

ACCESSIBILITY AND TRANSPORTATION MODE CHOICE

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Summary

Venues, ranging from businesses to parks to schools, vary widely in their accessibility by public transit. More accessible locations will attract more transit riders than less accessible locations. We have developed an objective measure of transit accessibility—the Transit Accessibility Index (TAI)—and describe its application to the selection of meeting locations.

Introduction

Public transit offers many public benefits—reduced traffic congestion, lower public infrastructure costs, lower emissions, lower fuel consumption, health benefits from more walking, and access across the entire socioeconomic spectrum. Yet only 7% of the daily household trips in the greater metropolitan Washington region are taken by public transit¹.

There are a number of reasons that public transit utilization is as low as it is. One reason is that there are some locations in the region that are either sometimes or always inaccessible by public transit.² Yet not all locations that are technically accessible, i.e., within a certain distance of a transit stop, are equally accessible. A greater number of trips are taken to and from locations that are more transit accessible, for instance downtown Washington, DC, and a smaller number of trips are taken to and from locations that are less transit accessible, for instance less populated areas of suburban Fairfax County.

We have developed an objective measure of transit accessibility, called the Transit Accessibility Index (TAI), a ratio of the amount of time required to travel by public transit from one location to another location versus the amount of time to make that same trip by private vehicle. It may be relatively simple to determine the fastest way for one person to travel from one location to another, and it may be possible to determine the total travel time to different potential meeting venues for a small group of people. In a variety of other instances, for instance meetings involving larger groups with unknown attendees, it is often impossible to determine total travel time of all the attendees. The TAI utilizes common originating and terminating locations to develop this objective measure of individual location accessibility.

We recently developed TAI scores to help the Fairfax County Department of Transportation (FCDOT) decide where to hold public meetings in Fairfax County, Virginia. The meetings were scheduled to begin at 6:00 PM and to end at 8:30 PM. Though the organizers didn't know exactly where the attendees were going to be arriving from or departing to after the meeting, the subject of the meeting was a review of the Countywide Transit Network Study and the attendees were assumed to be local to Fairfax County and the Washington, DC metropolitan area. Accordingly, as a first cut, the organizers identified fifteen venues located in Fairfax County near Orange line and Blue line Metro Rail stations as potential meeting sites. Thirteen of these venues are Fairfax County Public School facilities, one is a Fairfax County facility,

¹ Dennis M. Leach, Director of Transportation, Arlington County Department of Environmental Services, October 20, 2012.

² The Washington Metropolitan Area Transit Administration (WMATA) considers a location inaccessible during hours that the transit service doesn't run and considers a location inaccessible if it is more than one mile distant from a transit stop.

and one is a Falls Church City Public School. The potential venues appear on a map in Figure 1: Potential Venues, and as a list in Table 1: Bus+Rail MDVA and Table 2: Bus+Rail VA below.

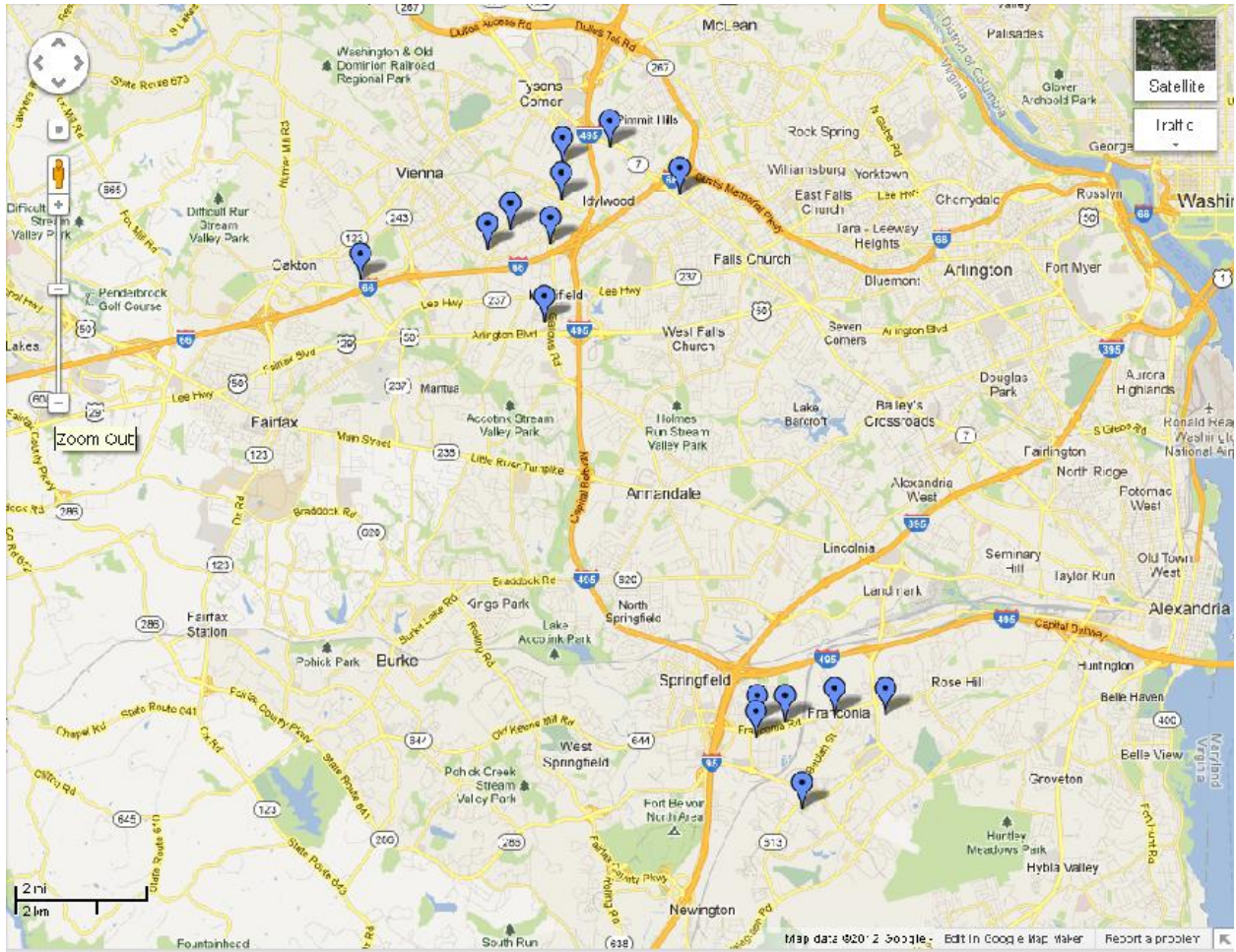


Figure 1: Potential Venues

In order to provide a fair comparison between transit trips and private vehicle trips and because we wanted to evaluate the transit accessibility of the potential venues rather than the transit accessibility of the locations attendees were coming from and departing to, we looked for starting and ending locations that are well served by both public transit and highways. We chose four Metro Rail stations located in Maryland, four in Virginia, and four Park and Ride facilities located in Fairfax County to serve as the originating and terminating locations. Each of the Metro Rail stations—Branch Avenue, Greenbelt, New Carrollton, and Shady Grove in Maryland, and Franconia-Springfield, Huntington Avenue, Vienna, and West Falls Church in Virginia—is located by an Interstate highway and is served by a large parking garage. The four Park and Ride locations—Backlick Road Rail Station, Fairfax County Government Center, Herndon Monroe, and Reston South—are the largest such facilities, as measured by parking spaces, not served by Metro Rail. These locations appear in Figure 2: Sample Originating and Termination Locations.

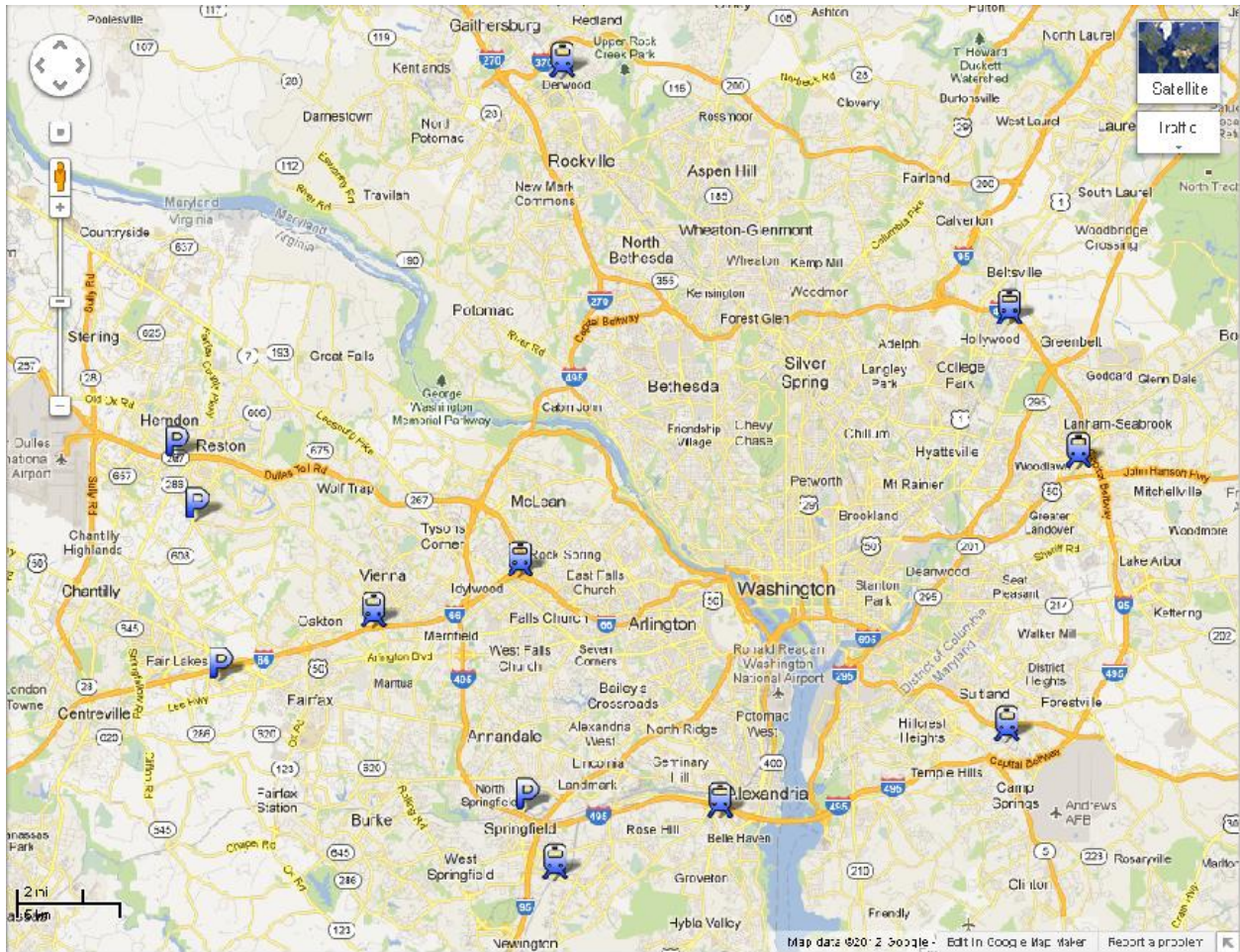


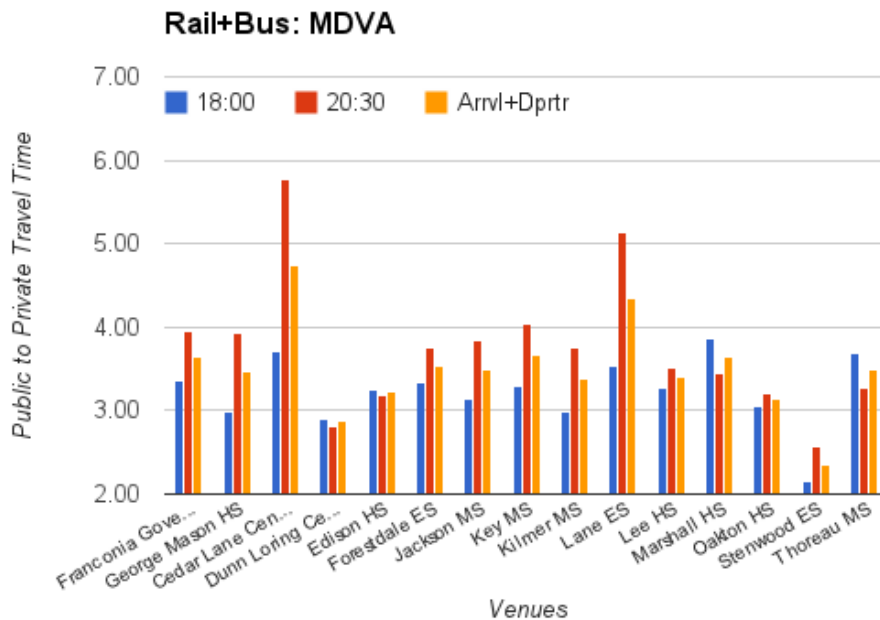
Figure 2: Sample Originating and Terminating Locations

Results: Rail+Bus in Maryland and Virginia

Using WMATA's Trip Planner and Google Maps, we determined the ratio of travel time to each of the fifteen venues arriving at 6:00 PM from each of the twelve originating locations, and determined the ratio of travel time from each of the fifteen venues at 8:30 PM to each of the twelve terminating locations. We determined the average of these scores, a measure of transit accessibility, for each venue.

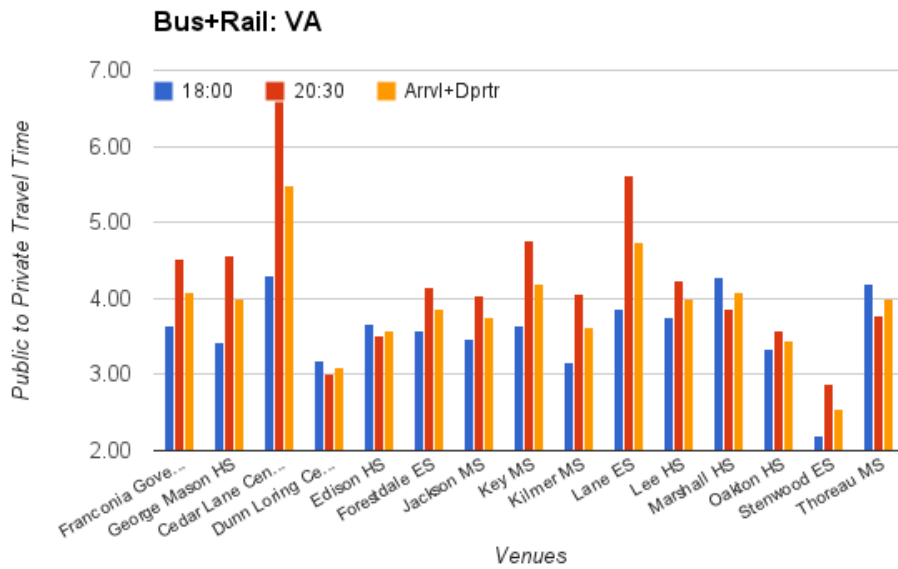
As shown in the chart below (Rail+Bus: MDVA), there is a significant difference in the transit accessibility of these venues. Stenwood Elementary is the most transit accessible of all the venues at 6:00 PM, at which time travel to this venue takes 2.15 times as long by transit as by private vehicle. As is most often the case, this venue is not as well served by public transit at 8:30 PM as it is at 6:00 PM. At 8:30 PM, public transit takes 2.56 times as long as by private vehicle.

At the opposite extreme in terms of accessibility is the Cedar Lane Center, which has score of 3.70 at 6:00 PM, and a score of 5.77 at 8:30 PM.



Results: Bus+Rail in Virginia

Given that the target audience for these meetings is people who live or work in Fairfax County, we decided to determine how the index would change if we removed the Maryland Metro Rail stations from consideration, leaving only the Virginia Metro Rail and Park and Ride locations in the model. When we reran this analysis, we found that the scores rose overall, which is to say that the relative transit accessibility declined. At Stenwood the increase was relatively insignificant—from 2.15 to 2.21 at 6:00 PM and from 2.56 to 2.88 at 8:30 PM. On the other end of the spectrum, the score for Cedar Lane departing at 8:30 rose from 5.77 to 6.68. In this scenario, public transit trips from Cedar Lane at this time take 6.68 times as long as private vehicle trips. Some trips leaving Cedar Lane at 8:30 PM end at 11:25 PM, almost three hours later.



Conclusion

There are dramatic differences in the transit accessibility of different public venues that are relatively proximate to each other. Individuals who have the choice of public transit or private vehicle will take transit accessibility into consideration when deciding how to travel to meetings, and are more likely to use public transit to travel to more transit accessible locations. Individuals who do not have private vehicles must decide whether to spend an inordinate amount of time to travel to less transit accessible locations, or not to travel at all.

Though this analysis was conducted for a particular set of public meetings, the same considerations apply to other circumstances including other community events, PTA meetings, school activities, jobs, conferences, luncheons, training, office site location, etc. In order to increase public transit use as a share of daily household trips, transit accessibility should be considered when planning these other activities.

Table 1: Bus+Rail MDVA

Name	18:00	20:30	Arrvl+Dprtr
Franconia Governmental Center	3.35	3.94	3.65
George Mason HS	3.00	3.93	3.46
Cedar Lane Center	3.70	5.77	4.73
Dunn Loring Center	2.91	2.82	2.87
Edison HS	3.25	3.19	3.22
Forestdale ES	3.34	3.75	3.54
Jackson MS	3.13	3.84	3.49
Key MS	3.29	4.05	3.67
Kilmer MS	2.99	3.75	3.37
Lane ES	3.54	5.14	4.34
Lee HS	3.27	3.52	3.40
Marshall HS	3.86	3.45	3.65
Oakton HS	3.04	3.22	3.13
Stenwood ES	2.15	2.56	2.36
Thoreau MS	3.69	3.28	3.49

Table 2: Bus+Rail VA

Name	18:00	20:30	Arrvl+Dprtr
Franconia Governmental Center	3.64	4.52	4.08
George Mason HS	3.42	4.58	4.00
Cedar Lane Center	4.30	6.68	5.49
Dunn Loring Center	3.18	3.00	3.09
Edison HS	3.66	3.51	3.59
Forestdale ES	3.59	4.15	3.87
Jackson MS	3.47	4.04	3.76
Key MS	3.64	4.76	4.20
Kilmer MS	3.17	4.07	3.62
Lane ES	3.86	5.62	4.74
Lee HS	3.75	4.24	4.00
Marshall HS	4.28	3.88	4.08
Oakton HS	3.34	3.58	3.46
Stenwood ES	2.21	2.88	2.54
Thoreau MS	4.20	3.79	4.00