Metropolitan Transportation Authority – Long Island Rail Road

Rolling Stock Programs Department – Selected Aspects of the M9 Rail Car Project Management

Report 2020-S-50 | March 2022

OFFICE OF THE NEW YORK STATE COMPTROLLER
Thomas P. DiNapoli, State Comptroller

Division of State Government Accountability

Audit Highlights

Objective

To determine whether the Long Island Rail Road's Rolling Stock Programs Department has managed the M9 contract so that the contractor delivers the cars on time, within the required scope and quality, and within budget. The audit covered the period from September 2013 to November 2020.

About the Program

The Metropolitan Transportation Authority (MTA) is a State public authority created pursuant to Article 5, Title 11 of the Public Authorities Law. One of six related MTA agencies, the Long Island Rail Road (LIRR) is one of the oldest commuter railroads still in operation, with a charter dating back to the 1830s. LIRR maintains over 700 miles of track, serves 124 stations, and transported more than 300,000 weekday commuters across its system before the COVID-19 pandemic. It remains an important transportation artery for the New York region.

On September 18, 2013, LIRR awarded a contract to procure new M9 train cars. The procurement is managed by LIRR's Rolling Stock Programs Department's nine employees, with the assistance of subject matter experts representing LIRR's operating departments. The contract includes a firm initial base order of 92 cars with options for an additional 584 M9 cars for LIRR and/or Metro-North Railroad. (Metro-North Railroad subsequently dropped out of the contract.) In July 2017, LIRR exercised its first option for an additional 110 cars for a total of 202 LIRR M9 cars. The cars will replace the M3 cars and expand the fleet in preparation for service into Grand Central Terminal via the East Side Access. The cars are assembled at the contractor's plant in Lincoln, Nebraska with final assembly in Yonkers, New York. The first M9 cars entered revenue service on September 11, 2019. The project is funded by MTA's capital program.

Key Findings

We found that LIRR:

- Was behind schedule for delivery of the initial base order of 92 cars by almost 3 years and over budget by $8.9 million.
- Did not assess or collect liquidated damages of $5.5 million from the contractor for delays as of September 2020.
- Accepted 62 rail cars, as of July 31, 2020, with deficiencies under a Conditional Acceptance (CA) agreement. Further, the deficiencies were not corrected timely.

Key Recommendations

- Account for the MTA Capital Program funds as originally budgeted.
- Create a formal procedure to periodically assess and collect the liquidated damages.
- Prioritize the correction of all outstanding items on CA cars so that they can be finally accepted.

Office of the New York State Comptroller
Division of State Government Accountability

March 25, 2022

Janno Lieber
Chairman and Chief Executive Officer
Metropolitan Transportation Authority
2 Broadway
New York, NY 10004

Dear Mr. Lieber:

The Office of the State Comptroller is committed to helping State agencies, public authorities, and local government agencies manage their resources efficiently and effectively. By so doing, it provides accountability for the tax dollars spent to support government operations. The Comptroller oversees the fiscal affairs of State agencies, public authorities, and local government agencies, as well as their compliance with relevant statutes and their observance of good business practices. This fiscal oversight is accomplished, in part, through our audits, which identify opportunities for improving operations. Audits can also identify strategies for reducing costs and strengthening controls that are intended to safeguard assets.

Following is a report of our audit of Long Island Rail Road, entitled *Rolling Stock Programs Department – Selected Aspects of the M9 Rail Car Project Management*. This audit was performed pursuant to the State Comptroller's authority under Article X, Section 5 of the State Constitution and Section 2803 of the Public Authorities Law.

This audit's results and recommendations are resources for you to use in effectively managing your operations and in meeting the expectations of taxpayers. If you have any questions about this report, please feel free to contact us.

Respectfully submitted,

Division of State Government Accountability

Contents

Glossary of Terms 4

Background 5

Audit Findings and Recommendations 6

- Budget and Project Schedule 6
- Recommendations 8
- Liquidated Damages 8
- Recommendation 9
- Conditional Acceptance 9
- Recommendations 10
- System Hardware and Software Design 10
- Recommendations 12
- All-Agency Contract Evaluations 12
- Recommendations 13

Audit Scope, Objective, and Methodology 14

Statutory Requirements 15

- Authority 15
- Reporting Requirements 15

Agency Comments 16

State Comptroller's Comments 26

Contributors to Report 27

Glossary of Terms

Term	Description	Identifier
ACE	All-Agency Contractor Evaluation	*Key Term*
ATC	Automatic Train Control	*Key Term*
CA	Conditional Acceptance	*Key Term*
FMECA	Failure Mode Effect and Criticality Analysis	*Key Term*
FRA	Federal Railroad Administration	*Oversight Agency*
FST	Flammability, Smoke Emission, and Toxicity	*Key Term*
GSA	Global Service Agreement	*Key Term*
Guidelines	ACE Guidelines	*Key Term*
HA	Hazard Analysis	*Key Term*
HVAC	Heat, Ventilation, and Air Conditioning	*Key Term*
LIRR	Long Island Rail Road	*Agency*
MTA	Metropolitan Transportation Authority	*Auditee*
PTC	Positive Train Control	*Key Term*
SSP	System Safety Program	*Key Term*

Background

The Metropolitan Transportation Authority (MTA) is a State public authority created pursuant to Article 5, Title 11 of the Public Authorities Law. One of six related MTA agencies, the Long Island Rail Road (LIRR) is one of the oldest commuter railroads still in operation, with a charter dating back to the 1830s. The LIRR maintains over 700 miles of track, serves 124 stations, and transported more than 300,000 weekday commuters across its system before the COVID-19 pandemic. It remains an important transportation artery for the New York region.

On September 18, 2013, LIRR awarded a contract to procure new M9 train cars. The procurement is managed by LIRR's Rolling Stock Programs Department's nine employees with the assistance of subject matter experts representing LIRR's operating departments. The contract includes a firm initial base order of 92 cars with options for an additional 584 M9 cars for LIRR and/or Metro-North Railroad. (Metro-North Railroad subsequently dropped out of the contract.) In July 2017, LIRR exercised its first option for an additional 110 cars for a total of 202 M9 cars. The cars will replace the M3 cars and expand the fleet in preparation for service into Grand Central Terminal via the East Side Access. The cars are assembled at the contractor's plant in Lincoln, Nebraska with final assembly in Yonkers, New York. The first M9 cars entered revenue service on September 11, 2019. The project is funded through MTA's capital program. The base order of 92 cars – project L-601-01-MA (MA) – was funded by $354.8 million from the 2010-2014 Capital Program. The optional order of 110 cars – project L-701-01-ME (ME) – was funded for $368.8 million from the 2015-2019 capital program budget.

Audit Findings and Recommendations

We examined the contract management records for the M9 Rail Car project and found that the contractor was behind schedule to deliver the 92 base cars by almost 3 years and over budget by $8.9 million.

We also found that LIRR:

- Although eligible, did not assess or collect liquidated damages from the contractor.
- Accepted rail cars with deficiencies under a Conditional Acceptance (CA) contract clause. Further, we noted the deficiencies were not corrected for more than 6 months.
- Has not ensured that the contractor has conducted all the software Failure Mode Effect and Criticality Analysis, as required.
- Did not always comply with the All-Agency Contractor Evaluation Guidelines (Guidelines), as it failed to send written notifications to the vendor about the less-than-satisfactory performance.

Budget and Project Schedule

LIRR officials have a responsibility to ensure the delivery of the M9 rail cars within budget and scope and on schedule. Article 2.02 of the contract requires the contractor to deliver 92 production cars by March 2018, starting September 19, 2017 at the rate of 12 cars per month for a total of $250.8 million. The cars under the optional order are to be accepted at the rate of 12 cars per month immediately following the month of the acceptance of the last base car.

To determine whether LIRR officials ensured that the cars were delivered within budget and on schedule, we interviewed LIRR officials and reviewed capital M9 budgets and project schedules. We found that LIRR officials initially budgeted $355.9 million for the project. In addition to the contractor costs of $250.8 million, this included LIRR's project-related costs and the cost of an engineering management consulting firm. For the initial 92 rail cars, scheduled acceptance was by April 25, 2018 according to the vendor's initial detailed contract schedule for acceptance of the cars. However, as of September 2020, only 64 cars were conditionally accepted, and the budget was $364.8 million – $8.9 million more than the initial budget. LIRR officials conditionally accepted the first production rail cars on September 10, 2019 and the 64th on September 11, 2020, for a rate of five per month. The cars are delivered in pairs, and at that rate, just 76 of the base M9 cars were delivered as of March 2021, about 3 years after the initial completion date. As of August 2021, 100 cars were delivered.

LIRR officials did not respond to our inquiries about the reasons for the cost overruns because they believe that the M9 project costs are within budget. They posit that the initial and current budgets for each project (MA and ME) are $364.8 million and thus the total budget is $733.6 million. However, the $733.6 million contains two components – MA (base) and ME (optional). While LIRR officials contend that the

two projects share a single budget, in LIRR's Capital Program Budget, these are two distinct projects, and LIRR is thus using funding for ME (optional) to support the MA (base) project.

LIRR officials admit that the M9 project is behind schedule, attributing the delays to an accident while delivering eight pilot cars and required testing at the Federal Railroad Administration's (FRA) facility in Pueblo, Colorado. While the Pueblo testing is required by the FRA, LIRR also requires testing at its own facility. LIRR officials stated that, at the Pueblo facility, train cars are tested for three factors: power collection, propulsion, and braking. Also, the Pueblo facility allows for testing on three shifts or 24 hours a day, every day for as long as warranted. This level of testing at a LIRR facility would require shutting down LIRR passenger service.

We noted that issues found in the Pueblo testing were not remedied before additional cars were delivered with the same conditions. Fixing the pilot cars' issues at the LIRR facility added to the delays because these repairs were not part of the schedule.

We found that LIRR officials contributed to the delays by accepting cars with deficiencies under a CA process allowed by the contract terms. In addition, LIRR officials identified the following issues:

- Inadequate training of contractor employees and quality assurance oversight at their Nebraska facility, causing cars to be delivered with improper stripping of wire insulation, poor crimping, missing heat shrinking, and bent pins. Delays occur when additional repairs must be done before the cars are ready for revenue service. For example, LIRR officials asked the contractor to cease car production until defects—electrical wiring failures—found in cars after delivery to the LIRR Hillside facility were fixed.
- Ineffective inspections of the rail cars before delivery to the LIRR Hillside facility. Proper inspection at the contractor's facility and acceptance of only cars without defects would minimize these problems and improve car production.
- Inadequate staffing at the contractor's Yonkers facility, resulting in subcontractors' transmittals not being reviewed properly before being sent to LIRR; transmittals often lacked sufficient data for LIRR's review and were, in many instances, delivered late.

LIRR officials told us about corrective actions taken to address these issues, including:

- Meeting with the contractor's executives to address MTA's concerns about inadequate training and staffing.
- Having the contractor implement various initiatives to resolve workmanship items, such as hiring two additional project engineers dedicated to wiring; conducting refresher training with production, quality, and project engineering staff; and hiring additional inspection staff to enable greater levels of process monitoring.

- Addressing contractor manpower issues by taking steps to facilitate hiring during the COVID-19 pandemic.

Ultimately, however, the remedial actions taken were not effective.

These issues delay production and increase administrative costs, as the project cost increases the longer it takes to complete the project. For example, as of August 2020, although all the consultant costs were expended, only 62 of the base cars were conditionally accepted. Given the expected completion date of December 2023, we conclude that the final cost will be more than $364.8 million. Moreover, the $364.8 million excludes potential costs related to the 243 directives, which according to LIRR officials were issued to remedy problems that arose during production. According to the contract, the contractor is obligated to provide a change order for extra work if it deems that it is additional work. LIRR officials have not given us the cost of the directives, preferring to resolve the costs with the contractor at the end of the contract. According to LIRR officials, the contractor must resolve the directives at no cost to LIRR.

Recommendations

1. Account for the MTA Capital Program funds as originally budgeted.
2. Require the contractor fix the issues detected in testing at the Pueblo or contractor's facility before cars are delivered to the LIRR.
3. Notify the contractor that LIRR will not pay for increased costs related to directives for work not completed to contract specifications as well as increased consultant costs and LIRR's administrative and oversight costs.
4. Cap renumeration for rail car procurement contracts with contractual disagreements by only allowing a limited time to correct deficiencies in conditionally accepted cars.

Liquidated Damages

The contract provides for liquidated damages. The liquidated damage rate was subsequently revised by the Global Service Agreement (GSA) to a flat rate per car, per calendar day of delay, commencing 30 days after the "Conditional Acceptance Completion Date" for each car contained in the Contract Schedule until Acceptance or Conditional Acceptance, whichever occurs first.

We found that, under the original contract, the contractor incurred almost $12.9 million in liquidated damages as of January 30, 2019. However, LIRR officials did not assess the $12.9 million against the contractor. Since the GSA, the contractor has not delivered the cars on schedule. In addition to waiving the liquidated damages, the GSA required LIRR to pay $18.8 million to the contractor to resolve outstanding claims.

Based on the GSA, LIRR can assess $5.5 million in liquidated damages as of September 11, 2020, and we projected this number to grow to approximately $12 million as of June 30, 2021 for the first 92 cars. As with the other liquidated damages, LIRR has not assessed the $5.5 million against the contractor as of May 11, 2021.

At a meeting with LIRR officials on June 11, 2021, they informed us that it is their practice to wait until the end of the contract to assess liquidated damages. They added that this is not in writing or a formal procedure of MTA or LIRR. However, other MTA agencies assess damages during the contract execution. It was explained that when LIRR does assess damages it is in the form of negotiating for additional train cars, parts, or other concessions.

We believe LIRR should act earlier in the contract to assess liquidated damages to prod the contractor to improve its performance to ensure a positive remedy. Interim assessments help minimize the financial risk. At the closing conference, LIRR officials advised us they are revisiting how liquidated damages are handled.

Recommendation

5. Create a formal procedure to periodically assess and collect the liquidated damages.

Conditional Acceptance

Article 2.03 of the M9 rail car contract states that if post-delivery inspection shows that any car has been delivered with minor defects or deficiencies, which in the opinion of the Project Manager do not render the car unfit for service and do not affect safety or function, the Project Manager may in his or her discretion deliver to the contractor's representative a Certificate of Conditional Acceptance. Such Certificate of Conditional Acceptance shall specify as open items all such defects and deficiencies and provide that the car is accepted on the condition that the contractor make any necessary repairs or take such other corrective action to remedy the open items. LIRR shall have the right to withhold twice the value of the open items as may be determined by the Project Manager in his or her reasonable discretion. The Project Manager shall provide a written justification to support his or her valuation of such open items. According to the contract, a conditionally accepted car is "[a] determination by the Railroads that a Car appears to meet the Contract requirements with the exception of Open Items enumerated in the Notice of Conditional Acceptance issued by the Railroads."

The Certificates of Conditional Acceptance are signed by both LIRR and the contractor, with the contractor acknowledging that the cited exceptions are necessary corrective work, which they agree to repair in a reasonable time.

We found that, as of August 13, 2020 and as allowed by the contract, LIRR officials conditionally accepted 62 rail cars with minor defects and deficiencies. According to LIRR records, the 62 rail cars have 9,230 defects or deficiencies. We noted that 14 of the 62 rail cars were conditionally accepted in September 2019, with deficiencies that

the contractor has not corrected for over a year, as of October 13, 2020. However, LIRR officials have not required the contractor to undertake corrective actions to remedy the defects, nor have they set a deadline for it to do so. Examples of tests not done or the defects are:

- Skipped network check because CCTV was not available
- Loose cab control panel equipment (buttons, lights, button securement)
- A non-operational waste tank

LIRR conditionally accepted the first rail cars on September 10, 2019 and by September 26, 2019 had delivered 14 rail cars. LIRR officials advised that the defects are not safety related.

Officials of both the railroad and the manufacturer review and approve their Engineering design of modifications required to close out open items identified at Car Conditional Acceptance, and the railroad personnel to accept and sign off. Once a fix has been approved, cars will be removed from service in small batches, and the manufacturer will apply the fixes at LIRR's Arch Street facility. It is hoped that this process will result in the resolution of outstanding issues and the full and final acceptance of the rail cars.

The delivery of rail cars is behind original schedule by almost 3 years; consequently, LIRR officials are focused on delivering the outstanding rail cars and not fixing defects and deficiencies.

The continued operation of rail cars with minor defects and deficiencies runs the risk of aggravating the defects over time into conditions that will impact the operation of the rail cars and result in increased repair costs.

Recommendations

6. Prioritize the correction of all outstanding items on CA cars so that they can be finally accepted.
7. Work with the contractor to establish a schedule for developing proposed resolution of the open items, obtaining any necessary approvals, and making the repairs that allows the issues to be resolved by an agreed-upon future date.

System Hardware and Software Design

According to the Section 205, A.13 of the Technical Provisions of the contract, "The Contractor shall perform Failure Mode Effects and Criticality Analysis (FMECA) to identify weaknesses in system hardware and software design, and to analyze the modes and effects of failures whenever these details are not established by historical records of equipment operation. The FMECA shall provide input to system designs and to the safety analyses for theoretical circuit behavior, random component

failures, electrical interference, systematic component failures, and software errors in software-based logic. FMECA and reliability and maintainability analyses as specified in Section 204 shall be updated throughout vehicle design development."

We examined the hardware and software systems for 18 equipment systems to determine whether LIRR officials ensured the vendor complied with the contract's safety provisions. Of the 18 equipment hardware systems, we found that while the vendor conducted FMECAs for all hardware, they did not conduct FMECAs for the software of six equipment systems: Auxiliary Power Supply, Automatic Train Control (ATC), Friction Brake and Air Supply Heat, Ventilation and Air Conditioning (HVAC), Positive Train Control (PTC), and Waste and Water System.

Thus, while LIRR officials reviewed the available FMECAs, it appears that their review is incomplete because they have not reviewed the six software FMECAs mentioned above. Moreover, LIRR officials have not requested that the contractor prepare the six software FMECAs. In the absence of software FMECAs, conditions affecting rail car operations may occur.

In response to our preliminary findings, LIRR stated that they provided all available software FMECA documentation and references. However, even where documentation was provided, it raised questions regarding the thoroughness of LIRR's review of the contractor's work to ensure a quality product is delivered to LIRR. For instance, a review by LIRR personnel of their Hazard Analysis table of the auxiliary power system showed the 47 open hazard risks remaining after five iterations of the document were closed by LIRR without further review or explanation.

In addition to the FMECA, the Technical Provisions also require that:

- All materials used on the car shall conform to all FRA requirements and guidelines for flammability and smoke emissions. Additionally, the results of all testing performed on materials utilized in the construction of the M9 cars, in accordance with the above FRA requirements, shall be entered into a Flammability, Smoke Emission, and Toxicity spreadsheet (FST) database.
- The contractor develops, implements, and maintains a comprehensive System Safety Program (SSP).
- The contractor performs a hazard analysis on all hazards identified in the Hazard Lists developed in Section 205.A.14.

We found LIRR was generally compliant with these provisions.

Recommendations

8. Ensure that the contractor tests the PTC equipment after installation.

9. Ensure the contractor conducts all required software system FMECAs, including the ATC software FMECA, and make the document available to Rolling Stock officials.

10. Prepare a hazard database to identify all software and hardware systems.

All-Agency Contract Evaluations

According to MTA's Guidelines: "If all the categories receive a satisfactory rating but one or more components are, otherwise, the Agency shall ensure that the firm was notified in writing during the performance period of such deficiency. If no such notification was issued, the Agency shall notify the firm using the Performance Improvement Letter."

The Guidelines also state that: "Each evaluation shall be entered into the All-Agency Contractor Evaluation (ACE) System no later than 45 calendar days from the end of the performance review period or the applicable milestone."

According to LIRR Capital Program Procedure 445 – Evaluation of Contractor and Consultant Performance: "2.1 The ACE Administrator as designated by the Chief Program Officer Department of Program Management (DPM), shall ensure that each applicable construction and consultant contract release is assigned an Evaluator (typically Project Manager level), a Reviewer (typically Director level) and an Approver (typically Assistant Chief level), and shall function as the Long Island Rail Road (LIRR) ACE Point of Contact with the MTA and other MTA Agencies for the contract."

To determine whether LIRR officials complied with ACE, we examined 26 evaluations (11 from the engineering management consulting firm plus 15 from the contractor) for the M9 project. We found 13 evaluations that had one or more components with a marginal or unsatisfactory rating. Ten had no written notification to the vendor about their marginal or unsatisfactory rating, as required by ACE. Three have written notification about the marginal or unsatisfactory performance. Examples of marginal or unsatisfactory ratings are workmanship, submittals and deliverables, adequacy of contractor staffing, management of subcontractors and suppliers, and punch list work.

We also found that four evaluations were done more than 45 days late and that the evaluator for all evaluations was an employee who was not a Project Manager, as required. Rather, the evaluator was in a support role function and not aligned with day-to-day project operations.

According to LIRR officials, the reason for non-compliance with ACE was their proactive monitoring, evaluating, and reacting to the contractor's poor performance that are not directly "ACE" driven. LIRR officials explained that the contractor is

aware of the deficiencies because LIRR continuously informs the contractor and cites the directives as evidence. However, ACE is unequivocal; written notification is required. These letters and any responses would then have been available to other MTA agencies.

Further, in the absence of formal notification, it may affect MTA's efforts to seek remedies.

Recommendations

11. Notify the contractor using the Performance Improvement Letters, as required by the Guidelines.
12. Ensure that the ACE evaluator role is assigned to a Project Manager or above.

Audit Scope, Objective, and Methodology

The objective of this audit is to determine whether LIRR's Rolling Stock Programs Department has managed the M9 contract so that the contractor delivers the cars on time, within the required scope and quality, and within budget. The audit covered the period from September 2013 to November 2020.

To accomplish our objective and evaluate relevant internal controls, we interviewed LIRR officials to gain an understanding of their capital project administration, record keeping, and document storage. Additionally, we examined budget and schedule records on SharePoint and Project Status Reporting. We also visited the contractor's rail car facility at Hillside and observed completed M9 rail cars in operation. We selected a sample of 15 conditionally accepted rail cars (of the 40 conditionally accepted rail cars) as of March 21, 2020 to determine whether the identified defects had been corrected. The results from our samples are not intended to be projected to the population.

Statutory Requirements

Authority

This audit was performed pursuant to the State Comptroller's authority under Article X, Section 5 of the State Constitution and Section 2803 of the Public Authorities Law.

We conducted our audit in accordance with generally accepted government auditing standards. These 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 objective. We evaluated the LIRR's internal controls related to capital project management. We believe that the evidence obtained during our audit provides a reasonable basis for our findings and conclusions based on our audit objective.

In addition to being the State Auditor, the Comptroller performs certain other constitutionally and statutorily mandated duties as the chief fiscal officer of New York State, including some duties on behalf of public authorities. For MTA, these include reporting MTA as a discrete component unit in the State's financial statements and approving selected contracts. These duties could be considered management functions for purposes of evaluating organizational independence under generally accepted government auditing standards. In our professional judgment, these duties do not affect our ability to conduct this independent audit of MTA's oversight and administration of selected aspects of the M9 Rail Car Project.

Reporting Requirements

We provided a draft copy of this report to LIRR officials for their review and formal comment. Their comments were considered in preparing this final report and have been attached in their entirety at the end of it, except for documents labeled "Confidential" and a 39-page document related to PTC. Our responses to certain MTA LIRR comments are included in the report's State Comptroller's Comments.

MTA officials replied to our draft report that they either disagree or take a neutral position with most of our recommendations. MTA takes the position that many of the conditions noted in the report are the result of common industry practice and thus they decline to take action. However, we urge MTA and LIRR officials to revisit their position as rail cars that are delivered over 3 years late and defects – even minor ones – that take years to correct should not be the accepted norm for performance at MTA and LIRR.

Within 180 days of the release of our final report, as required by Section 170 of the Executive Law, the Chairman of the Metropolitan Transportation Authority shall report to the Governor, the State Comptroller, and the leaders of the Legislature and fiscal committees, advising what steps were taken to implement the recommendations contained herein, and if the recommendations were not implemented, the reasons why.

Agency Comments

2 Broadway
New York, NY 10004
212 878-7000 Tel

Janno Lieber
Chairman and Chief Executive Officer

Metropolitan Transportation Authority
State of New York

February 11, 2022

Ms. Carmen Maldonado
Audit Director
The Office of the State Comptroller
Division of State Government Accountability
59 Maiden Lane, 21st Floor
New York, NY 10038

Re: Draft Report #2020-S-50 (Selected Aspects of the M9 Rail Car Project Management)

Dear Ms. Maldonado:

This is in reply to your letter requesting a response to the above-referenced draft report.

I have attached for your information the comments of Phillip Eng, President, MTA Long Island Rail Road, which address this report.

Sincerely,

Janno Lieber
Chairman and Chief Executive Officer

c: Laura Wiles, MTA Chief of Staff
Michele Woods, Auditor General, MTA Audit Services

Jamaica Station
Jamaica, NY 11435-4380

Phillip Eng
President

Robert Free
Senior Vice President - Operations

Long Island Rail Road

February 10, 2022

Mr. Janno Lieber
Chairman and Chief Executive Officer
Metropolitan Transportation Authority
2 Broadway
New York, NY 10004

RE: Long Island Rail Road - Rolling Stock Programs
Selected Aspects of the M9 Rail Car Project Management
Audit 2020-S-50

Dear Chairman Lieber,

As required by Section 170 of the Executive Law, detailed below are the responses to the specific findings and recommendations contained in the Office of the New York State Comptroller (OSC) Audit of the Long Island Rail Road (LIRR) Rolling Stock Programs' M9 Rail Car Project Management, and the actions that have or will soon be taken to address those recommendations.

INTRODUCTION

The Long Island Rail Road Company (LIRR), on behalf of itself and Metro-North Commuter Railroad Company (MNCR), awarded a contract to Kawasaki Rail Car, Inc. (Kawasaki) in 2013 for the design, manufacture, test and delivery of M-9 Passenger Railcars (the Contract). The initial award was for a fixed amount of $250,777,040 for 92 Base Order M-9 Cars for LIRR. The Contract required delivery of the 92 Production Cars to begin on September 19, 2017 at the rate of 12 Cars per month. In July 2017, LIRR exercised its first option for an additional 110 Cars in the fixed amount of $246,581,500, which in accordance with the Contract were to be delivered at the rate of 12 cars per month continuously following the last Base Order Car. However, due to numerous unforeseen technical and workmanship issues, Kawasaki failed to meet its car delivery deadlines. The current schedule provided by Kawasaki lists October 2022 as the completion date for the Conditional Acceptance of the 202nd Car.

The Office of the New York State Comptroller (OSC) commenced an audit of the Rolling Stock Programs Department – Selected Aspects of the M9 Rail Car Project Management on July 23, 2020 with the objective to determine whether:

- The LIRR's rolling stock programs department has managed the M9 contract so that the contractor delivers the cars on time, within the required scope and quality, and within budget.

LIRR's top priority and key responsibility is to ensure Kawasaki's compliance with the Technical Specifications and Terms and Conditions of the Contract, and to ensure that LIRR receives safe and reliable cars for our customers and workforce.

Comment 1

Throughout the audit, LIRR met with the audit team on numerous occasions and provided them with documents and information that clearly demonstrate the actions and due diligence taken by LIRR.

LIRR fundamentally disagrees with the audit conclusions.

ANALYSIS OF KEY AUDIT FINDINGS AND CONCLUSIONS

The audit report noted the following key findings:

1. *LIRR was behind schedule for delivery of the initial base order of 92 cars by almost 3 years and over budget by $8.9 million.*

   While LIRR acknowledges the delayed delivery of cars, LIRR strongly disagrees that it contributed to the delays by accepting cars with deficiencies. It is an industry practice to conditionally accept cars with non-safety related minor defects because it allows the agency to safely bring new cars to passenger service, while correcting the minor defects. Contrary to the audit report, conditional acceptance is a contractual provision that assists in expediting the schedule. The audit fails to recognize the complexity of the typical rail vehicle design and manufacturing process and the valid reasons for delays that occurred including unforeseeable technical and workmanship issues. In fact, the rigorous testing that is required prior to acceptance is in place to find and address such issues. Implementing design changes and correcting workmanship issues take time. As previously stated in LIRR's September 30, 2021 response, in December 2020, MTA Senior Staff and the Agencies' Project Teams met with Kawasaki executives to address the MTA's concerns over inadequate training and staffing at Kawasaki's facilities and Kawasaki presented various initiatives Kawasaki implemented to address the MTA's concerns. The report understates the significance of the remedial actions that were taken. Contrary to the audit report, the remedial actions were effective. The workmanship issues experienced in the Lincoln and Yonkers plants decreased, and the cars presented for testing had improved workmanship.

   Comment 2

   Further, the audit report incorrectly stated that the expected completion date is December 2023. The Contractor's latest Detailed Contract Schedule (DCS) estimates that the final M-9 Car will be accepted in October 2022.

   Comment 3

   LIRR is committed to only accepting a quality product and will never accept a car until it is safe and reliable to operate on LIRR's property. LIRR will not accept a car for the sake of meeting a prescribed schedule.

   Comment 4

   To expedite the Work and mitigate any further delays to the project, LIRR issued Directives, which is directing work that LIRR has determined to be within the scope of the M-9 contract and for which the Contract value would not be increased. Although previously explained in LIRR's July 9, 2021 response, the audit report incorrectly categorizes all these Directives as Change Orders. To date, a total of 253 Directives have been issued, of which 160 have been resolved and closed. Of the 93 Directives that remain open to-date, 57 are Directed Work and 36 are Change Orders and will be negotiated such that they will not substantially increase the project cost or budget.

   It is inaccurate to state that LIRR officials did not respond to the audit inquiries regarding cost overruns. As previously stated in LIRR's July 9, 2021 response, there were no cost overruns. The M-9 project is an order for 202 Cars - 92 Base Cars funded by the 2010-2014 Capital Program and 110 Option Cars funded by the 2015-2019 Capital Program. When the Option Car order was exercised, the M-9 project team combined the budget into one total of $733 million. The audit emphasized that the M-9 Project has 2 components, but lost sight of the fact that the design work for a Base Order Car is the same for an option car, and there is no

   Comment 5

downside to combining the budgets, as it is all one project, albeit funded in two separate Capital Programs. In fact, collecting actual costs incurred for LIRR and Consultant labor based upon whether work was being performed on a Base Car or an Option Car was not feasible, worthwhile, or practical.

2. *LIRR did not assess or collect liquidated damages of $5.5 million from the contractor for delays as of September 2020.*

On January 31, 2019, LIRR and Kawasaki entered into a Global Settlement Agreement (as opposed to a Global Service Agreement as indicated in the report) to resolve certain disputes and claims that arose with respect to the Contract. The settlement agreement allowed for a new contract schedule and an assessment of liquated damages against the new delivery schedule in the event of further lateness. Additionally, the settlement agreement resolved several open issues on the Project and avoided a potentially long and protracted mediation process that would have likely further delayed the Project. The audit report is inaccurate in its determination that LIRR did not assess liquidated damages since the liquidated damages that accrued were part of a negotiated settlement, which resulted in benefits for LIRR and Kawasaki, including but not limited to the exercise of option cars, extra work, and a new delivery schedule.

The utilization of the liquidated damages, either as part of a negotiated settlement, or to purchase spare parts or defray the cost of cars, will be a decision LIRR will make at the appropriate time. Nevertheless, the full value of the liquidated damages will be utilized to offset an equal value received from Kawasaki.

Comment 2

3. *LIRR accepted 62 rail cars, as of July 31, 2020, with deficiencies under a Conditional Acceptance (CA) agreement. Further, the deficiencies were not corrected timely.*

To be clear, under the Contract with Kawasaki, LIRR may conditionally accept any car with minor defects or deficiencies which do not render the car unfit for service and do not affect safety or function. It is incorrect to state that LIRR is not focused on fixing any minor defects or deficiencies. LIRR took all appropriate action to ensure that all complex technical and workmanship issues were fully resolved per the Contract and that no cars were delivered or put into service without passing all testing required by the Contract. As stated above, Conditional Acceptance allows LIRR to accomplish its goal of safely bringing new cars to passenger service for the benefit of its ridership as quickly as possible while then turning to correcting any minor defects or deficiencies to bring the cars to Final Acceptance. However, fixing any minor defects as expeditiously as the audit report would imply has not been feasible especially during a period primarily dominated by taking delivery of the first group of cars ordered and safely placing them into passenger service.

Comment 2

The audit report erroneously states that LIRR is not requiring the contractor to fix the minor defects and deficiencies in the cars LIRR conditionally accepted and LIRR is more focused on delivering the outstanding cars than fixing defects. To the contrary, LIRR requires that Kawasaki identifies the root cause of every open item, and propose a new design, which is reviewed and approved by LIRR. Once approved, drawings are updated, and new parts are ordered. To perform the modification work, the cars must be taken out of passenger service, and as such, it

is to LIRR's benefit to combine as many modifications as possible so that the cars come out of passenger service as few times as possible. Further, the report dramatically overstates the significance of the continued operation of the cars with the minor defects. There is no evidence that continuing to run cars with open items will in any way lead to aggravating defects over time or increase repair costs. The cars remain under warranty until all open items are closed out and the car receives Final Acceptance.

4. *LIRR has not ensured that the contractor has conducted software Failure Mode Effects Criticality Analyses (FMECAS), as required.*

FMECAs are typically used to assess hardware failures. Many suppliers have noted that their software is not included in the FEMCA and address it separately because software does not have defined failure mechanisms. This is because software either works or does not work (it may not work as intended); the software itself does not fail, although hardware containing the software can fail.

LIRR has addressed software through the software design process required by Section 506 A.5 of the Contract. LIRR does ensure that proper analyses are completed by monitoring that each individual supplier performs the necessary software analysis as a FMECA or a Hazard Analysis to demonstrate if the failure modes and hazards are at unacceptable risks for their systems.

As LIRR explained during the March 30, 2021 teleconference with the auditors, LIRR was fully compliant as the Positive Train Control (PTC) system was designed by a consortium of Siemens and Bombardier for LIRR's entire fleet of Rolling Stock and was managed by LIRR. Since the FMECA is a design-related analysis and the PTC system was not designed by Kawasaki, it is not appropriate, feasible or cost effective to require that Kawasaki should, or could, perform the FMECA when the LIRR had already managed this work for the PTC system. Additionally, as per LIRR's response dated May 6, 2021 to the auditor's preliminary letter, the LIRR did appropriately complete the FMECA for the PTC equipment installed on the M9 cars (documentation of which was provided with LIRR's response – see Attachments A & B).

Comment 6

5. *LIRR did not always comply with the All-Agency Contractor Evaluation (ACE) Guidelines, as it failed to send written notifications to the vendor about the less-than-satisfactory performance.*

The audit found that although LIRR had completed evaluations of Kawasaki's performance, for 10 evaluations LIRR had no written notifications to Kawasaki about its performance. Though these written notifications had not been completed, Kawasaki was well advised of LIRR's view that its performance was marginal and/or unsatisfactory through numerous LIRR correspondences, including Directives that were transmitted to Kawasaki and during meetings held with Kawasaki. The audit report implies that the absence of the formal notification would render the other MTA agencies unaware of the car builder's performance and ACE ratings. It should be noted that within the MTA only three (3) agencies

(NYCT, LIRR and MNR) procure railcars. While NYCT does not utilize the ACE system, information is routinely shared between LIRR and NYCT. Also, LIRR and MNR conduct joint railcar procurements and have full access to each other's project related documents including ACE reports.[1] Moreover, LIRR, as the lead agency on the M-9 Project, regularly briefs the MTA Board, LIRR/MNR Committees and the Capital Program Committee, so all interested parties are fully aware of Kawasaki's performance on the M-9 Project. Finally, LIRR aggressively manages the contract to ensure that Kawasaki is accountable for the delivery of reliable cars in accordance with the Contract. Each car must pass rigorous testing, and any open items are tracked to ensure corrective actions are addressed by Kawasaki prior to Acceptance. The oversight by the LIRR has resulted in the cars exceeding the reliability requirements of the Contract.

LIRR RESPONSES TO AUDIT FNDINGS AND RECOMMENDATIONS

Recommendation No. 1

- Account for the MTA Capital Program funds as originally budgeted.

LIRR Response:

LIRR does not agree with this recommendation. As stated in previous responses, the Project's two funding sources, which come from two separate Capital Programs, support the entire project for 202 cars and there is no benefit in tracking them separately. While one budget may have been exceeded by $8.9M, the other budget is underrunning by $11.5M, leaving an overall project contingency of $2.6M. See response to Key Finding #1 above.

Recommendation No. 2

- Require the contractor fix the issues detected in testing at the Pueblo or contractor's facility before cars are delivered to the LIRR.

LIRR Response:

LIRR does not agree with this recommendation. This recommendation is based on the false assumption that *"issues found in the Pueblo testing were not remedied before additional cars are delivered with the same conditions."* This misstatement implies that LIRR allowed the cars in question to be shipped to LIRR without fixing these defects. This is incorrect. Any issues discovered on the cars during the limited testing at Pueblo on the propulsion, braking and current collection systems were required to be corrected prior to the delivery and commencement of testing at LIRR. Any other issues that arose after the cars were delivered to LIRR were unrelated to the limited testing at Pueblo. The testing at Pueblo was both appropriate and conducted properly. We note that all testing at Pueblo has been completed.

Comment 7

[1] It should be noted that the ACE system has been fazed-out and LIRR and Metro North are transitioning to the VENDEVAL system, which is currently being used by New York City Transit.

If LIRR were to require the contractor to fix all issues before delivering the cars, LIRR would not be able to place any M-9 cars in passenger service. Rolling Stock contracts always contain provisions allowing for Conditional Acceptance of cars with minor non-safety related deficiencies like punch list items which allow for beneficial use of a facility in construction contracts. In the case of the M-9's, it allows the new cars to enter passenger service, while design of modifications for non-safety related issues can be developed and implemented.

Recommendation No. 3

- Notify the contractor that LIRR will not pay for increased costs related to directives for work not completed to contract specifications as well as increased consultant costs and LIRR's administrative and oversight costs.

LIRR Response:

The M-9 Contract is a Firm Fixed Price contract and Kawasaki is responsible for designing and manufacturing the M-9 Car in accordance with the M-9 Contract.

Every Directive letter contains the following notification to Kawasaki making it very clear that LIRR is not responsible for any costs associated with the issuance of directives:

"This directive is being issued for the sole purpose of progressing forward Kawasaki's Work under the Contract. To date, Kawasaki and its supplier, have demonstrated an inability to timely progress the Work in a manner that gives LIRR confidence that Kawasaki and its supplier can complete the design of the car as required by the Contract. Accordingly, to mitigate potential, additional, and/or future schedule delays caused by Kawasaki's and its supplier's inability to provide specification-compliant design solutions for critical systems, LIRR is directing Kawasaki and its supplier to perform the portion of the Work identified herein. Nothing contained herein shall be construed as relieving Kawasaki of its obligations under the Contract including, but not limited to, Kawasaki's ultimate responsibility as the Contractor to provide for the design, arrangement, and manufacture of the Cars in accordance with the Contract Documents."

Recommendation No. 4

- Cap renumeration for rail car procurement contracts with contractual disagreements by only allowing a limited time to correct deficiencies in conditionally accepted cars.

LIRR Response:

LIRR does not agree with this recommendation. All contracts have negotiated terms and conditions, the acceptance of which carries risks for both parties. The amount paid for a railcar is capped by the contract but limiting the time to correct defects is not recommended. Each defect as they arise would require different actions and timelines. It is more important to fix an issue correctly than to arbitrarily establish a timeline without knowing the appropriate corrective action. This would impose a risk to potential proposers

and would likely result in higher upfront costs built into bids or potentially eliminate interested manufacturers from bidding. In the case of the M-9 Contract, if the Contractor fails to remedy the minor defects and deficiencies within the time-period set forth, the Contractor may be required to commit additional resources to remedy, to the degree possible, delays encountered in performing the work, or do or cause to be done, at the Contractor's expense, any necessary work to remedy the defect.

The overall Project is better served if all Modifications are finalized toward the end of car deliveries and then cars are cycled through a modification program a limited number of times, keeping in mind that when cars are taken out of service to implement, car availability is negatively impacted. Pursuant to the Contract's Conditional Acceptance provisions, LIRR receives cars with minor non-safety related deficiencies and operates them in passenger service. At the same time, the Contractor and LIRR work together on design solutions to remedy the deficiencies utilizing the necessary time and manpower to bring to successful closure.

Recommendation No. 5

- Create a formal procedure to periodically assess and collect the liquidated damages.

LIRR Response:

LIRR does not agree with this recommendation. The accrual and assessment of Liquidated Damages is based on the negotiated terms and conditions of the Contract. The utilization of Liquidated Damages, either as part of a negotiated settlement, or to purchase spare parts or defray the cost of cars, should be a decision LIRR can make when it is appropriate for the project instead of according to a set procedure which may not reflect the specifics of the contract. Nevertheless, as stated above, the full value of the liquidated damages will be utilized to offset an equal value received from Kawasaki.

Recommendation No. 6

- Prioritize the correction of all outstanding items on CA cars so that they can be fully accepted.

LIRR Response:

LIRR is currently working with Kawasaki to finalize the modification design changes and develop a schedule for implementation. Specifically, LIRR is working closely with Kawasaki to review and approve their Engineering design of modifications required to close out open items identified at Car Conditional Acceptance. The open items requiring an Engineering design to close are taking top priority, since they are generally longer to implement and require materials to be fabricated and delivered. When enough of these modifications is finalized by Kawasaki, approved by LIRR, and materials are available to allow Kawasaki to implement the modifications, cars will be cycled through the Arch Street Facility. While the cars are at Arch Street for the modification program, minor workmanship issues previously identified as open items will also be corrected. Once all open items are closed, the cars will achieve Final Acceptance by LIRR.

Recommendation No. 7

- Work with the contractor to establish a schedule for developing proposed resolution of the open items, obtaining any necessary approvals, and making the repairs that allows the issues to be resolved by an agreed-upon future date.

LIRR Response:

As per the response to Recommendation No. 6, LIRR is currently working with the Contractor to finalize the modification design changes and develop a schedule for implementation.

Recommendation No. 8

- Ensure that the contractor tests the PTC equipment after installation.

LIRR Response:

Pursuant to the terms of the M-9 Contract, PTC equipment was always intended to be provided by LIRR as a piece of government furnished equipment. Kawasaki's only contractual requirement was to install the PTC system in each M-9 car. As a result of this arrangement, the scope of testing that Kawasaki would conduct is limited to verifying that the electrical interface between the car and the PTC equipment is correct. It is LIRR's responsibility to test the PTC equipment, which is done upon delivery by the PTC Contractor to LIRR. The LIRR M-9 commissioning team updates PTC software and completes a full static test procedure on every M-9 vehicle. LIRR then conducts Dynamic Qualification testing on the M-9 Cars to qualify them for PTC operation.

Recommendation No. 9

- Ensure that the contractor conducts all required software system FMECAs, including the ATC software FMECA, and make the document available to Rolling Stock officials.

LIRR Response:

As stated above, FMECAs are typically used to assess hardware failures. Many suppliers have noted that their software is not included in the FEMCA and address it separately because software does not have defined failure mechanisms. Software has been addressed through the software design process required by Section 506 A.5. In the case of the ATC software (and the process is typical of the other systems with software), the ATC Contractor has issued its ATC System Safety Certification Report 'Release 7' Software (the latest software installed) confirming that verification and validation has been completed and that there are no known non-conformities, and the software is fit for revenue service.

Recommendation No. 10

- Prepare a hazard database to identify all software and hardware systems.

LIRR Response:

As stated above, LIRR has a database to identify all software and hardware systems (documentation of which was provided with LIRR's May 6, 2021 response to the preliminary letter- see Attachment C). The hazards are identified in the FMECAs and Hazard Analyses and are provided for each major subsystem by the Contractor, separated by systems for those it designed and those of its suppliers, for efficiency of review.

Recommendation No. 11

- Notify the contractor using the Performance Improvement Letters, as required by the Guidelines.

LIRR Response:

Performance Improvement Letters, as required, have been issued.

Recommendation No. 12

- Ensure that the ACE evaluator role is assigned to a Project Manager or above.

LIRR Response:

Change in review personnel has been completed.

Sincerely,

Phillip Eng
President – LIRR

cc: Robert Free - LIRR
Jim Allen – LIRR
Anthony Kamanes – LIRR
Paige Graves – MTA
Stephen Papandon - LIRR
Johanna Rosado - LIRR
Howard Cutler – LIRR
Darren Jurgens - MTA

State Comptroller's Comments

1. The audit concluded that the M9 rail cars were not delivered on time and within budget, and that many of the cars that were conditionally accepted have not had their deficiencies corrected although a significant amount of time has passed. These findings are supported by sufficient and competent evidence.

2. The audit does not conclude that conditional acceptance of cars itself was the cause of the delays but only that this practice under specific circumstances was a contributing factor to delays. By the continual acceptance of certain cars that were determined to be defective by testing at Pueblo, LIRR's schedule was delayed due to required remediation work of these cars at LIRR facilities, which was unplanned. Moreover, contrary to LIRR's assertions, the corrective actions were not effective, as demonstrated by the significant delays, which MTA acknowledges. MTA is conflating timeliness and quality. This finding relates to timeliness alone.

3. The source of the December 2023 estimated completion date was LIRR. We are pleased to see that LIRR is now reporting a completion date of October 2022.

4. MTA is again conflating timeliness and quality. Contrary to MTA's belief, the two are not mutually exclusive and the finding makes no statement about quality – only that MTA was not timely. If MTA does not believe it can provide a quality product within the time frames it schedules, it should examine and improve its scheduling process.

5. LIRR combined the budgets for two projects MA and ME – allowing the shifting of cost overruns from the MA project to the ME project (currently incomplete) and obscuring the cost overruns of the MA project. The MTA Capital Plan 2010-2014 and LIRR's Project Summary Report show MA is a separate project with a separate budgeted amount, which LIRR exceeded. This action also resulted in a decrease in the amount available to complete the ME project and, unless the ME project comes in below budgeted costs, will result in a cost overrun for the combined project.

6. As stated in the report, we requested documentation to support that the PTC installed in each rail car was tested by the contractor to ensure it was working properly. Instead, LIRR officials provided a document that was previously provided to show that the PTC equipment was tested when it was accepted from the manufacturer. This does not provide any assurance that the equipment will function properly in the rail car.

7. Our review of documents for the tests that were supposed to be conducted at Pueblo show that not all of the tests were done, and issues disclosed by other tests were not addressed. Instead, the contractor determined they would be addressed at a LIRR facility.

Contributors to Report

Executive Team

Andrea C. Miller - *Executive Deputy Comptroller*

Tina Kim - *Deputy Comptroller*

Ken Shulman - *Assistant Comptroller*

Audit Team

Carmen Maldonado - *Audit Director*

Robert C. Mehrhoff - *Audit Manager*

Joseph Smith - *Audit Supervisor*

Orin Ninvalle - *Examiner-in-Charge*

Sean Liao - *Senior Examiner*

Contact Information
(518) 474-3271
StateGovernmentAccountability@osc.ny.gov
Office of the New York State Comptroller
Division of State Government Accountability
110 State Street, 11th Floor
Albany, NY 12236

Like us on Facebook at facebook.com/nyscomptroller
Follow us on Twitter @nyscomptroller
For more audits or information, please visit: www.osc.state.ny.us/audits/index.htm