



OFFICE of INSPECTOR GENERAL
NATIONAL RAILROAD PASSENGER CORPORATION

MAJOR PROGRAMS:

**Company Improved Management of New Acela Program,
but Additional Delays and Cost Increases are Likely**

Certain information in this report has been redacted due to its sensitive nature.

Report amended November 7, 2023


OIG-A-2023-013 | September 29, 2023

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Memorandum

To: Laura Mason
Executive Vice President Capital Delivery

From: James Morrison 
Assistant Inspector General

Date: September 29, 2023

Subject: *Major Programs: Company Improved Management of New Acela Program, but Additional Delays and Cost Increases are Likely (OIG-A-2023-013)*

Acela is Amtrak's (the company) premier service and its most profitable business line; the company relies on Acela's revenue to meet its financial goals. In 2014, the company initiated the \$2.3 billion New Acela program to replace its aging fleet of high-speed trainsets on the Northeast Corridor (NEC). The company contracted with Alstom (the vendor) to develop and manufacture 28 new high-speed trainsets, which were initially scheduled to begin revenue service in May 2021. As of July 2023, the company has spent approximately \$1.6 billion on the entire program, including [REDACTED] on the trainset acquisition. It plans to launch revenue service with the first six functional trainsets the vendor delivers.

Given the size and importance of this program, our objective for this audit was to reassess the company's management and oversight of New Acela since we last reported on the program in 2020, including the trainset acquisition and other program elements necessary to launch revenue service. This is our fifth report on the New Acela program. Our previous reports focused on the company's business case for the program, its management of it, and schedule risks.¹

To reassess the company's management and oversight, we interviewed company executives and program management officials, and we reviewed key planning and

¹ *Asset Management: Amtrak Followed Sound Practices in Developing a Preliminary Business Case for Procuring Next-Generation High-Speed Trainsets and Could Enhance its Final Case with Further Analysis (OIG-E-2014-007), May 29, 2014; Train Operations: The Acela Express 2021 Program Faces Oversight Weaknesses and Schedule Risks (OIG-A-2018-002), November 16, 2017; Train Operations: Acela 21 Program Continues to Face Significant Risk of Delays, Warranting More Contingency Planning (OIG-A-2020-004), January 21, 2020; and Observations on Risks to the Acela 21 Information Technology Program Element (OIG-MAR-2020-009), April 22, 2020.*

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management documents—including its program management plan, program schedule, and trainset contract. We compared these to company and industry standards for program management. We also reviewed federal regulations and talked to officials from the Department of Transportation’s (DOT) Volpe Center and the Federal Railroad Administration (FRA) to obtain their perspectives on the program. We visited the company’s trainset storage facility in Philadelphia, Pennsylvania; the service and inspection maintenance facilities in Washington, D.C.; and the maintenance facility in Bear, Delaware, where the company stores several legacy Acela trainsets. We also visited the vendor’s manufacturing facility in Hornell, New York; observed trainset production processes; and interviewed vendor officials assigned to the program. For more details on our scope and methodology, see Appendix A.

SUMMARY OF RESULTS

The company has made recent improvements to the New Acela program’s management. Despite these efforts, the program is more than three years behind schedule, and additional delays are likely. Current delays have already resulted in significant cost increases, operational impacts, and delayed revenue, and any further schedule slippage would exacerbate these impacts.

We identified two key reasons for the current—and likely future—delays to New Acela:

- **Trainset designs have not yet met FRA requirements.** Federal regulations require the company to submit to FRA trainset performance predictions from a computer model showing that the model is valid and the trainsets are safe to proceed with required testing.² Although the company must submit these predictions to FRA for approval, the vendor is [REDACTED] responsible for developing and validating the model. Contrary to leading practices,³ however, the vendor started producing serial trainsets⁴ before it validated the model. Now, three years after starting serial production, the vendor has built more than half of

² The New Acela trainsets include a tilt-technology design, and a portion of the tilt system is new to North America.

³ Although the company asserts that there is no common standard for manufacturing passenger rail equipment, we relied on leading manufacturing practices, which included passenger and freight rail, among other industries such as defense, construction equipment, and automobile design and manufacturing.

⁴ The vendor has produced 14 full trainsets – 12 serial trainsets and 2 prototypes that are not considered serial trainsets.

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all units, but has not yet validated the model, which is the first step in a multi-step regulatory testing process. Company officials told us they did not object to the vendor proceeding into production because, among other things, they were overly optimistic about the vendor's progress and believed the vendor's assurances that validation was close. Without a validated model, FRA will not let the company move forward with the rest of its required testing. Until the company completes testing, the trainsets cannot operate in revenue service—let alone at the advertised speed of 160 miles per hour.

- **Trainsets have defects, and the schedule for addressing them is incomplete.** As of July 2023, the vendor has produced 12 of 28 serial trainsets and 22 of 28 café cars, all of which have defects—some that require structural and design modifications and others that require sealant, drainage, or corrosion corrections. Although some defects are expected when producing a new trainset, the vendor's schedule for addressing them is incomplete, and the company has not been successful in obtaining more complete scheduling data from the vendor. Without more complete information, the company cannot verify whether remediating the defects will impact the overall program schedule and the revenue service launch.

At this stage, the likeliest cause of additional future delays is the continued inability to produce a validated trainset model; a secondary risk of delays comes from correcting certain types of trainset defects. As a result of existing delays, the company has incurred about [REDACTED] million in cost increases, largely from maintaining its legacy Acela fleet, which it must continue running to maintain Acela service. In addition, as we reported in January 2020, without the New Acela trainsets—which are larger than the legacy fleet—the company is delaying capturing additional revenue⁵ that we estimate could be in the millions of dollars by the time the company launches these trainsets into service. Further, the reliability of its current aging Acela fleet is declining, causing more on-time performance delays and forcing the company to modify its Acela timetable, which poses reputational risks to its premier-branded service. Any additional program delays

⁵ *Train Operations: Acela 21 Program Continues to Face Significant Risk of Delays, Warranting More Contingency Planning* (OIG-A-2020-004), January 21, 2020.

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would further increase costs, reduce additional revenue, and leave the company vulnerable to service disruptions as more of its legacy fleet possibly become unusable.

More broadly, the issues we identified on New Acela are similar to challenges that have occurred on other rolling stock acquisitions.⁶ Since the company is about to embark on one of its largest rolling stock purchases in history—a multi-billion dollar program to replace its fleet of long-distance trains—while it is also engaged in the ongoing process of replacing its intercity trains, it has an opportunity now to learn lessons from New Acela to avoid similar issues going forward. Accordingly, we recommend that the company take the following actions:

1. Enhance its process to formally capture and incorporate lessons learned from New Acela and other rolling stock purchases.
2. Direct the vendor to provide complete and accurate schedules to address defects.
3. Work with the vendor to identify the risk of future defects.

In commenting on a draft of this report, the company's Executive Vice President, Capital Delivery, agreed with our recommendations and described the company's plans to address them. For management's complete response, see Appendix B. For Alstom's response and our comments addressing the letter, see Appendix C.⁷

BACKGROUND

The company has a longstanding relationship with the New Acela vendor, which was part of the consortium that produced its legacy fleet. In August 2016, the company signed a contract with the vendor to produce 28 new high-speed trainsets, which is now

⁶ The company's Airo program was previously known as the Intercity Trainset program on which we previously reported. *Train Operations: Company Has Improved Management of Intercity Trainset Acquisition and Can Improve Stakeholder Engagement on Major Capital Programs* (OIG-A-2023-005), December 22, 2022; and *Asset Management: Additional Actions Can Help Reduce Significant Risks Associated with Long-Distance Passenger Car Procurement* (OIG-A-2016-003), February 1, 2016.

⁷ The James M. Inhofe National Defense Authorization Act for Fiscal Year 2023 requires federal Inspectors General to notify non-governmental organizations or business entities that they are identified in an audit report and to provide them 30 days, after publication, to review the published report and, if they choose, the non-governmental organizations or business entities may provide a written response that clarifies or provides additional context for each instance they are specifically identified. See also James M. Inhofe National Defense Authorization Act for Fiscal Year 2023, Pub. L. No. 117-263, Div. E, Title LII, § 5274, 136 Stat. 2395, 3244.

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called the New Acela program. The contract terms include trainset specifications and terms of payment, shipping, delivery, and the company's acceptance of the trainsets.

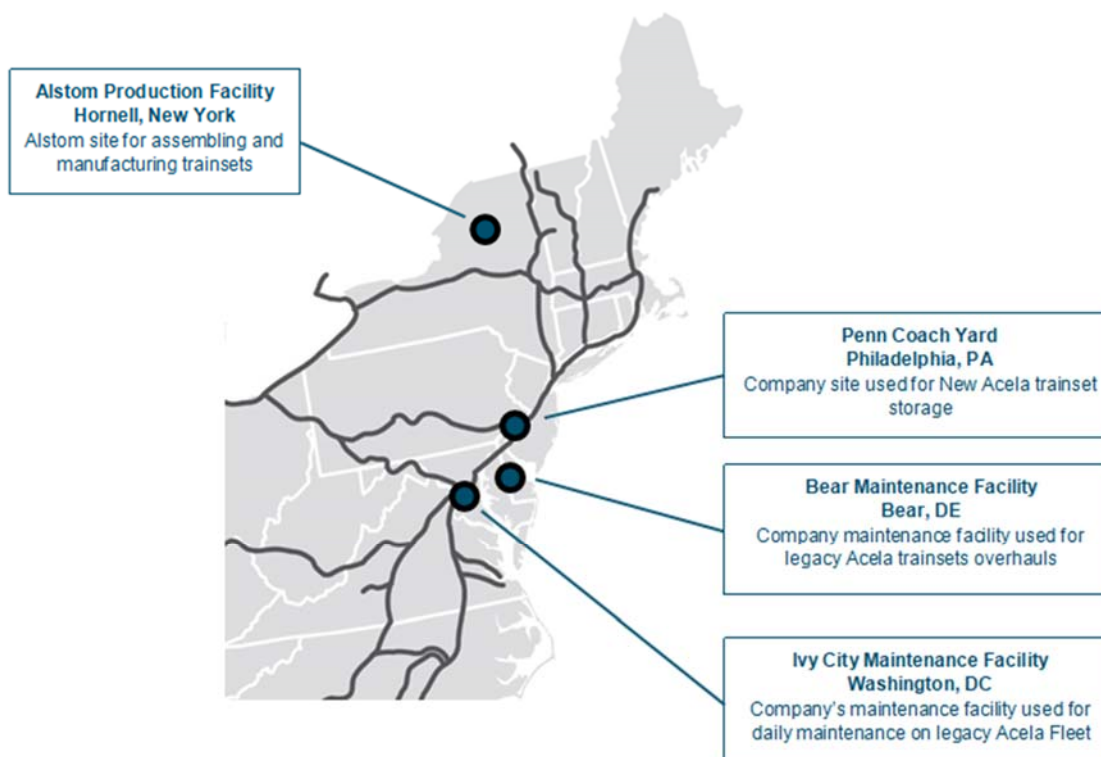
Program elements and worksites. In this report, we focus primarily on the trainset delivery program element. The New Acela program also includes other program elements, such as renovating existing high-speed maintenance facilities, readying the workforce to maintain and operate the new trainsets, and developing and installing new digital technology on the trainsets, on which we have previously reported.⁸

The company and the vendor are conducting work related to the New Acela program and the legacy fleet throughout the eastern United States, including four key sites we visited during our audit, as Figure 1 shows.

⁸ *Observations on Risks to the Acela 21 Information Technology Program Element* (OIG-MAR-2020-009), April 22, 2020.

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**Figure 1. Key Production, Storage, and Maintenance Facilities
 for New and Legacy Acela Fleet**



Source: OIG analysis of site visits and company documents

Note: The company also performs maintenance on its legacy Acela fleet in New York, New York; and Boston, Massachusetts.

New Acela storage agreement. In November 2021, the company and the vendor signed an agreement that allowed the vendor to ship up to six fully assembled trainsets and store them at the company's Penn Coach Yard in Philadelphia. Although the company allowed the vendor to ship these trainsets out of the production facility and on to company property, the agreement states that this does not constitute delivery of the trainsets under the terms of the contract.

Federal regulatory requirements. DOT and its railroad component, FRA, provide regulatory guidance to the company and the vendor. FRA also verifies that the company is complying with federally mandated safety and operational testing

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requirements. This multi-step process involves several different regulations⁹ that must be met prior to revenue service. The first step in meeting these requirements is for the company to provide trainset performance predictions from a computer model showing that the model is valid and the New Acela trainset is safe to proceed with additional testing prior to initiating passenger operations.¹⁰ A critical part of this requirement is ensuring that the design of the wheel-rail interface—the point at which a trainset's wheels touch the rails and materially impact a trainset's performance and behavior—performs within certain safety parameters on representative track. Although the vendor is [REDACTED] responsible for developing and validating the model, the company must submit model performance predictions as part of a qualification testing plan to FRA for approval to move forward with the trainset testing.

THE COMPANY REORGANIZED TO BETTER MANAGE NEW ACELA AND OTHER MAJOR CAPITAL PROGRAMS

The company has improved its management and oversight of the New Acela program. We have reported on the New Acela program four times over the past nine years. Prior to 2020, we reported that the program did not have key program management artifacts such as an integrated master schedule, and the company had not hired enough personnel to oversee the infrastructure projects needed to run the new trainsets. In our January 2020 report, we identified additional weaknesses in the program. In response, the company made the following improvements:

- We reported that key officials did not have the capacity to manage the program because they were responsible for multiple programs in addition to their New Acela responsibilities. In response to our recommendation, the company no longer tasks senior program officials with responsibilities outside the program.
- We reported that the program sponsor—the highest-ranked company official responsible for New Acela—did not have the authority to task program officials and make decisions necessary to resolve problems. In response to our recommendation, the company gave the most senior program official the authority to make most decisions.

⁹ For example, 49 C.F.R. § 213.345 and 49 C.F.R. § 238.111.

¹⁰ 49 C.F.R. § 213.345.

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In addition to these improvements, the company has improved its overall approach to managing major capital programs over the past two years as we previously reported,¹¹ including the following actions:

- In June 2021, the company hired an Executive Vice President for Capital Delivery¹²—a newly established position—to oversee and execute major capital programs, including New Acela.
- In January 2022, the company reorganized and established the Capital Delivery department to execute and oversee major infrastructure programs and fleet acquisitions.
- In June 2022, the company hired an Assistant Vice President for Project Controls—an overarching organizational position responsible for developing processes and procedures for the Capital Delivery department to align it with the company’s program management guidance.

With a senior executive leading the Capital Delivery department, the New Acela program is better aligned with industry standards¹³ that call for programs to be overseen by a senior accountable official with the authority to make timely business decisions.

Moreover, the Capital Delivery department is in the process of implementing project management controls to better manage New Acela and other capital programs. For example, as we recently reported, the department is in the process of refining its controls for project cost management to more accurately estimate and manage costs throughout the life of a project.¹⁴ The company anticipates finalizing guidance and implementation of these controls in March 2025.

¹¹ *Train Operations: Company Has Improved Management of Intercity Trainset Acquisition and Can Improve Stakeholder Engagement on Major Capital Programs* (OIG-A-2023-005), December 22, 2022.

¹² From June 2021 to January 2022, this official’s title was Executive Vice President of Major Program Delivery. When the company reorganized Major Program Delivery into the newly formed Capital Delivery department, the title changed as well.

¹³ Project Management Institute, *A Guide to Project Management Body of Knowledge*, Sixth Edition, 2017.

¹⁴ *Governance: Company Is Strengthening Project Cost Management but Can Better Organize Costs and Improve Guidance* (OIG-A-2023-010), July 17, 2023.

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THE PROGRAM IS MORE THAN THREE YEARS LATE FOR PROJECTED REVENUE SERVICE LAUNCH

Despite the company's improvements to its management and oversight of New Acela, the program is more than three years behind schedule. The company's most recent goal for revenue service launch is ██████████ 2024, as Figure 2 shows.

Figure 2. Current Schedule for New Acela Trainset Delivery Compared to Original Schedule



Source: OIG analysis of company and vendor schedule documents

The company acknowledges in its overall program schedule that ██████████ 2024 is an optimistic timeframe, and additional delays are possible. We noted in our 2020 report¹⁵ that the trainsets could face additional delays because the vendor and the company must conduct testing on the NEC to ensure that the trainsets meet all contractual specifications and demonstrate that they can operate safely. Further, at the time, officials from the company, the vendor, and FRA acknowledged that schedule risks existed because the testing and certification processes commonly identify problems that could delay operations. Those schedule risks have been realized and at this stage—despite the company's recent improvements to the program's management—the program is more than three years behind schedule, and additional delays are likely. We identified two main drivers of the current and likely future delays, which we discuss in more detail below.

¹⁵ *Train Operations: Acela 21 Program Continues to Face Significant Risk of Delays, Warranting More Contingency Planning* (OIG-A-2020-004), January 21, 2020.

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TRAINSET MODEL VALIDATION POSES CHALLENGES

In the seven years since signing the contract in 2016, the vendor has not produced a validated computer model of the trainset that proves the new designs are safe to proceed with required testing [REDACTED] and as required by federal regulations. Without this, FRA will not allow the trainsets to proceed with operational testing—let alone enter revenue service.

The Company and Vendor Proceeded to Production without a Validated Model

Federal regulations require the company to submit predictions of trainset performance from a computer-based model to demonstrate that the New Acela trainset is safe to proceed with required testing on the NEC. Although the company must submit these predictions of trainset performance as part of a qualification testing plan to FRA for approval to move forward with trainset testing, the vendor is [REDACTED] responsible for developing and validating the model. The trainsets are based on a design that has not previously operated in North America; therefore, the required testing had inherent schedule risk, as we previously reported. Moreover, model validation is only the first step in a multi-step regulatory testing process. The company must submit the results of the computer-based model to FRA for approval to move forward with additional testing.¹⁶ This testing is also required for the company to be able to run the new trainsets at the advertised faster speed of 160 miles per hour.

Despite not having a validated model demonstrating the safe design of the trainsets, the company sent a letter in January 2020 changing the design review status from “Objection to the continuation of planned work with technical comments” to “No Objection(s) to the continuation of planned work (with technical comments).”¹⁷ Program officials told us that this is when the vendor proceeded into serial production. Senior officials in Capital Delivery also noted that the company did not have the contractual ability to authorize or prevent the vendor from beginning serial production. The company’s letter to the vendor noted that the modeling effort was not complete,

¹⁶ 49 C.F.R. Part 213, App. D requires a computer model demonstrating that the trainset design operates safely to qualify rail passenger vehicles to operate at high speeds.

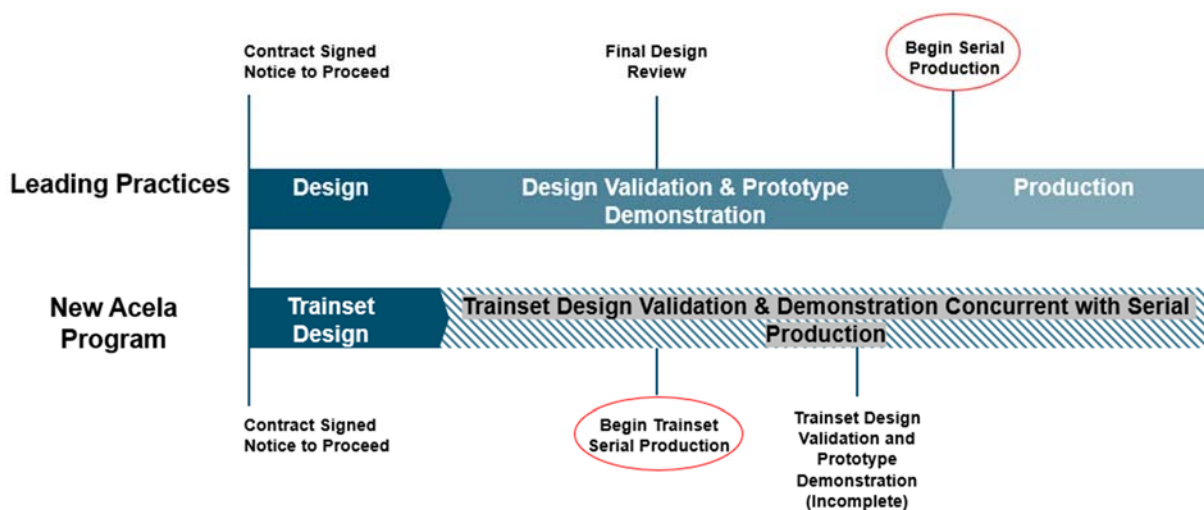
¹⁷ Contract letter T-AM-AL-20-0028-0-T, January 24, 2020. The company reiterated its position with contract letter T-AM-AL-22-0194-0-T, August 17, 2022, stating “Amtrak is declining to change the disposition status from ‘No Objection with Technical Comments’ to ‘No Objection.’” Further, the company stated this was because the vendor had not fully met the requirements in 49 C.F.R. § 213.345.

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and the company was holding its approval of the final design of the trainset until the vendor validated the model. As of July 2023, however, the company and the vendor have not finalized the design of the trainset, but the vendor has built more than half of all units; it has produced 12 of 28 serial trainsets, and 22 of 28 café cars.

Beginning serial production before ensuring that designs are solidified and before proving that the trainset will operate safely in its intended environment is contrary to leading practices, as Figure 3 shows.¹⁸ This poses a risk because any unanticipated design changes uncovered during model validation will need to be retrofitted onto the already-produced serial trainsets.

**Figure 3. Design, Validation, and Production
 Leading Practices Compared to New Acela Program**



Source: OIG analysis of company documents and leading practices for design, validation, and production

Company officials told us model validation is the primary driver of the program delays, and model validation and trainset testing timelines pose risks of additional delays. We previously reported on other rolling stock acquisitions when the company proceeded with the program before finalizing its designs. In these instances, the company

¹⁸ Government Accountability Office (GAO), *Report to Congressional Committees, Leading Practices, Iterative Cycles Enable Rapid Delivery of Complex Innovative Products* (GAO-23-106222), July 2023; Department of Defense (DOD) Instruction 5000.85, Major Capability Acquisition; and GAO, *Weapons Systems Annual Assessment: Limited Use of Knowledge Based Practices Continues to Undercut DOD’s Investments* (GAO-19-335SP), May 2019.

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absorbed additional risk, schedule delays, and costs.¹⁹ In the New Acela program, company officials said they did not object to the vendor's continuation of planned work, and the vendor proceeded into serial production at risk—meaning that if complying with the modeling requirement led to any design changes, the vendor would be responsible. Company officials said they did not object because they were overly optimistic about the vendor's progress and believed the vendor's assurances that it was close to validating the model within the parameters of the regulatory requirements.

Company officials told us they also made these business decisions to help preserve the company's relationship with the vendor and to hedge against the risk of further production delays. Additionally, the contract did not require the vendor to complete model validation prior to serial production although the company has the ultimate responsibility for submitting the model predictions to the FRA for approval. [REDACTED]

[REDACTED] Nevertheless, in spring 2023, the company stopped payment for the most recent existing milestone—the vendor shipping Trainset No. 06 to company property in Philadelphia—until the vendor complies with the requirement to validate the trainset model. Further, in March 2023, the company put a hold on all milestone payments due to the vendor's lack of progress achieving a validated model.

The Model Has Not Yet Met FRA Requirements

From August 2016 through July 2023, the vendor produced at least 14 different iterations of the trainset model, and none have met FRA requirements. Vendor officials told us the models have not met requirements because, in their view, 1) track conditions on the NEC are challenging, and 2) trainset modeling compliance guidance is ambiguous.

- **NEC track geometry.** [REDACTED]
[REDACTED] the vendor cited variances in company-provided data about NEC track conditions—commonly called track geometry—as a contributing

¹⁹ *Asset Management: Additional Actions Can Help Reduce Significant Risks Associated with Long-Distance Passenger Car Procurement* (OIG-A-2016-003), February 1, 2016; and *Train Operations: Company Has Improved Management of Intercity Trainset Acquisition and Can Improve Stakeholder Engagement on Major Capital Programs* (OIG-A-2023-005), December 22, 2022.

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factor to its ongoing challenges.²⁰ The vendor, however, was a partner in the consortium that produced the legacy fleet in the early 2000s and has been performing maintenance on them for more than 20 years; therefore, it should be familiar with the NEC's track geometry and how the legacy fleet—which has a tilting system—performs on it.²¹ Moreover, officials from the company, FRA, and DOT said that the company has consistently provided the vendor with track geometry data. Further, a subject matter expert at DOT told us it is common for track geometry data to have variances, and that any variances in different sets of the track geometry data collected at different points in time would not materially affect model validation testing outcomes. Ultimately, the contract specifies that the vendor must comply with the modeling regulation and that the New Acela trainsets will operate on the NEC.

- **Vendor's compliance with FRA guidance.** Vendor officials told us the other reason it has not yet met FRA requirements is because they believe that the regulation governing model validation is ambiguous about what is ultimately needed. Vendor officials also told us the FRA requirements related to computer modeling are significantly different than how they verify trainset safety in Europe where the vendor is based. FRA and DOT officials said they have been working closely with the company and the vendor to answer questions and help them comply with the requirements, including demonstrating a step-by-step process on how to comply. For example, as early as October 2017, the DOT subject matter expert outlined in detail to the company and the vendor the steps they needed to take to comply with the requirements. Additionally, company officials said that as early as July 2021 and many times since then, they offered to assist the vendor in its model validation efforts. For example, company officials said they offered to troubleshoot challenges in developing the computer model itself within the software the vendor uses, including an in-person session in Montreal, Canada, in fall 2021. In January 2023, the vendor's Chief Executive Officer, the company's Chief Executive Officer, and other executives began meeting regularly to discuss the model validation process and other issues related to maintaining the legacy fleet.

²⁰ Track geometry refers to the properties and relations of points, lines, curves, and surfaces in the three-dimensional positioning of railroad track.

²¹ The legacy fleet trainset design is also a tilting trainset—meaning it has the capability to tilt the passenger cars in turns to improve speed and passenger comfort.

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Despite these offers to assist the vendor and the recent executive-level discussions, the vendor has denied the company and DOT subject matter experts direct access to the trainset model input files, according to program documents and officials from the company, FRA, and DOT. During a March 2023 interview, vendor officials told us the contract does not require them to share the trainset model. Vendor officials said that the input files were their intellectual property and sharing them would risk disclosing proprietary information.

In June 2023, the vendor provided the company with updated data and test reports from the most recent model and testing efforts, which the company then submitted to FRA. In July 2023, FRA provided draft comments on the latest submission, noting significant gaps and questioning the results provided. For example, FRA's draft comments stated that the company "insists on submitting arguments that FRA explained are not scientifically accurate" and questioned engineering assumptions used in the submission. FRA also noted that although some model results improved, other model results were worse than in previous submissions, and FRA asked for an explanation. Until the company has a validated trainset model, it cannot move forward with the required safety and operational testing of the trainsets necessary to operate in revenue service.

THE TRAINSETS HAVE DEFECTS, AND THE SCHEDULE FOR ADDRESSING THEM IS INCOMPLETE

Each of the 12 serial trainsets the vendor has produced has defects that the vendor is required to fix or modify before the company launches revenue service. Some defects are expected when producing a new trainset, but the vendor's schedule for fixing these is incomplete, which creates uncertainty in the overall program schedule.

Trainsets have defects. There are at least four different kinds of defects on the trainsets

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the vendor produced.²² Some defects in the trainsets require field modification instructions (FMI) that require structural and design modifications, and others require sealant, drainage, or corrosion corrections to one or more trainsets. Company officials said they will not accept any trainsets with this type of defect—including for conditional acceptance²³—and, as of August 2023, has not accepted any trainsets. According to the vendor’s July 2023 FMI database, the most readily available list of defects, the vendor details 125 open unique FMIs to be remediated on up to 12 serial trainsets it has produced to date.²⁴ We analyzed the FMI database to identify the type and significance of these defects. Although the FMI database did not include complete information for all 125 FMIs, we identified three basic types:

- **Safety-related.** For example, the vendor identified one FMI related to how water drains between passenger cars, causing components that hold the cars together to corrode, which poses safety concerns.²⁵
- **Functional.** For example, the vendor previously reported that five windows on the trainsets shattered spontaneously.²⁶ As another example, the vendor identified leaks in the trainsets’ hydraulic tilting systems, a key performance characteristic of these trainsets, as Figure 4 shows.

²² The vendor categorizes different defects within different databases. 1) *FMI*. An FMI is a configuration and design change to address an issue or defect on the trainset. The vendor regularly shares the FMI database with the company. 2) *Non-Conformance Report*. A Non-Conformance Report is any defective part outside the criteria set in the specification that needs to be refurbished or replaced by the supplier. The vendor shares this database with the company only at select stage gates, such as shipping inspection. 3) *Open Items List*. The Open Item List contains items the vendor cannot address before shipping a trainset. The vendor regularly shares these items with the company. 4) *Buyback List*. A buyback is a one-off aesthetic item that can be addressed with nominal work. The vendor regularly shares the buyback list with the company. As of the vendor’s June 2023 reports, the Non-Conformance Report has 22,731 open items, and the Open Items List has 44 items open. Items can shift between lists and change month to month as new defects are discovered or remediated.

²³ The contract says that the company may issue to the vendor a Certificate of Conditional Acceptance for a trainset, rather than a Certificate of Acceptance, when the applicable trainset meets all of the conditions for acceptance identified but is defective or deficient in some respects.

²⁴ The vendor does not factor the 2 prototypes in its FMI schedule; therefore, our analysis includes only 12 serial trainsets. Many of the 125 FMIs apply to multiple trainsets, which means the total number of FMIs is 529.

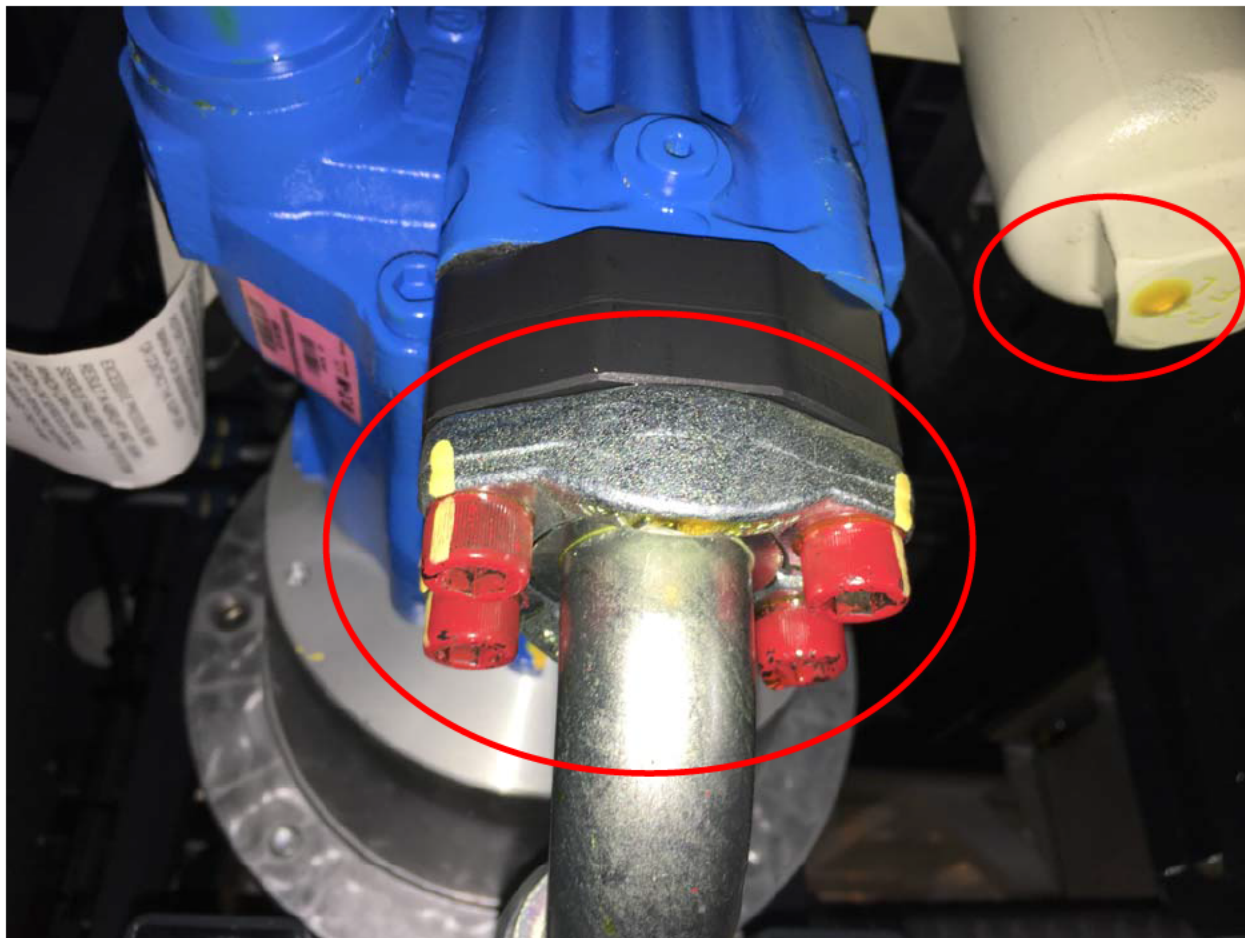
²⁵ Only 69 of the 86 items in the FMI database have enough information to determine whether they are safety-related. Of those 69, a total of 25 are noted in the database as safety-related.

²⁶ As of July 2023, the vendor’s monthly report indicates that they believe they have identified and remediated the root cause of this issue.

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- **Aesthetic.** For example, the vendor misaligned the pattern of the ceiling panels in the café cars. As another example, the café car floor is delaminating: the floor is separating from the subfloor, creating uneven surfaces throughout the café car.

Figure 4. Hydraulic Fluid Leaking from New Acela Tilting Systems



Source: OIG observations of hydraulic tilting unit on Trainset No. 13 stored on vendor's production line, Hornell, New York; March 7, 2023

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FMI Schedule for addressing defects is incomplete. Our analysis of the vendor's FMI database and schedule identified significant omissions and uncertainties, including the following:

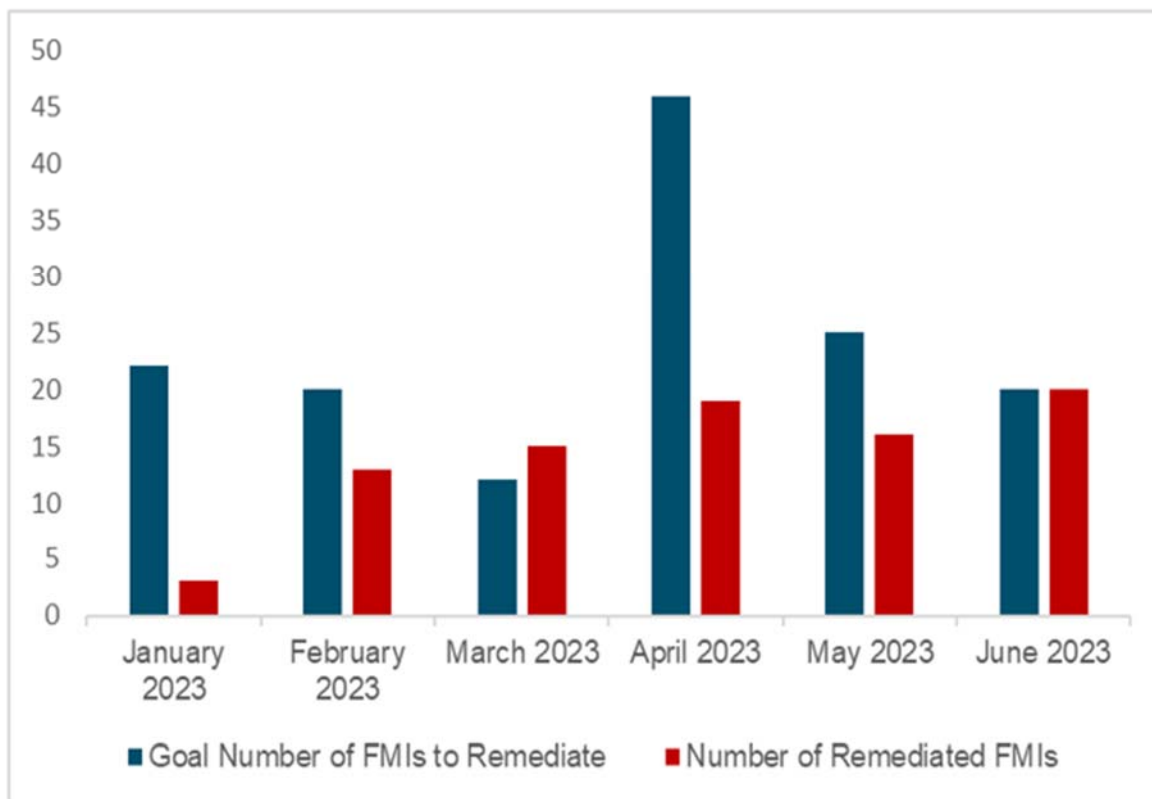
- The vendor's schedule omits some known defects. For example, the vendor identifies 19 FMIs related to software updates, but their schedule does not include software updates in their planned work.
- For 16 of the FMIs in the database, the vendor does not indicate whether it needs special access to the trainsets or a company maintenance facility to fix them. If it needs special access—as it has for other known defects—this could add time to the schedule and impact company operations.
- As of July 2023, the FMI database shows that it is not ready to implement 39 FMIs. Of these, 15 do not yet have an accepted engineering solution; therefore, it is unknown how long it will take to address these FMIs.²⁷
- The FMI database shows that the materials necessary to implement some FMIs may not be available prior to implementation. For example, one FMI had a target completion date of June 2023, but the database shows that the material necessary to remediate the FMI will not be available until September 2023.

In addition, we found that from January to June 2023, the vendor met its monthly FMI remediation goal only twice, creating additional uncertainty about its ability to complete the FMI work according to its own schedule and in time for revenue service launch, as Figure 5 shows.

²⁷ Although the current schedule has an estimated time for 11 of the 15 FMIs without an engineering solution, the absence of such a solution prevents our office from verifying the accuracy of those timeframes.

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Figure 5. Vendor’s Goal versus Actual Number of FMI Remediations



Source: OIG analysis of vendor FMI progress reports and FMI database, July 2023

These kinds of omissions and uncertainties are contrary to company and industry standards,²⁸ which state that entities should create a schedule that is predictive and usable, and that the schedule should have realistic activity durations and schedule contingency.

The company has had limited involvement in the FMI schedule. The vendor has not produced a complete FMI schedule in part because the company has had limited input into its development. Company officials told us the vendor determines the sequence it uses to implement FMIs, including those that require access to company maintenance facilities and could impact company operations. In addition, company officials and contractors overseeing FMI implementation told us vendor officials often refuse to provide additional information about how it will address the defects. For example,

²⁸ Amtrak, *Enterprise Project Management Standards*, December 2021; and GAO, *Schedule Assessment Guide, Best Practices for Project Schedules* (GAO-16-89G), December 2015.

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a company quality manager told us he asked a vendor official to provide the number of vendor personnel working on FMIs at the company's Penn Coach Yard facility, but the vendor official refused to do so.

Company officials told us the FMI defect schedule is a secondary reason for the program delays. To mitigate any further schedule risks from this issue, the company and the vendor recently agreed to change which six trainsets the company will use for revenue service launch: they now plan to use trainsets that were produced later because these generally have fewer FMIs. This may help mitigate the overall schedule risk that remediating FMIs has posed up to this point, but the vendor and the company could identify more FMIs while conducting required regulatory testing, which could pose additional schedule risks. Regardless, because the target completion date for addressing FMIs is a factor in the overall program schedule, the company needs complete information to ensure that remediating FMIs will not further impact its revenue service launch date.

FURTHER PROGRAM DELAYS, COST INCREASES, OPERATIONAL IMPACTS, AND DELAYED REVENUE ARE LIKELY

As a result of existing delays on the New Acela program, the company has incurred cost increases, reliability risks in its legacy fleet, delayed revenue, and reputational risk to its premier-branded Acela service. It has also started to execute contingencies it developed for delays. Further delays from the trainset model, quality assurance issues, or any other issues that arise would exacerbate all of these impacts and require the company to execute progressively more aggressive contingencies.

Risk of disruption to existing service. The company is facing a shortage of parts for the aging legacy Acela fleet, which increases the potential for service disruptions. The vendor producing the New Acela trainsets also contracts with the company to supply parts for the legacy fleet. Company officials told us the vendor's ability to supply parts for the 24-year-old trainsets, however, is increasingly strained because many of the original manufacturers are no longer in business or no longer produce the unique parts for these one-of-a-kind trainsets. For example, no company produces the power car circuit boards for the legacy fleet, which use unsupported software from the mid-1990s.²⁹

²⁹ This software is used to run the train control system.

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As early as November 2021, the company began cannibalizing some legacy trainsets for spare parts.³⁰ Based on our analysis of the Acela service timetable and information from the company's Mechanical department, the company has reduced the overall number of departures since 2018, which a Mechanical department official in charge of maintaining the legacy trainsets told us was caused by a lack of parts to keep them operable. As of August 2023, the company is operating 16 of the 20 trainsets in its legacy fleet. It has parked the remaining four trainsets at its Bear, Delaware facility to use for parts, including removing all the computer equipment. Figure 6 shows a legacy Acela trainset in Bear, Delaware.

³⁰ During the COVID pandemic, the company placed eight legacy trainsets in storage at its Bear, Delaware facility. When the company began to restore service, it did not return four of the eight trainsets to revenue service and instead used them for spare parts.

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Figure 6. Legacy Acela Trainset Used for Spare Parts



Source: OIG observations of legacy Acela trainsets, including power car cab controls removed, power car with nose cone removed, empty power car automatic train control bay, and a power car bogie assembly in Bear, Delaware; February 21, 2023

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Officials in the Mechanical department told us there is no other source for many spare parts except the existing trainsets, and as the legacy fleet ages further, service disruptions may increase as parts continue to fail. Mechanical personnel told us they are increasingly concerned about the reliability risks of running such an aged fleet. Processes are in place, however, including statutorily required inspections, to ensure that the remaining legacy fleet in service is safe to operate, according to a senior Mechanical department official.

In addition, the vendor needs special access to company maintenance facilities to fix some FMIs, which impacts company operations. A company official told us that such impacts have already occurred. For example, in April 2023, the vendor was using the drop table³¹ at the Ivy City Maintenance facility to remediate an FMI related to corrosion on a component that connects the cars on one of new trainsets, forcing the company to defer maintenance on one of its legacy Acela trainsets. As a result, the company had to take that legacy trainset out of service, which caused schedule delays for other trains on the NEC.

Cost increases. The company has incurred more than [REDACTED] million in additional costs as a direct result of delays in the New Acela program, including the following:

- [REDACTED] **million for legacy fleet parts.** The company must purchase new parts or refurbish existing parts to continue operating the legacy fleet. Since June 2022 when the last New Acela trainset was originally scheduled to enter revenue service, the company has spent about [REDACTED] million buying spare parts for the legacy trainsets it would not have had to buy if the new trainsets had been ready to enter revenue service on time.
- [REDACTED] **million for brake system overhauls.** Federal regulations require passenger rail operators—including the company—to overhaul the brake systems of individual power cars and passenger cars every ten years to ensure that the brakes operate safely. If the company had launched New Acela into revenue service in May 2021 as originally planned, it would have retired its entire legacy fleet by June 2022. On that timeline, the company would not have had to complete any brake system overhauls on its legacy fleet. Because of delays,

³¹ A drop table is used to remove wheelset assemblies from passenger cars and power cars by lowering them below the floor level with large hydraulic lifts. This equipment exists at the Ivy City Maintenance facility but is not available at Penn Coach Yard where the company and the vendor are storing six of the New Acela trainsets.

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however, and the need to continue to use the legacy fleet, the brake system certifications on at least seven legacy trainsets will expire before the company retires them. The company began planning for these overhauls in late 2022 as part of a contingency plan it put in place to account for the delays and has already ordered the necessary parts. It estimates the overhauls will cost about [REDACTED] million. The company has begun discussions about performing this work on additional legacy trainsets, which would further increase costs. Figure 7 shows brake system components pulled for refurbishment from a legacy trainset in Bear, Delaware.

Figure 7. Brake System Components from Legacy Acela Trainset



Source: OIG observations of trainset parts being prepped for refurbishment prior to reuse on operational legacy Acela trainsets in Bear, Delaware; February 21, 2023

- [REDACTED] million for New Acela Contractors. The company contracts with a private firm to provide subject matter experts, including several who act as quality assurance resident inspectors at the vendor's production facility in Hornell, New York, and the company's Penn Coach Yard, in Philadelphia, Pennsylvania. As a result of program delays, the company had to extend these contracts, costing the company [REDACTED] million since June 2022.

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Legacy fleet lease buyouts. From 1999 through 2001, a consortium of Alstom and Bombardier built the 20 legacy Acela trainsets for the company. The company then sold them to a group of investors, who leased the units back to the company from 2000 through 2022.³² In December 2020, the company spent about [REDACTED] million to buy out the expiring leases; in June 2021, it spent almost [REDACTED] million; and in March 2022, it spent almost [REDACTED] million, as Table 1 shows.

Table 1. Legacy Fleet Lease Buyout

Date of Acquisition	Number of Trainsets	Costs
December 2020	8 Trainsets	[REDACTED]
June 2021	9 Trainsets	[REDACTED]
March 2022	2 Trainsets	[REDACTED]
Total Costs	[REDACTED]	[REDACTED]

Source: OIG analysis of company documents and financial information

Note: The company already owned one trainset before these lease buyouts.

Although contingency planning documents for the program from 2019 to 2021 discussed extending or buying out the leases in the event of revenue service launch delays, company officials recently told us they would have bought out the leases regardless because they believed the buyouts had a net positive financial impact. Nevertheless, due to the protracted New Acela trainset delivery delays, the company would have been unable to continue running Acela service without extending or buying out the legacy fleet leases.

Delayed revenue. The company's original business case for the New Acela program, which it drafted in 2016, was predicated on this additional revenue it forecasted capturing from selling additional seats on the new higher-capacity trainsets. As we reported in January 2020, delaying revenue service launch for the New Acela has caused the company to delay collecting this additional revenue. At the time, we estimated that this amount of additional revenue from the higher capacity could be more than \$15,000 per departure, and as of August 2023, the Acela service was running about 150 departures per week.

³² In January 2021, Alstom completed the acquisition of Bombardier Transportation.

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Reputational risks. The legacy Acela trainsets are past their useful service life, and the reliability concerns we outlined above threaten the reputation of its premier-branded Acela service. Further, the company has had to modify its Acela timetable to accommodate a smaller fleet while also experiencing additional delays in on-time performance as the reliability of the older trainsets deteriorates. These impacts, along with the negative impact of the delay in the New Acela program itself, may undermine the reputation of the company's premier Acela brand.

Although our audit work focused primarily on the trainset workstream, other workstreams could pose additional risks to revenue service launch. For example, the Digital Technology workstream contains nine elements, each of which is needed for revenue service launch. In our April 2020 memorandum to the company, we reported that the company's projections for delivery of these elements ranged from June 2020 through April 2021. As of August 2023, the Digital Technology workstream has started, but not completed, its readiness assessment and operational testing for these nine elements. This is in part because it cannot test some digital technology components without physical access to an accepted trainset. Although the company has calculated durations to address its work to complete the nine elements, it cannot fully initiate that work until it has access to a trainset.

THE COMPANY DOES NOT HAVE A FORMAL LESSONS LEARNED PROCESS

Our prior work has identified program management weaknesses on the New Acela program and other rolling stock acquisitions. For example, on the company's \$7.3 billion Airo acquisition—a program to purchase up to 83 new trainsets—we reported that the company moved forward with the program without finalizing the trainset's designs. This led to a \$42.5 million company-initiated change order and a five-and-a-half-month delay in delivering the first trainsets.³³ Similarly, on the CAF acquisition—a program to acquire 130 new single-level, long-distance passenger cars—the company experienced significant delays, which were compounded by an absence of program management capacity and capabilities. Moreover, during that acquisition,

³³ TRAIN OPERATIONS: *Company Has Improved Management of Intercity Trainset Acquisition and Can Improve Stakeholder Engagement on Major Capital Programs* (OIG-A-2023-005), December 22, 2022.

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the company allowed a vendor who was already behind schedule to ship trainsets with significant defects, which contributed to the seven-year delay in final delivery.³⁴

The company's pattern of program management weaknesses appears to be reoccurring partly because the company has not ensured that it consistently captures lessons learned from other rolling stock acquisitions and distills them into guidance for managing similar ongoing and future acquisitions. The company's enterprise project management standards³⁵ call for project managers to capture lessons for use on future projects, incorporate best practices, facilitate early identification of challenges, and develop risk mitigation strategies and program-specific metrics. The company, however, has not instituted defined processes, tools, and techniques to help rolling stock teams follow these common industry standards.³⁶ For example, industry standards suggest using a five-phase process for institutionalizing lessons learned in an organization, as shown in Figure 8.

Figure 8. Steps to Institutionalize Lessons Learned



Source: OIG analysis of industry standards

To its credit, the company has identified and collected lessons learned on individual rolling stock programs—including the New Acela program—and shared them among the programs. These efforts, however, have been informal and siloed. For example, based on scheduling missteps in the New Acela program, the company official in charge of the Airo program hired a program official to analyze individual workstream schedules and gave them the authority to reject any vendor schedule inputs that do not meet company standards. The company has not, however, clearly defined this process

³⁴ *ASSET MANAGEMENT: Additional Actions Can Help Reduce Significant Risks Associated with Long-Distance Passenger Car Procurement* (OIG-A-2016-003), February 1, 2016.

³⁵ Amtrak, *Enterprise Program Management Standards*, December 2021.

³⁶ Project Management Institute, *A Guide to Project Management Body of Knowledge*, Sixth Edition, 2017.

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to ensure that it consistently captures lessons learned in a centralized repository and applies them on other rolling stock acquisitions, such as the upcoming multi-billion-dollar program to replace long-distance cars.

Also, since July 2022, the company has been developing a single, unified project management system to integrate and centralize all project management capabilities, and it intends to include a capability to capture lessons learned. This function, however, is not scheduled to be complete until March 2024. Moreover, even if the company successfully implements this capability, it could enhance its accompanying process to ensure that it consistently identifies, captures, analyzes, and applies lessons learned across rolling stock acquisitions to capitalize on any new database.

CONCLUSIONS

The company has improved its overall approach to managing major capital programs, but due to past actions the New Acela program is more than three years late and faces additional production, regulatory, and revenue service launch delays. In addition, the company faces financial and reputational risks by continuing to operate its aging legacy fleet while the costs and reliability risks increase. With the ongoing New Acela, Airo, and upcoming long-distance rolling stock acquisitions in various stages of execution, it is in the company's best interest to enhance its lessons learned program to better manage its future—and larger—rolling stock acquisitions.

RECOMMENDATIONS

To address these issues, we recommend that the Executive Vice President of Capital Delivery take the following three actions:

1. Enhance the company's formal processes, tools, and techniques to ensure that it regularly captures lessons learned from this and other rolling stock acquisitions and incorporates them into ongoing and future rolling stock procurements.
2. Direct the vendor to provide complete schedules to address field modification instructions. At a minimum, this would include the location of work, viable engineering solutions, and the availability of materials and personnel.
3. Work collaboratively with the vendor to identify the risk of future field modification instructions, as well as any modifications needed as a result of the model validation efforts, and develop plans to mitigate their schedule impact.

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MANAGEMENT COMMENTS AND OIG RESPONSE

In commenting on a draft of this report, the company's Executive Vice President, Capital Delivery, agreed with our recommendations and described the company's plans to address them, which we summarize below. For management's complete response, see Appendix B.

- **Recommendation 1:** Management agreed with our recommendation to enhance its formal processes, tools, and techniques to ensure that it regularly captures lessons learned from this and other rolling stock acquisitions. Management outlined its ongoing and planned enhancements to its Enterprise Project and Portfolio Management system—the company-wide unified project management system that includes a lessons learned module. The target completion date is February 29, 2024.
- **Recommendation 2:** Management agreed with our recommendation to direct the vendor to provide more complete schedule information to address field modification instructions. Management stated that it will request the vendor to expand the current spreadsheet and include information on the location of planned work and the availability of material and personnel. The target completion date is November 30, 2023.
- **Recommendation 3:** Management agreed with our recommendation to work collaboratively with the vendor to identify the risk of future field modification instructions to mitigate the schedule impact. Management stated it will build on its ongoing efforts with the vendor in modeling, testing, and quality. It also stated it plans to expand these efforts to include increased joint working sessions and weekly touch-point meetings, a monthly review of risk areas, and the development of risk mitigations steps to try and reduce the impact to the overall schedule. The target completion date is May 31, 2024.

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APPENDIX A

Objective, Scope, and Methodology

This report provides the results of our audit of the company's New Acela acquisition program. Our objective was to reassess the company's management and oversight of New Acela—including the trainset acquisition and other program elements necessary to launch revenue service—since our last report on the program in 2020. The scope of our work focused on the company's efforts to manage critical program elements, primarily the trainset delivery workstream. We conducted our work from November 2022 through August 2023 in Washington, D.C.; Philadelphia, Pennsylvania; Bear, Delaware; and Hornell, New York. Certain information in this report has been redacted due to its sensitive nature.

To reassess the company's management of the program, we interviewed company executives and key program management officials, reviewed the company's Enterprise Project Management Standards and commonly accepted public- and private-sector standards for project and program management—such as the Project Management Body of Knowledge and the Code of Federal Regulations—that are required for certification of new passenger rail rolling stock in the United States.

To reassess the company's oversight, we reviewed the updated New Acela program management plan, updated program financial plan, and the trainset contract. We also reviewed the vendor's database of field modification instructions, which is spreadsheet-based. We interviewed executives from the Capital Delivery department, the program team charged with managing program delivery, and contractor personnel who provide quality assurance expertise related to trainset production for the company. We also interviewed officials in the company's Mechanical department, including those in charge of maintaining the legacy fleet—the Procurement and Finance departments.

We interviewed officials from the Department of Transportation's Volpe Center and FRA to obtain their perspectives on the program's status, and we reviewed communications between these entities and the company and the vendor. We visited company maintenance facilities in Philadelphia, Pennsylvania; Washington, D.C.; and Bear, Delaware. In addition, we visited the Alstom manufacturing facility in Hornell, New York, where we observed production processes and interviewed Alstom officials assigned to the New Acela program.

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We conducted this performance audit in accordance with generally accepted governmental 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 objective.

Internal Controls

Our review considered the extent to which the company used its internal control network to assess whether departments implemented controls designed to specifically mitigate risks associated with managing a major procurement. In particular, we determined that the following two of the five internal controls areas were significant to our audit objective:

Control environment: Management should establish an organization structure, assign responsibility, and delegate authority to achieve the entity's objectives.

Information and communication: Management should use quality information and communicate this information internally to achieve the entity's objectives.

We developed audit work to ensure that we assessed each of these controls. This included reviewing the extent to which the company followed internal program management standards (such as maintaining an integrated master schedule) and held the vendor accountable to control provisions and requirements, developed a risk register, assigned clear roles and responsibilities for program management, and ensured that there were clear lines of authority within the program. We did not conduct an independent review of company controls.

Computer-processed Data

The company uses the SAP software solution—an integrated, enterprise reporting package that interfaces with other company systems. We used the SAP Business Planning and Consolidation module to gather financial information about the overall cost of the New Acela program and its components, including the trainset acquisition. We also gathered financial information about costs related to maintaining the legacy fleet. Our queries agreed with available company documentation and, based on this, we determined that the data were reliable for the purposes of our audit.

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Prior Reports

In conducting our analysis, we reviewed and used information from the following OIG reports:

- *Governance: Company is Strengthening Project Cost Management but Can Better Organize Costs and Improve Guidance (OIG-A-2023-010), July 17, 2023*
- *Train Operations: Company Has Improved Management of Intercity Trainset Acquisition and Can Improve Stakeholder Engagement on Major Capital Programs (OIG-A-2023-005), December 22, 2022*
- *Observations: Observations on Risks to the Acela 21 Information Technology Program Element (OIG-MAR-2020-009), April 22, 2020*
- *Train Operations: Acela 21 Program Continues to Face Significant Risk of Delays, Warranting More Contingency Planning (OIG-A-2020-004), January 21, 2020*
- *Train Operations: The Acela Express 2021 Program Faces Oversight Weaknesses and Schedule Risks (OIG-A-2018-002), November 16, 2017*
- *Asset Management: Additional Actions Can Help Reduce Significant Risks Associated with Long-Distance Passenger Car Procurement (OIG-A-2016-003), February 1, 2016*
- *Asset Management: Amtrak Followed Sound Practices in Developing a Preliminary Business Case for Procuring Next-Generation High-Speed Trainsets and Could Enhance its Final Case with Further Analysis (OIG-E-2014-007), May 29, 2014*

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APPENDIX B

Management Comments

NATIONAL RAILROAD PASSENGER CORPORATION

Memo



Date:	September 15, 2023	From:	Laura Mason, EVP Capital Delivery
To:	Jim Morrison, Assistant Inspector General, Audits	Department	Capital Delivery
		cc	Stephen Gardner, CEO Roger Harris, President Eleanor Acheson, EVP General Counsel Kuvesh Ayer, VP CPO Yevgeniya Burg, AVP Capital Portfolio Gov Costin Corneanu, SVP Finance Norman Forde, VP Project Delivery Fleet & Facilities Robert Grasty, EVP CHRO Dennis Newman, EVP Strategy & Planning Steven Predmore, EVP CSO Christopher Stratemeyer, Sr Dir Train Sets Michelle Tortolani, AVP New Acela Program Gerhard Williams, EVP Service & Delivery Ops Tracie Winbigler, EVP CFO Christian Zacariassen, EVP CIO

Subject: Management Response to **Major Programs: *Company Improved Management of New Acela Program, but Additional Delays and Cost Increases are Likely*** (Draft Audit Report for Project No. 003-2023).

This memorandum provides Amtrak's response to the draft audit report titled, "*Company Improved Management of New Acela Program, but Additional Delays and Cost Increases are Likely*". Management agrees with all the noted OIG recommendations below and appreciates the opportunity to provide a response.

Recommendation #1:

Enhance formal processes, tools, and techniques to regularly capture lessons learned from this and other rolling stock acquisitions and incorporate them into ongoing and future rolling stock procurements.

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Management Response/Action Plan:

Current Process and Tools:

Amtrak implemented a formal Lessons Learned standard in 2018, which specifies process parameters for identifying, documentation, and storing of Lessons Learned throughout project lifecycle. A more detailed procedural guidance is included in the company's project management procedure manual. Lessons Learned standard is also included in the bi-annual project management training, which is mandatory for individuals who manage and support capital projects. The company requires for projects to use a standard lessons learned log with further details of the lessons learned documentation and sharing process contained within Project Management Plans (PMPs). All relevant documentation, templates, instructions and training are easily accessible on Amtrak intranet at <https://allaboard.amtrak.com/s/epmo>. The New Acela program uses standard logs, which are published and shared with other fleet projects, in compliance with company's current standard.

Future Process and Tools:

In June of 2022 Amtrak launched implementation of the company-wide Enterprise Project and Portfolio Management (EPPM) system. Aurigo, a Texas based software development company, was selected to help Amtrak implement its MasterWorks platform. As a part of the system design, Amtrak conducted detailed process mapping, which included lessons learned process supported by the new system functionality. MasterWorks went live on June 5th, 2023 for capital construction and fleet projects. The first release includes a lessons learned module with ability to document, analyze and store lessons learned as a part of the centralized searchable library accessible to project teams seeking to leverage historical data. Amtrak conducted end user training in May of 2023 for all individuals managing and supporting capital construction and fleet projects. The MasterWorks user tool kit is accessible on Amtrak Intranet at <https://allaboard.amtrak.com/s/filepreview?docid=0691K00000unwDjQAI>. A Change Management plan is currently underway to migrate historical project documentation from existing templates and shared drives into the new system by the end of Q1 2024. Future system releases are planned for FY2024 and 2025 with major enhancements to support construction management, resource planning, migration of the non-construction capital projects, and addition of project pipelining and early planning functionality.

Responsible Amtrak Official(s):

Michelle Tortolani, AVP New Acela Program
 Yevgeniya Burg, AVP Capital Portfolio Governance

Target Completion Date: February 29, 2024.

Recommendation #2:

Direct the vendor to provide complete schedules to address field modification instructions. At a minimum, this would include the location of work, viable engineering solutions, and the availability of materials and personnel.

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Management Response/Action Plan:

Amtrak already has within its functionality, a process in which its vendor provides FMI data on a scheduled basis. Alstom currently maintains and delivers to (and reviews with) Amtrak on a weekly basis a detailed FMI spreadsheet and schedule that provides the following: FMI ID, FMI description, FMI type, impacted trainset and cars, status of solution review with Amtrak, priority for implementation, whether parts are required, whether depot access is required, number of operators required, hours to complete, current status, and target schedule for completion.

Amtrak will request that Alstom expand the spreadsheet; and include location of work, and the availability of materials and personnel (Note, that regarding viable engineering solutions, this activity is already occurring. Upon identified need for an FMI, Alstom engineering defines an engineering solution and then reviews the solution and implementation procedure with Amtrak, prior to release of the FMI).

Responsible Amtrak Official(s):

Michelle Tortolani, AVP New Acela Program
 Christopher Stratemeyer, Sr Dir Train Sets

Target Completion Date: November 30, 2023.

Recommendation #3:

Work collaboratively with the vendor to identify the risk of future field modification instructions, such as those resulting from the model validation efforts, and develop plans to mitigate their schedule impact.

Management Response/Action Plan:

Amtrak will build on its ongoing collaboration efforts with Alstom in the areas of modeling, testing and quality to identify the risk of future FMIs and develop plans to mitigate their schedule impact. These expanded collaboration efforts will include increased joint working sessions and touch points (weekly), monthly review of risk areas, and development of risk mitigation steps to mitigate impact to the overall schedule.

Responsible Amtrak Official(s):

Michelle Tortolani, AVP New Acela Program

Target Completion Date: May 31, 2024

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APPENDIX C

Alstom Comments and Amtrak OIG Response

The James M. Inhofe National Defense Authorization Act for Fiscal Year 2023 requires federal Inspectors General to notify non-governmental organizations or business entities that are identified in an audit report and provide them 30 days after publication to review the published report and, if they choose, provide a written response that clarifies or provides additional context for each instance they are specifically identified.³⁷

On October 3, 2023, when we posted *Major Programs: Company Improved Management of New Acela Program, but Additional Delays and Cost Increases are Likely* (OIG-A-2023-013) on the OIG public website, we provided Alstom the public copy in which sensitive and confidential information was redacted for public dissemination. On October 23, 2023, the President and Chief Executive Officer of Alstom Americas provided us a written response. Alstom's response largely focused on three issues, which we summarize and respond to below. For Alstom's complete response, see below.

Issue 1. Alstom stated that our reference to windows shattering was patently false and sensational, and it would be more accurate to say that windows were "fracturing." We used the word "shattering," however, because Alstom used the term to describe this issue in its own progress reports from at least January 2023 through August 2023. We note that after we posted our report on the OIG public website on October 3, 2023, Alstom changed how it characterized this issue from "shattering" to "fracturing" in its progress report dated October 9, 2023.

Issue 2. Alstom asserted that our statement that trainsets have defects is incorrect. As we state in our report, however, each of the trainsets that Alstom has produced to date have issues that do not comply with the quality standards in the contract. Alstom classifies these issues into four different categories, which we call "defects" for ease of

³⁷ James M. Inhofe National Defense Authorization Act for Fiscal Year 2023, Pub. L. No. 117-263, Div. E, Title LII, § 5274, 136 Stat. 2395, 3244.

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reporting.³⁸ As of October 2023, Alstom has not shipped a trainset to Amtrak that meets the quality standards in the contract.

Alstom also disagreed with our finding that its schedule for remediating a particular type of defect—field modification instructions (FMI)—is incomplete and presents a secondary program risk. As we state in our report, some defects are expected when producing a new trainset, but Alstom’s schedule for addressing them is incomplete. Specifically, we identified significant omissions and uncertainties in Alstom’s own database, including the availability of materials to address FMIs. Further, based on Alstom’s own monthly data, we found that in the six months from January through June 2023, Alstom met its monthly FMI remediation goal only twice, creating uncertainty about its ability to complete the FMI work according to its own schedule. Thus, we continue to believe that without more complete information, Amtrak cannot verify whether remediating the defects will impact the overall program schedule and the revenue service launch.

Issue 3. Alstom disputed our finding that delays to the overall project are partly due to the lack of a validated computer model.³⁹ Alstom stated that it has submitted sufficient data to Amtrak, and Amtrak then submitted the data to FRA to allow the trainsets to be tested at high-speed on the NEC. As we note in our report, however, in July 2023, FRA provided draft comments on the latest submission related to the computer model, noting significant gaps and questioning the results provided. Moreover, two and a half years after the original revenue launch date, FRA has not approved the trainsets for high-speed testing on the NEC. Without a validated model, FRA will not allow Amtrak and Alstom to move forward with the rest of its required testing, let alone revenue service. Thus, we maintain our position that the lack of a validated computer model has significantly contributed to program delays and continues to create additional schedule risk.

³⁸ As noted in our report, Alstom categorizes different defects within different internal databases: 1) FMI is a configuration and design change to address an issue or defect on the trainset; 2) Non-Conformance Report is any defective part outside the criteria set in the specification that needs to be refurbished or replaced by the supplier; 3) Open Items List contains items the vendor cannot address before shipping a trainset; and 4) Buyback is a one-off aesthetic item that can be addressed with nominal work. As of the vendor’s June 2023 reports, the Non-Conformance Report has 22,731 open items, and the Open Items List has 44 items open. Items can shift between lists and change from month to month as new defects are discovered or remediated.

³⁹ 49 C.F.R. § 213.345.

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October 18, 2023

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RE: Response to *MAJOR PROGRAMS: Company Improved Management of New Acela Program, but Additional Delays and Cost Increases are Likely (OIG-A-2023-013)*

Dear Sirs:

This memorandum provides Alstom's response to the audit report titled "MAJOR PROGRAMS: Company Improved Management of New Acela Program, but Additional Delays and Cost Increases are Likely" (OIG-A-2023-013) released by the Amtrak Office of the Inspector General (the "OIG") on September 29, 2023

While the OIG interviewed Alstom personnel in connection with the Program, Alstom was not provided an opportunity to review or comment on the Memorandum prior to its release. Unfortunately, the Memorandum paints an inaccurate and incomplete picture of the current state of the Program and what has transpired since the Program began in August 2016.

The assertions in the Memorandum are misleading and damaging to Alstom's reputation as the worldwide industry leader in the design of high-speed trains. Alstom thus respectfully submits this formal response to the OIG to correct the record and address certain parts of the Memorandum.

Alstom vigorously disagrees with several of the assertions in your report and addresses them below.

Before addressing specific inaccuracies it is worth noting that Alstom is the world leader in high-speed trains, with over 40 years of experience designing and manufacturing this technology and nearly 2,300 high-speed trains in service built by Alstom or built with Alstom parts and technology.

We share Amtrak's excitement in bringing this technology to America and Alstom is producing these, the first American, union-made, high-speed Avelia Liberty trains in Hornell, New York.

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Throughout the program and continuing today, Alstom has collaborated closely with Amtrak and the Federal Railroad Administration (FRA) to work through Amtrak and the FRA's first-ever safety certification for high-speed trains to ensure that these new trains meet all FRA requirements for entry into service. As part of the validation, in addition to ongoing computer simulation modeling activities, we have already successfully run these trainsets at speeds over 160mph on FRA's Pueblo, CO test track and on the Northeast Corridor for a total of nearly 70,000 miles.

While not exhaustive, Alstom addresses certain inaccuracies in the OIG report below. Alstom would have corrected these points had we been given the opportunity to review the report before it was published.

First, your assertion about windows "shattering," is patently false and the sensational nature of the assertion that was made public in your report has caused numerous headlines carrying this inaccurate information and questions of concern from Alstom's other current and prospective customers, and has significantly damaged the reputation of Alstom as a leading highspeed railcar supplier and casted unfounded doubts as to the safety of the product which also risks being detrimental to Amtrak itself. How can we expect the public to trust the future Acela Service if the windows of the trains are shattering? We therefore unequivocally reject this assertion.

Passenger safety has always been and will always be of prime importance for Alstom, as it is for Amtrak. Based on decades of high-speed experience across the world and in full compliance with FRA safety standards, Alstom uses multi-layer glass windows, which are designed to maintain their shape even if an interior pane cracks and prevent windows from "shattering" into smaller pieces. Alstom did observe fractures in five windows. As your report chose to **bury in the footnote**, this issue has since been resolved by Alstom and we have not seen this type of failure subsequently. As your report notes, we have now produced 14 trainsets worth of cars, there are 86 windows per train, so we have now installed over 1200 windows, for a failure rate of less than 1%.

Your report does not properly contextualize these failures and actively buries the fact that this issue was resolved.

Second, your assertion that the trainsets have "defects" is incorrect and not reflective of the actual condition of the trainsets. Every train that has been released from the manufacturing site was authorized for shipping by Amtrak after thorough inspections, with identified modifications to be completed prior to acceptance.

These modifications, commonly called FMIs (or Field Modifications Instructions in our industry) are a normal practice in train deliveries as Amtrak teams with experience of in receiving new assets will certainly confirm. These FMIs represent the number of agreed points, as signed off by the Agency upon shipment and will be completed before final acceptance of the trainsets, as is foreseen in the contract and customary in our industry.

These trains have been manufactured during and in the immediate post-COVID pandemic period where supply chain disruptions had widespread impacts on the U.S. economy (a fact that your report deliberately chooses to ignore). Therefore, a higher level of FMIs was required on the first trains released and have steadily decreased in subsequent trains and are at a level that is normal for a program of this magnitude.

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None of these FMIs are safety critical (per Alstom railway safety and quality rules, Alstom would not ship a train with safety critical FMIs). The assertions of "defects," and "risk for safety" are baseless mischaracterizations which are significantly affecting Alstom's reputation as a car builder and Amtrak as serious purchasing entity which would certainly not authorize train shipments should these assertions be true.

Page 18 states, "Company officials told us that the FMI defect schedule is a secondary reason for program delays." This claim is baseless and unsubstantiated. The list of FMIs for each trainset and the progress of FMI implementations is known by Amtrak and fully documented. These modifications, along with additional changes that Amtrak has requested, are in no way in the critical path of completion of this project. We find the very nature of your report to be drafted in a way where it is used as a platform to communicate claims and assertions by the Company without providing Alstom reasonable visibility to them, nor the ability to defend ourselves. This has resulted in a work product that is inaccurate and unfair to Alstom and unbalanced in its reporting.

Third, you make many assertions around the modeling process and the delays due to modeling. We strongly dispute allegations that delays to this overall project are due to Alstom's actions. It is important to note that Alstom has submitted sufficient data to Amtrak who has submitted it to FRA to allow these trains to be tested at high-speed both at FRA's test facility in Pueblo, Colorado and on the Northeast Corridor, for a total of nearly 70,000 miles to date.

Alstom contests several of your assertions on the Safety Authorization process. We will take additional aspects of the claims around Safety Authorization directly with Amtrak.

Alstom continues to work closely with Amtrak and FRA to deliver on additional requests for modeling and looks forward to having a clearer pathway to getting the trains back on track to validate the results of the most recent modeling efforts and finish the qualification of these trainsets for revenue service.

Alstom is extremely proud of the reputation it has built in the industry over the last 40 years. Alstom sincerely appreciates the OIG's interest in the Program and thanks the OIG for providing Alstom an opportunity to formally respond to the Memorandum. Alstom hopes that in the future it will have the opportunity to work more closely with the OIG prior to the release of similar Memoranda to correct inaccuracies and prevent the release of commercially damaging allegations before they are shared with the press and public.

Should you or anyone from the OIG wish to further discuss these matters, please do not hesitate to contact me.

Best regards,

A handwritten signature in blue ink, appearing to read "M. Keroullé".

Michael Keroullé
President and CEO, Alstom Americas
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APPENDIX D

Abbreviations

DOD	Department of Defense
DOT	Department of Transportation
FMI	field modification instruction
FRA	Federal Railroad Administration
GAO	Government Accountability Office
NEC	Northeast Corridor
OIG	Amtrak Office of Inspector General
the company	Amtrak
the vendor	Alstom

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APPENDIX E

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OIG MISSION AND CONTACT INFORMATION

Mission

The Amtrak OIG's mission is to provide independent, objective oversight of Amtrak's programs and operations through audits and investigations focused on recommending improvements to Amtrak's economy, efficiency, and effectiveness; preventing and detecting fraud, waste, and abuse; and providing Congress, Amtrak management, and Amtrak's Board of Directors with timely information about problems and deficiencies relating to Amtrak's programs and operations.

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