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ASSESSMENT OF THE STUDENT TRANSPORTATION ORGANIZATION AND OPERATIONS

Knox County Schools

March 29, 2016

School Bus Consultants

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Mr. Russ Oaks, Chief Operations Officer
Knox County Schools
912 South Gay Street
Knoxville, TN 37902

Dear Mr. Oaks,

School Bus Consultants (SBC) is pleased to deliver this final report for Assessment of the Student Transportation Organization and Operations for Knox County Schools (KCS). The assessment includes reviews of the school bus routing as it pertains to effective use of the routing software and subsequent efficiency in routing and resultant performance metrics in cost of operations, and the organizational structure and appropriateness of staffing of the transportation department. Additionally included are reviews of the contracted operations relative to fleet assessment, accident rates, contractor funding formulas, driver training, impact of local policies and procedures and customer service.

I appreciate the assistance of you and all transportation staff, particularly Dr. Rick Grubb, who arranged all focus group meetings and provided important background for this project, and their willingness to meet with our consulting staff members and openly discuss their positions within the organization. Their input was valuable in understanding the transportation operation. Should you have any questions please call me at 888-506-3413, extension 709.

Sincerely,

Jeff Viar

Jeff Viar

Project Manager

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Introduction

Knox County Schools (KCS) system is located in and around the City of Knoxville in the eastern portion of Tennessee. Knox County is a large, urban and rural area of 526 square miles with a population of approximately 450,000. The geography is both fairly flat in areas and also mountainous in areas as Knox County is bounded to the east by the Smokey Mountains. The district services almost 60,000 students, of which just over twelve (12) percent are students with special needs, and lists just over 40,000 students as eligible for transportation. District data indicates that 337 school buses are used to transport students as well approximately 60 shuttle vans that provide transportation to a wide variety of the student population to 89 schools. KCS employs a contracted school bus and shuttle system to provide the transportation.

The KCS Board voted to let a Request for Proposal (RFP) for an Assessment of the Student Transportation and Operations. The following report assesses in detail all areas addressed in the RFP. Comments and/or recommendations are provided as needed relative to industry best practices as well as providing cost comparisons to other Eastern Tennessee school systems, a larger Tennessee metropolitan district and national facts and cost ranges. The resulting cost performance metrics analyses were determined using the final FY2015 budget of $16,283,439.

The following Summary and Recommendations provides an insight into the highlights of the report as well as recommendations as noted above. The full details of the report follow the Summary and Recommendations.

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Summary and Recommendations

Key Observations

Organizational Structure – SBC performed an analysis of the organizational structure. As KCS is a 100 percent contracted operation, initially it was believed that the department was overstaffed. However, the department performs numerous functions that would typically be provided by larger contractors with transportation staff retaining the right to inspect all vehicles and driver records to assure compliance with the contract language. A local decision determined that KCS was to maintain all records of drivers and vehicle information and oversee state inspections of over 300 hundred school buses and 74 individual contractors. KCS also provides for management of the drug and alcohol testing program for all drivers on the districts' driver eligibility list as well as recording and maintaining this information and all school bus driver licensing information, training records, medical certifications and background checks. Also included is the payroll for all contractors that require a tremendous amount of time to process.

Recommendations *- SBC believes that the department requires a second supervisor over safety. This recommendation is because SBC believes the department needs significant assistance and improvement in oversite of the contracted operations, oversee recommended additional training of drivers and student behaviors management, (discussed later in this report), provide for on-site inspections of buses and drivers on school grounds, reviewing and revisions of traffic patterns on school grounds and real time assessment of bus routes as they are being performed. Additionally, the Global Positioning System (GPS) and camera system programs cannot be currently reviewed and maintained at a significantly higher level SBC believes is required, particularly considering recent and not so recent events of accidents. At this point in time it is virtually impossible to provide for this recommended coverage with the current personnel level.*

SBC also recommends that the payroll functions be consolidated and provide for software applications that will help in this consolidation. Currently there are several people involved in processing extra payments for bus contractors and shuttle contractors that burdens the department with manual entry of data and mountains of paper, that are currently faxed in for the most part.

Policies and procedures – KCS has a "Knox County School Bus Handbook". SBC believes this handbook is well done and details transportation policies and procedures that cover all aspects from students to schools to contractors. Anyone can access this handbook on the district web site and ascertain anything they need to know about KCS transportation. Staff interviews indicate that routing is performed to these established policies procedures.

Recommendation *- This document was last revised in 2013. Whereas SBC often sees much older policies and procedures or none at all, it is recommended that the document be reviewed, and updated if needed, to 2016.*

Crash Statistics – SBC analyzed crash data from a five year period from June 2011 to December 2015. The data revealed that in this period, KCS buses have been involved in 427 reported crashes. These crashes range from bus drivers clipping a mirror on another bus up to and including a crash with fatalities. The at-fault status of the crashes was not determined over the five-year period; however in the most recent year, 2014 to 2015, there were 85 reported crashes. Of the 85 crashes (which is equivalent to one crash every other day), 58 were determined to be at the fault of the bus driver. The performance guideline from

the Council of Great City Schools is 1 to 1.5 crashes per 100,000 miles. The KCS performance measure is 2.8 crashes per 100,000 miles, approximately double the performance guideline.

SBC believes the high incidence of crashes is in direct correlation to a lack of formal training as a new driver, lack of annual in-service training for bus drivers, and a lack of training for the students and drivers in acceptable behaviors on board and around the school bus that may cause incidents of distracted driving. SBC was unable to ascertain any current training manuals or processes that document the training that is provided to KCS bus drivers by the contracted operators. Interviews with a group of school administrators indicates a significant difference in how some bus riders behaviors are managed that too often results in the bus driver being distracted. As there are 74 individual contractors, SBC believes there could be significant differences in methods of training.

Recommendation *– SBC recommends that KCS implement and manage a new and systematic method of the training of school bus drivers from the point they have been approved to be a driver (via background checks, drug testing requirements, etc.) and become a viable candidate for the contractor to operate a school bus for KCS. This includes training to obtain a Commercial Drivers' License, passenger endorsement, school bus endorsement, air-brake endorsement, defensive driving, first aid training, student management training, bullying management training and an array of other training that is available on the open market to support this effort. SBC believes KCS needs a fresh perspective on training and believes a district led initiative and consistency in training will provide KCS opportunities to reduce the rate of crashes, affording safer transportation to its customer base.*

SBC believes the district needs to review the access and egress to school buildings by school buses and private vehicles and determine if there are alternative ways, and consequently safer ways, to redirect traffic as needed in order to significantly reduce the 99 reported crashes on school grounds involving school buses during the five year crash analysis period.

SBC recommends that the crash record keeping system be reviewed and revised to make for cleaner retrieval of data for analysis while maintaining the integrity of the data needed by the Director of Transportation for reporting to the State.

Fleet Assessment – SBC acknowledges and understands that the State of Tennessee increased the replacement limits on school buses; to no limit on age or mileage past 15 years, as long as the bus passes additional incremental and regular annual State inspections. However, it is well known in the school bus industry that as buses age in years and mileage that the costs rise to continue maintaining them (particularly the type of operation school buses endure), and in Tennessee, additional high costs for non-annual State inspections. This was changed in order to allow school systems to operate buses longer in order to reduce the costs to replace the buses. However, this has a counterintuitive result because the age of the buses will continue to get older and older when not replaced and increases the overall fleet age. At the point this has to be resolved, when the bus will no longer pass inspection and will be prohibitive to repair it, and at the current reimbursement rate to KCS contractors (discussed later in this report), SBC believes many contractors, particularly KCS's smaller contractors, will not be able to afford to replace the buses and they will no longer be in business for themselves, or of service to KCS. No change in this way of conducting business will at some point have a great negative impact on services to the students and/or KCS will need

to begin operating some of their own buses and incur all that goes along with being in the school bus business.

Recommendations *- SBC has demonstrated within this section of the report that the contractors' fleet in KCS is aging and that the NASDPTS have made recommendations that "Type C and D" buses should be replaced that are over 15 years of age and/or have over 200,000 miles on the odometer. SBC also demonstrates later in this report that the contractors are not receiving sufficient funding to support updating their equipment overall, particularly the much smaller contractors. However, the fact is, the fleet is aging and KCS has students that, as of right now, are provided transportation to and from school under current policies. At some point, KCS needs to make decisions whether they will;*

- *Begin to reduce services to students, perhaps by increasing the Parent Responsibility Zones (PRZ) that will reduce the numbers of eligible riders in order to reduce the fleet required to transport the remaining students to save costs. This will further increase the already bloated traffic at many schools*
- *If the PRZ choice is taken, redirect the savings from the reduced number of buses due to the PRZ increases and provide additional financial support to the remaining contractors to purchase what fleet is left that is overdue for replacement*
- *Make tough financial decisions to increase the funding for the existing contractors for the current scenario*

Budget Allocation – SBC analyzed the KCS FY15 final budget which was used to provide the key performance measurements and comparable costs to other Tennessee districts. SBC allocated costs based on regular education transportation, special needs transportation and community based transportation (shuttle service vans). SBC removed $55,753 of costs from the allocation as these funds were not related to transportation. Based on a final allocated budget of $16,227,685, SBC determined that approximately 66 percent of the budget is regular transportation; approximately 26 percent of the budget is special needs transportation, and approximately 7 percent is community based transportation. KCS, with 26 percent of the transportation budget for special needs, is comparable with national averages of 28 percent of the budget.

Recommendations *– There are no recommendations.*

Key Cost Performance Measures – In these measures, KCS is higher in the cost per student overall measure than all other districts but is within the range of national averages. In the cost per bus overall measure KCS is lower and fairs well against all but Greene County. The cost per regular education student is higher than Nashville but falls just below the national range. KCS compares favorably in the remaining measures other than in the buses per 100 students category. KCS, in the transportation budget as a percentage of the total district budget, is lower in this category. This is indicative of the results findings within this report that indicate additional funding is needed.

KCS cost per special needs student is approximately $3,475 and Nashville is approximately $6,519. National costs for special needs students have regularly shown to be approximately 6 to 10 times higher than that of the regular education student. This is due to the need for specially equipped buses, special equipment, monitors on buses and typically lower capacity buses. Nashville is also significantly higher in this

measure due to a consent decree requiring aides on every bus transporting students with special needs. The national averages are approximately $4,160 - $5,460. KCS is lower than the average range.

KCS cost per regular education bus is $45,570. Nashville is $77,621.

Recommendations *– There are no recommendations but it is noted that KCS, overall, performs well in these cost performance measures for comparison purposes. However, this can mean that a system is routed well and operated efficiently, or it can mean that a district is operating a system that is not well funded and may have deficiencies that need to be righted, for example training. These discussions are provided further in this report.*

Routing Assessment - KCS establishes bus stops and bus routes according to the district's policies and procedures, and exceptions to those policies and procedures are both rare with rationale documented. A performance measure of buses per 100 students is higher than the range of industry norms overall with a measure of 1.6, mostly due to special education. However the regular education routing alone provides for a measure of 1.1. The performance measure range in this category is 1 to 1.3. The seating capacity is somewhat low, and while not without reason, it is nonetheless concerning. The reuse of buses could be better but is within the expected range of industry norms. The average ride times are good but there are a number of exceptions exhibiting very high ride times.

The average route time for regular education students is 36 minutes and for students with special needs the average ride time is 38 minutes. The shortest ride time for regular education students is three (3) minutes and for students with special needs the shortest ride time is two (2) minutes. The longest ride time for regular education students is one (1) hour and 51 minutes and for students with special needs the longest ride time is one (1) hour and 50 minutes. The longer ride time for regular education students is at the Magnet and STEM Schools as the students in these programs come from all over the county. The longer ride time for students with special needs is due to available programs to serve the needs of some of these students, are long distances from their residence, and often are not based on an attendance area as in regular education.

Recommendations – *In order to improve capacity utilization and thereby improve the district's buses per 100 students' metric, bus routes should be more closely examined for opportunities for improvement. Also, routes with ride times exceeding 60 minutes, and especially those routes with ride times exceeding 90 minutes, should be examined more closely in order to identify ways to shorten and/or split portions of those routes out of their existing assignments in order to improve ride times and thereby improve customer service.*

KCS should consider updating its routing software such that combination runs can be accurately entered into the routing system, reflecting all pertinent aspects of those routes. Furthermore, the routing software upgrade should also address the district's current inability to enter all pertinent student transportation data into its routing software such that the need for and use of Census can cease, thus simplifying the routing process and thereby making it more time and resource efficient. Lastly, staff desires for the routing software should be considered in the next iteration, as they relate to improving both processes and capabilities within the system related to routing efficiency and effectiveness. Interviews indicate the update to a newer version is in process.

With or without a routing software update, the district should ensure that the routing software is fully executed such that all aspects of the software are being utilized and can contribute fully to the routing efficiency process. Map updates should be explored, fleet data should be entered into the system and maintained, and all applicable functionalities afforded by the software and determined to be beneficial to the transportation operation should be implemented, utilized and continuously improved. This will be a joint effort between the district and the school bus contractors since the contractors own and operate the fleet serving the district.

SBC recommends KCS investigate the better utilization and integration of GPS data into the routing software for the use of planned routing versus actual execution of routes. It is believed that if this capability were available to the district and school bus contractor that KCS can reduce costs by improving efficiency. Additionally, the use of the GPS alone can provide for on-time performance measurements in all aspects of routing and trips. Lastly, KCS could work with its school bus contractors to forge a link between Edulog™ and Synovia™ for comparison of planned routing versus what is actually occurring on the road.

Contracted buses and funding formula – KCS contracted school bus system includes 74 school bus contractors to operate 337 school buses. Currently, from district provided routing data, SBC determined that approximately 302 school buses are currently being operated. This is due to insufficient school bus drivers available to drive the 337 buses actually needed to most effectively operate the system. The contractors purchase and insure their own buses and train all eligible drivers. Contractors (as well as school districts that operate their own transportation system) may keep buses in service in Tennessee as long as they want, as long as the vehicle passes state inspection. Interviews with several school bus contractors indicate it is difficult to try and purchase new school buses with the current funding levels from KCS. Many contractors have turned to purchasing used school buses in order to update equipment to some higher level versus keeping them past 15 or more years.

Interviews with contractors noted concerns with the funding formula for reimbursement. KCS has increased the funding for contractors a total of three (3) percent over the last five years. This equates to a $5.70 increase per day, over the five (5) years, based on a 65 to 66 passenger bus. Contractors indicate that it has become increasingly difficult to pay drivers enough in order to attract and retain qualified personnel. Additionally, increased insurance rates (unknown costs) and the cost of the significantly more expensive commercial tags for school buses (recently changed to commercial by the State), upwards of $600 annually, have been instrumental in their financial stability.

Recommendation *– See under funding formula.*

Funding formula – SBC believes the funding formula for contractors is insufficient. For example, SBC took the reimbursement rate of a 65-66 passenger bus for six hours of service with no extra miles (52 miles are included in the base rate) and determined this equates to $31.80 per hour. KCS is asking a vendor to pay a driver, purchase parts, purchase vehicles, purchase insurance, pay taxes, and provide for maintenance of the bus, and, make some kind of profit. For a simple comparison, SBC took the Internal Revenue Service (IRS) rate for reimbursement for a personal vehicle (not including paying the driver) and determined it is equivalent to $28.08 for 52 miles at the IRS rate $.54 cents per mile. Therefore, KCS, for $3.72 per day over and above a personal vehicle, is funding the contractor to pay the driver to operate a school bus and provide safe and reliable transportation to its students.

Recommendation *- SBC believes KCS needs to revisit the funding formula for reimbursement to contractors and provide an increase. These costs will be discussed further in this report.*

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Organizational Structure

The school transportation department is staffed with eleven (11) full time employees and several part-time employees. One of the part-time positions provides for maintenance support for the GPS, camera and video systems. The remaining part-time employees are college students who provide assistance in receiving and entering contractor extra pay submissions for mileage and time and other ancillary duties as needed in support of the full time positions.

The Director of Transportation is also responsible for the Enrollment Department. His role in transportation involves the following elements:

- Contract agreement and negotiations for transportation services, contractor compliance, budget, School Bus Handbook, L and N STEM Academy routing, Career Magnet Academy routing, driver compliance, contractor compliance and Parent Responsibility Zone Appeals (not eligible for transportation areas)

The Director is supported by a Supervisor of Transportation whose areas of responsibilities include:

- Regular transportation operations, bus stop safety and concerns, student incidents, bus aide assignment, extended utilization bus inspections, driver compliance and contractor compliance

Both the Director and Supervisor share driver and contractor compliance as the Supervisor is the first point of contact with any issues and renders a decision. The driver or contractor may appeal any decisions to the Director. If the driver or contractor is not satisfied with a decision they may appeal to the Chief Operations Officer and then the Superintendent.

KCS employ three routers who provide for the routing of school buses; provide student information to the shuttle companies who provide for the routing and dissemination of all the routes and changes for the start of school and all during the year. The Lead Router is responsible for:

- Regular Education routing, Pre-School routing, Extended Language Learning routing, Extended School Day Program routing, and is also the Edulog (routing software program) administrator

The Alternative Programs Router is responsible for the following areas:

- Special Education routing, Alternative Schools routing, Community Based Instruction routing, Magnet Program routing, Homeless Program routing and Extended Language Learners routing

The third Router position works in conjunction with the other two routers and is responsible for:

- Disseminating route information changes to contractors and schools, ridership analysis, processes stop changes whether additions or deletions, accident records and reports and is charge of the School Messenger notification system for transportation

Transportation also has a Geographical Information Systems Specialist. The person in this position is responsible for the following:

- Network administration, hardware/equipment maintenance, reviews/archives video of incidents on buses, GPS equipment, shuttle payroll, Synovia administrator, geographic analysis, Davis Demographics administrator, Metropolitan Planning Commission liaison, Knoxville Geographic

Information Services liaison, State transportation and EIS reports, student addresses, and map development

There are two Compliance Facilitators who are responsible for:

- Bus contractor files, annual school bus inspections notifications, driver training records, contractor monthly payroll, reconciliation of route mileage fuel index adjustments, driver personnel files, driver eligibility roster, US Department of Transportation (DOT) regulations, substance abuse testing program and records, background checks, department accounts payable and department purchasing

There is one Administrative Assistant employee whose responsibilities include:

- Scheduling for pre-school bus aides, homeless family processing, parent reimbursement, bus assistant payroll, mail room backup, reconciliation of cellular accounts, processing identification badges for human resources and school bus drivers

Lastly, KCS has added a Customer Service department within transportation. This addition includes a Manager position and a Clerk position. These positions were established to enhance communications with the entire customer base from parents to schools to contractors. This department is currently working on revamping the internal emergency management system to improve communications between district office personnel, transportation, contractors and school administration during any accidents as well as weather related incidents. Interviews with staff determined that the following elements by Customer Service have been updated and/or revised for the transportation department as a whole:

- Answer an average of 300 plus phone calls per week (along with part time staff members) in the Transportation Department and respond accordingly
- Review transportation complaints and concerns by staff members and make sure that all callers receive a timely response (within 24 hours)
- Provide customer service training for staff members (example, proper procedures for answering calls, gathering information and how to best work with callers' requests and provide information on proper chain of command)
- Respond to Transportation Department emails and social media requests
- Ensure all complaints and concerns are filed appropriately according to school, contractor and/or driver
- Work with the Director of Transportation to ensure substantiated transportation system issues are addressed by the appropriate staff member(s) – initiated new operating systems within the department as needed
- Present monthly report to Director of Transportation and Chief Operating Officer on actions taken by the Transportation Department concerning the follow through on transportation investigations performed by Knox County Schools School Resource Officers

- Process daily bus driver "check rides" by Knox County Schools School Resource Officers (letter to contractor reporting the results of the check ride)
- Work with contractors and school officials to solve transportation issues between bus drivers, students and administration. Issues such as: contractor consistently not meeting scheduled times and/or providing adequate service, student discipline issues regarding interaction with bus drivers, requests for bus aides, assistance with school bus stops and appropriate routes
- Provided an inclement weather plan update to the Director of Transportation and Chief Operating Officer. This update provided guidance as to the appropriate chains of command within the schools and building level supervisors, as well as bus drivers and contractors, during an inclement weather situation in Knox County
- Supervise eight part-time staff members and provide appropriate feedback and direction
- Completed special projects: re-organized, cleaned and re-defined areas within the transportation department in order to operate more efficiently

SBC interviews with all staff recognize that staff are well versed in their areas of responsibilities and are very willing to assist each other where required. There appeared to be no animosity among staff that would be detrimental to the department.

Recommendations - *SBC believes that the department requires another supervisor and envisions that the person in this position would be tasked with supervision over safety and training. This recommendation is because SBC believes the department needs significant assistance and improvement in oversite of the contracted operations, oversee recommended additional training of drivers and student behaviors management, (discussed later in this report), provide for on-site inspections of buses and drivers on school grounds and along active routes, reviewing and revisions of traffic patterns on school grounds and real time assessment of bus routes as they are being performed. Additionally, the GPS and camera system programs cannot be currently reviewed and maintained at a significantly higher level SBC believes is required, particularly considering recent and not so recent events of accidents. At this point in time it is virtually impossible to provide for this recommended coverage with current personnel level.*

SBC also recommends that the payroll functions be consolidated and provide for software applications that will help in this consolidation. Currently there are several people involved in processing extra payments for bus contractors and shuttle contractors that burdens the department with manual entry of data and mountains of paper, that are currently faxed in for the most part.

SBC recommends that the accident record keeping system be reviewed and revised to make for cleaner retrieval of data for analysis while maintaining the integrity of the data needed by the Director of Transportation for reporting to the State.

Policies and Procedures

KCS has a "Knox County School Bus Handbook". SBC believes this handbook is well done and covers all of the policies and procedures that detail transportation including but not limited to:

- Eligibility requirements for transportation
- Bus route development
- Bus stop development criteria – main roads, developments, private property
- Magnet routes
- Driver qualifications and responsibilities
- Parent responsibilities
- Student responsibilities
- Contractor responsibilities
- Video systems operations and review
- Parent concern process
- Principal responsibilities – traffic patterns, loading/unloading safety

Interviews with routing staff indicate, for the most part, that routing is performed consistent with established polices. It is often found in transportation reviews that transportation departments are influenced by decisions outside of the department that direct personnel to violate a district's own policies and procedures in the development of bus routes. For example, creating stops that cause routes to become less efficient and timelier or being directed to transport students that are otherwise not eligible. These directions often cause a snowball effect where what you do for person you must do for the others, skewing proper routing for efficiency and effectiveness.

Commendation *– KCS is to be commended for routing to policies and procedures.*

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Crash Statistics

SBC recognizes that "accidents" is a term that is well recognized across the country in all aspects of transportation. However, the high majority of accidents are not accidents at all because the high majority of accidents have a typically easily determined reason that the accident occurred, while some accidents may have an underlying reason, perhaps driver fatigue or issues of concern outside of the workplace that have an effect on a driver's concentration, or distracted driving. For example, a driver that is texting while driving and is involved in a crash where the driver runs into another vehicle or immobile object is actually operating the vehicle but not paying attention to the roadway due to the texting. Hence, it is fair to say that minimally the driver is operating the bus inattentively or distracted due to the texting. The point is there is causal effect in most every crash due to some cause by one or more drivers involved in the crash; therefore it is not an accident. The term crash is used in this summary of crash statistics section because they are not "accidents" by definition. And as a technical term, "accident" does not have a clearly defined legal meaning.

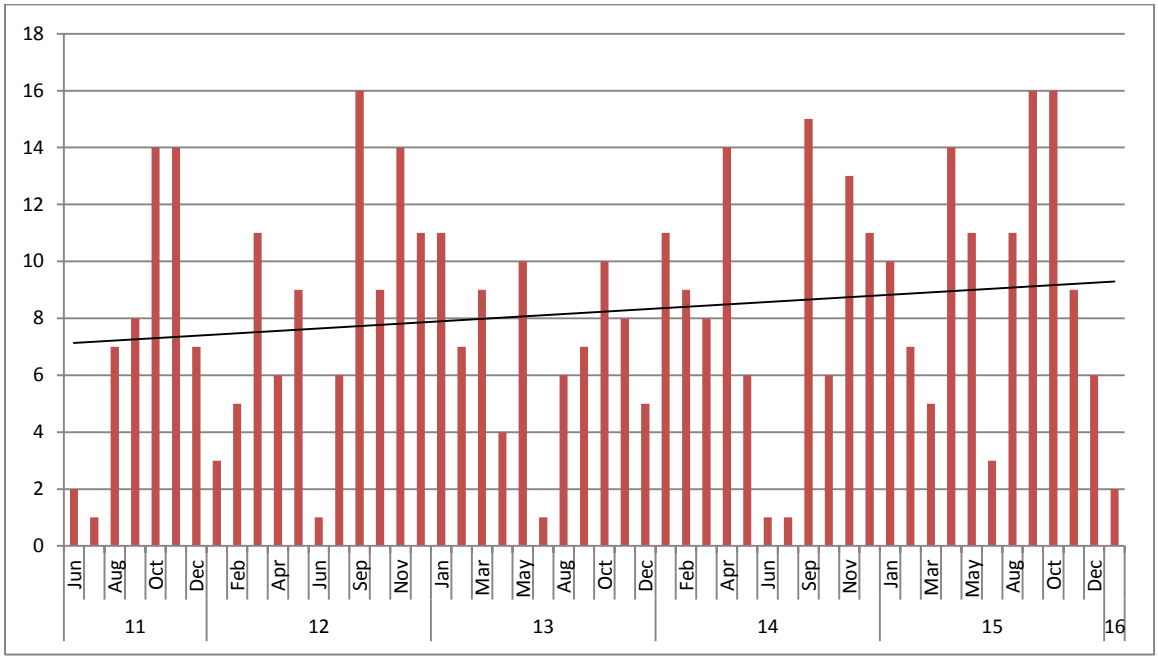
KCS maintains records of crashes involving school buses. These records include every reported contact with other vehicles and immobile objects (example, a phone pole, tree branch, fire hydrant, mail box). In lieu of recent crashes and the very significant crash fatality, SBC obtained a file of the last five (5) years of crashes and performed an analysis. For the period of June 2011 through December 2015, KCS bus drivers reported being involved in 427 crashes. These crashes range from clipping another buses' mirror up to and including one crash with two school buses that involved three fatalities. In reviewing the details of the crash reports, not all crashes met the threshold that required it to be reported to the State. SBC reviewed in detail the crashes reported during the most recent 2014-2015 school year. During this period, the data indicated that there were 95 crashes reported to KCS. Twenty (20) crashes of the 95 crashes involved bus to bus contact, as in clipping mirrors. As each bus driver is required to fill out a report when two buses make contact, SBC removed ten (10) of the crashes from the analysis due to double reporting. This left 85 crashes for the reporting period. SBC reviewed the conditions of each of the 85 crashes and determined that, of the 85 reported crashes, bus drivers were at-fault for 58 of the accidents, or 68 percent of the total. And as there were 85 reported crashes in a 177-day school year, this indicates that there was a crash almost every other school day somewhere in Knox County involving a school bus. SBC also determined the performance metric for all school bus related crashes for the 2014-2015 school years. The result was a rate of 2.8 crashes every 100,000 miles traveled. The Council of Great City Schools reported the performance guideline for total accidents overall is 1.1 to 1.5 crashes per 100,000 miles. This result "does not" take into consideration deadhead miles;

- Miles that are traveled from where the bus is parked at night to the first stop in the morning
- Miles that are traveled from the last school drop off in the morning back to where the bus is parked
- Miles in the afternoon from where the bus is parked to the first school pick up in the afternoon
- Miles in the afternoon after the last student drop off to where the bus is parked at night.

These additional miles, typically referred to as deadhead miles, equate to approximately 1,210,680 miles, which is the difference in miles traveled annually with students on board of 3,072,720 (mileage from the Edulog™ routing system), and the 4,283,400 miles reported on the districts' website of total miles traveled for the 2014-2015 school year. The point being that this measure was developed based on students on

board the bus. The following chart in **Illustration 1 below** depicts the crash rate over the five year period in this analysis:

Illustration 1 - Total Accidents by Month and Year with Trend Line



This rate of crashes overall, meaning without regard to assigned fault, is significantly higher than the industry guideline, nearly double. The chart indicates that the trend for crashes overall has increased in the last five years from approximately 7.5 crashes reported each month to approximately 9.5 reported crashes per month.

Additionally within the crash review, SBC discovered that an alarming rate of the reported crashes has occurred on school grounds or at the entrance to schools. During the five year study period, 23 percent, or 99 crashes, were reported to have occurred at these locations. On a school site visit by SBC staff to the Farragut campus, the amount of vehicles entering and exiting the campus was viewed as surreal. Vehicles were backed up off school grounds and waiting to drop off students in the morning. Interviews with staff from the Farragut campus as well as other schools indicate that this is of concern at many of the schools. It was stated though, that there is a significant drop off of the number of cars in the afternoon versus the morning. This is most likely due to parent(s) dropping off their child in the morning while on the way to work but they are riding the bus in the afternoon because the parents are at work. **Illustration 2** below displays the rate of crashes by school:

Illustration 2: Rate of Crashes on School Grounds by School

School	Number of Reported Crashes
Karns ES	18
Holston	15
Halls MS/HS	14
Karns HS	13
Bearden HS	13
KAEC	12
Karns MS/HS	12
Fulton	10
Northwest	10
Gibbs HS	8
Gresham	7
South-Doyle MS	7
Ritta	7
South-Doyle HS	7
Richard Yoakley	7
AL Lotts	7
Carter MS/HS	7
Brickley McCloud	7

SBC believes the causal effect of so many crashes is in direct correlation to a lack of training of the school bus drivers. Additionally, it is believed that so many crashes on school grounds is most likely due to the greatly increased number of cars in the morning dropping off students, though this cannot be determined with any degree of certainty. There is also the possibility that traffic patterns may need to be reviewed and determine where instances are of private vehicles and school buses sharing the same drop off areas and determine if alternative drop off methods can be established.

Recommendations *– SBC believes the district needs to take large strides in reformulating the current method(s) of the training of school bus drivers for both new and current school bus drivers. SBC further believes the district needs to have ownership of the training as we do not believe it will necessarily be done by the contractors unless the district makes it mandatory to do so. Further description of the types of training will be within the next section on training.*

SBC further believes the district needs to review the access and egress to school buildings by school buses and private vehicles and determine if there are alternative ways, and consequently safer ways, to redirect traffic as needed in order to significantly reduce the 99 reported crashes on school grounds involving school buses during the five year crash analysis period.

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Training

SBC believes there is a significant training concern for school bus drivers in KCS. This is evidenced in the high rate of accidents that have been reported over the last five (5) years and detailed in this report for the 2014-2015 school years. In response, KCS has recently begun training school resource officers to be licensed to operate a school bus. The officers are then randomly scheduling with school bus drivers to ride along and observe the driver during periods when students are on the bus. The officers are provided with a checklist of driving maneuvers, along with pre and post trip bus inspections, that the officers will, after completion of a ride along, form an opinion of performance based on the outcome of the ride along observations. This document is then provided to the transportation department for their review and subsequent action as needed. An interview with a school resource office staff member regarding this program further indicated that in his opinion after some ride-alongs, there is a significant need for better and more training for school bus drivers as well as, including students, in the training as to the expected behaviors while on the bus.

KCS also recently released a RFP that was due in early March, 2016 that was directed at training for school bus drivers. SBC understands that this training may only be directed at the School Resource Officers and only to have them operate a school bus, no additional training in important other areas. However, as stated earlier in this report SBC believes the training in other areas needs to be extended to any new drivers and all current drivers (in the form of in-service training) as well as providing ridership training for the students.

The current training for school bus drivers involves the initial training as applicable for CDL license, school bus endorsement, passenger endorsement and air brake endorsement. This involves the actual operation of the bus along with pre and post-trip inspections. Aside the minimum requirements of the State of Tennessee of four (4) hours of annual in-service and two (2) hours of district provided annual in-service that drivers must all complete, SBC requested of two contractors any information on any available training materials or programs that are provided to their school bus drivers, but received no responses. As there were multiple requests via email and phone calls SBC believes there are no programs, which is a significant finding in this assessment. With that being said, SBC has developed a comprehensive list of training opportunities that SBC believes needs to be incorporated into the training program to be managed by KCS. This is not all programming that is available but is of sufficient sampling:

- Defensive driving – when, if ever, has a school bus driver received “any” defensive driving program. Defensive driving in a school bus is significantly different than in a personal vehicle
- Best safety practices – again, significantly different than in a personal vehicle
- Driving situations including intersections, safe backing, railroad crossings, danger zones, pedestrian and bicycle safety, adverse condition and mountain driving
- About the driver including fatigue, distractions, understanding and preventing harassment and drug and alcohol awareness
- About the riders including safe bus stops, student management, managing extreme behaviors, bullying on the bus, sleeping children, power lines safety and preparing students to learn about theirs and others safety

- Emergency evacuations
- Post-accident procedures

Recommendations: *SBC recommends that KCS implement and manage a new and systematic method of the training of school bus drivers from the point they have been approved to be a driver (via background checks, drug testing requirements, etc.) to becoming a viable candidate for the contractor to safely operate a school bus for KCS. This includes training to obtain a Commercial Drivers' License, passenger endorsement, school bus endorsement, air-brake endorsement and the list of topics described above of other training that is available on the open market to support this effort. KCS may consider available out-sourcing the training (bringing a fresh perspective to the district) so as to not require further full-time employee salaries and associated benefits costs and having to build their own programming. SBC believes this method of professional and consistent training will provide KCS opportunities to reduce the rate of accidents, affording safer transportation to its customer base*.

School Bus Consultants

Fleet Assessment

SBC analyzed the available KCS fleet data and determined there is a total of 382 buses total. SBC assumes the difference in the 337 buses listed on the district website and the difference in the 382 listed totals of 45 buses, that these are spare buses. This assumes a twelve (12) percent spare rate which is between the recommended spare bus ranges of ten (10) to fifteen (15) percent of the total of all buses. SBC acknowledges that not all contractors have one or more spares buses in their fleet and must make arrangements to borrow a bus as needed. Several measures within the fleet listing could not be adequately displayed in chart form due to no values had been inserted in some categories. Charts have been inserted where SBC believed there was sufficient information to fairly represent the category of information. If no chart is provided then information that was available is below in parentheses. Also, there are instances where the total numbers are different depending on the chart and this is due to blanks in some of the data within the categories. The fleet listing included several categories:

- Bus number (individual numbers assigned, no double of numbers was discovered)
- Year placed in service (270 listed as in service; 112 with no designation)
- Type of vehicle class (A, B, C and D)
- Model year (can be different than year placed in service as some buses were purchased used)
- Mileage as of last inspection (average mileage is 129,000)
- Bus status (78 blanks)
- Video/audio cameras installed (280)
- Fuel type: Gas (62) Diesel (218) Blanks (106)
- Years in service (ranges from 1 year to 18 years)

The table below in **Illustration 3** below depicts the mileage ranges as of the last bus State inspection. Approximately 61 percent of the fleet range from 100,000 to 200,000 miles.

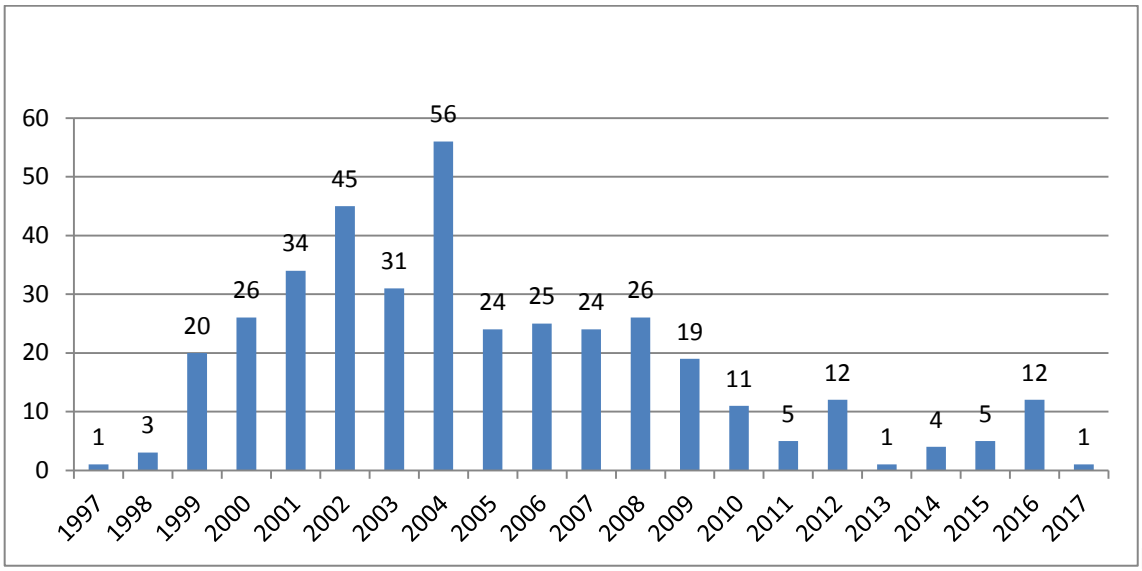
Illustration 3: KCS Fleet Mileage

Up to 50,000 miles	50,000 to 100,000 miles	100,000 to 150,000	150,000 to 200,000	200,000 to 250,000	Greater than 250,00
40 buses	72 buses	130 buses	107 buses	26 buses	6 buses
3 buses with no mileage information					Average mileage is 129,000

The chart in **Illustration 4** below depicts the KCS fleet by year of manufacture. The fleet listing shows that the oldest bus is a 1997 and is now 19 years old. However, the data indicates that this bus has not been

inspected since October of 2014, so that bus data is not up to date, the bus is not being used any longer, or it is being used without valid inspection. The chart also depicts the average manufactured year is 2005 or 11 years old. It is also evident that the purchase of newer equipment has drastically decreased since 2004.

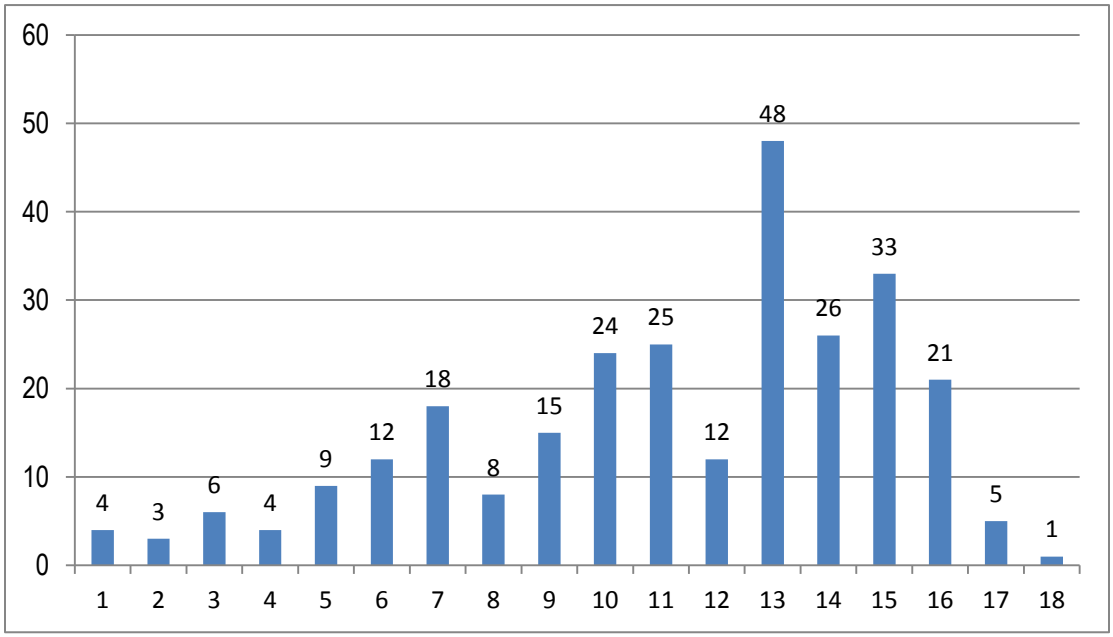
Illustration 4: KCS Fleet by Year of Manufacture



SBC acknowledges and understands that the State of Tennessee increased the replacement limits on school buses; to no limit on age or mileage past 15 years, as long as the bus passes additional incremental and regular annual State inspections. However, it is well known in the school bus industry that as buses age in years and mileage that the costs rise to continue maintaining them (particularly the type of operation buses endure), and in Tennessee, additional high costs for non-annual State inspections. This was changed in order to allow school systems to operate buses longer in order to reduce the costs to replace the buses. However, this has a counterintuitive result because the age of the buses will continue to get older and older when not replaced. At the point this has to be resolved, when the bus will no longer pass inspection and will be prohibitive to repair it, and at the current reimbursement rate to KCS contractors (discussed later in this report), SBC believes many contractors, particularly KCS's smaller contractors, will not be able to afford to replace the buses and they will no longer be in business for themselves, or of service to KCS. No change in this way of conducting business will at some point have a great negative impact on services to the students and/or KCS will need to begin operating some of their own buses and incur all that goes along with being in the school bus business.

The chart in **Illustration 5** below depicts the number of years in service:

Illustration 5: Years in Service



The highest column displays the peak in this chart of 48 buses that have been in service for 13 years and represents 12 percent of the fleet. What this does not show is the age of the bus. It may be that a used bus that is already 8 years old may have been placed in service in year 1 through 8 and is now anywhere from 9 to 16 years old. The National Association of State Directors of Pupil Transportation Services (NASDPTS) discussed school bus replacement in a white paper. The following is a quote from that paper:

> "It is widely accepted that it is more costly to operate and maintain older school buses than newer school buses. However, the vehicle age at which the total operating costs of an older bus versus a newer bus becomes intolerable is not an exact science. In the mid-1980s, independent studies of annual school bus operating costs were conducted in California and Washington. Both studies reached the same conclusion – after 12 years of use, the annual operating costs of Type C and D school buses began to increase significantly and continued an annual increase each year thereafter.
>
> A January 2000 study of life cycle costs for Type D school buses in South Carolina indicated that 15 years should be adopted as the cycle for school bus replacement. The study also noted that school buses that accumulate mileage more quickly, such as the special needs school buses in South Carolina, should have their life cycle cost analyses based on mileage accumulation, not age."

The table in **Illustration 6** below represents the NASDPTS recommended replacement schedule in years and age:

Illustration 6: NASDPTS Recommended Replacement Levels for School Buses

Bus Type	Recommended Replacement Years	Recommended Replacement Mileage
30 passenger Type A	10 years	120,000
72 passenger Type C	15 years	200,000
81 Passenger Type D	15 years	200,000
Wheelchair lift equipped Type C	12 years	150,000

The four (4) school bus types are:

- TYPE A: A "type A" bus is a van conversion or bus constructed utilizing a cutaway front section vehicle with a left-side driver's door. This definition includes two classifications: Type A-I, with a Gross Vehicle Weight Rating (GVWR) less than or equal to 14,500 pounds; and Type A II, with a GVWR greater than 14,500 pounds and less than or equal to 21,500 pounds.

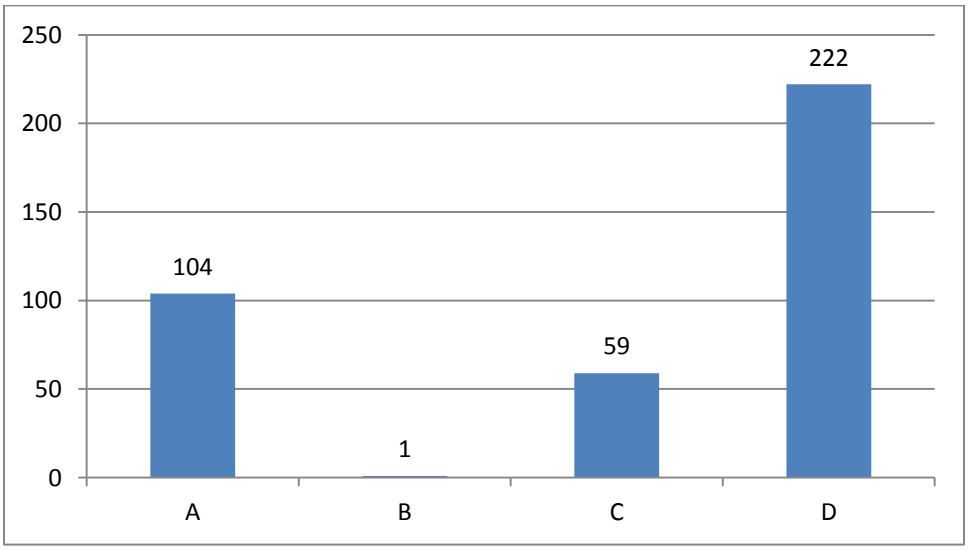
- TYPE B: A "type B" school bus" is a conversion or body constructed and installed upon a van or front-section vehicle chassis, or stripped chassis, with a GVWR of more than 10,000 pounds, designed for carrying more than ten persons. Part of the engine is beneath or behind the windshield and beside the driver's seat. The entrance door is behind the front wheels.

- TYPE C: A "type C" school bus is constructed utilizing a chassis with a hood and front fender assembly. The entrance door is behind the front wheels. A "type C school bus" also includes a cutaway truck chassis or truck chassis with cab, with or without a left side door, and with a GVWR greater than 21,500 pounds.

- TYPE D: A "type D" school bus" is a body installed upon a chassis, with the engine mounted in the front, mid-ship or rear, with a gross vehicle weight rating of more than 10,000 pounds, designed for carrying more than ten persons. The engine may be behind the windshield and beside the driver's seat; it may be at the rear of the bus, behind the rear wheels, or mid-ship between the front and rear axles. The entrance door is ahead of the front wheels. A type D school bus has a maximum length of 45 feet.

Lastly, the chart in **Illustration 7** below represents the number of buses by bus type in KCS and does not reflect shuttle vans:

Illustration 7: Fleet by Type Bus



The "type D" bus, or the last picture displayed above, is most prevalent in KCS with 58 percent of the total fleet. The manufacturers rated capacity of these buses can be as high as 90 passengers and bode well when trying to reduce the number of buses in a fleet and therefore reduce the number of drivers and associated costs. However, the offset is these buses can be significantly higher in costs to purchase and present some maintenance difficulties simply because some of the engine components can be difficult to

reach versus the "type C" bus. Another offset in the higher capacity buses is student behavior management. A "type C" bus typically has a manufacturers rated capacity of 65 to 72 passengers, which can be challenging in and of itself, then add basically another classroom of students onto a 90 passenger bus and the degree of difficulty of maintaining behaviors increases.

***Recommendations**: SBC has demonstrated that the KCS contractors' fleet is aging and that the NASDPTS have made recommendations that "type C and D" buses should be replaced that are over 15 years of age and/or have over 200,000 miles on the odometer. SBC also demonstrates later in this report that the contractors are not receiving sufficient funding to support updating their equipment overall, particularly the much smaller contractors. However, the fact is, the fleet is aging and KCS has students that, as of right now, are provided transportation to and from school under current policies. At some point, KCS needs to make decisions whether they will;*

- *Begin to reduce services to students, perhaps by increasing the Parent Responsibility Zones (PRZ) that will reduce the numbers of eligible riders in order to reduce the fleet required to transport the remaining students to save costs. This will further increase the already bloated traffic at many schools*
- *If the PRZ choice is taken, redirect the savings from the reduced number of buses due to the PRZ increases and provide additional financial support to the remaining contractors to purchase what fleet is left that is overdue for replacement*
- *Make tough financial decisions to increase the funding for the existing contractors for the current scenario*

School Bus Consultants

Understanding Routing Efficiency and Effectiveness

Efficiency is doing the most with the fewest resources. Effectiveness is providing services that meet or exceed an expected level of service which is generally defined by district policies and procedures and industry best practices. The main objective of efficiency in school transportation is to fill the bus and then to reuse the bus as often as possible within a given bell time structure.

The KCS currently operates a two-tier transportation system that is heavy in both the first and second tiers but also has a small number of bus runs in a pseudo third tier. Within this system, the KCS has several roadblocks to the efficiency of its school bus routes. The first roadblock is bell times that are not optimally aligned across the district's tier structure to facilitate an even, balanced load of students across all bell times. Look no further than the lopsided amounts of bus runs in the first and second tiers, which are not well balanced, to view this obstacle to efficiency. The second roadblock faced by the district is that the existing bell times, while somewhat conducive to a two-tier routing structure, are constraining the system in the afternoon due to the 35-minute travel-time window between the prime two tiers of elementary schools and middle/high schools. For a county-wide system that is not as densely populated as a strictly urban-core district, the existing bell times do not, generally speaking, allow for maximum reuse of buses within the given routing window (i.e., the times in the morning and afternoon when buses are operating with students on board). So not only are bell times not optimally structured to balance the student loads across the transportation system's tiers, but the bell times are also not optimally spaced to allow for sufficient route times between those tiers. Additionally, the district represents a county-wide system of considerable size which exacerbates the effects of having magnet and other district-wide programs that demand transportation of students over great distances. Such requirements drive up ride times and correspondingly drive down capacity utilization due to more time spent traveling longer distances and less time spent picking up students. This is very evident in one of the performance measures of seating capacity use. Concerning the special education school runs, buses are, on average, estimated to be operating somewhere between one-third and one-half of their available capacity.

In recent years, key performance indicators are increasingly utilized by the school bus industry to measure the performance of school transportation systems' efficiency and effectiveness. These indicators tell how well a district is providing transportation services and at what level of cost. The measures developed for the KCS in our analyses were compared to industry standards that will provide guidance in areas where KCS does well and where it needs improvement. The measures that involve costs include all items SBC could find related to transportation expenditures and are based on a 180 day school year[1]. For KCS, these measures are calculated (when able) for each category of student, for example, regular education and exceptional education. As noted early in the report, there are several performance measures examined and they include but are not limited to:

[1] A 180 day school year is used in comparison calculations in order to maintain equivalencies among analyses across all clients.

- Cost per student
    - What the average cost is to the district per year to transport each student.
- Cost per bus per day and per year
    - What the average cost is to the district to operate a bus per day and per year
- Cost per trip
    - What the average cost is to the district per trip (or bus-run)
- Cost per mile
    - What the average cost is to the district per mile traveled
- Capacity usage
    - This value provides an indication of how many available seats are scheduled to be filled through the route planning process. The greater the seats filled, then the more efficient the routing scheme.
- Buses needed per 100 riders
    - This value provides an indication of the ability of the routing scheme to effectively utilize seating capacity and the ability of the bell time structure to support a multi-tier routing scheme.
- Average ride times
    - This value provides an indication of both service quality and an indication of available capacity with the bell structure. When this value is low in combination with low capacity usage then it is an indication that buses are not being adequately filled. When this value is high and capacity usage is low then it is an indication that buses are traveling greater distances and thus unable to fill the bus.
- Trips per bus
    - This value provides an indication of how effectively the route development process is able to reassign buses to support multiple trips in a given day and in a given bell time structure.

These measures represent a snapshot in time. Consequently, the use of performance measurement to evaluate operational performance must be done on a regular basis in order to assess not only the impact of operational changes but to support the early identification of other potential concerns. It is through a cyclical process such as this that maximum value can be obtained from both technology tools and performance measurement activities.

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Assessment of Routing Efficiency and Effectiveness

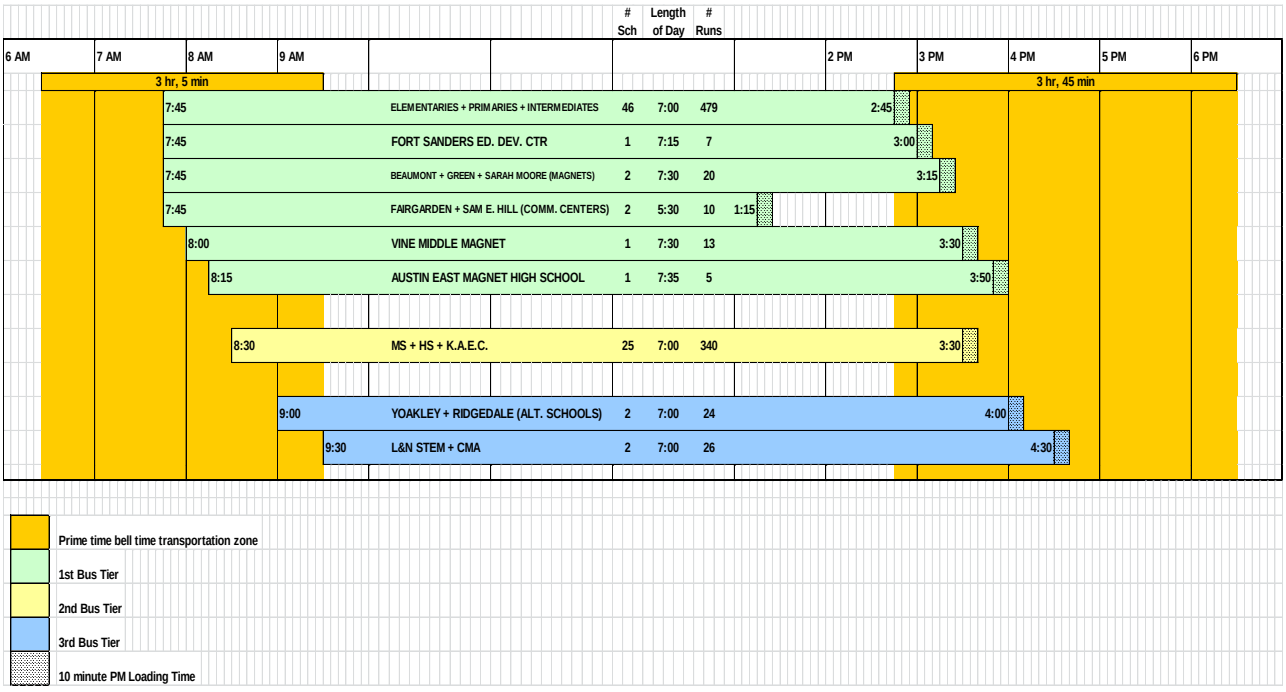
Route Data Analysis

The route data analysis provides an opportunity to assess the performance of the routing scheme relative to the district's bell times. Comparatively high costs of transportation are often but not always attributable to inefficiencies in the routing scheme. Present inefficiencies can be identified using performance indicators as previously described. There are two primary steps to maximizing efficiency in a student transportation system. The first is to fill as many seats as possible on each bus run, known as "capacity utilization". The second is to link as many runs to each bus as possible, a process called "pairing". When both steps are effectively combined, the result is a greater efficiency within the routing structure resulting in a lower cost per transported student.

The metric "Buses per 100 Students" is one of the most effective measures to evaluate the overall efficiency of a routing scheme. Like golf, a lower score in the buses used per 100 students is better. In KCS, the buses used per 100 student's measure (1.6), is above the SBC guideline of 1.0 to 1.3. This overall value is a little misleading, however, and should be examined more closely. The regular education bus routes exhibit a "buses per 100 students" metric of 1.1, which is well within the industry average spectrum. This is a sign that for the regular education transportation service that KCS is doing an adequate job of executing efficiently. The special education transportation service is another story, though, as the buses per 100 students metric for this service category is an exceptionally high 8.46. This metric's value is not a reflection of ineffective reuse of the buses in the special education category (4.34 trips per bus or 72 percent of the total trips-usage available in a perfect 3-tier system) so much as a combination of moderate reuse of buses coupled with low capacity utilization. Given the preponderance of 24-passenger buses in the special education fleet, it is easy to use such a vehicle as the average capacity benchmark against which to compare ridership data. As such, average daily capacity utilization for the KCS special education routes would be 12 percent per run and 50 percent per bus. So, put more plainly, the KCS is reusing its special education buses a sufficient number of times but those buses are not sufficiently loaded, on average, each time. For comparative purposes in the student transportation industry, reuse and capacity utilization benchmarks are 80 percent or better with values of 60 percent or lower indicating a need for closer examination.

Regarding both the KCS regular and exceptional categories, the trips per bus measure is within the realm for industry standards. The regular education category is making, on average, 4.18 trips per bus per day overall with the exceptional education making, on average, 4.34 trips per bus per day. These values are decent indicators for both at 70 and 72 percent, respectively for reuse of these buses. These values are attributable, in part, to district bell times that are positioned fairly well for multiple pairings of bus runs. See **Illustration 8** below for an illustration regarding KCS' bell times and tier spreads.

Illustration 8: KCS Bell Times and Transportation Zones



The special education buses, at first glance, fare surprisingly well in this category with the higher value of the two categories. This metric tells only half the story, however, as it is coupled with much lower capacity utilizations which are not, as previously mentioned, as favorable to overall resource utilization.

Seating capacity use for both regular and special education buses was estimated by SBC as being below the desired measure's range at estimated values of 58 percent and 34 percent, respectively. As previously mentioned, these figures are rough estimates based on limited data of questionable accuracy, and the industry standard for further examination is any value below 60 percent. These estimated values indicate that, generally speaking, special education bus routes are having to run longer periods of time to try to fill the bus, but cannot, as students are spread out over the county and/or require more loading and unloading time per student due to required accommodations and/or conditions. The regular education measure is just shy of the industry recommended range of 60 percent which indicates the buses in this category are being minimally filled, however service quality for some is being affected by longer rides in order to reach even that modest capacity utilization rate.

Average ride time across the fleet, at over 36 minutes, is well within the district's policy-limit of 90 minutes. System wide, there are 146 routes (approximately 10 percent) that exceed 60 minutes and 19 routes that exceed the 90-minute window, with the highest ride time at 1 hour and 51 minutes. The 90-minute routing window should be an effective amount of time to fill buses in a geographic area like KCS, but challenges like special education programs with solitary locations, STEM and other magnet programs, Homeless students and other county-wide transportation-eligible demographics are detrimental to keeping ride times low.

Key Observations

- Buses per 100 students is higher than the range of industry norms, mostly due to special education
- Seating capacity is somewhat low, and while not without reason, it is nonetheless concerning
- Reuse of buses could be better but is within the expected range of industry norms
- Average ride times are good but there are a number of exceptions exhibiting very high ride times

Recommendations *– In order to improve capacity utilization and thereby improve the district's buses per 100 students' metric, bus routes should be more closely examined for opportunities for improvement. Also, routes with ride times exceeding 60 minutes, and especially those routes with ride times exceeding 90 minutes, should be examined more closely in order to identify ways to shorten and/or split portions of those routes out of their existing assignments in order to improve ride times and thereby improve customer service*.

Stop Development, Route Design and Route Pairings

While in-depth analysis of individual routes was not within the scope of this project, SBC did discuss routing policies and practices with the KCS routing staff. It was indicated that the KCS establishes bus stops and bus routes according to the district's policies and procedures, and exceptions to those policies and procedures are both rare with rationale documented. With that being said, no student transportation is exception-free but the goal is always to minimize exceptions as they almost always compromise the efficiency of the system.

Regarding route pairings, while they were not found to be at a high level, they were at a level expected given the structure of the routing system. A two-tier routing system should have most routes performing at least 4 runs per day, while a three-tier routing system should have most routes performing at least 6 runs per day. Given that the KCS is a two-tier system with small numbers of buses still operating after the second tier, the fleet average of 4.23 runs per bus per day is within the 4 to 6 runs per day range that would be expected.

Key Observations

The KCS routing staff pairs routes when possible, and even in cases where regular education riders are assigned to special education buses when such practices can eliminate the need for an additional bus or significantly lengthening another regular education route. Such a practice, if and when appropriate, is an efficiency best-practice. Additionally, on countywide routes that must run long distances, the district relaxes some of its historical practices regarding grade level limitations on bus route assignments. Put differently, whereas the district might not typically route elementary and high school students on the same bus for a neighborhood school, the KCS will route elementary, middle and high school students on STEM or other magnet program bus routes due to a variety of reasons but all in support of making those challenging bus routes more efficient.

Recommendations *– Continue the best practices that the KCS is presently exhibiting in these regards. It appears that most improvements within this category will be related to structural system changes afforded by potential changes in other constraints operating upon the system.*

Deployment of Buses

Illustration 9 and 10 below demonstrates that the current KCS bell schedule provides for a two-tier system in the morning and afternoon, with a "tail" that is comprised of a much lower volume of runs in a pseudo third tier. The differences in the peaks of the bars is an indication of the imbalances caused by the bell schedule due to the varying demand for services associated with special needs requirements and non-public schools:

Illustration 9: Morning Deployment of Buses

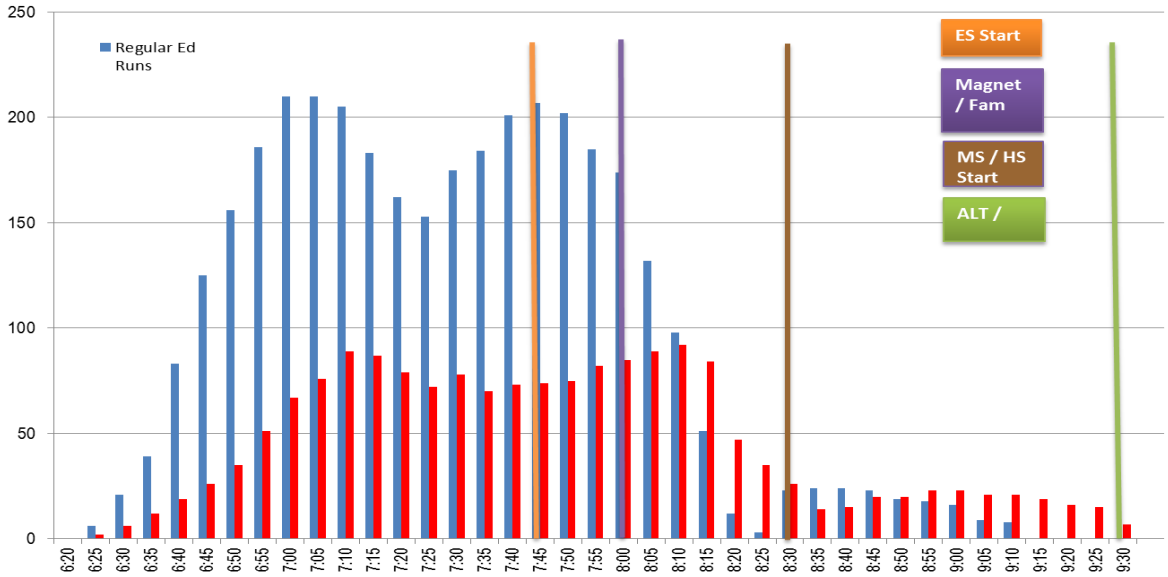
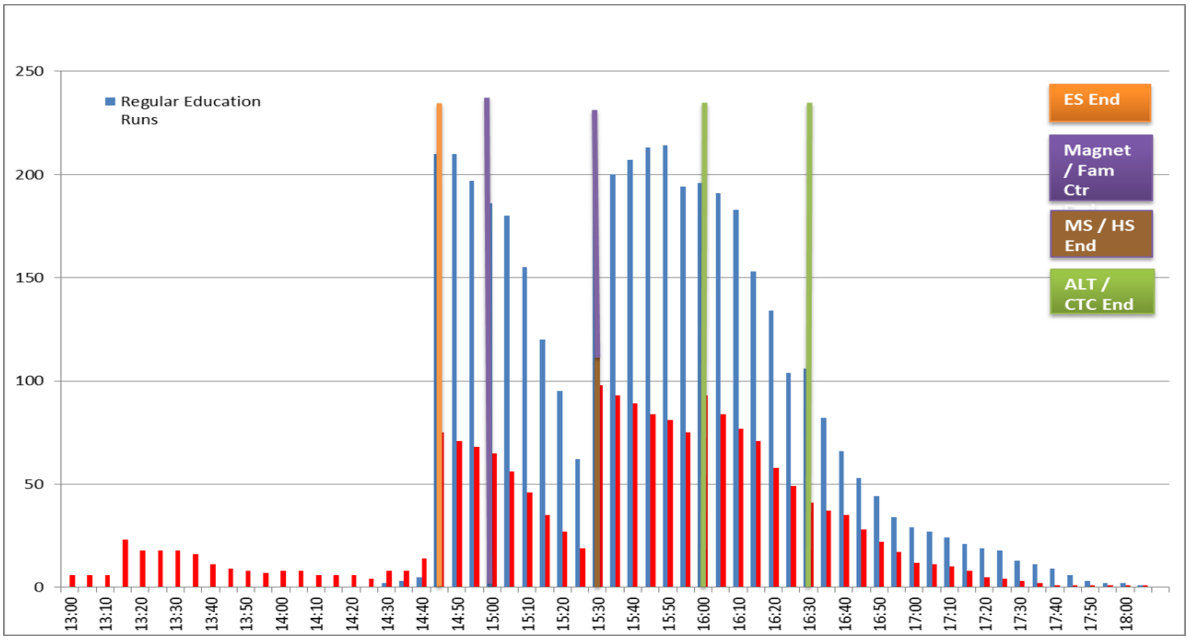


Illustration 10: Afternoon Deployment of Buses



The above figures demonstrate the peaks of the morning and afternoon deployments of all buses in the system. The morning deployment shows that the first peak, or tier, is where the largest percentage of buses with students on board is in use. In the afternoon, the peak occurs in the second tier. Afternoon deployments of buses do not always mirror the morning deployment because often systems are servicing multiple programs across multiple bell times and multiple lengths of day. This is the case for KCS, while we previously mentioned that the KCS transportation system is essentially a two-tier system, the graphical representation of the district's routing data displays the pseudo third tier as more of a tail to the first two tiers and especially during the morning deployment. The afternoon deployment shows slightly more delineation between the first and second tiers, when compared to the morning deployment, and also the pseudo third tier is more recognizable as a tail among the special education routes. This can be attributed, in part, to the window of loading time that is required at each school in the afternoon, as opposed to the morning drops which typically do not require the buses to stage and wait.

In a general sense, when bell times are strategically adjusted then the differences in the height of the resource utilization peaks are more balanced. When the peaks are more balanced then the system is open to the use of fewer assets as opportunities for the reuse of assets become more plentiful. When the reuse of assets is maximized, in combination with the effective use of available capacity on utilized buses and maximum available run-time windows, then a system becomes ripe for resource reductions which thereby reduce first variable costs and with enough reductions perhaps also fixed costs. The KCS's district bell time system is conducive to efficient bus routes, but the system could be made more efficient if the constraint of the afternoon work time (i.e., 35 mins) could be elongated. More significantly, however, bell time agreements among all transported schools, with efficiency improvements in mind for the KCS, would be instrumental in potential transportation cost and service improvements from the bell time and route pairing perspective. If existing transportation work could be moved from the first and second tiers into a bonafide third tier, with a focus on balancing work across three tiers instead of two, then there would be a marked reduction in the number of buses needed to operate the system and correspondingly significantly less drivers and equipment would be needed to transport the district's eligible students. Due to ongoing driver supply challenges facing the district, two obstacles could be overcome with one solution if both costs and required drivers could be reduced by reallocating demand evenly across the tiers. Based on SBC's assessment of the district's driver supply, reductions in required daily drivers may not cause a drop in demand for drivers due to the current and apparently chronic driver shortage suffered by the district and its contractors. An immediate reduction in required drivers, rather, could bring the district into compliance with industry norms regarding spare drivers available for substitute work related to workers' compensation losses, vacations, illnesses, and all other manners of daily absences that further strain an already taut staffing situation. Additionally, a reduction in daily required drivers could also enable more and more regular availability of activity and field trip drivers, which are also in short supply. In the same vein, challenges associated with equipment regarding breakdowns, shortages and age-related constraints could also be eased by requiring less equipment to operate on a daily basis.

Capacity Use

In combination with the reuse of assets, capacity use is a robust component of routing efficiency. Due to difficulty in obtaining accurate fleet information in a timely manner, as well as due to a lack of fleet data within the Edulog™ routing software, SBC was not able to provide an in-depth capacity usage analysis for

the KCS. As previously mentioned, and in general terms, SBC has been able to determine estimated capacity usages across service types as well as the total fleet, but those estimates do not support deeper analysis and decision-making attributed to more substantive and accurate data.

Key observations

SBC can say with certainty that the routing data from Edulog indicates that the KCS is over-assigning its buses as a general rule, and this practice is also known in the student transportation industry as "planned overloads." Planned overloads are often used where route planners know the actual number of students on particular bus routes have historically not ridden the bus. This practice is often most common at the high school level where junior and senior students often drive or find alternative methods of getting to and from school, but while less common on middle and elementary school routes it is certainly not unheard of. Such a practice indicates an organizational intention of efficiency by trying to ensure that routes are as full as they can be, and in such cases routers rely heavily on bus drivers to inform them if their buses are under, at or over capacity. Over capacity situations are student safety concerns, so without a doubt communication is a key element in making the practice of planned overloads successful.

On the other hand, it is clear from even a conservative estimate on special education buses seating capacities that special education capacity utilization is low. Without doubt, special education transportation is less efficient and more challenging than virtually any other type of student transportation service, so seeing lower capacity utilization figures is not outside of the norm. Such observations, however, are not without limits and as such the district should look more closely at its special education routes to determine what combination of factors, if any, could improve capacity utilization without negatively impacting the service delivery to stakeholders.

Recommendations – The district should continue its proactive practice of planned overloads with the caveat that efficiency should never take a front seat to safety and this practice should be targeted primarily to high school and middle school routes. Also, as mentioned in other parts of this report, improving the amount and quality of fleet information within the routing software will augment the routers' application of this practice and also reduce the number of necessary driver communications for basic information like bus capacity. Additionally, special education routes should be more closely examined for efficiency opportunities related to all aspects of constraints currently prohibiting greater capacity utilization. Be it bell times, program locations, IEP shortcomings or shortages of resources, effort should be made to identify constraints and entertain alternatives such that capacity utilization could be improved.

Route Management Technology

Transportation management and information systems have allowed school districts to become more efficient in routing of school buses when used effectively. In combination with properly managed student information downloads from student information systems, school bell times, driver information and required buses, bus routes are more easily developed and maintained when compared to outdated manual processes. The data outputs are invaluable from providing schools access to student bus assignments, bus stop times and locations that reduces time requirements of transportation personnel. The driver route reports are a valuable tool to maintain student lists, stop time and locations and driver directions. These systems also provide data that is easily accessible for analysis.

Key Observations

KCS's school bus contractor utilizes Edulog™ for route planning and Synovia™ for active bus locations via GPS. The Synovia™ system is partially implemented (200 out of 337 buses, with only 160 or so units functioning at any one time) for locating buses in real time, but Edulog™, however, is not currently configured to accept into the application, real time or archived GPS data for overlay analysis purposes. This limitation prevents assessing routes as planned versus routes as executed, and the district and the contractors are missing out on opportunities to address route deviations and challenges both early and often.

SBC's analysis of the available routing data within Edulog™ indicates that the district is establishing runs and routes (i.e., trips of multiple runs assigned to the same bus) in Edulog™ and using the software to a significant degree of its intended usage. Students are being assigned to bus stops based on a variety of eligibility and accommodation based criteria, in concert with district policies, and then those stops are assigned to bus runs which are then grouped into bus routes.

Due to limitations within the district's iteration of the Edulog™ routing software, runs that serve students within a given geographic area and then transport those students to and from multiple school sites (also known within the student transportation industry as "combination runs") are entered into the software as multiple runs (one per school site served) with mostly identical information and only the school site field differing between each run. Further challenging this shortcoming is that for each run entered into the routing software, the departure and arrival times are, as previously mentioned, identical and do not indicate order of school visits or times for individual schools' arrivals. As such, interpreting and analyzing data presented in this way proves challenging, time consuming and marginally accurate, at best. At worst, the representation of data in this way can be easily misinterpreted and thus misanalysed and incorrect conclusions can be arrived at and acted upon costing time, money and perhaps even student safety.

Also regarding the Edulog™ software, the KCS staff reports that limitations with the software's capabilities prevent the district from being able to utilize Edulog™ for all of its student transportation data needs. Due to these further limitations, the district has utilized for many years a Microsoft Access based database program that captures pertinent transportation data for non-regular education riders. This program is called Census and is used in concert with Edulog in order to fully capture and apply the transportation data necessary to properly transport non-regular education riders. While student transportation data changes are always captured in Census, changes in Edulog™ only occur if data pertaining to the student's pickup, drop-off, school, or other bus-route pertinent information has changed. Stated differently, Census contains rosters, notations, and other ancillary data about students' IEPs or transportation accommodations that are not easily or conveniently entered into Edulog™.

The KCS routing staff also voiced additional concerns about the district's current iteration of routing software, including its lacking in the area of reporting capabilities, a desire for more graphical interface options for clicking and dragging or executing changes on the map as opposed to in the database, and a wanting for "ease of use" improvements that would streamline some processes that currently take multiple steps and lots of time to accomplish. Additionally, the staff wishes that all of the buses could have GPS capabilities so that GPS data could be imported into Edulog in order to perform planned versus actual comparisons across the system. Lastly, the map utilized within the Edulog™ software is out of date and is

only updated by 15 percent each year, per contract, by Edulog™, and therefore also uses and maintains a separate district map in ArcGIS that is better than the map within Edulog™ but not accessible within Edulog™.

Regarding equipment and the routing software, the fleet capabilities of the software are not being utilized by the district as Edulog currently does not contain much if any of the bus fleet information. This limitation prevents capacity utilization determinations from within the software, as well as assessments of vehicles ages, types, odometer readings, etc., by route or route type, by school, by contractor, by terminal, etc. Many analyses could be completed from within the routing software regarding fleet, as well as how fleet impacts the routes, if all of the fleet data was entered into the routing software.

Recommendations *– KCS should consider updating its routing software such that combination runs can be accurately entered into the routing system, reflecting all pertinent aspects of those routes. Furthermore, the routing software upgrade should also address the district's current inability to enter all pertinent student transportation data into its routing software such that the need for and use of Census can both cease, thus simplifying the routing process and thereby making it more time and resource efficient. Lastly, staff desires for the routing software should be considered in the next iteration, as they relate to improving both processes and capabilities within the system related to routing efficiency and effectiveness.*

With or without a routing software update, the district should ensure that the routing software is fully executed such that all aspects of the software are being utilized and can contribute fully to the routing efficiency process. Map updates should be explored, fleet data should be entered into the system and maintained, and all applicable functionalities afforded by the software and determined to be beneficial to the transportation operation should be implemented, utilized and continuously improved. This will be a joint effort between the district and the school bus contractors since the contractors own and operate the fleet serving the district.

In this same vein, SBC recommends KCS investigate the better utilization and integration of GPS data into the routing software for the use of planned routing versus actual execution of routes. It is believed that if this capability were available to the district and school bus contractor that KCS can reduce costs by improving efficiency. Additionally, the use of the GPS alone can provide for on-time performance measurements in all aspects of routing and trips. Lastly, KCS could work with its school bus contractors to forge a link between Edulog™ and Synovia™ for comparison of planned routing versus what is actually occurring on the road.

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Budget Summary and Key Cost Performance Measures

The FY2014-2015 (FY15) final budget was analyzed by SBC. The purpose of the analysis was to determine cost and performance measurements, as well as to break out the annualized costs by key transportation modes. For KCS, the analysis covered regular education transportation, special needs education transportation, and community shuttle transportation. **Illustration 12** below depicts the budget breakdown to show the allocated total that was used for this analysis:

Illustration 12: FY15 Transportation Budget Expenditures

Fiscal Year 15 Final Budget	Exclusions	Allocated Total for Analysis
$16,283,439	$55,753	$16,227,685

Exclusions are costs that are not related to transportation and were removed from the budget for the purpose of a more accurate analysis. Exclusions consist of such expenses as bulk mail inserter, mail room expenses, and mail room staff.

The total FY15 transportation budget expenditures were subsequently broken down by service type as follows in **Illustration 13** below:

Illustration 13: FY15 Transportation Budget Expenditures by Service Type

Regular Education	Special Needs	Community
$10,723,151	$4,190,465	$1,314,069

SBC also analyzed the transportation service types of KCS as a percentage of the whole and are depicted below in **Illustration 14:**

Illustration 14: Transportation Cost Percentages by Service Type

Allocation Type	Regular Education	Special Needs	Community
Students	92 percent	6 percent	2 percent
Buses	70 percent	30 percent	
Runs	69 percent	31 percent	
Miles(or time)	58 percent	36 percent	6 percent

Regular education costs represent the highest percentage of service across all types of service and allocation type. This is due to the fact that there are significantly more school students and buses used for regular education services.

SBC also analyzed the numbers of students within each service type and are displayed in **Illustration 15** below. It is with these ridership statistics in combination with the allocated budget statistics that provide for the performance metrics for KCS.

Illustration 15: Transportation Ridership Statistics

Unit totals	Total	Regular Education	Special Needs	Community
Transported Students	22,325	20,713	1,206	406
Total Buses	337	235	102	
Total Bus Runs	1,425	982	443	
Miles per Day	18,520	11,889	6,631	1,160

The $1,288,302 was removed from the general budget analysis and was added back as a separate line item and is 100 percent allocated to the community shuttle category. As there are only 406 students listed in this category it represents approximately 8 percent of the budget. Based on data provided by KCS, SBC provides for a breakdown of the costs within this category in **Illustration 16** below. These students are transported by shuttle vans across KCS. They represent a population that cannot efficiently or effectively be transported by the typical school bus due to the variations of the types of services provided to these students. For example, homeless students that are retained in their home school attendance boundary even though they no longer reside in their home attendance boundary. This is to try and provide stability for the student until they can return to reside in their home attendance boundary or finish a school year there until they settle into another attendance area when they find a more permanent location of residence.

Illustration 16: Community Based Transportation Statistics

Transportation Type	Total Funds	Number of Students
ELL	$34,440	9
Homeless	$428,967	170
Magnet	$60,566	17
NCLB	$45,749	9
Regular	$18,406	8
Special Needs	$634,161	162
Stability Transfer	$66,023	31
Totals	**$1,288,302**	**406**

Illustration 17 below is the resulting performance metrics that allows for comparison of KCS to other districts as well as compare their self from year to year. It is noted that this analysis is a snap shot in time. In order to effectively measure where KCS stands from year to year, this type analysis should be performed in order to gage efficiency and effectiveness over time.

Illustration 17: Performance Metrics

Metric	Total	Regular Education	Special Needs	Community
Annual Cost per Student	$727 per student overall	$518	$3,475	$3,237
Annual Cost per Bus	$48,153	$45,630	$41,083	
Annual Cost per Run	$11,388	$10,920	$9,459	
Cost per Mile	$4.87	$5.01	$3.51	
Daily Cost per Bus	$268	$254	$228	
Daily Cost per Run	$63	$61	$53	

SBC analyzed the KCS FY15 final budget which was used to provide the key performance measurements and comparable costs to other Tennessee districts. Based on a final allocated budget of $16,227,685, SBC determined that approximately 66 percent of the budget is regular transportation; approximately 26 percent of the budget is special needs transportation, and approximately 8 percent is community based transportation. KCS, with 26 percent of the transportation budget for special needs, is comparable with national averages of 28 percent of the budget.

Key Cost Performance Measures Comparisons

KCS key cost performance measures were compared to two other districts from Eastern Tennessee and another large metropolitan school district in Tennessee. The table in **Illustration 18** below depicts the comparisons of the other three districts with KCS:

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Illustration 18: Cost Comparisons of KCS and Three other Tennessee Districts

	Knox Contracted	Anderson Contracted	Greene Reg. Contracted/ District Sped	Nashville District operated (Dec. 2014 study)	National Averages Range
Students transported overall	22,325	4,400	5,000	38,841	
Cost per student overall	$727	$679	$511	$616	$650 to $850
Cost per bus overall	$48,153	$62,203	$35,507	$77,642	$45,000 to $66,500
Cost per Regular Ed student	$518			$344	$520 to $546
Cost per Special Needs students	$3,475			$6,519	$4,160 to $5,460
Cost per Regular Ed bus	$45,630			$77,621	
Cost per Special Needs bus	$41,083			$101,807	
Transportation budget as percentage of total budget	3.7 percent			5.3 percent	4 to 6 percent
Buses per 100 students	1.6			1.2	1.0 – 1.3
Percent of special needs	26 percent			47 percent	28 percent

In these measures, KCS is higher in the cost per student overall measure than all other districts[2] but is within the range of national averages. In the cost per bus overall measure KCS is lower and fairs well against all but Greene County. The cost per regular education student is higher than Nashville but falls just below the national range. KCS compares favorably in the remaining measures other than in the buses per 100 students category. This is due to the fact that Nashville is able to effectively operate a true three tier bell time schedule versus the two tier bell time schedule in KCS (this is also why the costs per bus measures for Nashville are higher as they operate the buses on more tiers, hence more use equals a higher costs to operate the bus). KCS, in the transportation budget as a percentage of the total district budget, is lower in this category. This is indicative of the results findings within this report that indicate additional funding is needed.

KCS cost per special needs student is approximately $3,475 and Nashville is approximately $6,519. National costs for special needs students have regularly shown to be approximately 6 to 10 times higher than that of the regular education student. This is due to the need for specially equipped buses, special equipment, monitors on buses and typically lower capacity buses. Nashville is also significantly higher in this measure due to a consent decree requiring aides on every bus transporting students with special needs regardless if transportation is a related service or not. The national averages are approximately $4,160 - $5,460. KCS is lower than the average range.

KCS cost per regular education bus is $45,570. Nashville is $77,621. There is no performance measure for this category as costs are all across the board from typically lower in southern regions to significantly higher, for example in the Northeastern United States, for similar operations, simply because costs are higher there. Nashville's costs are higher in part because they operate more of their buses over a three-tier bell time routing structure, meaning they can have higher numbers of miles therefore higher per bus cost. They also are a district operated system versus the KCS contracted system. District operated systems are typically higher due to the addition of employment costs associated with drivers, monitors and mechanics.

[2] Anderson County and Greene County performance costs were determined by a high level analysis of their total transportation budget, numbers of buses and numbers of students. Their costs were not allocated down to the level of detail of KCS. Nashville costs were determined from an operations review conducted by SBC in 2014.

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Contracted Buses and Funding Formula

The KCS contracted school bus system includes 74 school bus contractors to operate 337 school bus routes needed to provide appropriate and effective service to KCS. The school bus contractors operate anywhere from approximately 30 buses down to a single bus. Board policy now allows for a single vendor to operate up to 20 percent of the total number of buses required in the system, which is up from 10 percent. The current levels of school buses, owned by any one vendor, remains at about 10 percent of the total. The contractors purchase and insure their own buses which they may keep in service in Tennessee as long as they want, provided the vehicle passes state inspection. Bus owners of Type C and D school buses with fifteen (15) or more years of service may request for extended utilization of the school bus from the State of Tennessee. Interviews with several school bus contractors indicate it is difficult to try and purchase new school buses with the current funding levels from KCS. Many contractors have turned to purchasing used years.

School bus contractors currently train their own drivers who are, in turn, certified for a Commercial Drivers' License (CDL) by a third party tester. Beyond training potential school bus drivers to obtain a CDL, school bus endorsement, air brake endorsement and passenger endorsement, the State of Tennessee provides for a four (4) hour annual in-service training that includes verifying that all drivers' licenses are up to date and have not been suspended or revoked during the previous year. KCS also provides for an annual two (2) hour in-service program, the most recent on distracted driving.

Interviews with contractors noted concerns with the funding formula for reimbursement. KCS has increased the funding for contractors a total of three (3) percent over the last five years as depicted in the table below in **Illustration 10:**

Illustration 10: Five Year Rate of Reimbursements

September 2010	September 2011	September 2012	January 2013	September 2013	September 2014	September 2015
$185.09	$185.09	$185.09	$188.79	$190.79	$190.79	$190.79

The total of these increases equate to a $5.70 increase per day, over the five (5) years, based on the 65 to 66 passenger bus category, or $0.95 per hour. Contractors indicate that it has been difficult to pay drivers enough in order to attract and retain qualified personnel, much less buy new school buses. Additionally, increased insurance rates (primarily from accidents) and significantly, higher in cost, commercial tags for school buses, (recently changed to commercial by the State) from $30 annually to upwards of $600 annually, depending on the capacity of the bus. KCS also gave a stipend in November 2015 of $600 paid over a seven (7) month period.

The base rate for a 65-66 passenger school bus that includes six (6) hours of service and 52 miles is $190.79 per day and equates to $31.80 per hour. SBC compared this rate to the Internal Revenue Service (IRS) rate for reimbursement for a privately owned vehicle used for business purposes. The current IRS rate for business purposes is $.54 per mile. Multiplying the $.54 times the 52 miles from the base rate for the 65 to 66 passenger school bus equates to $28.08. The difference between the two (2) rates is $3.72. KCS is

paying a contractor $31.80 an hour to pay the school driver, purchase parts, purchase vehicles, purchase insurance, pay all associated taxes, etc. for $31.80 per hour, and make some kind of profit, which is why they are in business.

One further example, Category E of buses begins with the vehicles that are paid for 100 miles included in the base rate. The base rate for Category E buses, which is a 20-passenger school bus without wheelchair spaces, is $204.69 and equates to $34.12 per hour for six (6) hours of service. The IRS reimbursement for business purposes for a personal vehicle for 100 miles is $54.00. The difference in jumping categories from 52 miles to 100 miles is a difference of $19.88, or $0.41 per mile. The rate per mile over 100 miles is $0.88 per mile. Subtracting the $0.41 from the $0.88 leaves $0.47 per mile to pay all other costs beyond fuel.

The following tables in **Illustration 11** below depict the current rates for all categories of school buses in use in KCS:

Illustration 11: Table of Rates for all School buses by Category

Category I	>65 Capacity	Daily Rate	Monthly Pay	Base Rate Mileage	Hours of Service	Time Frame AM	Time Frame PM	Rate over 52 miles
A	65-66 Conventional	$190.79	$3,376.98	52 miles	6	6:15 am 9:15 am	2:15 pm 5:15 pm	$1.26 mile
B	84 Non-Conventional	$224.50	$3,973.65	52 miles	6	Same	Same	$1.40 mile
C	88 Non-Conventional	$230.37	$4,077.55	52 miles	6	Same	Same	$1.40 mile
D	90 Non-Conventional	$231.61	$4,099.50	52 miles	6	Same	Same	1.40 mile
Category II	**<65 Capacity**					**Any 3 assigned consecutive hours within time period**	**Any 3 assigned consecutive hours within time period**	**Rate over 100 miles**
E	20 without wheelchair spaces	$204.69	$3,623.01	100 miles	6	6:30 am 11:30 am	1:00 pm 6:00 pm	$.88 mile
F	36 without wheelchair spaces	$243.58	$4,311.37	100 miles	6	6:30 am 11:30 am	6:30 am 11:30 am	$1.04 mile
G	Combination seating-short wheelbase (regular seats and wheelchair)	$218.95	$3,875.42	100 miles	6	6:30 am 11:30 am	6:30 am 11:30 am	$.96 mile
	Combination							

H	seating-long wheelbase (regular seats and wheelchair)	$243.58	$4,311.37	100 miles	6	6:30 am 11:30 am	6:30 am 11:30 am	$1.11
Category III		**Daily Rate**				**9 continuous hours and a 30-minute break with no service**	**9 continuous hours and a 30-minute break with no service**	**Rate over 100 miles**
I	Extended hours service assignments without lift	$298.55				6:30 am 5:30 pm	6:30 am 5:30 pm	$.96
J	Extended hours with combination seating	$356.89				Same	Same	$1.11
Category IV	**Miscellaneous Services**	**Daily Rate**				**Time Frame AM**	**Time Frame PM**	
K	**4-hour scheduled service**	$96.42				As needed	As needed	
L	**3-hour scheduled service**	$67.67						
M	**2-hour scheduled service**	$42.98						
N	**Scheduled shuttle service (one way)**							
O	**Emergency or other on-demand service**	As mutually agreed upon at time of service						

Fuel reimbursement for the base contract for all buses is $2.75 per gallon. Should the fuel rate increase over $2.75 per gallon then the fuel index is implemented. The last time a fuel index was calculated was

when fuel was $3.94 per gallon in May 2012. The calculation for the fuel index is the price of fuel over $2.75 and when it was last calculated is shown below;

- $3.94 - $2.75 = $1.19. The $1.19 difference was then divided by 5 (as in 5 mpg) which leaves $0.24 rounded. Then take the $0.24 and pay that per mile for live mileage on the regular runs (first stop to last school in the morning and first school to last stop in the afternoon). The index does not include any deadhead mileage or those miles without students on board the bus. However, STEM & MAGNET buses are paid the deadhead miles up to and including $50.00 per day (depot to depot). It was stated deadhead mileage is paid in these instances because buses typically have to travel further distances to and from the depot to reach the first stop in the morning and return from the last drop off in the afternoon

It is an SBC observation, and does not get lost by the contractors, that KCS does not take any fuel costs back when the fuel costs drop below the $2.75 per gallon. The contractors state that this is the only saving grace right now due to the reimbursement rates being insufficient, for which SBC agrees.

Recommendations: Suffice it to say, SBC believes that KCS is underpaying the contractors for their services and it is believed that the underpaying is affecting the contractors abilities to pay a fair wage to recruit and retain qualified drivers. It is also having an effect on the contractors in purchasing new equipment. And likely worse yet, it is having an effect on the safety of the students because training cost money. If KCS were to implement a training program as discussed in this report, SBC still believes the contractors need to have an increase in funding.

SBC makes no recommendations on any increase in pay and there are no national averages on what contractors are paid, like there are in costs as developed in this assessment, because the operating costs are all across the board and have significant variables of service and delivery within these costs. SBC is sure the contractor would like if they were paid $60,000 per bus annually on a base rate, however it is not what the market bears in Eastern Tennessee. But with a high degree of certainty, SBC believes the contractors are due for an increase. While contractors do not have to open up their books or have discussions regarding their business to SBC or KCS, if they did, SBC would expect to see significant differences in;

- Costs to contractors based on the number of buses are in operation
- How a contractor runs their business which can be in direct correlation to profits
- How they pay themselves
- Differences in pay to drivers
- Differences in costs of insurance
- Differences in costs for parts because smaller contracted operations are not going to have the buying power of larger contractors
- Differences in training costs of drivers

Due to these differences, SBC recommends KCS and the contractors come together on some common ground as to how these issues can be worked out, and be paid fairly, before it gets worse, as the system is on a dangerous cliff.

Conclusions

There are several themes within this assessment of KCS transportation department;

- Initial training of new drivers and in-service training
- High incidence of crashes overall and in particular on school grounds
- Contractor funding formula
- Aging fleet
- Purchasing of used buses versus new buses
- Lack of oversight of the contracted operation by school transportation
- Performance measurements of the system

First, the themes SBC are most concerned with are the lack of training for school bus drivers that directly correlates to the high incidence of crashes. SBC believes that the lack of formal training past the State of Tennessee minimums must be rectified in order to reduce the number of crashes as these crashes also directly relate to the safety and well-being of the students serviced by KCS and the safety of the general motoring public. Anytime there is a crash, not only is there concern for safety but also the time students may be missing classroom time, because it has its own place of importance and is often time that cannot be made up. SBC has made recommendations on training and believes KCS needs to take ownership of the training.

Second, SBC is concerned with the funding formula for the contractors which is too low and directly correlates to an aging fleet which does not necessarily get corrected when a used bus is purchased in lieu of new equipment. A used bus comes with no warranty and may have hidden mechanical issues that may not be evident until the contractor gets back home with a bus just purchased in Ohio or Pennsylvania. These are areas of the country where high salt use takes place in the winter and directly affect the undercarriage of any vehicle. School buses are unlike personal vehicles that may be purchased to get back and forth to work carrying one or two people. These are vehicles that are transporting everyone's most important cargo, their children. And as indicated by contractors, it is difficult to pay a decent wage to attract and retain drivers and is evident in the fact that KCS is only operating approximately 302 buses when the system dictates 337 to do the job properly. It is also evident in the doubling of school runs resulting in early drop offs at elementary schools as early as 7:05 a.m. to 7:10 a.m. SBC has made recommendations to review and revise the funding formula to assist in rectifying these concerns.

Third, the lack of oversight of the contracted operation by the school district is not an issue with current district personnel, but is an issue because there are not enough personnel to properly manage what is a very large school transportation system. SBC has recommended that another person should be brought into the transportation department to oversee safety in general, as well as provide another set of hands and eyes to monitor buses and bus drivers. Interviews indicate there are drivers doing things they just should not

be doing either because it is wrong or may be perceived by the public as being wrong, which can be just the same in the long run, because the damage has been done to the integrity of the transportation program system wide.

Four, KCS actually operates a fairly efficient system and fairs well in key performance measures. The routers are performing well especially in light of the bus driver shortage that requires them to daily rework the schedule depending on what driver is out or what bus is broken down. Special needs and alternative routing is efficiently controlled for a system that also has numerous daily changes to a system that is unlike regular education, as it is basically a dynamic system (inherently has many changes) versus a static system (inherently small numbers of changes). Payroll and driver and contractor compliance management are performed well considering there is enormous amounts of paper and record keeping. These areas should consider newer programs and applications to reduce the amount of paper and labor required in the current system. The management of the drug and alcohol testing and compliance system is also well performed but SBC believes personnel need assistive training in the Federal laws to better understand the program overall and develop access points of updates to laws, when they occur, to be well informed. The new customer service department is doing well in streamlining and restructuring different procedures and processes and redirecting areas of communications off of other staff members so they may be better engaged in their work.

SBC has described a transportation system under stress, but also envisions how KCS can successfully retool and re-fund the system. Paying the contractors in sufficient amounts to begin bringing their fleets up to date and enable them to attract and retain qualified school bus drivers will be critical to success. The fact that the State of Tennessee has eased its requirements on the age and mileage of buses does not mean that KCS needs to as well. It is evident within this report that the age increases of school buses and reduced funding of the contractors has had a deleterious effect system wide. SBC also believes that training has been insufficient which directly correlates to the high number of crashes reported in the last five years, of which the magnitude of possibilities reached the ultimate in loss of lives. KCS also has insufficient personnel to have direct oversight of the operations due to a lack of on-the-road observations of the actions of drivers. Without sufficient funding of the current levels of service, as defined in the policies and procedures section of this report, SBC believes the transportation system will continue to degrade to a point where it will find itself in a difficult position to simply hang on, much less recover. SBC suggests an analogy of the system; that of an aging rubber band, whose elasticity is stretched to its limit, and is about to break.