

## RouteYield™ - What Is It and How Does It Work?

### **Purpose**

The purpose of the RouteYield™ assessment is to measure and assess the efficiency of the current bus routing and service delivery, develop findings, and to make recommendations for possible efficiency improvements. Although the data was gathered for only one school day, in-so-long as that day was a “normal” school day the findings will have a sufficient degree of integrity and validity upon which to draw sound conclusions.

The assessment measures the two limiting factors involved in routing of school buses – Time and Capacity.

Time: Districts typically establish a ride time policy for the maximum amount of time they want students to ride a bus, or a time limitation that has been established to help pair runs. (The industry standard is 50-60 minutes for regular education runs and 60-90 minutes for magnet and special needs runs.) This policy (assume 60 minutes) is the maximum time that any route is supposed to operate and generally includes the loading of students in the afternoon. If properly administered, as a route approaches 60 minutes it must conclude its route and deliver students to school. This occurs regardless of any remaining unfilled seats. If this does happen the route becomes time constricted. For school districts that have ‘paired or tiered routing’ (buses running more than one route to different schools on different bell schedules) the time between the school bells restricts reaching capacity and is often less than the stated ride time policy.

*For OCPS, we applied a 50 minute regular education ride time policy as the PM release bell times are predominately 50 minutes apart at 2:10, 3:00 and 3:50. We set the Alternative and ESE run ride time at 90 minutes due to the county-wide nature of the programs.*

Capacity: Districts typically establish limits as to how many riders per seat are acceptable by school type. Generally, high school students are two per seat; elementary three per seat, etc. As routes are developed the maximum number of riders may be reached prior to using all of the available time. When a bus fills to capacity but still has time available, the route becomes capacity restricted and the bus needs to proceed to its destination.

*For OCPS, we set the capacity parameters at 3 per seat for Elementary, 2.5 per seat for Middle and K-8, 2 per seat for High, Alternatives and Shuttles, and 1 per seat for ESE. All of the RouteYield reports and analysis are based upon the adjusted seating capacity by school type, not upon the rated passenger capacity of the bus.*

In order for a system to be perfectly efficient every route would fill all available seats and reach school at or under the allotted time limit. This never occurs. Eighty percent (80%) or better efficiency ratio is considered to be very good. Within the analysis an efficiency percentage for both time and capacity are calculated. Bus runs below 80% are deserving of more analysis, as even 5 riders or 5 minutes all add up. Efficiency ratings are also calculated for each school building served.

The RouteYield™ product is a tool that management should utilize in planning for route improvements. It offers a blueprint of where to go to fix problems. It is not uncommon to have bus routes appear to be inefficient and upon review valid reasons are found for the apparent inefficiencies; however, they must be reviewed and any possible improvements should be made.

In most every case altering or adjusting the bell times of schools can gain efficiencies. This allows buses to consistently serve more than one school and transport more students per bus in operation. Districts that can successfully assemble workable bell time scenarios can reap significant savings within their transportation budgets. Factors that must be considered in setting up bell times would include the overall District size (time and distance considerations), teachers unions, length of school day, community and parents, athletic schedules, programs offered and other influences.

### **How to Interpret the Reports:**

All of the RouteYield™ reports and analysis are based upon the adjusted seating capacity by school type, not upon the rated passenger capacity of the bus. Thus a 65 passenger bus serving a high school will show an adjusted capacity of 44, or two per seat.

#### School Reports

The report contains a bar graph for each school served showing the buses that served that school that day, the number of riders transported on each bus, and the live ride time (riders on bus) for each bus. Special needs and magnet bus numbers are highlighted in green to identify them as non-standard runs. The chart calculates the utilization rate for each bus and a total for school served.

**The Horizontal Red and Blue Lines:** The red line near the top of graph is the ride time policy or time available. The blue line (or dot) indicates the actual amount of time riders were on each bus. The red line (or dot) will move below the standard ride time policy level when that bus run has been constrained by the run that bus served immediately before the bus run shown. The closer these red and blue lines are to one another the more efficient they become in time, however some gap is needed to allow for deadhead (time for the empty bus to get to its next destination). If the blue line is above the red line then the route did not adhere to the ride time policy, to the extent that it may have been late at its next school.

**The Vertical Yellow and Blue Bars:** The blue area of the vertical bars represents the empty seats; yellow represents the number of seats filled.

You can readily determine the efficiency of each bus relative to capacity and the time remaining, and utilization rates are calculated across the bottom of the chart. To facilitate the efficiency analysis, the program highlights the Current Utilization calculation field in orange for any bus reported to have less than 60% Time AND less than 60% Capacity. Such a bus would have considerable time and seats to work with, and should be considered a consolidation target or opportunity with other buses serving that school.

### "Gray Bar" Route Data by School Reports

Another tool of RouteYield™ is the "gray bar" reports which summarize the route data by school in an executive summary list. This program analyzes the time and capacity utilization by school and generates a mathematical forecast of run reductions or additions resulting from available time and seats. As this is a mathematical forecast, the projected addition or subtraction is only an indicator of the overall routing efficiency at that school. Special needs runs impact the math. Again, it is a tool, not an answer.

### Pie Charts

These charts summarize all data by school type and program, and provide valuable information about riders, time, and efficiency, and average time and capacity utilization.