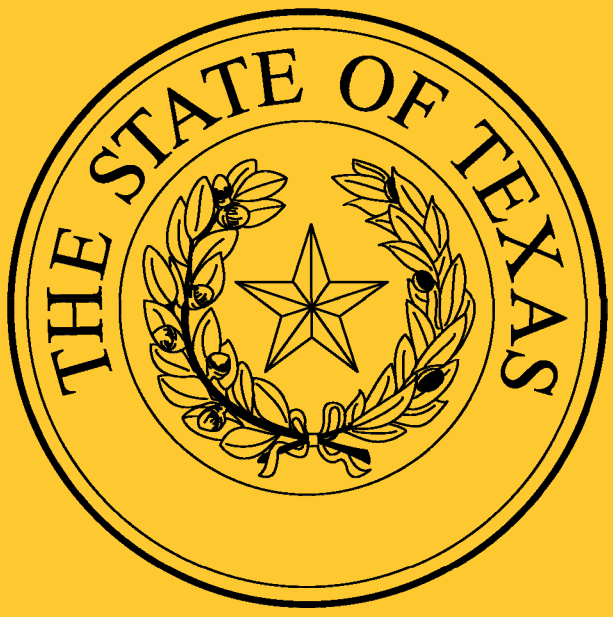

Hallettsville Independent School District

TRANSPORTATION REVIEW

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

FEBRUARY 2009

LEGISLATIVE BUDGET BOARD

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February 27,2009

Dr. Jo Ann Bludau
Superintendent
Hallettsville Independent School District

Dear Dr. Bludau:

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

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

Rev. Herb Beyer
Michael DeLaRosa
David Ehler
Dean Madden
John Martisek
Todd Schindler
Mark Schneider

EXECUTIVE SUMMARY

OVERALL ASSESSMENT

The Transportation Department of the Hallettsville Independent School District (HISD) is a small but reasonably cost-effective operation. Transportation service is provided to approximately 450, or 47 percent of the 950 enrolled students in the district, at an annual cost of approximately $393,500, or $867 per transported student. While this cost is about 15 percent above national averages, it is not unreasonable given the district's rural and low student-density service characteristics. The district also provides transportation services for high school students residing in neighboring districts with only kindergarten through 8th grade programs.

There are, however, concerns regarding service quality and safety. The structural impediments of geography coupled with the small size of the operation impact service quality, which is most apparent in long student ride times. Visual inspection of buses and facilities together with a sub-par maintenance program raise safety concerns. Service is provided using 12 active routes, and the small size of this operation generally precludes investment in many of the tools and techniques typically found in larger transportation organizations. While safety concerns must be addressed, other improvements to the operation are likely to require additional funding unless a new approach to service delivery, including possible transportation services cooperation with surrounding school districts, can be formulated.

The department is managed and run by a single full-time-equivalent (FTE) supervisor/mechanic position who oversees the delivery of daily services on a single time-tier system. While adequate for the needs of this small system, the current approach to staffing and service delivery does not provide for a high level of cost effectiveness or service quality.

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

ACCOMPLISHMENT

- **HISD does a creditable job keeping the cost of service reasonable, given the service constraints imposed by the geography of the district and the locations and bell times of the schools.** HISD is faced with a rural service area with travel distances for students enrolled at a limited number of school buildings, which are all centrally located in the core of Hallettsville. As a result, a single school bell time with bus routes that pick up all kindergarten through 12th grade students on a single bus run is the only feasible route structure. Given these constraints, HISD achieves a decent level of capacity utilization and is restricted in its ability to reuse the bus for a second or third bus run.

MAJOR FINDINGS

- **HISD lacks the personnel typically found in a large transportation operation, yet the task and responsibilities of the additional positions are performed by one person.** This method of operation has resulted in a nonsystematic approach to day-to-day operations, which increases safety concerns. While the additional positions may not be financially justified to support a 12-bus fleet, the tasks and responsibilities they would perform are still important and relevant. Nevertheless, a larger supervisory or administrative staff cannot be justified for an operation of the size of HISD, which points to a fundamental issue facing small school district transportation operations nationwide.

- **The district lacks policies and operational protocols that clearly establish an acceptable level of guidance for transportation services.** Clear and concise operational policies and procedures are necessary to ensure that service is delivered in a safe, equitable, and consistent manner across the service area.

- **HISD's bus maintenance processes are informal and undocumented.** Current systems provide insufficient documentation for audit or analytical purposes and are not robust enough to support a safe and reliable fleet.

MAJOR RECOMMENDATIONS

- **Conduct a study to explore the feasibility of establishing a regional student transportation service organization.** The primary benefit to be derived through cooperation is to establish a larger operation and to share the infrastructure and staffing costs that would facilitate a more professional approach to service delivery throughout the region.
- **Develop and document a new set of clear and concise transportation policies and supporting procedures to define the manner and extent of transportation services.** The district lacks policies that clearly establish what level of service is to be expected and supporting procedures that determine how services will be delivered.
- **Conduct a comprehensive safety evaluation of the fleet, maintenance facility, and fueling site.** The maintenance building and in particular, the bus fleet and fueling station, should be evaluated in conjunction with the recommendation regarding shared service with surrounding communities to mitigate employee and environmental risks and to address safety concerns in the delivery of services.

TRANSPORTATION OPERATIONS

ORGANIZATION AND STAFFING

Located between San Antonio and Houston, the Hallettsville Independent School District (HISD) serves pre-kindergarten through 12th grade. HISD also provides high school programs to Ezzell, Sweet Home, and Vysehrad Independent School Districts, which are geographically adjacent kindergarten through 8th grade school districts. School facilities include a consolidated high school/middle school campus and a single elementary school. All of the school buildings are located within the city limits of Hallettsville. The bus compound is located on the edge of the central campus and provides space for bus parking, fueling, and minor maintenance.

The transportation department is supervised by a full-time supervisor/mechanic who oversees the provision of transportation services to approximately 450 students (of approximately 950 enrolled) on 11 regular education and one special needs route. The special needs route serves students attending a program in Cuero ISD. The supervisor of transportation/fleet maintenance reports directly to the Superintendent. Additional support is received from the district's central administrative office for clerical, personnel, payroll, and accounts payable services. The only other employees assigned to the department are bus drivers.

The department provides transportation services at a reasonable cost and an acceptable level of service quality, especially given the long distances that must be traveled by the bus fleet each day. The primary challenge facing the district is the same one faced by transportation programs in all small school districts: its small size precludes investment in the techniques and tools that now pervade modern, safe, effective, and efficient student transportation operations. Informal processes coupled with experience have thus far compensated for the absence of structure and have served the district well. Pending challenges in the area of fuel costs coupled with the need to address safety concerns demand that an alternative approach to the provision of transportation services be considered.

ADMINISTRATIVE STAFFING AND WORK DISTRIBUTION

Since HISD's transportation department is small, personnel typically found in larger operations are absent, yet the task and responsibilities found in these districts are performed by one staff in HISD. Examples of typical support positions and tasking would include: dispatch and bus operations oversight staff; route development and software specialists; office support staff; and fleet maintenance technicians. While the positions noted are unnecessary to support a 12 bus fleet, the tasks and responsibilities they would perform are still important and relevant. The responsibilities of the supervisor, therefore, must cover all aspects of transportation. The occupant of this position reports that approximately 25 percent of his time is devoted to the ongoing supervision of transportation services and 75 percent to management of the bus fleet and other motorized equipment owned by the district. Typical duties include: route planning, driver assignments, field trip scheduling and assignments, and responding to bus failures or other service interruptions. The supervisor is not a formally trained or certified mechanic, yet his assigned responsibilities also include minor maintenance on the buses such as bulb and switch replacement, oil and filter changes, seat repairs, and tire changes. The supervisor is also licensed to drive a bus and provides substitute bus driving services as needed.

The supervisor's daily tasks are performed largely in the absence of documented operating procedures and are largely reactive to the demands of the day. Rather than having a formal bus dispatch log or driver check-in procedure, for example, the supervisor will intervene or take action only when a problem on the road is brought to his attention. Similarly, there is no effort to systematically track, report, or capture important transportation data, such as documentation that confirms the completion of required daily pre- and post-trip inspections on buses. The small size of the fleet and its associated service requirement allows for this informal approach to the management and oversight of the operation to be perpetuated. A potential liability emerges, however, in the absence of documentation and established protocols for managing this inherently difficult and risk-prone function.

Nevertheless, a larger supervisory or administrative staff cannot be justified for an operation of this size, which points to a fundamental issue facing small school districts nationwide. Certain economies of scale are prevalent in the management of student transportation operations that cannot be captured in very small systems such as HISD. Specialized skills and tasking are required in areas such as

employee supervision, fleet management and maintenance, and routing and scheduling in order to gain maximum efficiency, safety, and cost-effectiveness. With only 12 daily bus routes, HISD would not reap benefits in proportion to the investment required in these specialized positions and will always find it difficult to justify investment in the technology, tools, or the formal business processes prevalent in more progressive and larger student transportation organizations.

Driver staffing is more than adequate for the district's needs. There are 20 drivers on staff to cover the 12 daily routes. By choice, some of the drivers have elected to drive only a morning or afternoon route. The additional drivers on staff therefore benefit the department by increasing the number of trained and licensed drivers available to cover absences. Driver responsibilities also include fueling and a pre-trip inspection of the bus. Field trips are scheduled by the supervisor and assigned to drivers on a seniority basis. All sports and activity trips are handled by teachers and coaches (with appropriate licenses) and are assigned buses either from the spare pool or the regular fleet, as appropriate. Driver training is provided by the Regional Education Service Center III (Region 3), and meets all state requirements. Current drivers receive the required eight hours of in-service training every three years. Training is mandatory with drivers required to sign an attendance form to provide documentation of completion.

The district's central administrative office provides support for tasks such as budget development and monitoring, payroll and accounts payable, state and financial reporting, driver recruitment, and driver background checks. These processes are readily handled as an adjunct duty for the central office staff, and this is an appropriate allocation of resources for this operation. Further specialization is hampered, once again, by the small size of the operation.

POLICIES AND PROCEDURES

The district uses the online policy system maintained by Texas Association of School Boards (TASB) to publish their board-approved policies. While day-to-day operational processes are informal and poorly documented, certain documented policies have been adopted by the Board of Trustees and provide for the overall guidance of many departmental activities. These include elements such as:

- definitions for transportation;
- discussion of bus stop locations;
- standard safety precautions to be followed;
- definition of employee responsibilities;
- field trips procedures;
- homeless student transportation requirements;
- special needs transportation;
- student behavior management; and
- the management of transportation fleet assets.

While the policies broadly address some of the key factors necessary for successful student transportation, the majority of the policies do not provide specific guidance or service parameters for day-to-day operations. Examples of such criteria include:

- transportation eligibility criteria;
- allowable walk to stop and school distances;
- clear hazard definitions;
- allowable student ride times; and
- policies regarding courtesy transportation.

Also lacking are operational procedure statements that, in support or the absence of policy, provide guidance to the department and users of the system. An example of a current policy statement that lacks specific language or supporting procedures is the policy statement on stop locations. As written, this policy states that "all students who use district transportation shall board buses at authorized stops. Authorized bus stops shall be designated annually by the superintendent or designee. Bus drivers shall load and unload passengers only at authorized stops." The policy is not specific as to the criteria for an "authorized stop." Commonly included in such a policy or supporting regulation is the distance a student is permitted to walk to the stop, what types of locations are suitable for stops (e.g., street corners), whether only right-side stops are allowed, and under what conditions stops will be authorized at student residences (house stops). The lack of detailed documentation does not provide for the specific considerations required for the hazardous mile provisions of TEA administrative requirements.

The current policies do not address these operational parameters in this way, and current operational protocols do not provide an acceptable substitute. Clear and concise operational policies and procedures are necessary to ensure

that service is delivered in a safe, equitable, and consistent manner across the service area. In the absence of clear policies and procedures, departmental decisions may be made that are counter to safety guidelines or requirements or that negatively impact departmental efficiency and levels of service.

BUS ROUTING AND SCHEDULING

SERVICE DESCRIPTION

Transportation services are provided to approximately 450 students attending programs at two school locations on a single-tier bell system. Nearly 50 percent of all enrolled students are eligible for transportation service. Eleven regular education bus routes provide this service to three schools. Hallettsville Junior and Senior High Schools are co-located on the same site, and Hallettsville Elementary is located approximately one mile from the other schools. Bell times for all three schools are the same and run from 7:30 AM to 3:15 PM. All students in kindergarten through 12th grade are transported on single-tier routes, with each route serving a combination of schools and grade levels. Of particular note is that HISD buses provide service originating in neighboring kindergarten through 8th grade districts for those students attending Hallettsville High School.

ROUTING PROCESSES

No routing software is in place at the district, and the current route network was developed manually. There is no discernible annual planning cycle for routing; rather there is simply an update process of the previous year's routes. It is reported that changes to the route structure result primarily from capacity and directional changes required to account for new or graduating students. Annual route planning is limited to these additions or deletions and does not include any comprehensive or strategic perspective on the entire route network. As new students are enrolled, the department is provided with the address directly by the admitting office of each school. Drivers are provided a simple route list which includes addressing for all eligible students on their route and basic left/right directions. Additional information is gathered and tabulated for state reporting (AM/PM counts in October and November, plus mileage), but this process is disconnected from the route sheets and not used for day-to-day operations or analysis. No maps are provided or available to visualize routes.

While it is difficult to justify the investment in such tools and techniques for a small school district, the major shortcoming with this approach is in the lack of readily available data and analytical tools for proactive planning. This approach causes a systemic reluctance to change (or challenge) the status quo as any major route reengineering effort must encompass a large investment of time and attention to develop the data necessary to properly evaluate alternatives. This issue tends to perpetuate the existing route structure, with changes only as required to adapt an existing route or set of routes to changing circumstances. The lack of ongoing performance measurement and monitoring coupled with the inherent difficulty of analyzing potential changes results in a less effective route network than is otherwise possible. This problem is particularly true as the manual approach tends to constrain thinking to local district concerns, even though opportunities may exist for a more expansive approach to transportation in the geographic region.

SYSTEM PERFORMANCE ASSESSMENT

The goal of any transportation system should be to provide high-quality services at the lowest possible cost. There are two sometimes conflicting goals that should be pursued in the accomplishment of these objectives: fill each bus as closely as possible to capacity; and reuse that bus as many times as possible over the course of the day. These goals conflict in that to fill a bus, the length of the run must be extended; and by extending the run, the time available to reuse the bus is reduced. It is also true that service constraints and geography can work against both of these goals. A key constraint is school bell times and how well they support (or detract from) these efficiency goals. Another key constraint that is only partially controllable by transportation or district administrators is the relative density of students and their location relative to their schools of attendance. It is data that provides the basis for informed decisions to design the best balance between the cost and quality of the service to be provided and to analyze the impact of geographic and programmatic constraints on the transportation system.

The route information and related data maintained by HISD provides only minimal analytical value, which greatly limits the potential for quantitative analysis of system performance both for the purposes of this review and for ongoing management of the system. In the absence of these data, this analysis was limited to the calculation of a few basic measures of cost performance. Measures of service quality could not be calculated, and an understanding of system-wide performance is therefore restricted.

The measures that were calculated, however, when coupled with a qualitative understanding of system performance provided through on-site observation and interviews with district staff, reveal a system that is marginally cost-effective but with highly suspect levels of safety and overall service quality. The overall annual cost per student, while above national averages, is reasonable given the low levels of student density and dispersed geography of the school district. While not quantified, student ride times appear to be long. Average capacity utilization on the buses is below national averages but reasonable, given the service characteristics of the school district. Visual inspection of buses coupled with concerns regarding maintenance processes and overall transportation operations leads to a concern regarding the safety of the operation. While fortunate in the absence of serious accidents in recent years, this is a major potential liability for the district that must be addressed in the near-term.

SERVICE QUALITY

The absence of data prevents a quantitative analysis of service performance measures. Examples of service quality metrics that would otherwise be calculated and tracked include the following:

- *Student ride times*—a key measure of service quality that defines how long students must ride the bus to arrive at and be delivered home from school. This measure can be defined by policy and is constrained by the student's distance from school. This measure provides a gauge to determine how well the department complies with policy and maximizes service quality within the constraints imposed on the system.
- *Timeliness of bus arrivals relative to schedule*—a measure of accuracy and effectiveness for the system of bus routes is how close buses arrive and depart schools relative to scheduled times. This measurement requires data collection and record keeping via logs or automated means, such as global positioning system (GPS) technology.
- *Accident rates*—a measure of tracking accident trends per million miles driven or some other baseline that provides a useful measure of overall system safety. While excellent records are maintained by HISD for each chargeable and non-chargeable accident, the data necessary to record and track this measure of performance is not currently captured.
- *Complaint rates and complaint resolution*—a measure of the rate at which complaints are received and resolved, tracked by type of complaint, provides a useful operational measure of service quality. Even the best transportation operations receive complaints and/or requests from users; however, how the complaints are handled is a key performance measure. Such data is not currently captured or tracked by the department.

It is a statement on the relative availability of data to assess and manage the HISD transportation operation that these statistics are not currently available and could not be developed within the scope of the review. However, it is equally important to gauge service quality on a more qualitative scale. The observation of loading zone and dispatch operations during the on-site portion of this assessment, including interviews with building administrators, indicate a general level of satisfaction with the service received from transportation services. This observation must be tempered, however, by the concerns regarding the overall safety of the operation.

One element of service delivery is particularly relevant to the recommendations for the future of transportation services in the district. Currently, transportation service is provided to students residing outside district boundaries who attend Hallettsville High School. Certain buses begin their morning runs in these outlying communities before returning to the district boundaries to pick up the rest of their students. This procedure has the effect of lengthening these runs and lowering overall service quality. Opportunities may nevertheless exist to leverage this out-of-district service in the development of a more expansive approach to transportation service delivery.

COST-EFFECTIVENESS

HISD keeps the cost of service reasonable given the service constraints imposed by the geography of the district and the locations and bell times of the schools. HISD has a rural service area with travel distances for students enrolled at a limited number of school buildings, which are all centrally located in the core of Hallettsville. As a result, a single school bell time with bus routes that collect all kindergarten through 12th grade students on a single bus run is the only feasible route structure. Given these constraints, HISD achieves a decent level of capacity utilization (fill the bus) and is restricted in its ability to reuse the bus for a second or third bus run.

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 pricing of contracted transportation services. A subset of cost metrics that help to explain overall costs include the number of buses required to transport 100 students and the percentage of available bus seats being filled on each bus run. All of the inputs that define the service characteristics of a transportation system reveal themselves in the cost performance metrics, which are summarized in **Figure 1**.

FIGURE 1
KEY MEASURES OF COST-EFFECTIVENESS

Annual Cost per Student	$867
Annual Cost per Bus	$32,798
Daily Cost per Bus	$182
Buses per 100 Students Transported	2.64
Maintenance and Repair per VEU*	$1,284
Parts per VEU	$405

*Vehicle Equivalent Unit provides a standard comparison basis for dissimilar vehicle types by converting resource requirements to the equivalent of one standard sedan, discussed in detail in the fleet management section of this report.
SOURCES: HISD Transportation Department; Management Partnership Services, Inc. analysis, 2008.

As a measure of performance, the annual cost per student provides the single most relevant measure of operational efficiency. The overall annual cost per eligible student for HISD was calculated as $867 per student compared to current national averages of $685 to $735. The difference between the eligible transported population and the actual number of riders is not known and could drastically alter these results if there is a substantial difference. This result is based on the transportation of 454 students (the number reported by HISD) and calculated annual costs for transportation of $393,578. Given the system constraints and limitations discussed in this report, this produces a reasonable level of cost-effectiveness.

The overall annual cost per active route bus is approximately $32,798. This figure compares to current industry averages of $41,000 to $64,000. This low cost can be attributed to several factors, including minimal administrative salary costs. A major factor contributing to the difference in the district's annual cost compared to the guideline is the absence of health care coverage for drivers. This metric is useful to illustrate the potential for savings possible by an increase in routing efficiencies. The removal of even one route from the system would result in savings of approximately $32,800, or 8 percent of the total transportation budget.

Figure 2 summarizes the route data that was available for analysis and illustrates the number of eligible riders per bus,

FIGURE 2
ROUTE SUMMARY, SCHOOL YEAR 2007–08

ROUTE NUMBER	BUS CAPACITY	NUMBER OF ELIGIBLE RIDERS	ESTIMATED UTILIZATION BASED ON ELIGIBLE RIDERS	MILES PER ROUTE
9	64	30	47%	47.3
10	64	41	64%	59.7
17	64	56	88%	90.8
20	64	35	55%	60.7
29	64	40	63%	45.3
30	64	17	27%	63.7
31	64	25	39%	46.7
33	64	53	83%	65.6
35	64	27	42%	47.2
36	64	34	53%	51.8
37	64	39	61%	40.1
38	20	10	50%	117
Easy Transport	–	5	–	10.5
TOTAL	**724**	**412**	**57%**	**746**
NUMBER OF BUSES PER 100 STUDENTS TRANSPORTED				**2.91**

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

estimated capacity utilization on this basis, and the number of miles reported per route for school year 2007–08. These data were extracted from the reports submitted to the Texas Education Agency related to transportation services. **Figure 2** shows that each individual bus run is long from the perspective of mileage. Data was not available to calculate the length of these runs in time, but the knowledge of bus operations can be used to estimate this statistic. It would be unusual for these buses to operate at an average speed of more than 30 miles per hour on these runs. Thus, these bus runs appear to be as much as two hours in length. Even accounting for the probability that deadhead mileage (the amount of time a bus operates without students on board, either traveling to its first stop or from its last stop back to its parking location) is included, these are very long runs. This consideration, in turn, helps to explain why the district is able to achieve reasonable levels of bus capacity. More time allows more students to be picked up on the run.

The average capacity utilization, based on the rated capacity of the bus, is 57 percent. Industry guidelines are for rated capacity utilization ranging from 60 to 70 percent. This is a good result given the limitation on ride times imposed by the district's geography. As a stand-alone system and with only 450 transported students, it is doubtful that a much better result is possible. However, returning to the existence of neighboring districts and the resulting cross-district transportation requirement as a possible avenue for cooperation and sharing would improve the efficiency of the route structure.

The number of buses required per 100 students is currently 2.91. While industry guidelines are significantly lower than this number, indicative of a much higher average number of daily runs per bus, this result is as expected. As a single-tier system, planning for Hallettsville must make the most efficient use of the assets on each individual run (maximize capacity utilization) to control costs. A multi-tiered system (typically seen in larger operations and in more densely populated areas) provides more of an opportunity to reuse the bus, thereby reducing the number of buses required to move the same amount of students.

RECOMMENDATIONS

- **Recommendation 1: Conduct a study to explore the feasibility of establishing a regional student transportation service organization.** Evaluating the regional sharing of transportation services may reveal opportunities for savings and/or service improvements but is simply not possible given the current size of the operation. A regional organization could support (on a cost-sharing basis) employees who specialize in operational and technical tasks. The nature and governance of the regional organization will be dependent on the results of the analysis. However, the use of an existing regional education service center or the establishment of an entirely new structure is possible. The specialization of employees promotes professionalism, innovation, and the potential for increased efficiency. The sharing of infrastructure including software, maintenance and bus storage facilities, and fueling stations reduces costly redundancies for each district to secure and operate these assets individually.

  HISD should coordinate with the neighboring districts and their regional education service center to explore the possibility of regional transportation services. If the district decides to move forward with conducting the feasibility study, it may require the use of external transportation consultants estimated at a one-time cost of $25,000.

- **Recommendation 2: Develop and document a new set of clear and concise transportation policies and supporting procedures to define the manner and extent of transportation services.** HISD should develop policies that clearly establish what level of service is to be expected and supporting procedures that determine how services will be delivered. At a minimum, these policies should include basic service and route planning parameters including eligibility, walk to stop distances, maximum expected ride times, and loading parameters.

  The district may be able to access its membership services through TASB to develop these policies. If not, the district will need to designate staff time to develop these polices and, due to the limited staff, may accumulate additional staff hours to complete. It is estimated that this task will require an additional 240 hours (6 weeks) to complete. If the transportation supervisor is tasked with this responsibility at about $20 per hour (staff salary) for 240 hours, this will cost the district about $4,800. This task does not have to be performed in six consecutive weeks, but these hours represent the cumulative time needed to complete. The district should complete these policies no later than the beginning of school year 2010–11.

FLEET MANAGEMENT

ORGANIZATION AND STAFFING

The HISD bus fleet consists of 12 active route buses and 5 spare units. In addition to the bus fleet, the department oversees minor maintenance on the district's general service vehicles. Approximately 75 percent of the supervisor's time is reported as dedicated to fleet maintenance. The majority of work performed in-house is minor in nature and consists of bulb and switch replacement, simple electrical repairs, tire rotation and flat repair, and oil and filter changes. All other fleet maintenance and repair work is performed under contract and off-site by a local vendor. The current maintenance staffing is adequate to the size of the fleet, given the magnitude and type of maintenance services currently being performed in-house. The small fleet size does not justify the employment of a full-time mechanic position, and a single-mechanic structure would not be a very efficient or effective approach to the provision of fleet maintenance services.

Annual training for the supervisor is the same as the drivers and consists of eight hours every three years. However, the supervisor is not currently certified as a mechanic, and the training he receives is not specific to the mechanical needs of the fleet. Thus, the current fleet management structure is a workable solution, but the district must remain committed to the retention of a qualified outside vendor to perform any but the most basic of mechanical service on its bus fleet.

All major maintenance and repair activities are performed at a local vendor's facility using vendor staff. These activities include: brake inspections/repairs; suspension and steering repairs; alignments; and major engine, transmission, and body work. This structure is appropriate given the small size of the fleet. However, the review team was unable to evaluate the service quality provided by this vendor due to data limitations. While a paper invoice is provided for each job, there is no systematic tracking of maintenance and repair activities on the fleet, presenting a host of potential liability, safety, and management concerns that must be addressed. Overall fleet maintenance costs, however, as recorded in the district's accounting systems, are within expected national ranges of about $1,200 to $1,600 per vehicle equivalent unit (VEU) as described later in this section.

WORK DISTRIBUTION AND SHOP OPERATIONS

Maintenance processes are informal and undocumented. Repair activities are generally initiated by a driver's verbal report to the supervisor of mechanical problems discovered during pre-trip inspections or on-road operations. There is no pre-trip inspection or work request form and no systematic tracking of maintenance and repair activities. The absence of documentation is a major concern from both an archival and performance measurement standpoint and a safety and liability perspective. The only exception is in the documentation of regular preventive maintenance (PM) oil changes on a manual ledger and a file of vendor repair invoices maintained for each bus. Neither of these systems provides sufficient documentation for audit or analytical purposes, and a wholesale redesign of work tracking processes is required.

PM procedures are minimal and consist mainly of oil and filter changes together with a chassis lubrication performed every 6,000 to 7,000 miles. All other PM inspections and repair work is outsourced. One item that serves as an example of concern is the absence of regular brake inspections on the fleet. It was reported during the on-site interviews that bus brake systems are only inspected on an annual basis during the mandated state bus inspection and not as a regular component of a multilevel PM program. The annual inspection itself is provided by the contract vendor for a minimal fee and raises major concerns regarding the validity of the inspection and, consequently, the overall maintenance program for the district's bus fleet.

MAINTENANCE PERFORMANCE ASSESSMENT

The key measures of cost-effectiveness for a fleet maintenance and repair operation include total cost per VEU, parts costs per VEU, mechanic staffing ratios, age of the fleet, spare bus ratios, and mechanic productivity. These figures are calculated as the maintenance and repair cost and cost of spare parts per 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.

The mechanic productivity could not be calculated as part of this analysis due to limitations on the availability of suitable

data. The results of the calculations for these measures of performance are summarized in **Figure 3** and indicate costs that are well within expected ranges. Based on industry guidelines and practice, the total maintenance and repair costs are expected to be between $1,200 and $1,600 per VEU. The calculated result for HISD is $1,284, at the low end of this range. The cost of spare parts is also within the expected range. In combination, this result illustrates a cost-effective maintenance system, but concerns remain regarding the quality of the services provided and the impact of the approach on the safety and reliability of the fleet.

FIGURE 3
KEY MEASURES OF FLEET COST-EFFECTIVENESS

Maintenance and Repair Cost per VEU	$1,284
Parts Issued per VEU	$405
Fleet Technicians per VEU	106
Spare Vehicle Ratio	42%
Average Vehicle Age	9 years

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

There was no quantifiable basis for this assessment, but a visual inspection of bus condition and industry practice leads the review team to conclude that safety and reliability problems may exist. Several conditions were observed and noted during the review including: general housekeeping problems, such as unsecured trash cans that impede a quick exit from the bus; seats in need of recovering; seats not latched securely to frames; missing covers in the drivers area resulting in exposed wiring; pooling of unknown fluids on the floor in the area of the pedals; and pinched exhaust pipes. These observations are compelling in combination with a clearly inadequate PM program and the absence of any significant documentation of maintenance activities.

MAINTENANCE FACILITIES

The shop is old and is best suited only for minor maintenance or storage. There is room for oil changes and other work on buses within the building, but it lacks the basic tooling and equipment generally found in newer facilities including: improved work space lighting, bus lifts, built-in waste fluid catchments and separators, fire suppression systems, and fuel tank monitoring and leak detection systems. Also lacking are radio communication capabilities to the bus fleet, fleet maintenance tracking software, and office and driver areas. Overall, the current facility is inadequate and presents significant liability and safety concerns.

FUEL MANAGEMENT

The district uses a 6,000-gallon diesel tank and a 3,000-gallon gas tank for bus and other fleet fueling. The tanks are above ground and are located within the bus parking compound. The current fueling system is manual, with no automatic tracking of fuel dispensed, usage, or mileage by vehicle. Drivers are responsible for fueling their bus on an as-needed basis. The supervisor fuels buses for activity and athletic trips. No manual or automated method of tracking is currently in use. Drivers are not required to log fuel usage (or mileage) as part of any fuel monitoring procedure. The only control over fuel use is having the pump locked out during all but scheduled work hours. These processes do not result in adequate control and management of fuel dispensing activities and related costs.

The tanks are owned and provided by a local vendor at no cost to the district. The contract has been in place for an extended period of time. While fuel bids have been sought from several providers in the past, it is reported that the rural location of the district limits the number of responses. This is a valid constraint, but the lack of available data precludes an in-depth examination of the impact of this situation on overall cost. The overall cost data reveals that approximately $72,000 was expended on fuel in school year 2006–07, which represents 18 percent of the overall transportation budget. Even allowing for the high-mileage rural geography prevalent in the district, this figure is significantly above the range of 10 percent 12 percent as typically seen in other districts. Of more concern is both the location and construction of the storage tanks. No leak containment devices or detection system was noted during a visual inspection. The tanks are located at the edge of the parking lot adjacent to a small stream and, in the event of leakage, there is a considerable environmental liability concern.

FLEET REPLACEMENT PLANNING

The district has not historically maintained a formal fleet replacement policy or program. The new administration, however, has made initial efforts to determine the condition of the fleet as the first step toward establishment of a regular replacement and funding schedule. Currently, there are 17 buses in the fleet with an average age of approximately nine years. While the average age is nine years, 47 percent of the buses are 10 years old with 3 older than 15 years. Twelve of the buses are active daily route buses with five buses used as spares and for activity and field trips. The percentage of spare buses to route buses is approximately 42 percent, which is significantly higher than a typical range of 15 percent to 25

percent of buses for small fleets. On average, the district has purchased one bus per year over the last 18 years; however, this practice has not been on a regular basis. As **Figure 4** illustrates, the number of buses purchased ranges from zero to three buses per year and shows the age distribution of the fleet by model year as of June 2008.

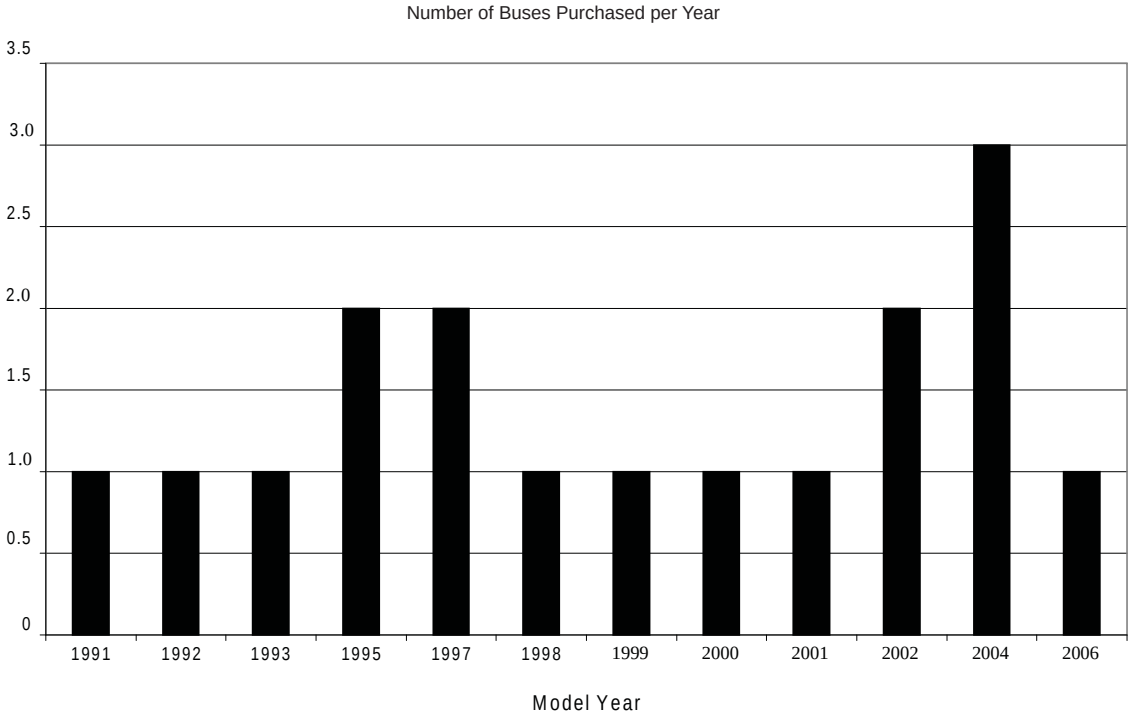
RECOMMENDATIONS

- **Recommendation 3: Develop and implement a comprehensive mechanical skills training program for the transportation supervisor.** The district should develop a safety and ongoing mechanical skills training program specifically for the transportation supervisor. This program should include in-service training on state required maintenance standards and schedules. Skills training should be provided through formal sessions or by local vendors and suppliers to ensure that maintenance meets original equipment manufacturer (OEM) standards and that work is performed in a safe manner. A transportation department the size of HISD's should build in about $5,000 annually to account for mechanical staff training.

- **Recommendation 4: Develop and monitor preventive and reactive maintenance schedules and standards to ensure that fleet maintenance supports the safe and fuel efficient operation of the bus fleet.** As the district is considering developing a formal fleet management plan, it is imperative that a system of fleet maintenance monitoring be implemented to enable the purchase decisions to be based on a combination of bus condition and current and historic per bus maintenance costs. The district should establish a preventive maintenance schedule with documented procedures and a multi-level set of inspections. A tiered approach to inspecting major safety components (brakes, lights, and other safety components) and general bus condition supports safe transportation, cost control, budget development, and overall risk management. Although current costs for fleet maintenance are within expenditure guidelines, it is impossible to judge whether all maintenance is performed to an established standard.

  The objective of the recommended PM program is to minimize equipment failure by monitoring the condition of the equipment and correcting defects before they result in bus failure, route delays, or

FIGURE 4
AGE DISTRIBUTION OF THE BUS FLEET, SCHOOL YEAR 2007–08



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

additional costs. An effective and well-designed PM program minimizes unscheduled repairs by identifying most maintenance and repair activities during scheduled inspections. An effective PM program pays dividends not only in improved equipment safety and reliability but also financially by extending the life of equipment, minimizing the high cost of breakdowns. A multi-level (three tiered) preventive maintenance program based on a progressively more comprehensive maintenance cycle provides the foundation for the program.

The recommended service cycles are as follows:

- "A" Level: Perform a basic check and lubrication every 2 months or 3,000 miles;
- "B" Level: Perform a basic check and lubrication plus an oil change every 4 months or 6,000 miles; and
- "C" Level: Annual (summer) complete unit service including "A" and "B" level services.

The preventive maintenance programs should incorporate detailed checklists that conform to the vehicle and engine OEM prescribed maintenance procedures and service cycles. These checklists should be integrated with generic maintenance procedures that are common to school bus operations; for example, lubrication of stop arm pivots, lubrication of service door mechanism, inspection of body mounting gussets, etc.

This process is consistent with the best standards used in the industry for preventive maintenance programs and has contributed to the very high level of mechanical reliability within fleets where it is implemented. An excellent beginning resource to develop a comprehensive PM program is available at: http://www.schoolbusfleet.com.

Since HISD has limited staff resources, it is assumed that the district will need to access outside sources to plan a PM program. The one-time cost for this service is estimated at $10,000.

- **Recommendation 5: Conduct a comprehensive safety evaluation of the fleet, maintenance facility, and fueling site.** The maintenance building and the fueling station in particular should be evaluated in conjunction with the overall recommendations in this report to mitigate both employee and environmental risks. In the absence of available funding for infrastructure improvements, collaborative services should be explored with surrounding school districts. The district has not specifically changed operational procedures as a result of the increased cost of fuel experienced in school year 2007–08. Interviews suggest that regular monitoring of fuel costs will assist in determining if changes to any operating practices are required.

  It is assumed that the district will have to access outside professionals to conduct the safety evaluation which will be a one-time cost of $5,000. The district may be able to access these services from one of the education associations in the state or from the transportation department in Region 3 which provides the district's bus driver training.

- **Recommendation 6: Develop a formal fleet replacement plan and funding program.** The current administration is taking a proactive step in recognizing the need for a regular fleet replacement and funding program. A formal fleet replacement plan should encompass specific policies regarding the planned replacement cycles for school buses, projections regarding the timing for replacement of each specific bus in the fleet, and should establish a formal funding mechanism to ensure that appropriate funding will be available to purchase replacement equipment in accordance with the plan.

  The recommendation is therefore to develop a formalized, documented approach to fleet replacement planning. The actual cost implications of the resulting replacement plan can only be determined after the plan is developed and formalized. Replacement planning should also consider the other recommendations in this report regarding the potential for developing a regional transportation services organization, with potential positive impacts on the quantity of replacement units required.

  The development of a regular replacement program would help in budget development and the control of recurring maintenance costs. An additional factor to be considered is the possibility of seat belts becoming a mandated requirement. Currently only special needs buses are equipped with seat belts. The district has not developed a formal impact summary of the cost of implementing the new seat belt requirements. It is

expected that if funding becomes available to implement the requirements, these costs will be incorporated into future projections.

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 5** 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.

Once projected replacement costs have been determined, it is possible to evaluate alternatives to cash financing of replacement purchases. These alternatives include leasing, establishment of a sinking or reserve fund, or some combination of these options. To initially develop this plan with outside professional assistance is estimated to be a one-time cost of $5,000.

FIGURE 5

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	14	15 years	2010	$75,000	–	$0	$75,000
Bus 2	13	15 years	2011	$75,000	5%	$5,000	$83,750
Bus 3	12	15 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. Conduct a study to explore the feasibility of establishing a regional student transportation service organization.	$0	$0	$0	$0	$0	$0	($25,000)
2. Develop and document a new set of clear and concise transportation policies and supporting procedures to define the manner and extent of transportation services.	$0	$0	$0	$0	$0	$0	($4,800)
3. Develop and implement a comprehensive mechanical skills training program for the transportation supervisor.	$0	($5,000)	($5,000)	($5,000)	($5,000)	($20,000)	$0
4. Develop and monitor preventive and reactive maintenance schedules and standards to ensure that fleet maintenance supports the safe and fuel-efficient operation of the bus fleet.	$0	$0	$0	$0	$0	$0	($10,000)
5. Conduct a comprehensive safety evaluation of the fleet, maintenance facility, and fueling site.	$0	$0	$0	$0	$0	$0	($5,000)
6. Develop a formal fleet replacement plan and funding program.	$0	$0	$0	$0	$0	$0	($5,000)
TOTAL	**$0**	**($5,000)**	**($5,000)**	**($5,000)**	**($5,000)**	**($20,000)**	**($49,800)**