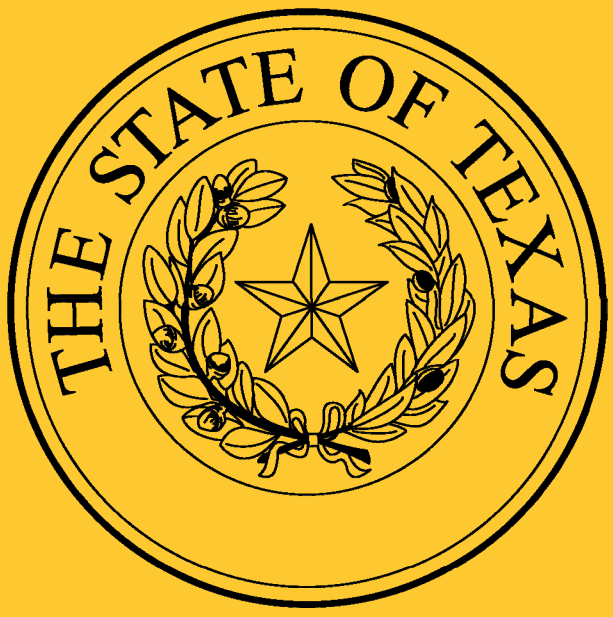


Somerset Independent School District

TRANSPORTATION REVIEW

Conducted by
Management Partnership Services, Inc.
for the
Legislative Budget Board

FEBRUARY 2009

LEGISLATIVE BUDGET BOARD

Robert E. Johnson Bldg.
1501 N. Congress Ave. - 5th Floor
Austin, **TX** 78701

512/463-1200
Fax: 512/475-2902
http://www.lbb.state.tx.us

February 20,2009

Mr. Saul Hinojosa
Superintendent
Somerset Independent School District

Dear Mr. Hinojosa:

The attached report reviews the management and performance of the Somerset Independent School District's (SISD) transportation operations.

The report's recommendations will help SISD improve its overall performance as it provides transportation services to district students. The report also highlights model practices and programs being provided by SISD's transportation program.

The Legislative Budget Board engaged Management Partnership Services, Inc. to conduct and produce this review, with LBB staff working in a contract oversight role.

The report is available on the LBB website at http://www.lbb.state.tx.us.

Respectfully submitted,

John O'Brien
Director

Legislative Budget Board

cc:

Omar Pachecano, D.D.
Leo Salas
Andrea De La Cruz
Robert Sanchez
Don Green
Iris Ledezma
Pedro "Pete" Zamora

EXECUTIVE SUMMARY

OVERALL ASSESSMENT

The transportation department of the Somerset Independent School District (SISD) is an organized operation that provides safe and effective transportation services to the district's student population at an average cost of $638, below the national average of about $710 per student. SISD transports approximately 2,000 students, or about 60 percent of the enrolled population of 3,554 students. The approximate annual cost to provide all transportation services is $1.25 million. In addition to reasonable costs, service quality in this operation is high. Timely, safe, and effective services are being provided, and average student ride times are below expectations for this district.

The department is organized into two main divisions. The first, "Transportation Operations," is responsible for the day-to-day delivery of transportation services to the student population, and includes the majority of department staff. The second, "Fleet Management," is responsible for the upkeep and maintenance of the bus fleet plus all other vehicles and motorized equipment owned by the district. This report is organized based on these two divisions.

ACCOMPLISHMENT

- **SISD transportation is a well-organized operation that provides safe, cost-effective, and high-quality transportation services to the district's student population.** The organization structure is unique in that the transportation operations and fleet management divisions report to different administrators even though they must work cooperatively to provide services day-to-day. This structure has nevertheless allowed for the effective provision of services.

MAJOR FINDINGS

- **SISD does not use route planning software.** The district owns the *Smarter* routing software but has not used it for several years, and the implementation was never properly completed. As a result, routes are still managed manually with impacts on the productivity of staff and effectiveness of the system. A lack of information technology such as routing software and analytical focus has unnecessarily increased the size of the administrative staff and hampered the overall cost effectiveness and efficiency of the operations.
- **SISD provides transportation to students at a cost that is lower than national averages, but can be reduced further as the district is not maximizing capacity utilization.** While the annual cost to own and operate a bus is low relative to national averages, the annual cost per transported student—a more relevant measure of overall cost-effectiveness—is lower but close to national averages. This factor is a direct result of low levels of capacity utilization on individual bus runs. Currently, just 37 percent of available seats are filled on the average bus run.

MAJOR RECOMMENDATIONS

- **The district should modify the transportation department's business processes to incorporate information technology and data analysis into the organizational culture.** There are two key components to this recommendation: Acquire, implement, and integrate a robust routing software package into departmental operations; and design and implement a regular program of performance measurement, reporting, and analysis.
- **The district should consider redesigning the bus routes to increase capacity utilization by at least 10 percent on each bus run with the goal of reducing transportation costs.** Once the routing software is in place and integrated into the operations of the department, staff should undertake a comprehensive analysis of routes with the sole objective of improving overall levels of capacity utilization. This would require consideration of bell time changes to facilitate longer bus runs. Service parameters should be established and should reflect reasonable levels of service delivery but will need to result in ride times that are significantly higher than those currently enjoyed by SISD students. This analysis should only be undertaken if these changes to bell times and service parameters are considered feasible. Increasing average capacity utilization on each bus run by even 10 percent (to approximately 47 percent overall) could result in annual recurring savings in excess of $200,000.

TRANSPORTATION OPERATIONS

ORGANIZATION AND STAFFING

The transportation department of the Somerset Independent School District (SISD) provides transportation services to approximately 2,000 students, or 60 percent of the enrolled population of 3,554 students. These students are carried on 43 active route buses, of which 34 are used for regular and 9 for special education students.

In a unique split of responsibilities, the district's director of student support services oversees transportation operations, and the director of plant operations oversees school bus maintenance and repairs. Transportation operations is managed by the transportation supervisor, with an organization comprised of a transportation secretary, a transportation office aide, and a dispatcher as well as 40 assigned bus drivers and 15 bus aides. The garage supervisor manages the fleet and supervises a master mechanic and two mechanics assistants.

Overall, SISD transportation department is an organized operation that provides safe and effective services to the district's student population. The organization structure is unique in that the transportation operations and fleet management divisions report to different administrators even though they must work cooperatively to provide day-to-day services. Qualified staff and well established operational protocols appear to mitigate many potential problems posed by this structure, but a scarcity of information technology and a lack of analytical focus has unnecessarily increased the size of the administrative staff and hampered the overall cost effectiveness and efficiency of operations, as described throughout this report.

ADMINISTRATIVE STAFFING AND WORK DISTRIBUTION

The management and administrative functioning of the department is operating effectively. The district has a qualified workforce which focuses on the safe and timely transportation of students. Job roles within the department are clearly defined. Tasks and responsibilities are specific, and cover all aspects of a well-run and comprehensive transportation program. A lack of automation, however, leads to a shortage of readily available data that is the cornerstone of a modern, quantitative approach to the management of student transportation operations. The lack of this data leads to an absence of analytical focus and largely prevents the strategic monitoring of cost and service performance. Without this information it is difficult to plan and execute improvements to the transportation system, which is reflected in the cost-effectiveness of the operation as described later in this report. The following is a description and assessment of each administrative position in this division.

Transportation Supervisor – This position has routine operational responsibilities in addition to overall management oversight of the department. Primarily these functions include: scheduling of special trips and assigning drivers to those trips, interviewing job candidates, conducting monthly training meetings, and monitoring drivers' adherence to established operating policy.

The management of special trips begins when the principal of the school first approves the request for a special trip and submits this to the transportation department. The transportation supervisor approves or rejects the trip based on the availability of buses and drivers. Once a special trip is approved, a driver is assigned based on a random drawing, as determined at the beginning of each semester. A driver must be an active driver for at least one year to sign up for field trips. If the selected driver declines the trip, the next person in order gets the trip, and so on. This practice is a rational and fair approach. The only concern that arises is in the manual record-keeping that the process entails.

Dispatcher – This position is responsible for routing and scheduling of buses, assigning drivers to routes, and finding substitute drivers when regular route drivers are absent. Routes are assigned on an annual basis prior to the start of school and on a seniority basis. This position plans routes using a word processing software package, as described further in the Routing Processes section of this report. Daily activities for this position include approving day-off requests from drivers and taking phone calls from drivers who call in sick. This position also assigns empty routes to substitute drivers or schedules a double run for regular route drivers. This individual takes phone calls from drivers who may have an issue on their route and follows established procedures based on the issue. This position is effective in terms of the responsibilities assigned. The dispatcher faces challenges in areas such as recurring driver absences, a lack of substitute drivers and, most importantly, the lack of software or other

technology tools for route planning or daily tracking of operations.

Transportation Secretary – This position manages time sheets for all staff and processes parts purchases for fleet maintenance and repair. This position's responsibilities are an example of how day-to-day activities of transportation operations and fleet management are intertwined, and why the split management responsibility in SISD is so unique. Driver and mechanic hours are tracked via a time clock system. Payroll is processed weekly. The secretary manually tallies driver and mechanic hours from the time cards, submits time sheets to the supervisor for approval, and then sends a request for pay checks to the business office. A lack of automation dramatically increases the time necessary to complete this task. An inordinate amount of administrative time is consumed in this area, and it is unusual to find a full-time position dedicated to the functions of this position in a transportation department of this size.

Transportation Office Aide – This position organizes bus rosters (a list of students who ride district buses) and disciplinary actions against students while on the bus. This position is the first point of contact for inbound calls from parents and other users of the system. The dispatcher or transportation secretary answers the phones when the transportation office aide is unavailable. The aide addresses parent complaints, often regarding disciplinary actions. If parents are not satisfied with the response they get from the aide, the complaint is elevated to the supervisor. This position also performs many of the clerical duties of the department and serves as an interpreter for drivers and parents who have English as a second language. This individual plays an important role in the department primarily due to the manual processes that dominate department operations. Tasks such as the filing of bus rosters and disciplinary action forms affect the efficiency of the aide, and the functioning of the department as a whole. The district reported that since the time of onsite review that changes have been made resulting in the elimination of the transportation office aide position and renaming the transportation secretary position to the transportation clerk.

ADMINISTRATIVE OFFICES AND FACILITIES

The transportation department is located at the southeastern end of the district near Somerset Elementary School. This is a free-standing facility that is shared with other district departments and that includes administrative office space, driver facilities, the bus maintenance garage, and bus parking. The entire facility is within a secured fence. There is adequate parking for the entire bus fleet with sufficient room to safely and efficiently maneuver buses, and clear exit and entry paths to support safe terminal operations. There are three administrative offices for use by operations staff: one for the transportation supervisor; one for the transportation secretary, and one that the dispatcher and transportation office aide share. There is a large lounge area for drivers that includes mail boxes which serve as the primary means of communication between drivers and the operations staff. The quantity and quality of space available for transportation operations is excellent. It is organized and appropriate to support safe, efficient, and effective operations.

ASSESSMENT OF DRIVERS AND OTHER BUS PERSONNEL

Drivers are recruited through word-of-mouth, a banner on the football stadium fence, and by passing flyers out to students to take home to parents. Word-of-mouth is reported to have been the most successful form of recruiting new drivers. However, retention rates for new drivers are reported to be low, resulting in a chronic shortage of drivers. At the time of the onsite review, there were only 40 regular route drivers available and one designated substitute driver to cover 43 regular routes. The master mechanic and mechanics assistants maintain commercial drivers licenses (CDL) and frequently provide coverage for the remaining routes.

The shortage of drivers has significant impacts on cost and service delivery. This shortage affects the maintenance and repair costs as the mechanics must incur overtime as they fill two job roles. Uncovered routes must be managed by combining students on other buses or sending buses to perform a second run after completing their assigned run. Part of the issue is explained as SISD pays lower wages than neighboring school districts in urban areas. On average, San Antonio school districts pay bus drivers two dollars more per hour than SISD. It was reported during onsite interviews that many drivers come to SISD for training, and then take a job in a neighboring district for higher wages. According to district administrators, since the time of the onsite review, the Board of Trustees has raised the pay scale for bus drivers to be more competitive.

The transportation department attempts to improve retention rates through monthly activities such as cook-outs, picnics, and a monthly lunch out for drivers with perfect attendance. The district also allows bus drivers to bring their children on the bus or to leave them in the driver's lounge before or after school while they complete their route. This practice has

allowed SISD to retain drivers with children who are unwilling or unable to leave their child at home or in the care of another individual. Despite these efforts, the driver shortage is an issue that must be addressed, and that represents a major challenge for the department.

Drivers must complete a 20-hour training course developed and required by the Texas Education Agency (TEA). In addition to completing the mandatory state training course, new employees are trained by SISD drivers. Trainees ride route buses, practice driving skills, and complete student management training modules. Drivers must attend in-service training twice a year through the Region 20 Educational Service Center. Attendance is mandatory at monthly safety and training meetings conducted by the transportation supervisor. The strong emphasis on safety has resulted in few accidents in the past year and regular training in student management has decreased the number of parental complaints.

POLICIES AND PROCEDURES

SISD has issued a standard set of school board policies regarding student transportation that include the following elements:

- eligibility criteria;
- hazardous conditions and allowable walk zones;
- transportation of students who attend accelerated programs or career and technology programs at another campus; and
- transportation of homeless students.

In addition to student transportation policies, the district has adopted school board policies regarding the use of district vehicles. These policies address:

- operation of district vehicles;
- use of school buses for school sponsored trips; and
- accident or damage of a district vehicle.

The employee handbook supplements the school board policies with a broad array of operational procedures and protocols. Examples of topics covered by this manual include:

- bus line up procedures;
- bus violations and criminal violations;
- daily safety check and pre-trip inspection;
- bus work order submission; and
- transportation guidelines.

Finally, the student behavior policy is defined in the "Student Safety Manual and Rider Agreement." The safety manual covers such topics as general safety rules, procedures for waiting at the bus stop, loading the bus, conduct on the bus, exiting the bus, and crossing the street or highway. The manual also lists prohibited items on the bus and disciplinary actions for misbehavior. Assistant principals administer discipline, and disciplinary actions are filed at the transportation department.

Overall, these documents provide fairly comprehensive set of guidelines defining what transportation services will be provided and how they will be provided. However, there are a number of key elements generally found in high-quality transportation policies that are absent, and the existing policies are not uniformly enforced in practice. This inconsistency raises some concern regarding the validity and usefulness of the documentation as a management tool.

SISD provides transportation to students who live within a two-mile radius from their campus where hazardous conditions exist. SISD has clearly defined hazardous conditions in their board policies. Hazardous conditions are defined as areas where no walkway is provided and students must walk along or cross a freeway or expressway, an underpass, an overpass or a bridge, an uncontrolled major traffic artery, an industrial or commercial area, or another comparable condition. Much of the district qualifies as a hazardous area under this definition, providing further justification to the district's practice of transporting all students regardless of their distance to school. In school years 2004–05 and 2006–07 the district's hazardous conditions mileage reported to TEA exceeded the maximum amount allowed by the Texas Education Code; therefore, the district absorbed the additional cost for transporting these students.

In addition, many of the existing policies do not provide specific guidance or service parameters generally required for effective planning and for day-to-day operations. Examples include:

- special needs transportation requirements;
- allowable walk distance to stop;
- maximum ride time; and
- the number of students per seat.

Operational parameters such as these ensure that services are delivered in a safe, equitable, and consistent manner across the service area.

BUS ROUTING AND SCHEDULING

SERVICE DESCRIPTION

SISD provides transportation services to roughly 2,000 students using 44 bus routes in a two-tier system. This includes junior high and high school routes on the first tier and elementary and intermediate school routes on the second tier. Somerset Junior High School (7th and 8th grades) and Somerset High School (9th through 12th grades) have adjoining campuses, and Somerset Early Childhood Elementary (pre-kindergarten through 1st grade) and Somerset Elementary School (2nd through 5th grades) are each less than a mile from those campuses, creating a cluster of service locations in the core of Somerset. Savannah Heights Intermediate School which houses fifth and sixth grade opened in 2007 and is located in the southeast corner of the school district near SSG Michael P. Barrera Veterans Elementary School (pre-kindergarten through fourth grade). The combination of these two schools represents the second and final cluster of school locations. **Figure 1** shows the school bell times for school year 2006–07 that create the two-tier system.

The proximity of Somerset Junior High and Somerset High School, along with a five-minute bell time stagger, are used to facilitate combining these students on common bus runs for the first tier. After the first tier combination runs are complete, route buses generally perform a second run to Somerset Early Childhood Elementary School and Somerset Elementary School, SSG Michael P. Barrera Veterans Elementary School, or Savannah Heights Intermediate School. The common length of the school day at each location allows this approach to be repeated for the afternoon runs.

ROUTING PROCESSES

SISD does not use route planning software. The district owns the *Smarter* routing software but has not used it for several years, and the implementation was never completed properly. A major problem was in the quality of the digital map, as many rural roads and unimproved roads were not included. Furthermore, transportation staff found they were not able to invest the time necessary to learn how to use the software, update street networks, or manage student data. These factors are the typical reasons cited for an incomplete software implementation, and the problem exists because of an unreasonable expectation regarding the effort involved in planning for and executing the change in operational orientation that such software requires. However, the benefits to be derived over the long run often far outweigh the effort and expense required on the front end. As a result, SISD's routes are still managed manually with impacts on the productivity of staff and effectiveness of the system.

Routes are planned using maps manually drawn in *Microsoft PowerPoint™* and driver directions developed in *Microsoft Word™*. These maps, along with route rosters, are used as a substitute for routing software. To properly manage this system, however, requires an inordinate amount of administrative effort. As a result, routes have been established for some time and rarely change. District enrollment has been fairly level, and the only documented review of route changes provided by the district was a feasibility study conducted by staff in 2006 prior to the opening of Savannah Heights Intermediate School. The new school required route changes, and district staff took advantage of the opportunity to study capacity utilization and run length across the entire system. However, while routes did change to accommodate the new school building location, SISD staff did not change the number of routes. Route planning software, properly implemented and used, would have made this analysis easier and more effective.

FIGURE 1
SCHOOL BELL TIMES, SCHOOL YEAR 2007–08

SCHOOL	AM BELL TIME	PM BELL TIME
Somerset Early Childhood Elementary School	8:05	3:15
Somerset Elementary School	8:05	3:15
SSG Michael P. Barrera Veterans Elementary School	8:05	3:15
Savannah Heights Intermediate School	8:05	3:25
Somerset Junior High School	7:25	2:35
Somerset High School	7:25	2:35

SOURCE: SISD Transportation Department.

The SISD transportation department manages student data through the system used by the district administrative office. The department receives student data from the administrative office prior to the beginning of school and processes student additions and deletions to established routes. During the first week of school, bus riders are given a "Student Safety Manual and Rider Agreement." Students must complete this contract, which includes school bus violations and corresponding disciplinary action, and return it to their driver. The completion of this contract is recorded and filed in the department. During the school year, if a parent or guardian wishes to make a change to their students' transportation pick up or drop off address, they must come to the department to complete a school bus change request form. Parents or guardians are allowed to make changes to the students' route information if they come to the department and provide identification. This measure is taken to ensure students' safety.

Maps are produced and managed in *Microsoft PowerPoint™*. The maps are not to scale. Street names and numbers were confirmed following the feasibility study when routes were adjusted due to the opening of Savannah Heights Intermediate School. However, the limitations of *Microsoft PowerPoint™* do not produce an accurate representation of the district.

SYSTEM PERFORMANCE ASSESSMENT

SISD provides safe, effective transportation to students with a high level of service quality and at a reasonable cost. The annual cost to own and operate a bus is very low relative to national averages, and the annual cost per transported student—a more relevant measure of overall cost-effectiveness—is just 90 percent of the national average. This cost-effectiveness result is reflective of low input costs (i.e., the cost to operate a bus) and low levels of capacity utilization on individual bus runs. Based on the data made available for this review, on average, only one of every three seats on a bus is occupied, resulting in operational inefficiencies that drive up costs. Compensating for this issue are very high levels of service, as measured primarily by student ride times which rarely exceed 30 minutes. It is possible to improve the cost- effectiveness of the system further by reducing these levels of service to industry-standard levels in order to also reduce the number of buses in operation.

SERVICE QUALITY

Service levels may be measured in any number of ways, including: walking distances to bus stops, allowable walking distances to schools, bus on-time arrival rates, accident rates, allowable seat loading factors, and many others. Given the available data, many of these metrics cannot be quantified for SISD. A key measure of quality, however, is the amount of time students spend riding the bus. The average maximum ride times for students was calculated by using bus run times from the available data as a substitute. For any given bus run, the time between the first stop where students board the bus and the last stop where students disembark represents the maximum possible student ride time. These averages were calculated across all morning runs only. Manual tabulation was required, and the scope of the review did not allow for further analysis of afternoon runs.

The average maximum run time across all bus runs was calculated to be 24 minutes or less in the morning. The average run length was calculated to be 33.7 miles, although this may include deadhead mileage (the amount of time a bus operates without students on board). **Figure 2** displays the average run time and average run length by grade level in the morning.

It is important to note that the average run time does not accurately represent average ride times for all students, but rather the average maximum ride time by run. Thus, the average ride time for almost all students will be lower than indicated by these results. These are judged to be exceedingly low ride times given the distances traveled and the largely rural geography of the school district. A direct correlation can be drawn between short ride times and low capacity

FIGURE 2
AVERAGE BUS RUN TIMES, SCHOOL YEAR 2007–08

MEASURE OF SERVICE QUALITY (MORNING ONLY)		
	AVERAGE RIDE TIME	**AVERAGE RUN LENGTH**
Junior High and High Schools	22 minutes	37.7 miles
Elementary and Intermediate Schools	24 minutes	39.6 miles
TOTAL	**23 minutes**	**33.7 miles**

SOURCES: SISD Transportation Department; Management Partnership Services, Inc. analysis, 2008.

utilization, as further described in the Cost-Effectiveness section of this report.

Figure 3 shows the distribution of run times in the morning (all grade levels have been combined for this illustration). The horizontal axis represents run time and the vertical axis represents the number of bus runs recorded with this time. The solid line in the middle of the graph area indicates the average across all runs, at 23 minutes. A significant number of runs are considerably shorter than the (already short) average, and only a few extend into a "normal" range for a suburban district of 35 to 45 minutes, and not even one exceeds the 45-minute threshold.

Other than for run times, it was not possible to quantify service levels given the limited data. Comprehensive data was unavailable to calculate arrival rates, but the bell times and route data suggest that late arrivals should only occur in the case of emergency or unusual circumstances. A review of accident reports indicates that incident rates are low, citing only minor damage to buses and no injuries in the past year. These factors are both strong indicators of a safe and high-quality level of service delivery.

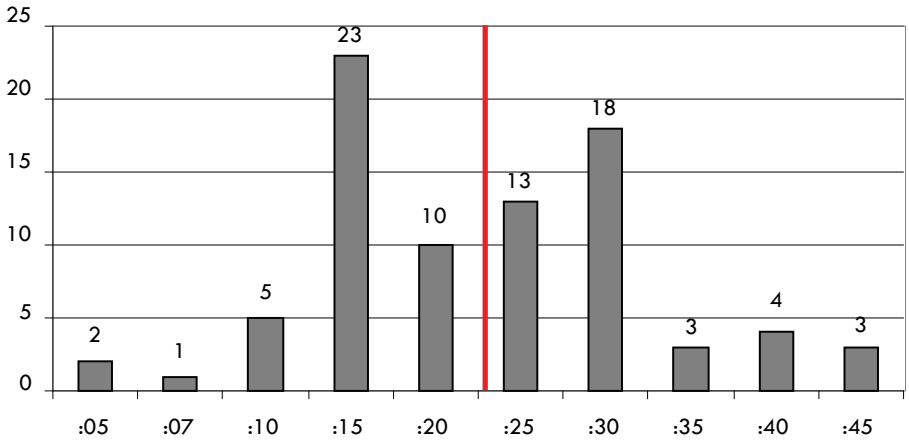
During the onsite review, it was observed that the loading and unloading procedures varied at each school. At the elementary schools, teachers, and aides were available to greet students in the morning and to ensure they are safely loaded onto the bus in the afternoon. The junior high unloading procedure was done in waves; the first group of buses would line up and drop off students. Once all students were unloaded, the first group of buses would leave and other buses would enter the parking lot. No students were allowed to linger in the parking lot. After buses left the junior high in the morning and afternoon, they traveled a short distance to the high school. There, four to seven buses lined up on the side of the high school building to load or unload students. Once a group of buses left, the next group pulled up in front of the school. No unsafe practices were observed in the morning, but in the afternoon there were several students lingering in the driveway and between buses. Buses did not park closely behind one another to discourage students from walking in between them. Furthermore, students would run to the bus to load in the afternoon while other buses were rolling. It is a common practice to let students on the bus regardless of whether they are late. This practice poses safety concerns, as students could get hurt running between buses. Overall, however, these observations support the assessment of high-quality service.

Students at SISD also are provided door-to-door transportation, with the exception of two express stops in town to which students walk less than two blocks to the stop. The majority of the school district lacks sidewalks, and many students live along busy state roads, preventing them from safely walking to a shared bus stop. The lack of sidewalks in the district also contributes to a minimal allowable walk distance to school.

COST-EFFECTIVENESS

The key measures of cost-effectiveness for a student transportation system include the annual cost per transported student and the annual cost per active route bus. A useful comparison is also to convert the annual cost to a daily cost, which is a typical industry standard for

FIGURE 3
MORNING RUN TIME DISTRIBUTION, SCHOOL YEAR 2007–08



SOURCES: SISD Transportation Department; Management Partnership Services, Inc. analysis, 2008.

pricing of contracted transportation services. A subset of cost metrics that help to explain overall costs include those to maintain and repair the bus fleet which are calculated as the maintenance and repair cost, and cost of spare parts per Vehicle Equivalent Unit (VEU). A VEU provides a standard comparison basis for dissimilar vehicle types by converting resource requirements to the equivalent of one standard sedan. Thus, a typical Class C school bus consumes 3.5 times the resources of a sedan in both labor and parts and receives a VEU of 3.5. Other important explanatory metrics include the number of buses required to transport 100 students and the percentage of available bus seats being filled on each bus run (capacity utilization).

These measures are used strictly as indicators and to provide the analyst with the opportunity to understand the factors underlying the level of performance achieved. There is a significant amount of variability to be expected between comparable districts, each of which might be providing high-quality and cost-effective services. These metrics are not therefore definitive. Looked at in combination, however, and gauged against broad industry ranges, they provide an excellent overall assessment of system performance and its underlying causes. **Figure 4** illustrates the calculation of the key measures of cost-effectiveness.

FIGURE 4
KEY MEASURES OF COST-EFFECTIVENESS

Annual Cost per Student	$638
Annual Cost per Bus	$29,075
Daily Cost per Bus	$162
Maintenance and Repair per VEU	$1,747
Parts per VEU	$1,181

NOTE: VEU =Vehicle Equivalent Unit.
SOURCES: SISD Transportation Department; Management Partnership Services, Inc. analysis, 2008.

SISD's annual cost per bus is calculated as $29,075. This calculation accounts for all costs associated with the transportation operation distributed to the 43 active route buses in the SISD system. The expected range is based on national averages and is wide because of the numerous geographic and demographic factors that affect costs across geographic regions. The SISD result is low relative to national averages but within expectations based on industry practice with other Texas school districts. As a result, the issues with overall cost-effectiveness are not judged to be the result of unusually high input costs (e.g., driver wages or overhead), but rather are fundamental to the manner in which individual assets are being used.

The average annual cost for transporting each student at SISD is calculated as $638. Current national averages are approximately $685 to $735 per student. Once again, these indicators are affected by several factors including geography, the size of the operation, and various operational policies. However, the review team's experience in Texas has been that, with lower than average input costs, the cost per student should at least be within national ranges. The result in SISD is excellent at 90 percent of the midrange national average. However, given the low input costs, there is an opportunity to improve this result and lower the overall cost of transportation further, as discussed later in this report.

Further evidence of this issue is apparent in the calculation of buses per 100 students, which is a measure of how well buses (assets) are being used over the course of a service day. Fewer buses used to transport any single group of students will lower the total number of buses required, and reduce overall cost. The expectation for a system such as SISD is less than 2 buses per 100 students. SISD uses 2.23 buses to transport 100 students.

All of these results are explainable when analyzing how well the available seating capacity is being used on each individual bus run. That is, how many of the available seats are being filled. Costs on a per-student basis will go down as more seats are filled even as the cost to operate the bus remains about the same. Overall average capacity utilization across all bus runs is extremely low at 37 percent, relative to a guideline of 60 to 70 percent of rated (manufacturer) capacity of three students per seat. **Figure 5** shows an analysis of SISD's average asset and capacity utilization.

FIGURE 5
AVERAGE ASSET AND CAPACITY UTILIZATION, SCHOOL YEAR 2007–08

OCTOBER COUNTS, MORNING ONLY	
Buses per 100 Students	2.23
Capacity Utilization, Junior High and High Schools	40%
Capacity Utilization, Elementary and Intermediate Schools	34%
Capacity Utilization, Overall	37%

SOURCES: SISD Transportation Department; Management Partnership Services, Inc. analysis, 2008.

In summary, it is these low levels of capacity utilization that are driving all other results and are dampening the cost-effectiveness of the system. Low capacity utilization allows

runs to be short (short ride times) but increases the number of buses required to transport the same number of students (high buses per 100 students), and raises cost per student even though the cost per bus is low. It is this issue that should become the focus of management attention.

RECOMMENDATIONS

- **Recommendation 1: Adjust driver recruitment efforts to support modified business processes and a reengineered route network.** This recommendation will vary depending on the decisions reached about other recommendations included in this report regarding changes to the routing system. For example, the need for recruitment and retention of drivers will vary considerably with the number of route buses in operation. Assuming no change in the number of bus routes, then a significant effort is required to recruit and retain drivers to operate an effective and efficient transportation system. For example, SISD should increase the use of area job fairs, local advertising, and web-based advertising. Should the number of route buses be reduced, then attrition processes are likely to keep driver ranks full for the foreseeable future without any special effort dedicated to driver recruitment.

- **Recommendation 2: Modify the transportation department's business processes to incorporate information technology and data analysis into the organizational culture.** There are two key components to this recommendation:
  - Acquire, implement, and integrate a robust routing software package into departmental operations. This technology tool is a critical element of modern student transportation operations. It provides the data backbone that will support all performance measurement, analytical, and improvement efforts of the administrative and management staff. It will also require an up-front commitment of financial resources and staff time to achieve successfully. Often a majority of software implementations fail primarily due to a lack of understanding and commitment to the work required on the front end. The district should be prepared for a $35,000 initial cost for software purchase and a six to nine month implementation process, with a large commitment of staff time and effort required to design new business processes to take advantage of the software capabilities and system coding and setup to ensure that the analytical value inherent in these systems is realized. The staff time is estimated to cost an additional one-time cost of $10,000. System maintenance and the license is estimated at $5,250 annually beginning the second year of implementation. The total fiscal impact of this recommendation is ($35,000 + $10,000) + ($5,250 X 4 years) = $66,000.
  - Design and implement a regular program of performance measurement, reporting, and analysis. An analytical culture will develop only as an outgrowth of measurement and reporting. In the tracking of key performance indicators over time, management will discern trends and target specific areas of the operation for analysis and improvement. The implementation of this part of the recommendation must proceed in parallel with the implementation of routing software. The cost and resources required for implementation of this recommendation will depend on the complexity and extent of the program, but in all cases should be limited to staff time required for design of the appropriate measures, data collection mechanisms, analysis, and reports.

  The opportunity to better use technology to understand and to conduct a redesign of the route system would be a significant undertaking that district administrators should consider. However, the magnitude of the opportunity that presents itself is equally significant. The opportunity exists to bring the SISD transportation operation at least in line with industry average costs and, given the relatively low input costs as evidenced by the annual cost per bus, to potentially lower these figures to levels below current industry and national averages.

- **Recommendation 3: Consider redesigning the bus routes to increase capacity utilization by at least 10 percent on each bus run with the goal of reducing transportation costs.** If the district purchases and implements routing software into the operations of the department, staff should also undertake a comprehensive analysis of routes with the sole objective of improving overall levels of capacity utilization and a goal of achieving levels close to the industry average of 60 percent to 70 percent. In order to achieve greater

capacity utilization, it is inevitable that runs may be consolidated. It would also be necessary to consider changes to the current bell schedule to facilitate the development of longer bus runs. This may not prove feasible. Therefore, it is equally critical that SISD establish planning parameters that set maximum allowable student ride times, and establish to what degree bell times might be changed by policy prior to the route redesign project. These parameters should reflect reasonable levels of service delivery but will need to be significantly higher than the ride times that currently exist in the district.

Increasing average capacity utilization on each bus run by 10 percent (to approximately 47 percent overall) would result in approximately seven additional students on each run. In the two-tier system this translates to 14 additional students transported by each bus. This in turn would facilitate a reduction in the size of the fleet by as many as 7 to 10 buses. At approximately $28,611 per bus, the low end of this range, seven buses, would yield an annual recurring savings in excess of $200,000.

FLEET MANAGEMENT

ORGANIZATION AND STAFFING

The department is responsible for the preventive and reactive maintenance on 40 regular education buses; 11 special education buses; and 37 maintenance, grounds, and warehouse vehicles. The department is managed by a full-time supervisor/mechanic who is responsible for the oversight of the district's three full-time mechanics. Approximately 50 percent of the supervisor's time is dedicated to fleet maintenance with the remainder focused on administration, employee oversight, and parts management. In addition to fleet maintenance, the department's mechanics serve as substitute drivers in the event of regular driver and substitute shortages.

The fleet maintenance department is well-managed and provides excellent services to the transportation operations division, to the facilities department, and other users of vehicles and equipment throughout the district. However, this assessment is largely based on observations and interviews with maintenance department staff, as the primary means of record keeping is via manual (paper-based) files which could not be readily analyzed as part of this review. Based on the quantifiable cost and staffing data that were made available, the department is operating within expected cost ranges overall, although parts and supplies costs are higher than expected. Staffing levels are appropriate given the age of the fleet and other duties assigned to mechanical and supervisory staff.

WORK DISTRIBUTION AND SHOP OPERATIONS

Work is distributed to the shop employees based on repairs noted on pre-trip inspection forms, preventive and annual maintenance inspection forms, and work request forms. The lead mechanic is assigned all levels of bus repairs, provides assistance to the other mechanics, and assists the supervisor with the ordering of parts and supplies. The other two mechanics provide assistance as needed and are each assigned specific maintenance and repair tasks on the fleet. One mechanic is assigned the primary responsibility for preventive maintenance (PM) including oil and filter changes, chassis lubrication, tire replacements, brake inspections, and pad and drum replacements. The other mechanic is assigned the primary responsibility for maintaining the air conditioning units, fuel monitoring, and window replacements. The supervisor/mechanic provides direct assistance, training, and completes repairs as needed. The shop is staffed from 5:15 AM to when the last bus returns to the yard in order to respond to start-up issues and on-road failures. This distribution of work and staffing schedule is appropriate, effective, and meets the needs of the district's transportation operations.

The supervisor and the lead mechanic both hold Automotive Service Excellence (ASE) certifications. The supervisor's certifications include diesel engines and air brakes. The lead mechanic holds certifications in brakes, air conditioning, electrical, and diagnostics. One shop mechanic is certified in air conditioning with the other mechanic in the process of obtaining certification. Training is provided as a combination of vendor-sponsored sessions and home study through computer-based programs funded by the district. Additional training has included coolant recovery, evaporative emissions, and diagnostics. This focus on certifications and support for skills-based training is an excellent practice for the district and will support the delivery of cost-effective and high-quality fleet services.

One major shortcoming in fleet management operations is that all work requests and work orders are manually documented. The drivers use a pre-trip form to check for leaks, inoperable lights, mirror damage, missing safety equipment, and the functions of the horn, wipers, seats, engine gauges, etc. Post-trip inspections include bus cleaning. A form is provided for the drivers to note any repairs or service issues requiring a shop work order. The forms must be signed and returned to the shop before the end of the day. This form serves as the tracking mechanism for all work requests and records of work performed on the unit. This approach prevents easy analysis of repair trends, mechanic productivity, and other key performance management data. A paper-based system runs counter to the modern, quantitative approach to fleet management that is now prevalent in most fleets of this size around the country.

A process for entering fleet maintenance data into a *Microsoft Excel™* database was developed but has not been fully implemented. To its credit, the department recognizes the limitations this imposes and is in the process of implementing a commercial fleet maintenance software program called *In-Service Information System (ISIS)*. The implementation of the

ISIS fleet maintenance software will enable the department to move to the next level of performance by providing managers with the ability to track employee time, bus repair cost trends, and other major areas of interest such as air conditioning maintenance requirements and the impact of an aging fleet.

The PM program requires a 3,000 mile or 200 service hour inspection and service. This service includes oil and filter change, lubrication, a visual brake inspection, and an overall inspection of the bus. In addition to the basic scheduled PM inspection, all buses receive a major inspection twice per year. The summer inspection is conducted as a pre-check prior to the mandated annual state inspection. All work is documented on the preventive maintenance checklist. All completed work is entered onto the form used by the mechanics showing what work was completed, the number of hours per repair or service, and parts or supplies required. Overall, this program is adequate to meet the needs of the department.

MAINTENANCE PERFORMANCE ASSESSMENT

The key measures of cost-effectiveness for a fleet maintenance and repair operation include total cost per Vehicle Equivalent Unit (VEU), parts costs per VEU, mechanic staffing ratios, age of the fleet, spare bus ratios, and mechanic productivity. Of these items, only mechanic productivity could not be calculated as part of this analysis due to limitations on the availability of readily quantifiable data. The calculations for these measures of performance are summarized in **Figure 6**, and indicate that while total maintenance and repair (M&R) expenditures are within expected guidelines, parts and supply costs are high. Based on industry guidelines and practice, the total maintenance and repair costs are typically between $1,200 and $1,600 per VEU. The calculated result for SISD is $1,331, or close to the lower end of the range. The cost for parts is $530 per VEU, almost 18 percent higher than the upper end of this range of $430 to $450. However, given that overall costs are low, this amount does not present a major cause for concern at this time.

FIGURE 6
KEY MEASURES OF FLEET COST-EFFECTIVENESS

Maintenance and repair cost per VEU	$1,331
Parts Issues per VEU	$530
Fleet mechanic per VEU	95 to 108
Spare vehicle ratio	16%
Average vehicle age	10 years

NOTE: VEU =Vehicle Equivalent Unit.
SOURCES: SISD Transportation Department; Management Partnership Services, Inc. analysis, 2008.

A key measure used to assess the adequacy of maintenance staffing is the ratio of mechanics to VEUs. Industry practice indicates that a ratio of 1.0 full-time-equivalent (FTE) mechanic per 100–125 VEUs is a reasonable standard. SISD has a combined bus and maintenance fleet of approximately 243.50 VEUs. In calculating mechanic capacity, it was considered that the shop supervisor performs mechanical work for an average of 50 percent of his work day, or the equivalent of 0.5 FTE of additional mechanical capacity. This factor is offset, however, by the equivalent of 0.5 FTE lost to the use of mechanic labor as substitute bus drivers. This results in the availability of 3.0 FTE for mechanical duties (2.5 mechanics and 0.5 supervisor). A final adjustment required before calculating the mechanic to VEU ratio is to recognize that not all paid time for these positions is available for productive mechanical labor. A certain percentage of time is lost to administrative duties, meetings, in-service training, and other activities such as the sourcing and acquisition of spare parts. While a detailed allocation of time was not conducted as part of this analysis and actual mechanic productivity could not be calculated with the available data, industry practice indicates that a reasonable range for available productive time is 75 percent to 85 percent, given the range of duties assigned to the SISD mechanic staff. Accounting for these factors results in a range of 96 to 108 VEUs per FTE mechanic. Given the high number of air conditioned buses within the fleet, which require a heavier than normal maintenance load, the current staffing appears appropriate to the size and needs of the fleet.

The number of spare vehicles is approximately 16 percent compared to an industry standard of 10 percent to 15 percent. Given the service area and the age of the fleet, the ratio of spares to active route buses is acceptable and does not present any cause for concern.

MAINTENANCE FACILITIES

The maintenance facility is a full service shop with three work bays, including one bay with a lift, one bay with a pit, and a wash bay. The district is responsible for providing all tools and equipment. Security is accomplished by locked storage cabinets and tool racks. Interviews with staff indicate that tools are replaced as needed, and new tools are purchased without question and in a timely manner to reduce employee downtime. The supervisor's office is located within the parts room. Parts are neatly organized with each part assigned a unique number. Inventory is managed on a visual basis without the aid of software. Overall, the maintenance facility

is appropriately sized and equipped for the needs of the operation.

FUEL MANAGEMENT

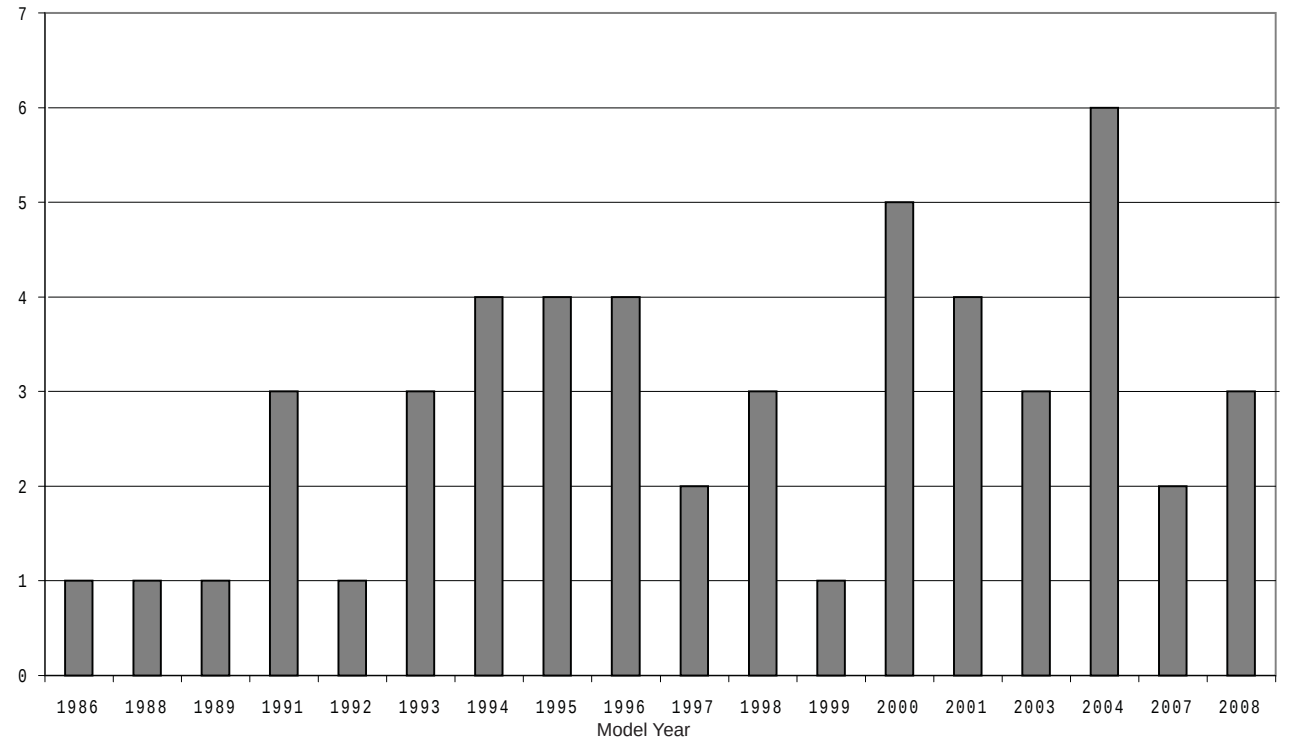
The district contracts with a local vendor to provide above ground tanks supplying both diesel (6,000 gallons) and gasoline (4,000 gallons). Specifications include bi-weekly tank replenishment, provision of the tanks and related infrastructure, and environmental indemnification. Bus drivers and other district employees log usage by their vehicle number and mileage. Although the manual tracking of fuel does provide a level of accountability to each driver, the resulting fuel usage log has little additional value without re-entering the information into a database enabling the analysis of fuel usage by vehicle. This analysis can be useful in tracking fuel consumption which many times will aid in the prediction of a mechanical failure or indicate the need for service. The tracking of mileage helps to ensure that each vehicle is identified for service at its regularly scheduled mileage interval for preventive services. The automation of the fueling system should be considered to support these important service elements and reduce the amount of manual monitoring by district staff.

The district is not currently using alternative fuels but has recently attended seminars presented by Region 20 Educational Service Center to learn the possible benefits of alternative fuels and engines. Information learned from this seminar may influence the specifications for future bus purchases pending the analysis of the overall cost benefit of alternative fuels and new engine technologies. The district has not made any dramatic changes in its operations as a result of the recent fluctuations in fuel prices, but administrators are clearly aware that changes may be required if costs increase.

FLEET REPLACEMENT PLANNING

The district has not established a formal fleet replacement policy. The average age of the district's bus fleet is 10 years; 53 percent of the buses are over 10 years of age, and almost 20 percent are over 15 years. As discussed earlier, these factors are contributing to increased expenditures for parts and supplies. The district is currently contemplating the purchase of five new buses. Based on demographic projections of new housing areas, the district has determined that 77 passenger buses will best serve these areas where 300 new homes are expected to be constructed. **Figure 7** shows the total number of buses purchased by model year.

FIGURE 7
TOTAL NUMBER OF BUSES PURCHASED PER YEAR



SOURCES: SISD Transportation Department; Management Partnership Services, Inc. analysis, 2008.

While on average, the district has purchased over two buses per year, **Figure 7** helps to illustrate the potential impact on future maintenance and capital costs of purchasing without a clear replacement plan. **Figure 7** also shows that the number of buses purchased varies from one bus per year to six buses per year. Assuming an active fleet size of 44 buses, the district would need to buy 4 or 5 buses every other year (4.4 per year) to maintain a fleet of 10 years of age or less. With the current variance in bus purchases, replacement funding cannot be fully anticipated and would vary year by year. The development of a purchasing policy that supports and funds a regular replacement policy would help to smooth bus purchasing, aiding in budget development, and the controlling of recurring maintenance costs.

An additional factor to consider for budgeting purposes is the possibility of seat belts becoming a mandated requirement by the state. Currently only special needs buses are equipped with seat belts. No funding presently exists for the procurement and installation of seats belts on older buses. The district expects that it will monitor the requirements and status of funding for the seat belt mandate and will incorporate implementation requirements once funding is made available.

RECOMMENDATION

Recommendation 4: Formalize a bus fleet replacement and funding plan. As approximately 53 percent of SISD's buses are older than 10 years, it is imperative that a purchasing plan be developed to manage the impact on capital funds and also to control recurring maintenance costs. In the absence of a formal replacement program, repair costs can be expected to be unpredictable and above guidelines.

The recommendation is to develop a formalized, documented approach to fleet replacement planning. There is no specific cost implication associated with the development of such a plan, and it is not until the plan is developed that the capital cost implications for future years can be adequately considered and understood. Indeed, it is the analysis itself that will provide the information and data required to assess and make sound business case judgments as to how to address this concern.

The process for developing a fleet replacement plan begins with establishing replacement criteria. The criteria can include any combination of age, accumulated mileage, or vehicle maintenance expenses among other options. Once specific criteria are established, each bus in the fleet must be compared to the criteria to establish a projected replacement date. Following the determination of a replacement date, the projected cost of the asset can be determined based on current cost plus some inflation factor and expected equipment requirements. **Figure 8** is an example using a three-bus fleet and age as the replacement criteria. In addition, provisions are made for expected cost increases due to changes in engine requirements.

FIGURE 8
EXAMPLE OF A BUS REPLACEMENT PLAN

UNIT ID	CURRENT AGE	REPLACEMENT CRITERIA	EXPECTED REPLACEMENT YEAR	CURRENT COST	INFLATION FACTOR	EQUIPMENT REQUIREMENTS	PROJECTED COSTS
Bus 1	9	10 years	2010	$75,000	–	$0	$75,000
Bus 2	8	10 years	2011	$75,000	5%	$5,000	$83,750
Bus 3	7	10 years	2012	$75,000	5%	$5,000	$87,688

SOURCE: Management Partnership Services, Inc. analysis, 2008.

FISCAL IMPACT

RECOMMENDATIONS	2009–10	2010–11	2011–12	2012–13	2013–14	5–YEAR (COSTS) OR SAVINGS	ONE TIME (COSTS) OR SAVINGS
1. Adjust driver recruitment efforts to support modified business processes and a reengineered route network.	$0	$0	$0	$0	$0	$0	$0
2. Modify the transportation department's business processes to incorporate information technology and data analysis into the organizational culture.	$0	($5,250)	($5,250)	($5,250)	($5,250)	($21,000)	($45,000)
3. Consider redesigning the bus routes to increase capacity utilization by at least 10 percent on each bus run with the goal of reducing transportation costs.	$0	$200,000	$200,000	$200,000	$200,000	$800,000	$0
4. Formalize a bus fleet replacement and funding plan.	$0	$0	$0	$0	$0	$0	$0
TOTAL	**$0**	**$194,750**	**$194,750**	**$194,750**	**$194,750**	**$779,000**	**($45,000)**