, no attempt has been made to estimate the expected increase in ridership or calculate the cost-effectiveness or cost-benefit of (many of) the menu of options. Indeed, for many of the options, estimating ridership and calculating the cost-benefit ratio would be difficult if not misleading; too many variables are involved to provide an accurate estimate. Who knows how many riders can be expected from adding bus shelters to existing stops? How does one estimate the number of new transit passengers from improved access to stops? These are qualitative improvements that add to the overall experience and will over time improve ridership, the extent of which is best determined by actual experience.

To adequately estimate the ridership from new service such as the Merrifield Circulator would require a home address study of employees of all businesses served by the service to determine the number of employees who live within access to the transit system and the relative attractiveness or utility for each employee compared to their existing mode of travel. A stated preference survey could also be completed. But the efforts involved in either are not within the scope of this study and might be more time consuming and expensive than simply testing the service.

Most of the improvements are of a nature that they are easy to implement and test. TDM measures can be installed and tried for a reasonable period of time. New bus service can be tested for a year, and, with adequate advertising, the results can be evaluated. After sufficient time to adequately test the results, adjustments can be made, just as they are with any existing route or service today.

For areas where service is already established, adding service or increasing service frequency is almost always a money losing venture. The general elasticity for changes in transit frequency is about 0.45-0.55, meaning that a doubling of frequency (and cost) would result in about a 45-55 percent increase in riders. But the stated goal is to increase ridership, not necessarily to do so while saving money.

The Regional Bus Study, a large, comprehensive study of bus service within the metropolitan Washington area, examined nearly every bus route in and around the city. Besides recommending major investments such as fixed guideway, it also recommended low-cost service enhancements in many areas. Many of those service enhancements sought to improve service in several areas to minimum thresholds or policy minimum service parameters, such as adding evening and weekend service or increasing midday service frequencies to levels that invite ridership.

This study reiterates those low-cost options for improving ridership recommended by the Regional Bus Study (RBS). Generally, no further analysis was done, as that report provided ample backup and justification. Where necessary or where the opportunities existed for enhancements, those are described herein. For example, the route for the Merrifield Circulator was adjusted from what was described in the RBS to serve more businesses and residential communities. Improved service frequencies for existing bus service in Bailey's Crossroads is recommended because the existing frequencies are much lower than the residential densities merit (about half the service that Marks Corner receives with the same number of residential towers). But no attempt has been made to determine whether WMATA provided those service levels in the past and subsequently reduced them due to poor ridership or exactly how new service should be routed, as those are not within the scope of this small study.

Proposed Bus Service Enhancements

Most of the recommended service enhancements include increased frequency during peak morning and evening travel periods. Adding service usually would add to operating costs and also may also require the assignment of one or more additional buses to a route. To determine the net increase in operating cost and fleet requirements, estimates for both the existing service and the enhancements were calculated. Costs would be reduced where existing service would be removed, and additional costs would be incurred where the new service would be added. As shown in the tables provided with each center's section of this report, the subtotals reflect the net change, expressed in vehicle revenue hours (VRH), fleet requirements, operating costs, capital costs, and patronage.

The operating cost and fleet requirements of the existing and proposed service is based on VRHs and the average cost per VRH. To calculate this value, the existing bus route schedules were taken from the various transit operator web sites in January 2005 and used to determine average route frequency, travel time and span of service. A 5 percent recovery time, 6-hour peak period (typically), and annual days of service were also factored into the model to estimate the annual VRHs for each route. Next, the 2002 average Operating

Expense per Vehicle Revenue Hour from the National Transit Database website was used to calculate an annual operating cost for each route. An annual inflation factor of 3 percent was then applied to inflate the 2002 dollars to 2005 dollars.

An effectiveness measure was used to determine which enhancements appear to be more productive in terms of annual additional passengers per additional vehicle revenue hour provided. For the sake of continuity, the elasticities used to calculate the incremental ridership is the same calculation used in the Regional Bus Study and originated in the TCRP Report 95, Chapter 9: Transit Scheduling and Frequency (2004). The effectiveness values shown in the tables provided with each center recommendations, were calculated by dividing the estimated annual additional passengers by the estimated annual additional vehicle revenue service hours.

Proposed "Regional Bus Study" Enhancements

The selected bus service enhancements adopted from the Regional Bus Study have been incorporated into this study without change. As such, the capital cost, operating cost and ridership estimates presented here have not been revised, except to adjust the costs 3 percent annually to compensate for inflation. The details pertaining to the Regional Bus Study enhancements are described in the Regional Bus Study Final Operating Plan, dated September 2003.

Estimated Fleet Requirements and Costs

The Regional Bus Study provided unit capital costs for four different types of buses, in 2002 dollars. For this report, \$80/hr was used as a way to standardize the costs among different centers to make the measure of effectiveness more universal. These original costs were then inflated at 3 percent per year and are shown in this report as 2005 dollars. The appropriate type or size of bus was then applied on a case-by-case basis to correspond with the service offered. The additional fleet requirements and associated capital costs are provided on a route basis. The subtotals and grand total reflect the net increase required to accommodate the improved bus service based on incremental vehicle revenue hours.

The methods used in this study are somewhat consistent with those employed in the Regional Bus Study. They are intended to indicate which service enhancements could potentially yield better patronage than others, by comparison. The operating costs, capital costs and patronage can and will vary dramatically from the estimates contained in this report due to the complexities of interlined bus routes, network affects, scheduling and other factors not addressed in the context of this study.