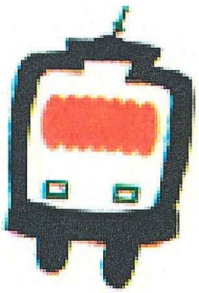

ELECTROWAVE
IMMEDIATE ACTION PLAN

FINAL

Sponsored by:
Miami- Dade Metropolitan Planning Organization
Miami Beach Transportation Management Agency
City of Miami Beach

CORRADINO

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INTRODUCTION

The Miami Beach Electrowave shuttle system will soon complete its fourth year of operation in South Beach. The 7-year long-range plan provides the City with preliminary planning information to enable decision-makers to determine if there is a need to continue or expand Electrowave service. This Immediate Action Plan is a departure from the long range plan's scope of service. It was deemed necessary to explore the issues contained herein and develop a strategy to enable the Electorowave to function at its peak level of efficiency and effectiveness prior to the implementation of the long range plan. This additional element addresses immediate concerns of the system. The Electrowave plays an important role for the City of Miami Beach. Aside from being an important and progressive public service, providing mobility options in an ever constricting environment, the Electrowave meets the goal and objective the alternative transportation required by the City's adoption of the Transportation Concurrency Management Areas (TCMA's), which enable corridor levels of service to be 150% of LOS D, as opposed to LOS D without the Electrowave service. To not have the Electrowave in operation would result in a development moritorium due to insufficient trip capacity. While the Electrowave is important to the City, and the objective of the initial plan is to define long range opportunities, there are important efficiency issues that affect the system today and must be addressed prior to undertaking any expansion as recommended in the initial report.

IMMEDIATE ACTION PLAN

It is of the utmost importance that the Electrowave operate its existing service to its peak efficiency and effectiveness. While the system has been successful overall, there are some trends that have come to light that are disturbing and are in need of mitigation. It is recommended that an immediate action plan be implemented. This plan would entail an initial 6-month effort (of which this report is the first step) to address the issues and an additional 12 months to measure and maintain adequate results. The plan addresses the Electrowave in four primary areas:

- Maintenance
- Equipment
- Management
- Performance Standards

Primary recommendations of the Immediate Action Plan are:

Maintenance

- Immediately provided temporary oversight to Electrowave battery and vehicle maintenance
- Hire a private maintenance contractor to maintain the Electrowave fleet

Equipment

- Purchase the necessary batteries to operate the fleet effectively

Management

- Reassess the management process
- Undertake marketing program

Performance Standards

- Develop performance standards by which the system can be measured

Of primary importance to any transit system is ridership. Electrowave ridership is at all time lows and has been in a general downward trend since August of 2000. Poor ridership is a symptom of larger problems. The primary cause of the ridership decrease is that the buses are not in service to pick up riders that may want to ride the system. This is detrimental not only in the sense that willing riders are not being serviced, but also in the sense that they may eventually loose confidence in the system and not ride even if the service was available. This lack of buses is attributable to maintenance. The maintenance issues manifest themselves in two ways (batteries and vehicles). First is the maintenance of the Batteries. This also is an equipment issue. Vehicles are not on the road because the batteries are running down too frequently. Improper battery treatment, storage and preventative maintenance have contributed to this. Second, the vehicles have similar reoccurring maintenance issues thought to be attributable to the manufacturer. The equipment has not only maintenance issues but is insufficient in quantity to adequately operate the system. Maintenance, while important is not solely responsible for these problems.

There are questions about the overall management structure and process as well as equipment issues. Due to cumbersome processes, management of the system has been unable to work through these problems thereby creating conflict between departments. Management problems manifest themselves in two primary ways. First, there are no established performance standards by which the system's routes, maintenance and operations can be measured. Second, there is not adequate control and authority given to assigned managers to react to and solve problems or issues in these areas. This has resulted in feeling of distrust between managers assigned to the shuttle project. These issues threaten the future of the system. There is serious concern with the systems ability to be maintained, operated and managed in its current state while being able to achieve the quality and level of service that the citizens of Miami Beach deserve and expect. It is expected that if not

mitigated these core problems will further deteriorate the function of the system. This concern is serious in nature, yet if addressed in the near term can be mitigated and repaired with minimal discomfort and the system can be quickly restored to its previous ridership levels.

The Immediate Action Plan examines the Electrowave system and details the corrective steps to be taken in order to have the system operate its existing Washington and Collins routes with its 11 existing vehicles, at 9 to 12 minute headways on a sustainable basis.

The following items comprise the immediate action plan. This is organized chronologically with associated costs attached.

IMMEDIATE ACTION PLAN

Issue	Completed	Potential Cost
Capital Funds		
Upgrade Shop Equipment to Operate Existing Service Efficiently	7/19/01	$140,585(FTA Funds)
Order Batteries (24 sets)	7/19/01	$313,200(FTA Funds)
Purchase 1 Hybrid Bus	7/19/01	$244,562(FTA Funds)
Operating Funds		
Temporary Maintenance Oversight	8/1/01	$24,158
Examine and Implement New Management Structure	8/1/01	—
Implement Enhanced Board of Directors	9/1/01	—
Separate Accounting from Municipal System	9/1/01	—
Complete Operational and Maintenance Performance Standards	10/1/01	$15,000
Receive Batteries	10/19/01	
Private Maintenance Firm Begins	11/1/01	$700,000
Manage and Measure the System forthcoming)	1/1/02	(see 2002 Bjt,
TOTALS		**$1,437,505**

MAINTENANCE

- **The hiring of a private maintenance contractor to perform maintenance on the vehicles is of utmost importance.**

- **Prior to the maintenance contractor initiating service, implement a temporary maintenance oversight person to assist Fleet Management in the maintenance of the batteries and vehicles.**

Poor maintenance is a contributing factor for the sever down turn in ridership. An RFP has been advertised, and responded to by one respondent, with whom the MBTMA is comfortable. It is suggested that a negotiating team designated by the MBTMA be developed to negotiate an acceptable contract. While official numbers are not public information, it is believed proposed costs for such maintenance are around $700,000. If the City can not be satisfied with private costs, the next option would be to create a funded and dedicated Electrowave maintenance department to work solely on Electrowave buses and report solely to Electrowave management. In the time period between this report and the actual initiation of service of a private maintenance contractor, it is suggested that the MBTMA initiate a Maintenance Oversight Committee that will hire a knowledgeable maintenance director to provide temporary oversight for the Electrowave buses. This person should be on site each day to provide oversight and direction to the maintenance crew currently in place. There are a plethora of issues beginning with battery maintenance that should be inventoried and corrected by this person.

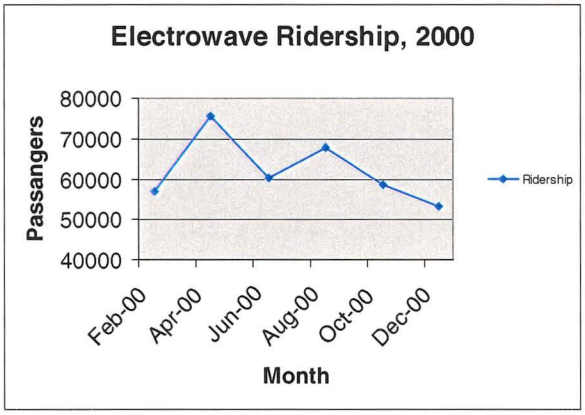
Batteries

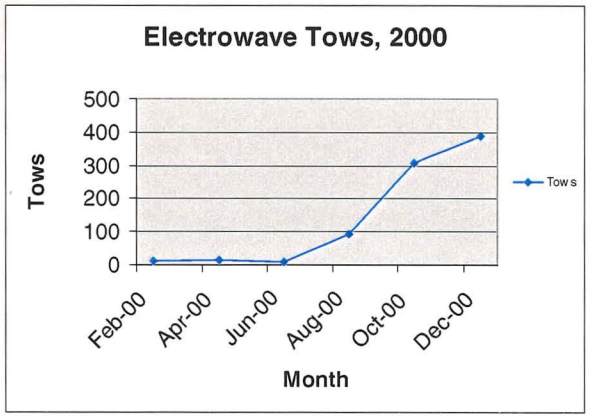
Of the existing battery sets, (the number of which is disputed between 18 and 21) Seven sets are new in 2001, of the remaining sets, the oldest was manufactured in August of 1999. It has been stated by a third party electric vehicle and battery expert who has examined the system that these remaining in service batteries should not be past their useful lives. Assuming, using what is now considered industry standard numbers, that a batteries useful life contains between 700 and 900 cycles, and assuming, as has been presented, that oldest battery if cycling properly at one time per day (30 cycles per month) should last until September of 2001. (A cycle is the process of charging and then discharging) Through this one cycle per day assumption, the oldest battery in service will have cycled approximately 660 times, just below its useful life as of July 1 of 2001. These batteries should not have had life problems in 2000. It is said, by the Electric Transit Vehicle Institute, (ETVI) that while these underperforming batteries have been damaged that they can be rehabilitated to some extent. This point is mute due to the fact that the City is intending to purchase 24 new battery sets, yet is a very short term solution to the problem while awaiting the deliveries of batteries. It also can help establish the credibility and capability of ETVI.

The fact is that currently nearly all batteries are underperforming, and all issues are exacerbated by the fact that the batteries are inefficient. It is believed that this has been caused by improper maintenance. A spot review of maintenance logs from 1998, 1999 and 2000 show that in September of 1998 few root causes of bus problems were occurring per bus. Only four of 80 entries (5%) were due to battery issues. Again, by August of 1999 few of the root causes of bus problems, (14 of 153, or 9%) were due to battery issues. By November of 2000 an overwhelming majority of bus problems, (320 of 480, 66%) were due to drained batteries. Consequently the number of bus tows rose from 15 in January of 2000 to 385 in December of 2000. Incidentally there are also no amp meters on the buses to alert drivers of low battery conditions. This also resulted in higher tows. The sheer number of tows due to battery problems has had a negative impact of the performance of routine maintenance, allowing limited time for the activity. This is a contributing factor to

the batteries not being properly maintained. These circumstances have let to a vicious cycle of too few batteries that are poorly maintained, running on shortened cycles and deteriorating by the day. At this point has been reached and the system is effectively shutdown on many days. Through observation of the maintenance operations it is believed that while a shortage in staff and the pressures of emergency duty on the buses have shortened the amount of time to adequately maintain the batteries, there is still time for such maintenance. Why it has not been performed is unknown. It is important to realize that poor battery maintenance will become evident within days. This lends to the contention that battery maintenance was performed adequately until about August of 2000 and then began to be performed poorly and has not recovered. The reasons why are again not clear at this time.

This maintenance issue coincides with the declining ridership trends noticed over the past year. It has been a slow but general down turn in ridership. Trends over the past two years are as follows. Between system initiation and August of 1999 nearly 125,000 riders per month rode the Electrowave. Beginning in August of





1999 and between that date and August of 2000 ridership dipped to an average of around 64,000 riders per month. This can be attributed to the implementation of a fee of $.25 per ride. Ridership received a general upward movement by this time beginning in February of 2000, due to the expansion from 7 to 11 buses. By August of 2000 ridership peaked and began to take another down turn, dipping below levels it was when it had the seven buses level by September 2000, rising above that level again only in November of 2000. Ridership dipped below 50,000 riders per month for the first time by January of 2001. This trend has continued to the present. The most recent ridership figures estimate about 39,000 riders per month, an all time low. The primary cause of this can be attributed to mainly to maintenance issues of improper maintenance and preventative care of the batteries that resulted in fewer buses being in service at any given time. When buses are not in service ridership suffers.

It must be noted that ETVI who has provided some information concerning with the battery issue is the sole bidder for the private maintenance contract for Electrowave service. Additionally initial estimates of battery cycle life at the time of purchase were said to be 2000 cycles. ETVI has very few examples if any of batteries being operated in the extreme climatic conditions experienced here in Miami Beach.

Vehicles

Maintenance of the vehicles is a separate matter. These vehicles are alternative fuel vehicles, meaning that they are maintained differently than traditionally fueled vehicles. There is apparently a lack of qualified maintenance people in this market that are willing to take maintenance positions. Currently there are reports of neglect on the part of maintenance operators. Attendance is often suspect as well as performance. It is apparent that the workforce dealing with the Electrowave is unmotivated and does not display a proactive attitude. The depth of the problem is not known, perhaps a full audit of the maintenance of the system should be undertaken by an objective third party. The major problem contributing to the deterioration of this system is not totally the lack of adequate batteries, but maintenance issues that have caused the batteries to operate at less than peak efficiency.

Under normal circumstances routine maintenance such as checking tire pressure, steering, belts, connections, shocks, wipers, lights and turn signals is done during the battery changes. At the current time there is less time to do this properly due to the fact that batteries are being rotated with such frequency and time is being spent on emergency towing. The most frequent maintenance problems with the vehicles have tended to center around power steering, the rear axles and air conditioning compressors. Again it is currently unclear weather this work is being done properly, but noting the recent reports, it can be assumed that it has not been performed at the level it should have been. It must be stated that the four newest buses are considered to have mechanical problems that are due to manufacturing inadequacies. Advanced Vehicle Systems (AVS) the vehicle manufacturer should be called in to assess the problem with their vehicle and be held responsible for vehicle inadequacies if this is the case. This has contributed to a lack of vehicles on the streets and the ridership problems.

There are required to be mechanics of various levels assigned to each of the three maintenance shifts. Two mechanics on the 4:00am to 12:00pm shift, 1 on the day shift and 3 on the night shift. When attendance is poor, either maintenance does not get done or the system must pay the mechanics sick leave, in addition to the overtime for a Fleet Management mechanic to work on the buses. The Electrowave is to be manned 24 hours per day, 365 days per year, including holidays.

Electrowave vehicles make up 11 of the over 1000 pieces of rolling stock that are maintained by the Fleet Management Division. These buses appear to often get lost in the voluminous work load that the division has. Since they are special vehicles they need special attention. To provide the required attention to these specialized vehicles, private contractors should be hired.

The cost of this is likely to be more than currently expended, however, the long-term cost of not doing it may be greater, perhaps jeopardizing the systems viability. Usually transit agencies move toward private maintenance contractors to lower costs or to increase efficiency. It is expected that the cost of properly maintaining the vehicles at the current time is greater than the amount currently expended. At this time ridership is suffering, faith in the reliability of the system is being questioned among citizens and riders, and even the ability to justify the system to its ardent supporters is being shaken. Buses are being towed at a rate of over 300 per month. At that rate nearly 10 buses or 90+% of the system is towed each day. Maintenance can not be labeled as solely responsible for the problems. Maintenance does need the proper staffing and equipment to properly perform its function. Maintenance should be the ultimate responsibly of the MBTMA Board and the system manager. The maintenance contractor should be held to performance standards developed by the MBTMA and penalized for failure to meet them.

EQUIPMENT

- **Purchase 24 battery sets, upgrade shop equipment and purchase one hybrid bus**

The provision of the necessary equipment (batteries, associated equipment, and facilities improvements) to operate the existing number buses on the existing routes at the desired efficiency is needed. Even with the hiring of the private maintenance firm, operation of the system to peak efficiency can not be done with out the necessary equipment. There are eleven Electrowave buses. These require 3 sets of batteries per bus for a total of 33 sets of batteries. According to Fleet Management the system currently has only 18 sets of batteries. Fifteen additional battery sets are required to operate this system in its most basic form. **It is assumed that with the purchase of 24 battery sets, (raising the total amount of relatively new batteries (purchased after January 2000) to 31 sets, two below what is required) the ridership problem will immediately be remedied.** The system is desperately short on the necessary equipment is due in large part to external circumstances. It was recognized that batteries were becoming ineffective early in 2000. Requests by Fleet Maintenance were made for new batteries. Electrowave management acknowledged the need and prepared to purchase the necessary equipment. Issues with the "Banana Tariff" had increased the price of the batteries. They have not been purchased and thus the system is in a state of drastic and chronic deterioration. It is assumed that new batteries will suffer the same fate if not maintained properly. This will become immediately apparent.

Storage room for some of these batteries will need to be sought out at the facility. Currently there is only room for 15 battery sets in the Electrowave shed. The battery use process is that one set is kept on each bus to operate the bus, one set is left to cool and be maintain and immediately after operation, and one set is left to charge so it can be placed on the bus next. Eleven sets will be consistently operating on buses. The remaining sets will need to be found storage locations. Currently seven sets are stored in Shop 3 in the north maintenance bay. This is not appropriate for the majority of batteries in this bay due to the inability to get a adequately sized forklift in the space to lift the batteries and turn them. Currently turning must be done with a hand cart. The facility is short of room for battery storage. It is recommended that reconfiguration of space be undertaken.

Batteries can not be ordered with out a release of funds from MDT, then subsequent approval from the City Commission. The closest commission meeting to approve this would be July 18. The batteries could be ordered the next day, and can be delivered from the supplier within three months. MBTMA has been assured by Advanced Vehicle Systems, Inc. (AVS), (the source of the batteries) that the 24 sets of batteries can be purchased for $12,300 per set. A letter from AVS states that assuming the batteries were purchased by June 19, 2001 they could be totally delivered by September 19, 2001, (a time period of three months). For the purposes of this report it is assumed that the order is made on July 19, 2001 the batteries can be fully delivered by October 19, 2001. The delivery schedule would have 2 sets of batteries available by August 19, 2001. Four additional sets could be available by the first week of September and the remaining sets would be delivered four sets per week until the order is complete, in mid October. Associated equipment in addition to batteries is needed. This includes:

- 24 Battery Sets
- 1 Electric Hybrid Bus
- Shop Equipment
  - Floor Jacks
  - MultiMate's

- 1 Personal Computer with Stand
- Accounting and Inventorying Software
- Soldering/Desoldering Equipment
- Battery Conditioning Equipment
- Load Bank
- Fork Lift
- Tow Truck

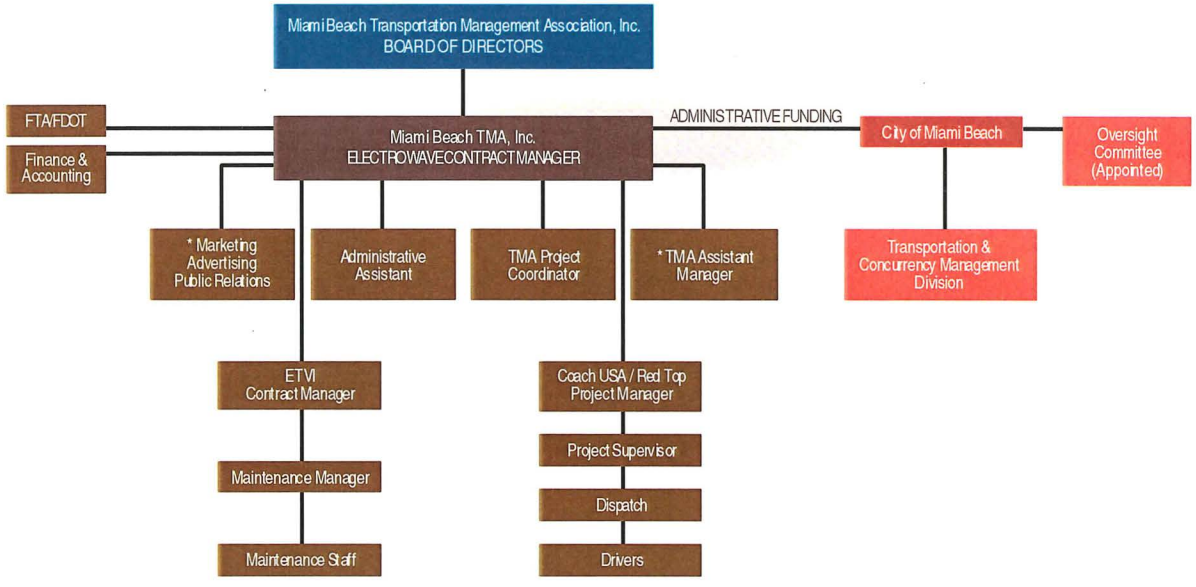
This equipment can be purchased as early as 7/19/01,with FTA section 3 funds of which $744,375 is available. An issue that has arisen is that the price of these batteries has increased by $1,560 per set due to a general increase in battery price. Regardless this puts the price for all necessary equipment at $777,455 or $33,080 more than what is available from the FTA Section Funds. Prior to formal ordering of these batteries, AVS should be notified and held to their initial price quote provided to MBTMA via an earlier letter, of which is pending delivery to Corradino for review.

SYSTEM MANAGEMENT

- **Examine and implement new management structure**
- **Enhance the board of directors**
- **Separate Electrowave accounting from municipal system**
- **Initiate a marketing plan**

In reality, the problems that are being exhibited are results of a management structure that is hampering the ability to actually manage. Each of the above issues are the responsibility of the system manager. It is felt that the management structure as it currently exists is providing "roadblocks" toward effective communication between the various parties involved, and in turn negatively, effecting the management of the system. Through this process a new management structure should be examined and implemented. This structure should place the responsibility of the Electrowave system squarely on the shoulders of the system manager who should function at the pleasure of the MBTMA board of directors. It is believed that if the current management will be very successful under this structure. The manager should have control over and a clear view of all financial information, direct meaningful input to how the system is operated and maintained, and the ability to make decisions about the management of the system in a timely manner without a cumbersome bureaucratic process hampering the ability to react to crisis. All maintenance, operations and other contractors to the Electrowave system need to be held accountable for their actions and to the manager. The manager should also be responsible for the production of monthly performance reports on the systems operations maintenance and performance standards that should be delivered to the MBTMA board monthly.

More specifically, management in terms of maintenance needs to be controlled closely. As mentioned above, maintenance performance is suspect. Management should be provided monthly reports from the maintenance contractor as well as operational contractor discussing staff and maintenance issues as well as having to directly review and approve maintenance bills and purchase orders. Currently bills for Electrowave maintenance from the Fleet Management department go to the City's budget office, not directly to the Electrowave manager.



* NEW POSITION

If it does not already the MBTMA board should contain a broad-based level of participation from a variety of stakeholders. Included should be members of the City Commission, the general public through the Transportation and Parking Committee, interested and affected retail or commercial representatives, city staff members (concurrency, finance, grants, appropriate assistant city manager), and a members of the primary funding agencies including FDOT and MDT. This board should meet with frequency (initially each month, and quarterly after the 1st year) to measure progress and provide direction to the system manager. Once adopted the long-range plan should serve as the guide by which the system is managed.

Upon completion of the mitigation measures of this plan, the Electrowave should attempt to regain whatever public confidence it has lost. A marketing effort targeted at this should be attempted. This can be done by offering free passes for the service or free service for a week. Attempts should be made over the radio, print media and through local resources (parking facilities, retail and entertainment outlets serviced by the system) to reach the potential riding public.

PERFORMANCE STANDARDS

- **The development of maintenance and operational performance standards are critical to the effective measurement and subsequent management of the Electrowave system.**

No current performance standards exist. These can be developed in no more that eight weeks at a cost of about $15,000. Both maintenance and operation contractors need to be subject to such performance standards, and held accountable to the MBTMA for them.

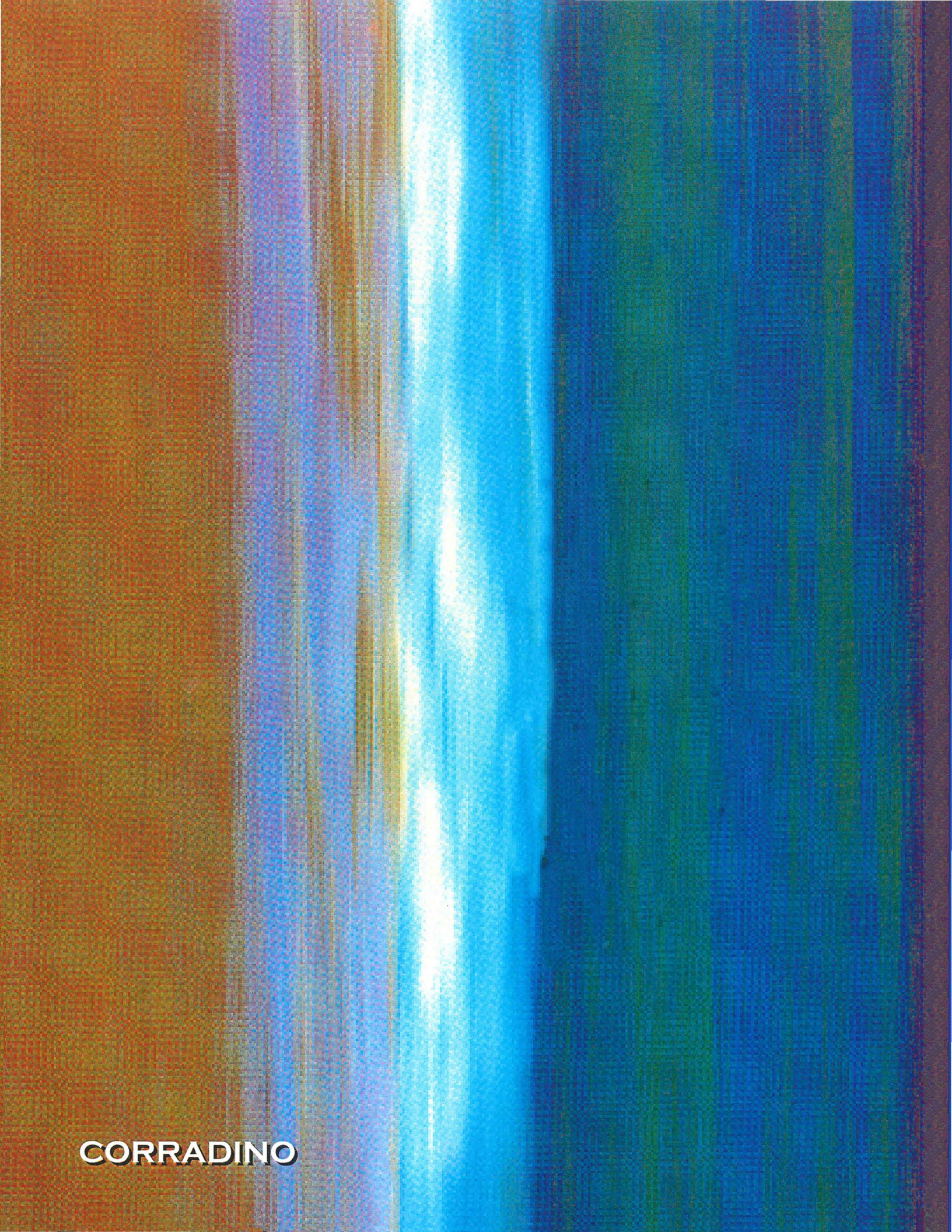
Performance standards would be developed for both the maintenance and operations aspects of the system. The following are examples of the types of issues covered by these standards.

Maintenance

- Battery life, by battery
- Individual bus maintenance file (tire changes, heaters, air conditioners, etc.)
- Number of tows, by day, by bus
- Employee attendance log and time cards
- Number of propane or other fuel fills
- Service hours by buses
- List of worker complaints

Operations

- Hours of service, by system, by vehicle (revenue hours)
- Revenue Miles
- Cost per mile
- Cost per passenger
- Passengers per mile
- Number of vehicle tows
- Required headway
- Required driver training and attendance
- Driver attendance and time cards
- Revenue hours by driver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