

MEMORANDUM

Date: August 4, 2006

From: Tom Platt

To: Dean Tistadt
Linda Farbry

Re: **Phase 2 Transportation Study – Project Status Memorandum #2**

This memorandum will summarize progress since our memorandum of July 17th, with a focus on explaining the approach we are pursuing for each of the tasks in Part 1 of the study. This was also the agenda for the meeting we conducted on August 2nd and will therefore also serve as a summary of these discussions. Please feel free to contact me if there are any questions or if anything requires clarification.

The project has proceeded to the point where all data has been collected, sorted, and manipulated to be used in our various analytical models and software programs. In addition, the MPS team has discussed and established an appropriate analytical approach for each task. The bulk of the analytical work will be conducted during the months of August and September. We anticipate a series of checkpoint meetings and teleconferences with Transportation staff as this work proceeds. Several elements of the work plan will require staffs' active participation.

The first substantive results should begin to emerge in the early part of September. Most of the key results should be apparent as we approach the end of that month. Given this, we believe that the two School Board work sessions scheduled for September 11th, and October 16th are the best opportunities for the MPS team to present progress reports to the Board, and to be available to answer questions. We recommend that these sessions be included on the Board's agenda for those dates.

Part 1 of the study is comprised of five tasks, four of which (Task 1B through 1E) collectively constitute a departure from the bell time analysis conducted in Phase 1, and being continued in Part 2 of the current study. These Part 1 tasks are designed to assess the impact that changes to the structure of the current transportation system might have on overall resource requirements, exclusive of the changes being contemplated to school bell times. We have identified two identical challenges to overcome in each of the four tasks:

1. *The quantity of data* – The sheer size and scope of the District's transportation operation requires that we manipulate large quantities of data in accurate, thoughtful, and efficient ways to infer meaningful results for a reasonable expenditure of effort. For example, the ability to systematically identify the subset of bus runs that transport students across school boundaries from a total population of more than 7,000 existing runs will be critical. On its own this will consume a significant amount of time and effort, but constitutes only the first step in Task 1B.
2. *The impact of assumptions* – Each task requires that we establish a set of baseline assumptions and criteria which will have a significant impact on the overall results. For example, the only practical way to evaluate the impact of eliminating a bus stop is to uniformly apply some criteria across all stops identified for elimination (e.g., reducing route time by 45 seconds per stop), and

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to then extrapolate the impact this will have on the overall system. Thus, the result becomes very sensitive to the assumptions made at the outset.

These two challenges demand that we proceed in a stepwise, methodical manner throughout this project. The scope is broad, and does not have enough slack to permit a lot of trial and error in our approach. We have given considerable thought to the way the analysis must proceed for each task. Generally speaking, we have identified the first several steps that we will take, and have recognized that the subsequent steps can only be clearly defined after these first steps are completed and we have the results in hand. For example, the manner in which we will analyze the impact of changes to out of boundary transportation (Task 1B) will depend in large measure on how many individual bus runs are impacted. The approach we have outlined thus far for each task in Part 1, and the current status of the analysis, is as follows:

Task 1B – Modify or Eliminate Busing for Out of Boundary Programs

In general, the approach being pursued in this task is to first identify the population of bus runs that are candidates for modification or elimination, then to apply pre-determined criteria to this population to target only those that can be eliminated without adversely impacting regular home to school transportation. Once this subset is identified, we will quantify the likely impact that eliminating or modifying these runs and/or categories of transportation service would have on resource utilization.

The data currently in-hand enables us to follow an iterative approach. The candidate population is being defined first as all runs serving magnet, GT, or academy programs that originate in one school boundary but terminate in another. We will identify these using a combination of GIS and tabular route data. The route data will be used first to parse those runs that serve the targeted programs. The GIS data will then be used to physically plot the first stop and terminus for each of these bus runs. By comparing these to existing school boundaries we will be able to identify those that cross boundaries.

The second iteration will identify the subset of out of boundary runs that can be targeted for elimination. It is the nature of the current system that many, if not most, cross-boundary runs serve a combination of the special programs being targeted and the regular home to school student population. For example, a particular run may commence within the boundary of School "A" by picking up two students attending a GT program at School "B". This run may then also, for example, pick up 18 students residing within the boundaries of School "B" on its way to that location. Thus, with only 10 percent of the bus load qualifying as "cross boundary" this is unlikely to be a run that can be targeted for elimination. It may, however, be subject to modification by eliminating the two out of boundary students from the run. Currently, the analysis for the first iteration is underway. We expect to have completed the selection of targeted runs in time to report and discuss this result with the School Board on September 11th.

Task 1C – Consolidate Bus Stops

The existence of more than 48,000 individually identified bus stops in the current system demands that we pursue a sampling approach in this task. The only practical way to identify the eligibility of individual stops for elimination is to conduct a review of individual bus routes, and to apply a set of loosely defined criteria that will uniformly target the same category of stops for elimination on each route being examined. These criteria are being defined in discussion with Transportation staff. It is critical at this juncture to reiterate that this analysis *is not* a practical bus stop consolidation exercise. Rather, it is designed to *analyze the impact* that a consolidation initiative would be likely to have on overall resource requirements. The precise validity of eliminating stop "A" versus stop "B", for example, is therefore not critical. What is

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important is that reasonable criteria and professional judgment be uniformly applied across the entire sample of routes being examined, and that these routes form an accurate representation of the system as a whole.

We are using a statistically valid sample of routes that are randomly selected from across the entire system for this analysis. The precise number of routes to be sampled will depend on two factors: the level of effort required to manually review each route; and the sample size required to achieve a reasonable level of confidence in the results. Once the sample is selected, these routes will be physically plotted in the GIS software we are using for this project, and each route will be examined for its stop consolidation potential. Consensus criteria regarding the time reduction impact of eliminating a stop from a route will be used to determine overall resource implications. We are currently in the process of determining an appropriate sample size, and expect to be underway with the analysis of individual sample routes by August 14th.

Task 1D – Increase Secondary School Walk Distance

We are currently in the process of plotting two sets of walk distance boundaries in our GIS software: the current 1.5 mile distance, and the revised 2.0 mile distance. We are working with one school first and will forward these maps to staff for review within a couple of days. The purpose is to identify the level of effort required on the part of Transportation staff to assist in identifying modifications to the walk zones based on hazardous conditions, etc. While the construction of the revised walk zones is relatively straight forward, the process of revising them requires local knowledge that we do not possess. Therefore, we are using this first step to evaluate how much effort will be required and will make a determination regarding whether all secondary school walk zones are modified or whether we proceed with a sample.

Regardless of how many revised walk zones are constructed, the purpose is to simply identify how many students currently eligible for transportation would not be eligible under the revised policy. This student count will then be evaluated in the context of current transportation system characteristics to determine the likely resource implications. We expect this aspect of the work plan to be completed first among all of the tasks. Staff will be extremely busy with school start toward the end of August and the beginning of September, so we are currently working to ensure that their required involvement on this task is concluded within two to three weeks. We expect to be able to provide the results of this task during the September School Board work session.

Task 1E – Optimize Attendance Boundaries to Minimize Transportation Demands

This task is being addressed on an exception basis, and relies to a large extent on professional judgment. We are in the process of plotting all attendance boundaries in our GIS system, and are also utilizing existing boundary maps produced by Fairfax County. We are reviewing each school attendance boundary at the elementary and secondary school level, excluding GT and other special program boundaries. We are utilizing our experience and judgment to identify those that appear to work against efficient transportation for further evaluation. This subset will be presented to staff and the School Board for review and discussion before any additional analysis is conducted.

Part 2 – Develop Alternative High/ Secondary School Bell Time Options

Efforts to date have been on updating our logistical models using 2005-2006 transportation routes. Phase 1 of the study utilized 2004-2005 data. These models have all been constructed and the analysis is now underway. The approach being followed is similar to that used for Phase 1. That is, we are maintaining

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the integrity of each individual bus run throughout the analysis. We are first adjusting the school bell times in accordance with the scenarios outlined for Phase 2. Then, we identify what effect these changes have on the ability of each bus to complete its assigned runs. Those runs that conflict as a result of the time changes are removed from that bus' morning or afternoon trip. We then attempt to re-link these "orphan" runs to other buses that have available blocks of time as a result of the bell changes. Those that cannot be re-linked require the addition of a new bus to the system.

The first step in the analytical process is now underway. Staff has provided several options for contiguous sample pyramids that will minimize the adverse effect of out-of-boundary runs. These are being analyzed, and we will respond with the group of two or three pyramids that we will be using in the analysis not later than August 14th.