

OFFICE OF THE STATE AUDITOR

DIANA DIZOGLIO

Official Audit Report – Issued December 24, 2024

Greater Attleboro Taunton Regional Transit Authority

For the period July 1, 2021 through June 30, 2023



OFFICE OF THE STATE AUDITOR

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December 24, 2024

Mary Ellen A. DeFrias, Administrator
Greater Attleboro Taunton Regional Transit Authority
10 Oak Street
Taunton, MA 02780

Dear Ms. DeFrias:

I am pleased to provide to you the results of the enclosed performance audit of the Greater Attleboro Taunton Regional Transit Authority. As is typically the case, this report details the audit objectives, scope, methodology, findings, and recommendations for the audit period, July 1, 2021 through June 30, 2023. As you know, my audit team discussed the contents of this report with agency managers. This report reflects those comments.

I appreciate you and all your efforts at the Greater Attleboro Taunton Regional Transit Authority. The cooperation and assistance provided to my staff during the audit went a long way toward a smooth process. Thank you for encouraging and making available your team. I am available to discuss this audit if you or your team has any questions.

Best regards,



Diana DiZoglio
Auditor of the Commonwealth

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LIST OF ABBREVIATIONS

BEB	battery electric bus
CFR	Code of Federal Regulations
GATRA	Greater Attleboro Taunton Regional Transit Authority
GPS	Global Positioning System
MassDEP	Massachusetts Department of Environmental Protection
MOU	memorandum of understanding
RTA	regional transit authority
ZEV	zero-emission vehicle

EXECUTIVE SUMMARY

In accordance with Section 12 of Chapter 11 of the Massachusetts General Laws, the Office of the State Auditor has conducted a performance audit of the Greater Attleboro Taunton Regional Transit Authority (GATRA) for the period July 1, 2021 through June 30, 2023.

The purpose of our audit was to determine whether GATRA did the following:

- complied with Sections 1, 2, and 3 of the “Commonwealth of Massachusetts Agreement between Massachusetts Department of Environmental Protection and Greater Attleboro–Taunton Regional Transit Authority” for acquiring battery electric buses (BEBs) and charging stations;
- complied with Chapter 2 of the *GILLIG Service Manual* and perform preventative maintenance on BEBs on the required items based on the preventative maintenance schedule;
- updated its safety and risk management processes to identify and mitigate safety hazards to address potential electrical fires in accordance with Section 673.25 of Title 49 of the Code of Federal Regulations;
- complied with Section 6 of the “Commonwealth of Massachusetts Agreement between Massachusetts Department of Environmental Protection and Greater Attleboro–Taunton Regional Transit Authority” for training on the operation and maintenance of BEBs and charging stations; and
- collected BEB performance and operation data in its BEB Annual Report to the Massachusetts Department of Environmental Protection in accordance with Section 8 of the “Commonwealth of Massachusetts Agreement between Massachusetts Department of Environmental Protection and Greater Attleboro–Taunton Regional Transit Authority.”

Below is a summary of our findings, the effects of those findings, and our recommendations, with links to each page listed.

Finding 1 Page 16	GATRA did not ensure that contracted maintenance employees completed GILLIG’s training before performing maintenance services on battery electric buses.
Effect	If GATRA does not ensure that maintenance employees complete proper training on BEB maintenance, then there is a higher-than-acceptable risk that they may not detect initial warning signs of electrical and other hazards, leading to vehicle damage and potential injury to employees and riders. Maintenance employees who have not been provided sufficient training may also experience higher risks of injury when they maintain this equipment. Maintenance work could inadvertently damage BEBs if they have not been appropriately trained.
Recommendations Page 16	<ol style="list-style-type: none">1. GATRA should contact GILLIG to provide training to maintenance employees.2. GATRA should develop policies and procedures to ensure that its contracted transit provider’s employees complete required trainings.

Finding 2 Page <u>18</u>	GATRA did not ensure that its contracted transit provider performed and documented preventative maintenance services on its BEBs.
Effect	Without a BEB maintenance checklist that distinguishes each specific component of a BEB, GATRA cannot ensure that the high-voltage components of all its BEBs receive preventative maintenance. If GATRA does not perform these inspections, then there is potential for damage to the BEBs' electrical components, which could result in serious injury or death to anyone in contact with the BEB and may result in avoidable damage to or loss of vehicles.
Recommendations Page <u>20</u>	<ol style="list-style-type: none">1. GATRA should require its contracted transit provider to document the preventative maintenance performed on its BEBs, including maintenance on high-voltage batteries, high-voltage cables, battery equalizers, and main disconnect switch and automatic disconnect systems.2. GATRA should establish monitoring controls (i.e., policies and procedures) that include appropriate management oversight over its preventative maintenance process to ensure that its contracted transit provider performs proper preventative maintenance services on all BEBs.
Finding 3 Page <u>21</u>	GATRA did not ensure that its contracted transit provider reconciled the collected farebox cash revenue to the transit fare collection system.
Effect	If GATRA does not ensure that its contracted transit provider reconciles farebox revenue, then there is a higher-than-acceptable risk that the provider may underreport the farebox revenue and misappropriate the cash revenue that was not captured in the transit fare collection system.
Recommendations Page <u>21</u>	<ol style="list-style-type: none">1. GATRA should ensure that its contracted transit provider reconciles the cash payments collected to the cash revenue recorded in the transit fare collection system.2. GATRA should develop policies and procedures, including a monitoring component, to verify the accuracy of the total farebox revenue reported by its contracted transit provider.

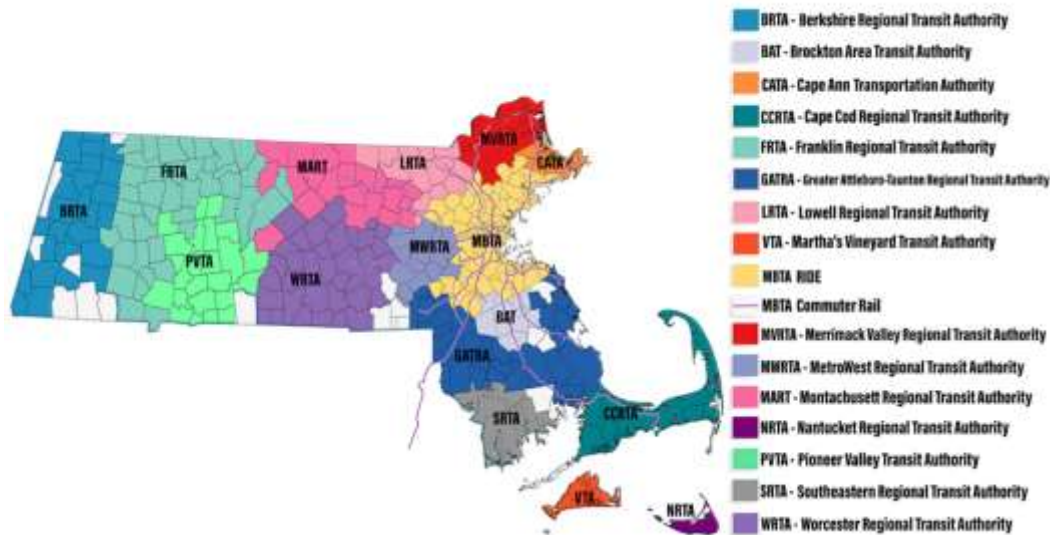
In addition to the conclusions we reached regarding our audit objectives, we also identified issues not specifically addressed by our objectives. For more information, see [Other Matters](#).

OVERVIEW OF AUDITED ENTITY

Regional Transit Authorities

Chapter 161B of the Massachusetts General Laws established regional transit authorities (RTAs) to provide a public transportation system under the control of municipalities. This law defines the roles and responsibilities of these authorities and the municipalities in which they operate. Each RTA has an advisory board composed of elected officials from the communities in which they operate (e.g., selectperson or mayor), as well as one representative of the disabled commuter population,¹ and one representative of the local rider community. The advisory boards appoint administrators, establish bylaws, and approve budgets and changes to RTA services.

Section 53 of Chapter 6C of the General Laws makes the Rail and Transit Division of the Massachusetts Department of Transportation “responsible for overseeing, coordinating and planning all transit and rail matters through the commonwealth,” including intercity buses, the Massachusetts Bay Transportation Authority, and RTAs.



Source: Massachusetts Department of Transportation—Rail and Transit Division (<https://www.mass.gov/info-details/public-transportation-in-massachusetts>)

1. According to Section 5 of Chapter 161B of the General Laws, “This representative shall be mobility impaired, have a family member who is mobility impaired, be a caretaker of a person who is mobility impaired or work for an organization that serves the needs of the physically disabled.”

Currently, there is a network of 15 RTAs operating in the Commonwealth, in addition to the transit services provided by the Massachusetts Bay Transportation Authority. These RTAs serve a total of 272 cities and towns outside the greater Boston area. RTAs are funded through a combination of state appropriations, federal grants, local governments, transit fares, and other sources. State appropriations for the 15 RTAs increased from \$88 million in fiscal year 2019 to \$94 million in fiscal years 2022 and 2023.

Greater Attleboro Taunton Regional Transit Authority

The Greater Attleboro Taunton Regional Transit Authority (GATRA) was established in 1976 and reports to the Massachusetts Department of Transportation's Rail and Transit Division under Chapter 25 of the Acts of 2009. GATRA is headquartered at 10 Oak Street in Taunton and had 17 administrative and 31 brokerage² employees during the audit period. GATRA provides transportation to 29 municipalities³ in southern Norfolk County, northern Bristol County, and Plymouth County.

According to Section 8 of Chapter 161B of the General Laws, RTAs may hire privately operated companies to provide its transportation services. As outlined in the service agreement between GATRA and its contracted transit provider, the provider is responsible for scheduling transportation services, maintaining GATRA's vehicles, training its maintenance and operational employees, and collecting farebox revenues.

According to GATRA's 2020 Comprehensive Regional Transit Plan, GATRA provides fixed-route transportation services,⁴ on-demand microtransit services,⁵ and demand-response transit services⁶ to riders daily—primarily on weekdays and Saturdays—during scheduled hours. GATRA's 2020 Comprehensive Regional Transit Plan states,

It is the mission of GATRA to provide safe, courteous, cost-effective transportation to the people throughout the region. As the needs of the community grow and change, GATRA will be dedicated to meeting the challenges of modern transportation.

2. GATRA brokerage employees provide medical transportation services to qualified MassHealth subscribers.

3. The 29 municipalities are Attleboro, Bellingham, Berkley, Carver, Dighton, Duxbury, Foxborough, Franklin, Hanover, Kingston, Lakeville, Mansfield, Marshfield, Medway, Middleborough, Norfolk, North Attleboro, Norton, Pembroke, Plainville, Plymouth, Plympton, Raynham, Rehoboth, Scituate, Seekonk, Taunton, Wareham, and Wrentham.

4. Fixed-route transportation services have established routes, schedules, and stops.

5. GATRA's on-demand microtransit services (called GATRA GO) allow riders to reserve rides through their smartphones, similarly to how rideshare services like Uber or Lyft work.

6. Demand-response transportation services are non-fixed route services that must be requested by riders and scheduled by dispatchers through a transportation service.

GATRA is one of two RTAs (the other is Montachusett Regional Transit Authority) that contracts with MassHealth to provide eligible MassHealth members with transportation services to various medical appointments.

Battery Electric Bus Initiatives

Since the Bipartisan Infrastructure Law was enacted on November 15, 2021, states and municipalities have invested in projects related to battery electric buses (BEBs), which are buses that use battery power to drive instead of diesel fuel. (See the “BEBs” section for more information.) According to the Fact Sheet: Bipartisan Infrastructure Deal released by the White House on November 6, 2021, one of the goals of the law is to “improve transportation options for millions of Americans and reduce greenhouse emissions through the largest investment in public transit in U.S. history.”

On October 24, 2013, the Governor of Massachusetts signed a memorandum of understanding (MOU), along with seven other state governors,⁷ to support zero-emission vehicle (ZEV)⁸ programs. This MOU included an agreement to collectively, across the eight states, have at least 3.3 million ZEVs, which include BEBs, on the road by 2025.

On September 16, 2016, the Governor of Massachusetts issued Executive Order 569 to combat climate change. This required the Massachusetts Department of Environmental Protection (MassDEP) to establish regulations to meet greenhouse gas emissions targets, mandated by the Global Warming Solutions Act, by August 11, 2017.

On July 14, 2020, Massachusetts, 14 other states, and the District of Columbia signed an MOU with a set of goals to ensure that 30% of medium- and heavy-duty vehicle sales would be ZEVs by 2030 and that these ZEV sales would be 100% by 2050. Medium- and heavy-duty vehicles are large vehicles such as pickup trucks, vans, and buses.

Volkswagen Clean Air Act Settlement and MassDEP Beneficiary Mitigation Plan

The Volkswagen Clean Air Act Settlement⁹ was a result of an investigation by the US Environmental Protection Agency and various state agencies into the automobile manufacturer Volkswagen. This

7. States governors who signed the MOU were those of California, Connecticut, Maryland, Massachusetts, New York, Oregon, Rhode Island, and Vermont.

8. ZEVs use battery power to run and do not emit pollutants when driven.

9. The Volkswagen Clean Air Act Settlement was reached in 2016 with the US Department of Justice.

investigation found that Volkswagen violated the Clean Air Act by installing software that displayed lower emissions in passenger diesel vehicles that were produced by Volkswagen during the 2009 and 2016 model years and that were sold in the United States. This included approximately 14,000 vehicles in Massachusetts. Based on the estimated 14,000 vehicles equipped with these so-called “defeat devices,” the Commonwealth was allocated \$75,064,424 in settlement funds.

MassDEP was the designated lead agency for Massachusetts under the Volkswagen Clean Air Settlement and was required, in order to receive its settlement funds, to develop a Beneficiary Mitigation Plan, which summarized MassDEP’s planned allocation of those funds to other state agencies. According to the Beneficiary Mitigation Plan, one goal was to support RTAs in purchasing BEBs and charging stations.

On November 25, 2020, GATRA was awarded a \$5,513,500 grant as part of the Volkswagen Clean Air Act Settlement allocation: \$4,973,148 was to purchase six 30-foot-long BEBs, and \$540,352 was to purchase and install six charging stations. GATRA signed a contract with MassDEP in order to receive these funds. This contract between MassDEP and GATRA required GATRA to discard six of its diesel buses; submit payment requests for six new BEBs and charging stations to MassDEP; and report BEB data annually to MassDEP regarding ridership, maintenance costs, performance, and operations in a BEB Annual Report. The contract also required GATRA to provide training to all pertinent maintenance employees on the operation and maintenance of the BEBs and charging stations.

BEBs

During the audit period, GATRA operated a total of 148 vehicles, including six BEBs that were put into service in January 2022. The six BEBs were acquired through a cooperative procurement initiative originally established between the Commonwealth of Virginia and GILLIG, the BEB manufacturer.¹⁰ These six BEBs are hybrid vehicles that use electricity to drive and diesel for heating the cabins. GATRA installed six charging stations in its garage behind its administrative building before it put the BEBs into service.

Each BEB contains seven high-voltage battery packs: Four are mounted on the BEB’s roof, one is located under the floor, and two are located at the BEB’s rear. BEBs also contain low-voltage batteries and cables to operate internal controls in the vehicle, such as lights. The BEBs also have battery equalizers to ensure that battery voltages remain at safe levels.

10. This contract also allowed any other state to purchase BEBs from GILLIG.

Training

We believe training for maintenance employees is critical when GATRA adopts BEBs and other electric vehicle technology because it helps operating and maintenance staff members understand the difference between BEBs and diesel buses to mitigate electrical hazards and the efficiency of time management while conducting preventative maintenance.

According to the contract between the Commonwealth of Virginia and GILLIG,

Upon delivery . . . the bus shall be put in service by qualified Contractor personnel, who shall provide training for the Authorized User. Training shall include operation and maintenance of the bus, all systems, accessories, operating procedures, and safety requirements. Placing the bus in service shall be held at a date and time to be agreed upon by the Contractor and Authorized User.

Maintenance

To monitor BEB maintenance, GATRA uses a web-based fleet management software, administered by GATRA's contracted transit provider, to manage its vehicles and its parts inventory and track vehicle maintenance and repairs. Select employees in GATRA's contracted transit provider's Maintenance Department can input vehicle information; set up preventative maintenance schedules for GATRA's vehicles; and enter work orders, information on parts needed for services, and information on the preventative maintenance performed for assigned vehicles. The maintenance employees use a preventative maintenance checklist to document the preventative maintenance services that have been performed. Maintenance employees use specific, individualized checklists for diesel, hybrid, and electric buses. The preventative maintenance checklist contains vehicle identification numbers, part numbers, descriptions of work performed, labor hours, etc. (See [Appendix A](#).)

Global Positioning System Software

GATRA uses online Global Positioning System (GPS) software to track and monitor electric battery usage and maintenance for its BEBs and charging stations. Similarly to the fleet management software, only certain employees from GATRA and its contracted transit provider have access to the software and can use it to generate battery usage reports for each BEB or charging station. Unlike the fleet management software, the GPS software does not allow users to manually input data into the system and can only be used to generate reports. GATRA's director of facilities uses data from the GPS software application to submit GATRA's BEB Annual Report to MassDEP.

Transit Fare Collection System

GATRA uses a transit fare collection system for all vehicles used to provide fixed-route transportation. A farebox (see the image below) is in each vehicle to collect payments from passengers using cash, paper tickets, or smart cards. It also generates revenue and ridership data in real time. Using a farebox probe (see the image below), the assigned employee of GATRA's contracted transit provider moves cash payments from the farebox in the vehicle to the wall-mounted vault at GATRA's main office. This occurs through a secure passthrough (see the image below) without a person physically handling the cash. This ensures that farebox revenue remains secure while being transferred to the counting room. The assigned employees from the contracted transit provider's Maintenance Department (1) count the cash payments in a secure, monitored counting room on a weekly basis; (2) record the actual cash count in a Microsoft Excel spreadsheet; and (3) compare the total cash amount to the transit fare collection system.



These images are examples of GATRA's farebox, farebox probe, and secure passthrough (left, center, and right, respectively).

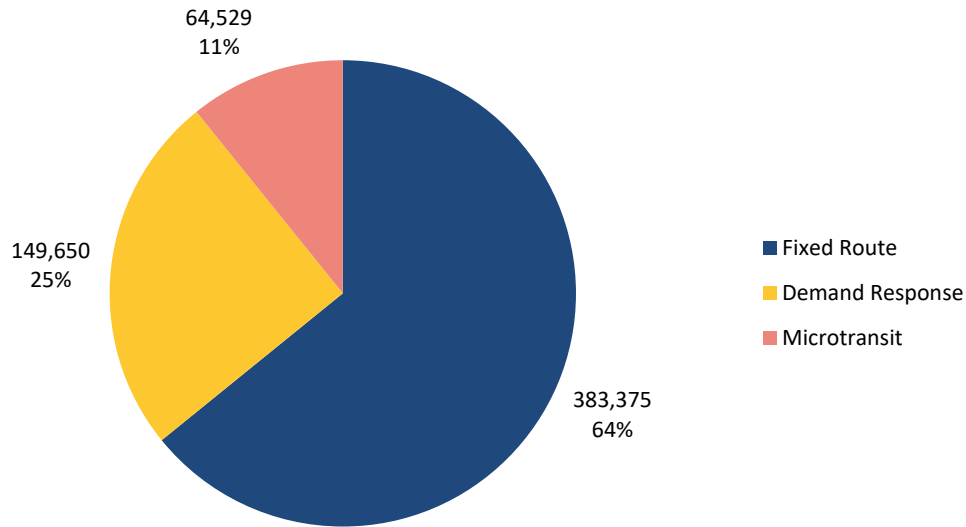
Safety

Before the BEBs were put into service, GATRA worked with the Taunton Fire Department and the Taunton Building Department to ensure that the facility where the vehicles are stored overnight are equipped with fire hydrants and sprinkler systems to suppress fires, should they arise. GATRA's director of facilities also developed an Emergency Action Plan (see [Appendix B](#)) to address the potential of battery and/or electrical fires.

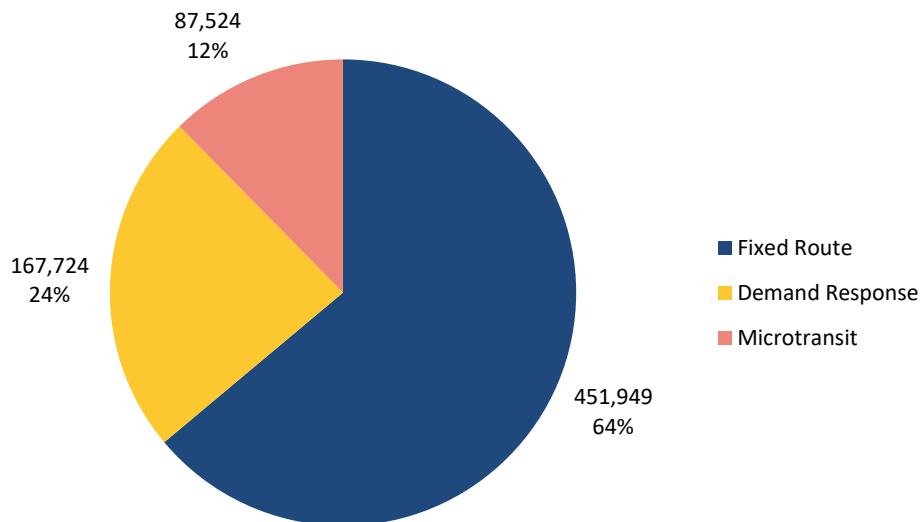
GATRA Ridership Information

The charts below summarize GATRA's ridership information for fiscal years 2022 and 2023.

Ridership Information for Fiscal Year 2022



Ridership Information for Fiscal Year 2023



GATRA Funding Sources

In fiscal years 2022 and 2023, GATRA received revenue from various sources, including fares and federal, state, and local assistance. The table below shows the total income that GATRA received during fiscal years 2022 and 2023.

Type of Funding	Fiscal Year 2022	Fiscal Year 2023
Brokerage Income*	\$ 49,038,745	\$ 67,463,263
Farebox Revenue	792,740	1,082,894
Federal Grants (Federal Transit Administration Operating Grants)	8,414,762	11,006,443
State Contracts**	12,103,982	6,363,341
Local Assessments	4,714,069	5,102,767
Other Income†	864,824	1,094,546
Total	<u>\$ 75,929,122</u>	<u>\$ 92,113,254</u>

* The Commonwealth's Human Service Transportation Office provides full reimbursement for brokerage service expenses.

** This funding source represents contracts with other Massachusetts state government agencies—for example, GATRA's contract with MassHealth for medical transportation.

† Other income includes advertising income, revenue from GATRA's paid parking lots, interest income, gains on the sale of property and equipment, and rental income.

AUDIT OBJECTIVES, SCOPE, AND METHODOLOGY

In accordance with Section 12 of Chapter 11 of the Massachusetts General Laws, the Office of the State Auditor has conducted a performance audit of certain activities of the Greater Attleboro Taunton Regional Transit Authority (GATRA) for the period July 1, 2021 through June 30, 2023.

We conducted this performance audit in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Below is a list of our audit objectives, indicating each question we intended our audit to answer; the conclusion we reached regarding each objective; and, if applicable, where each objective is discussed in the audit findings.

Objective	Conclusion
1. Did GATRA comply with Sections 1, 2, and 3 of the “Commonwealth of Massachusetts Agreement between Massachusetts Department of Environmental Protection and Greater Attleboro–Taunton Regional Transit Authority” for acquiring battery electric buses (BEBs) and charging stations?	Yes
2. Did GATRA comply with Chapter 2 of the <i>GILLIG Service Manual</i> and perform preventative maintenance on BEBs on the required items based on the preventative maintenance schedule?	No; see Finding <u>2</u>
3. Did GATRA update its safety and risk management processes to identify and mitigate safety hazards to address potential electrical fires in accordance with Section 673.25 of Title 49 of the Code of Federal Regulations (CFR)?	Partially; see <u>Other Matters</u>
4. Did GATRA comply with Section 6 of the “Commonwealth of Massachusetts Agreement between Massachusetts Department of Environmental Protection and Greater Attleboro–Taunton Regional Transit Authority” for training on the operation and maintenance of BEBs and charging stations?	No; see Finding <u>1</u>
5. Did GATRA collect BEB performance and operation data in its BEB Annual Report to the Massachusetts Department of Environmental Protection (MassDEP) in accordance with Section 8 of the “Commonwealth of Massachusetts Agreement between Massachusetts Department of Environmental Protection and Greater Attleboro–Taunton Regional Transit Authority”?	Yes

To accomplish our audit objectives, we gained an understanding of the aspects of GATRA’s internal control environment relevant to our objectives by reviewing GATRA’s internal policies and procedures and by

interviewing GATRA officials. We reviewed policies and procedures related to acquiring the BEBS, as well as the preventative maintenance, reporting, safety, and operation and maintenance training processes related to the vehicles. In addition, to obtain sufficient, appropriate evidence to address our audit objectives, we performed the procedures described below.

BEB Procurement Plan

To determine whether GATRA complied with Sections 1, 2, and 3 of the “Commonwealth of Massachusetts Agreement between Massachusetts Department of Environmental Protection and Greater Attleboro–Taunton Regional Transit Authority” for acquiring BEBs and charging stations, we took the following actions.

- We compared the number of months between the contract agreement date and the date the BEBs were placed in service to determine whether GATRA put the BEBs and charging stations into service within the required time frame.
- We examined Attachment A of the contract and reviewed vehicle work order data that GATRA provided to us to determine whether the BEBs and charging stations that GATRA purchased and put into service matched the requirements set forth in Attachment A of the contract.
- We calculated the total cost of all six BEBs and the six charging stations and compared this total cost to the grant total to determine whether the purchases exceeded the amount of the grant that MassDEP awarded to GATRA. We also interviewed GATRA officials about the additional funding that GATRA received to purchase extended warranties for all six BEBs and charging stations.
- We confirmed the date that GATRA submitted to MassDEP the list of cities and towns where the buses would be stored and operated to determine whether GATRA submitted this list within the required time frame.

We noted no significant exceptions in our testing. Therefore, we concluded that, during the audit period, GATRA submitted all required documentation to MassDEP within the required time frame.

BEB Preventative Maintenance Services

To determine whether GATRA complied with Chapter 2 of the *GILLIG Service Manual* and performed preventative maintenance on BEBs on the required items based on the preventative maintenance schedule, we took the following actions.

- We determined that there should have been a total of 39 routine preventative maintenance services performed during the audit period.

- We examined all preventative maintenance checklists to ensure that the maintenance employee assigned to perform this work inspected the high-voltage cables, high-voltage batteries, jump-start connections, the battery equalizer, the main disconnect switch, and the automatic disconnect system for each BEB according to the required maintenance schedules, as required by Chapter 2 of the *GILLIG Service Manual*.

Based on the results of our testing, we determined that GATRA's contracted transit provider did not document its preventative maintenance services on GATRA's BEBs for the required components. See Finding 2 for more information.

BEB Safety

To determine whether GATRA updated its safety and risk management processes to identify and mitigate safety hazards to address potential electrical fires in accordance with 49 CFR 673.25, we inspected the "GATRA Public Transportation Agency Safety Plan" to determine whether it included a safety risk management process, a risk assessment, and risk mitigation procedures and identifications of safety hazards.

Based on the results of our testing, we determined that GATRA's safety plan was compliant with the Safety Risk Management Requirements outlined in 49 CFR 673.25. However, we noted that GATRA's safety plan did not specify electrical fires as part of its process. See Other Matters for more information.

BEB Training

To determine whether GATRA complied with Section 6 of the "Commonwealth of Massachusetts Agreement between Massachusetts Department of Environmental Protection and Greater Attleboro-Taunton Regional Transit Authority" for training on the operation and maintenance of BEBs and charging stations, we took the following actions.

- We interviewed GATRA officials to determine whether pertinent maintenance employees are required to attend training on BEBs and charging stations. We identified a population of 18 employees of GATRA's contracted transit provider who were required to attend the BEB training during the audit period.
- We inspected the training attendance sheets that GATRA provided to us to ensure that all 18 pertinent maintenance employees received the required training on BEBs and charging stations.
- We inspected the training completion dates on the attendance sheets to ensure that GATRA's contracted transit provider's maintenance employees received training from GILLIG before the BEBs were put into service.

Based on the results of our testing, we determined that not all pertinent maintenance employees attended the required BEB training. See Finding 1 for more information.

BEB Annual Report

To determine whether GATRA collected BEB performance and operation data in its BEB Annual Report to MassDEP in accordance with Section 8 of the “Commonwealth of Massachusetts Agreement between Massachusetts Department of Environmental Protection and Greater–Taunton Regional Transit Authority,” we inspected the BEB Annual Report for the following data:

- vehicle miles traveled for each BEB;
- total number of riders for each BEB;
- electrical usage by each BEB;
- BEB and charging station operation and maintenance costs and records;
- BEB drivers’ experiences; and
- administrative issues with the BEBs.

We also inspected the email that GATRA sent to MassDEP with the BEB Annual Report to ensure that the annual report was submitted within one year after the first BEB went into service.

We noted no significant exceptions in our testing. Therefore, we concluded that, during the audit period, GATRA submitted the BEB Annual Report to MassDEP within the required time frame, and GATRA collected all required performance and operation data.

Data Reliability Assessment

Fleet Management Software

To assess the reliability of the vehicle work order data provided by employees of the fleet management software company used by GATRA’s contractor, we interviewed GATRA officials and conducted a system walkthrough with employees of the fleet management software company who were responsible for oversight of the data. We reviewed the System and Organization Control reports¹¹ that covered the audit period to determine whether there were exceptions in the testing

11. A System and Organization Control report is a report issued by an independent contractor on controls about a service organization’s systems relevant to security, availability, processing integrity, confidentiality, or privacy.

performed for certain general information technology controls (access controls, configuration management, contingency planning, segregation of duties, and security management).

We selected a random sample of 20 work orders from the population of 99 work orders for BEBs and compared the vehicle numbers and service dates to the original source documentation (i.e., the work orders). We also selected a random sample of 20 hardcopy work orders to compare the vehicle numbers and service dates to the fleet management software data. In addition, we compared record counts from the system to records that we received from employees of the fleet management software company. We tested the work order data for any worksheet errors (hidden rows, headers, and other contents) and for duplicates. We tested the work order data from the fleet management software for gaps in the work order numbers and followed up on instances of gaps in the numbering to determine whether there were any deleted work orders.

Global Positioning System Software

To assess the reliability of the mileage and the operation performance data for the six BEBs from GATRA's Global Positioning System (GPS) software, we tested the application controls for GATRA's GPS software by comparing the distance traveled on the selected BEB on the scheduled fixed route to the distance measured by Google Maps.

Transit Fare Collection System

To assess the reliability of the farebox revenue and the ridership data for BEBs from the fixed-route transit fare collection system, we tested the application controls for the system by comparing the farebox cash revenue to the cash revenue recorded in the transit fare collection system. However, because GATRA never reconciled its transit fare collection system to the amount of cash payments received for any of its fixed-route vehicles, we were not able to conclude whether the ridership information reported in the BEB Annual Report was accurate. We used this data as it was the only source available for our audit purpose. See Finding 3 for more information.

Based on the results of the data reliability assessment procedures described above, we determined that the information we obtained during the course of our audit was sufficiently reliable for the purposes of our audit.

DETAILED AUDIT FINDINGS WITH AUDITEE'S RESPONSE

1. The Greater Attleboro Taunton Regional Transit Authority did not ensure that contracted maintenance employees completed GILLIG's training before performing maintenance services on battery electric buses.

The Greater Attleboro Taunton Regional Transit Authority (GATRA) did not ensure that its contracted transit provider delivered battery electric bus (BEB) training to its pertinent maintenance employees as required by GILLIG's (the BEB manufacturer) training before performing maintenance services on BEBs.

If GATRA does not ensure that maintenance employees complete proper training on BEB maintenance, then there is a higher-than-acceptable risk that they may not detect initial warning signs of electrical and other hazards, leading to vehicle damage and potential injury to employees and riders. Maintenance employees who have not been provided sufficient training may also experience higher risks of injury when they maintain this equipment. Maintenance work could inadvertently damage BEBs if they have not been appropriately trained.

Authoritative Guidance

Section 6 of the "Commonwealth of Massachusetts Agreement between Massachusetts Department of Environmental Protection and Greater Attleboro-Taunton Regional Transit Authority," signed on December 1, 2020, states,

GATRA agrees to require all pertinent GATRA personnel to attend a training session (conducted by the [BEB manufacturing company]) on the operation and maintenance of the buses and charging infrastructure. GATRA will facilitate these training sessions by providing a mutually convenient time and location for such training.

Reasons for Issue

GATRA management told us that its former administrator and the former maintenance manager declined the formal training for contracted maintenance employees provided by GILLIG that GATRA was entitled to as part of its contract with GILLIG. GATRA also did not have policies and procedures to ensure that its contracted transit provider's employees completed the required training on BEBs and charging stations.

Recommendations

1. GATRA should contact GILLIG to provide training to maintenance employees.

2. GATRA should develop policies and procedures to ensure that its contracted transit provider's employees complete required trainings.

Auditee's Response

The decision regarding Gillig training for maintenance employees was made by two former GATRA employees, one of whom was the former Administrator, and neither of which are able to comment on why this decision was made. After doing substantial research, we can confirm that GATRA was notified in December 2020, when we put in the Purchase Order (PO) for the buses that maintenance employees would be receiving extensive training when the buses were received. This was GATRA's first order of Gillig electric buses, there were six of them, and everyone involved understood that training was a critical part of the maintenance of the buses and safety of operators and passengers.

GATRA received six battery electric buses (BEBs) from Gillig Corp in October 2021. All six buses arrived by a land-all trailered heavy duty tow truck within a short time of each other. Gillig technical field representatives arrived at our location to resolve any issues with these buses prior to putting them into service. This is a standard service provided by Gillig after new bus deliveries.

Gillig technical field reps were on site for weeks after the delivery of the electric buses. During the post-delivery inspection process, Gillig field reps had an extensive amount of time to interact with maintenance staff. Cummins field reps were also on hand at the same time. Maintenance staff had the benefit of interacting with not only the bus manufacturer, but also the company that brands the electric motors and batteries in these buses. It is my belief that because this was our initial delivery of electric buses, Gillig and Cummins reps were abundantly helpful and informative. Maintenance staff were taken through component identification and location, and all questions were answered. Gillig has the field notes to back up this onboarding experience.

Systems unique to electric buses were discussed such as charging, energy storage, and regenerative braking. In addition, towing practice, personal protection, reading system fault codes, and the traction motor were addressed. Beyond the normal steps of a preventative maintenance (PM) inspection, the electric buses require more visual inspection than a traditional diesel bus. We were advised how to include these changes in our PM process.

GATRA maintenance staff had a positive experience integrating electric buses into our fleet because of the time spent and information exchanged with Cummins and Gillig technical staff. This was equal to or surpassed formal, but basic, BEB training. We also purchased the extended 12-year warranty at that time to ensure the buses would be well maintained.

The purchased training is roughly 20 hours of classroom and hands on training, whereas we had dedicated technical representatives on site for over a month. The time GATRA maintenance employees spent with technicians over the course of eight hours a day, five days in a week, over four weeks in a month far exceeds what we would have gotten with the purchased package. In addition, these mechanics have now had over two years' experience working daily with BEBs. In fact, Gillig hired one of our mechanics to go work for them because of his extensive training and experience with their equipment. At this point, purchasing additional training would be a waste of money. I believe it is quite evident based on Gillig's information on our buses, as well as the . . .

maintenance records on our buses that our mechanics are more than competently trained on the electric buses.

I respectfully disagree that this should have been a finding. The majority of this evidence was presented to the auditors on site via interviews with GATRA staff and documents shared.

Auditor's Reply

We reviewed the information provided by GATRA, which indicates that technical field representatives from GILLIG were on site and inspected the BEBs before they were put into service. However, evidence was not presented to us that all pertinent maintenance employees attended the training referenced in GATRA's response, which was a key issue highlighted in our audit. We reiterate our recommendation that GATRA should develop policies and procedures to ensure that the maintenance employees of its contracted transit provider complete the required training, in accordance with Section 6 of the "Commonwealth of Massachusetts Agreement between Massachusetts Department of Environmental Protection and Greater Attleboro-Taunton Regional Transit Authority."

2. The Greater Attleboro Taunton Regional Transit Authority did not ensure that its contracted transit provider performed and documented preventative maintenance services on its battery electric buses.

GATRA's Maintenance Department did not document any preventative maintenance services for high-voltage batteries, high-voltage cables, battery equalizers, main disconnect switches, and automatic disconnect systems for all 39 preventative maintenance services that should have been performed on any six BEBs during the audit period. In addition, we compared the preventative maintenance checklist for the BEBs to the preventative maintenance checklist for diesel buses and found that both checklists required battery and cable maintenance (see [Appendix A](#)). However, the BEB preventative maintenance checklist did not distinguish between low-voltage or high-voltage batteries and cables and did not include all the necessary specification items. As a result, maintenance employees could have provided preventative maintenance to a low-voltage battery, which then would have appeared to be preventative maintenance to a high-voltage battery.

Without a BEB maintenance checklist that distinguishes each specific component of a BEB, GATRA cannot ensure that the high-voltage components of all its BEBs receive preventative maintenance. If GATRA does not perform these inspections, then there is potential for damage to the BEBs' electrical components, which could result in serious injury or death to anyone in contact with the BEB and may result in avoidable damage to or loss of vehicles.

Authoritative Guidance

Chapter 2 of the *GILLIG Service Manual*, dated November 2021, states,

Electrical . . .

Inspect [electric vehicle] high-voltage cable condition . . . Every 24,000 miles or twice annually (whichever comes first) . . .

Jump Start Connections

Verify the boot is in place . . . Every 6,000 miles

Inspect jump start cables for routing, chafing, and loose or broken clamps . . . Every 6,000 miles

Inspect jump start housing for damage and cracks . . . Every 6,000 miles

Inspect jump start terminal ends for corrosion . . . Every 6,000 miles

Clean terminal ends and apply an anti-corrosion protectant . . . Annually . . .

High-Voltage Batteries

Visually inspect battery enclosures for signs of damage . . . Every 12,000 miles

Check for signs of coolant leaks at all connectors to battery packs . . . Every 12,000 miles

Check that [Master Safety Disconnect] handle is visually in the locked position . . . Every 12,000 miles

Inspect all [high-voltage] connections at the batter. Ensure the connector locking tab is fully locked and undamaged . . . Annually

Check for any signs of cable damage or movement from connector . . . Annually

Inspect battery mounting isolators for wear, damage or loose fasteners . . . Annually . . .

Battery Equalizer

Inspect for dirt, damage or corrosion . . . Every 6,000 miles

- *If cables exhibit damage or corrosion, remove cables, repair and replace cables as required . . .*
- *Check torque on cables and re-torque as necessary*

Main Disconnect Switch and Automatic Disconnect System

Inspect for dirt, damage or corrosion . . . Every 6,000 miles

- *If cables exhibit damage or corrosion, remove cables, repair and replace cables as required . . .*

Check micro-switch for function (if equipped) . . . Every 36,000 miles

Check battery switch for function . . . Every 36,000 miles

Reasons for Issue

GATRA has not established sufficient monitoring controls (i.e., policies and procedures) over its preventative maintenance process to ensure that its contracted transit provider's maintenance employees perform preventative maintenance in accordance with the BEB manufacturer's manual.

Recommendations

1. GATRA should require its contracted transit provider to document the preventative maintenance performed on its BEBs, including maintenance on high-voltage batteries, high-voltage cables, battery equalizers, and main disconnect switch and automatic disconnect systems.
2. GATRA should establish monitoring controls (i.e., policies and procedures) that include appropriate management oversight over its preventative maintenance process to ensure that its contracted transit provider performs proper preventative maintenance services on all BEBs.

Auditee's Response

As for finding two, we are attaching the documented [preventative maintenance (PM)] service records on the BEBs, which were provided to the auditors on site at the time. While you could argue that a separate PM checklist could have been created for BEBs, there are so few things that need to be checked on the new buses that it seemed more prudent to use the existing PM checklist as electric vehicles were only a small part of our fleet at the time. With the growth of our fleet, a separate sheet has been created.

This does not change the fact that these buses are, in fact, well-maintained. With regards to monitoring controls . . . and we know that our fleet is in compliance with PM. Again, I respectfully disagree with that this should have been a finding.

Auditor's Reply

This audit covered the time period of July 1, 2021 through June 30, 2023. The checklist GATRA refers to above was effective after the audit period, and therefore could not be considered in our audit. GATRA reports that it has taken measures to address our concerns. We will be following up on this as part of our six-month post-audit review process.

3. The Greater Attleboro Taunton Regional Transit Authority did not ensure that its contracted transit provider reconciled the collected farebox cash revenue to the transit fare collection system.

GATRA did not ensure that its contracted transit provider reconciled the collected farebox cash revenue to the transit fare collection system. During our audit, we observed the cash-counting process performed by GATRA's contracted transit provider and noted a process discrepancy that resulted in a monetary discrepancy. Specifically, GATRA's contracted transit provider did not reconcile the cash revenue to the transit fare collection system, and there was a variance of \$710.41 for two days over what the transit fare collection system reported. Given that the full fare price is \$1.50, this discrepancy implies that approximately 473 riders were unaccounted for in the transit fare collection system for two days.

If GATRA does not ensure that its contracted transit provider reconciles farebox revenue, then there is a higher-than-acceptable risk that the provider may underreport the farebox revenue and misappropriate the cash revenue that was not captured in the transit fare collection system.

Authoritative Guidance

The Federal Transit Administration's *Transit Asset Management Systems Handbook*, dated September 2020, states,

Transit agencies must ensure that vendors are accountable for performance and provide low-risk software support. . . . [The Federal Transit Administration recommends] data reconciliation with banking and regional fare collection systems.

Reasons for Issue

GATRA did not have adequate policies and processes in place, including a monitoring component, to ensure that the total farebox revenue reported by the contracted transit provider was accurate.

Recommendations

1. GATRA should ensure that its contracted transit provider reconciles the cash payments collected to the cash revenue recorded in the transit fare collection system.
2. GATRA should develop policies and procedures, including a monitoring component, to verify the accuracy of the total farebox revenue reported by its contracted transit provider.

Auditee's Response

This audit was on the purchase and maintenance of our battery electric bus fleet. I believe finding three was outside of the scope of the audit, however, since the auditors brought it into this report, I will address it.

This audit, which started in October 2023, observed the cash room, where fare sales are counted and stored, in May 2024. At that point, cash wasn't being counted daily. The Operator's new Comptroller, who had been on the job for three months at the time, was still learning the full scope of the position. The Operator had not had a Comptroller position in several years and the GATRA Administrator had required that this position be created and filled shortly after starting as Administrator.

At the point where this was brought to the Comptroller's attention, she dropped everything to immediately change the cash counting process to daily and started a Cash Audit Review. These new policies were implemented at the time to demonstrate improvement to the auditors while they were still on site. Because of this immediate demonstrated improvement, GATRA was under the impression that this finding would not be listed. GATRA have already addressed the recommendations that were made.

Auditor's Reply

We understand that GATRA took action to address the concern after we notified them; however, this does not erase the finding that occurred during the audit period of July 1, 2021 through June 30, 2023. It is our duty and responsibility under generally accepted government auditing standards to report these breakdowns in the cash reconciliation process, which were indeed part of the scope of our audit. Specifically, this finding was identified as part of our data reliability assessment. This assessment is a requirement of generally accepted government auditing standards; we are required to comply with these standards as outlined in Section 12 of Chapter 11 of the Massachusetts General Laws. We appreciate that GATRA has taken measures to address our concerns regarding this matter and we will be following up on this in approximately six months as part of our post-audit review process.

OTHER MATTERS

During our audit, we found that the Greater Attleboro Taunton Regional Transit Authority (GATRA) does not identify battery and/or electrical fire hazards in its Agency Safety Plan. Battery and/or electrical fires are different from gasoline or diesel fires. According to the National Fire Protection Association and the Federal Transit Administration, battery and/or electrical fires last longer and can potentially reignite up to 22 hours after the initial incident. Moreover, the six BEBs and six charging stations were installed in GATRA's maintenance garage, where GATRA's entire fleet of vehicles is parked overnight. A fuel tank is also attached to the building. Given these risks, GATRA should implement safety measures.

The Federal Transit Administration's Guidebook for Deploying Battery Electric Buses, dated August 2023, states,

Instituting fleet storage guidelines with extreme storage distances between BEBs or groups of BEBs minimizes the spread of fire. Physical separation is a simple and effective way to mitigate the potential spread of fire. . . .

Fleet storage . . . of the BEB fleet [should be separate] from conventionally fueled buses.

In addition, we reviewed the *GILLIG Service Manual* and the *GILLIG Driver's Handbook* and identified specific safety procedures outlined in these guides. GATRA's Emergency Action Plan did not address any of the safety procedures outlined in the *GILLIG Driver's Handbook*. Without an adequate Emergency Action Plan in place to address the occurrence of battery and/or electrical fires, GATRA could potentially put its equipment, employees, and riders at serious risk.

We recommended that GATRA consider all safety hazards, including fire hazard analysis specific to BEBs, to mitigate hazards related to battery and/or electrical fires, and establish an Emergency Action Plan to address all safety procedures recommended by GILLIG.

Auditee's Response

GATRA is committed to providing a safe work environment for all employees, contractors, and vendors. As part of this commitment, the Authority is updating its Emergency Action Plan to include the battery electric buses. The plan's goal is to control and reduce fires that may cause personal injury, property damage or loss. It will also specify the type of equipment used in case of fire, to fully comply with all applicable [Occupational Safety and Health Administration] regulations regarding fire prevention plans as found in [Section 1910.38(b) of Title 29 of the Code of Federal Regulations].

The plan is currently being developed. Some of the items that GATRA will be implementing or investigating are as follows:

- *Segregate vehicles by type: Gasoline, Diesel, Battery Electric (BEB) buses*
 - *Internal combustion engines (ICE) vehicles have a higher instance of fire than battery electric. ICE vehicle fires are easily contained and extinguished.*
 - *This item is currently being implemented.*
- *Researching a deployable fire curtain to fully segregate ICE vehicles from BEB vehicles in the event of an incident. This curtain would be deployed by activation of the fire alarm system.*
- *Continued training with local fire departments on BEB safety. GATRA is, also, looking into installing QR codes on the vehicles that would link to manufacturer safety cards for first responders.*
- *The underground fuel tanks are at the opposite end of the building and pose little threat to the vehicle storage area. The closest charger/BEB is approximately 360 feet from fuel tanks and separated by 5 separate firewalls. As part of the action plan, GATRA will ensure that electric power is cut off from the fuel pumps. GATRA will investigate the possibility of an automatic disconnect connected to the fire alarm system.*
- *GATRA will implement all manufacturer safety recommendations as part of the plan.*

Auditor's Reply

Based on its response, GATRA is taking measures to address our concerns regarding this matter.

APPENDIX A

Battery Electric Bus Preventative Maintenance Checklist

Elec. Bus

BUS NO. _____ DATE _____
BUS MODEL _____ HUB MILEAGE _____

DESCRIPTION	OK	TECH INITS.	DESCRIPTION	OK	TECH INITS.
GREASE REAR			LINING THICKNESS FRONT		
GREASE FRONT			LINING THICKNESS REAR		
REAR END FLUID			KING PINS- DRAG LINK- TIE RODS		
FLUIDS			DRIVE SHAFT & U JOINTS		
ADJ. BRAKES REAR			HEATERS & AIR CONDITIONING		
ADJ. BRAKES FRONT			WIPER BLADES		
STEAM ENGINE			SEATS		
BATTERIES & CABLES			REAR VIEW MIRRORS		
AIR TANKS			FIRE EXT. CHOCK BLOCKS & FLARES		
FRONT HUBS			FIRE SUPPRESSION		
TIRES			LOW AIR BUZZER		
FRONT SUSPEN & TORQUE ARMS			LIGHTS & BACK UP ALARM		
REAR SUSPENSION & TORQUE ARMS			CAMERA SYSTEM		
COOLING FANS			WHEELCHAIR RAMP/LIFT		
TRACTION MOTOR					

ADDITIONAL REPAIRS TO BE MADE

Diesel Bus Preventative Maintenance Checklist

BUS

BUS NO. _____

DATE: _____

BUS MODEL: _____

HUB MILEAGE: _____

DESCRIPTION	OK	TECH INITS	DESCRIPTION	OK	TECH INITS
OIL & FILTER			REAR SUSPENSION & TORQUE ARMS		
GREASE REAR			RADIATOR HOSES		
GREASE FRONT			LINING THICKNESS FRONT REAR		
REAR END FLUID			PITMAN ARM - DRAG LINK - TIE ROD ENDS - KING PINS		
FLUIDS			DRIVE SHAFT & U JOINTS		
ADJ. BRAKES REAR			HEATERS & AIR CONDITIONING		
ADJ. BRAKES FRONT			WIPER BLADES		
BELTS			STICKER		
STEAM ENGINE			SEATS		
BATTERIES & CABLES			REAR VIEW MIRRORS		
AIR TANKS			FIRE EXTINGUISHER CHOCK BLOCKS & FLARES		
FRONT HUBS			FIRE SUPPRESSION		
ENGINE MOUNTS			LOW AIR BUZZER		
TIRES			LIGHTS & BACK-UP ALARM		
FRONT SUSPENSION & TORQUE ARMS			WHEELCHAIR RAMP/LIFT		

ADDITIONAL REPAIRS TO BE MADE

APPENDIX B

The Greater Attleboro Taunton Regional Transit Authority's Emergency Action Plan for Battery Electric Buses



EMERGENCY ACTION PLAN FOR BATTERY ELECTRIC BUS FIRE

While the possibility of a fire/thermal event is minimal it is still a risk. The National Fire Protection Association (NFPA) has not yet adopted a standard for dealing with electric vehicle fires. The current recommendation is pouring enormous amounts of water into the vehicle. GATRA's maintenance facility is fully fire suppressed with a sprinkler and alarm system. GATRA has and will continue to host local fire departments on the battery electric bus systems and the associated electric infrastructure.

In the event of a thermal or fire event on a battery electric bus located in the maintenance facility follow the following protocol.

- Dial 911 and report the incident
- Evacuate the building and trigger the nearest fire pull station.
- Assemble at your assigned rally point.
- Provide any information needed to the Incident Commander from the fire department.

Do not attempt to fight the fire or event.

If safely possible when evacuating open the garage doors to allow fire department access.