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**New York State Office of the State Comptroller**  
Thomas P. DiNapoli

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Division of State Government Accountability

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# Signal Maintenance, Inspections, and Testing

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## Metropolitan Transportation Authority – New York City Transit

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Report 2017-S-6

October 2018

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# Executive Summary

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## Purpose

To determine if the Metropolitan Transportation Authority's New York City Transit (NYCT) performed signal maintenance, inspections, and testing in compliance with federal, State, agency, and manufacturer standards. The audit covers the period January 1, 2015 through October 31, 2017.

## Background

NYCT Department of Subways' (Subways) Maintenance of Way division has six operating subdivisions; among them, Electrical is responsible for Power and Signals. Subway track is divided into sections for maintenance purposes. As of February 22, 2017, the signal system included 44,536 signal devices divided among 122 section locations. NYCT employs Signal Maintainers, who are responsible for the maintenance, inspection, and testing (MIT) of the equipment at their assigned section locations. As of April 2017, Signals had a monthly average of 1,257 hourly employees responsible for these tasks.

Maintenance of signals is critical in preventing subway delays. On much of the current system, if a signal malfunction occurs, a portion of the track must be shut down until the signal is fixed. Depending on the location of the signal, this can result in significant delays for commuters.

Each section location has a logbook that Signal Maintainers use to record MIT information (e.g., work performed). When work is completed, information from the logbook is entered, usually by a Signal Supervisor, into the Integrated Signal Equipment Information System (iSEIS) database.

In 1991, Congress directed the Federal Transit Administration to establish and administer a program providing for the State-conducted oversight of the safety and security of rail systems not regulated by the Federal Railroad Administration. Under Code of Federal Regulations Section 49, Part 659, the primary responsibility of the State is to designate an entity – other than the rail transit agency – to oversee the safety and security of a rail fixed guideway system.

In New York State, it is the Public Transportation Safety Board (PTSB) that reviews and approves NYCT's System Safety Program Plan (SSPP), which outlines when MIT is required. NYCT is required to review the SSPP annually, and any modifications must be submitted to the PTSB for review and approval. According to Subways officials, maintenance ensures the reliability and availability of train service, while inspections and tests ensure safety within the subway system.

## Key Findings

- We sampled devices at four section locations (Pelham, Howard Beach, Compressors, and New Technology-East New York). We found that Signals did not always perform MIT of its signal equipment within the required intervals. For example, at Howard Beach and Pelham, 450 of the 1,280 MIT activities (35 percent) required from January 1, 2015 to May 16, 2017 were not done within the required intervals.
- Maintenance Supervisors are required to inspect all of the devices within their section locations

annually or as directed by Signals management. For the 51,603 annual inspections with complete information that were performed from January 1, 2016 to May 16, 2017, we found that 39,194 (76 percent) were done late. In addition, we identified 2,345 devices that were on the Signal Device Master List but were not inspected by a Supervisor during this period.

- Despite staff shortages, in some cases poor communication resulted in unnecessary work being performed. For example, NYCT is required to review the SSPP annually, and any modifications must be submitted to the PTSB for review and approval. However, NYCT did not update its SSPP for at least one of the Task Codes we examined. According to Engineering division officials, this task was phased out during 2011 and 2012; however, it was not designated as “Not Applicable” until the June 2017 SSPP. As a result, based on data in iSEIS, the task was performed 108 times by Signal Maintainers from August 2015 through April 2017 despite staff not being available for regular maintenance.
- Signals does not have an inventory system to account for all of the equipment (units) it maintains. Keeping track of assets through an inventory system helps organizations maintain the assets and helps ensure sound procurement decisions. NYCT’s assets represent a significant investment. For instance, we selected three device categories and estimated (based on data from NYCT) the value of this equipment to be approximately \$235 million. For example, signal relays, which are reported at an estimated 350,000 units in the SSPP, come in different types and cost per unit. Using the lowest unit price provided by NYCT, the potential total cost of the units was \$175 million (350,000 × \$500). NYCT officials advised us that they are developing an Enterprise Asset Management system to manage their inventory; however, the process will take about three years to complete.

## Key Recommendations

- Review and allocate resources to ensure that all signal devices are maintained and tested in accordance with applicable procedures and standards.
- Improve the monitoring of MIT activities by Signal Maintainers and Supervisors to ensure that NYCT’s power and signal systems (including switches) are checked as required.
- Document and communicate changes and updates to the SSPP internally and to the PTSB in a timely manner.
- Develop a perpetual inventory system for signal maintenance equipment.

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**State of New York  
Office of the State Comptroller**

**Division of State Government Accountability**

October 17, 2018

Mr. Joseph J. Lhota  
Chairman  
Metropolitan Transportation Authority  
2 Broadway  
New York, NY 10004

Dear Mr. Lhota:

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 doing so, it provides accountability for 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 entitled *Signal Maintenance, Inspections, and Testing*. The audit was performed pursuant to the State Comptroller's authority as set forth in 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,

*Office of the State Comptroller  
Division of State Government Accountability*

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## Background

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The Metropolitan Transportation Authority (MTA) is a public benefit corporation established by the State Legislature. New York City Transit (NYCT) is an affiliated agency of the MTA that provides rapid transit services in the Bronx, Brooklyn, Manhattan, and Queens by operating the New York City subway 24 hours a day, seven days a week.

NYCT Department of Subways' (Subways) Maintenance of Way division (MOW) has six operating subdivisions; among them, Electrical is responsible for Power and Signals. Subway track is divided into sections for maintenance purposes. As of February 22, 2017, the signal system included 44,536 signal devices divided among 122 section locations. NYCT employs Signal Maintainers, who are responsible for the maintenance, inspection, and testing (MIT) of the equipment at their assigned section locations. In April 2017, Signals reported a monthly average of 1,257 hourly employees responsible for these tasks.

Signal maintenance is critical in preventing subway delay. On much of the current system, if a signal malfunction occurs, a portion of the track must be shut down until the signal is fixed. Depending on the location of the signal, this can result in significant delays for commuters.

MIT work is performed based on predetermined intervals (frequency + tolerance), measured in days. The intervals account for various issues, such as lack of track access and emergencies, which may affect compliance with frequency standards. Each section location has a logbook where Signal Maintainers are required to record MIT information. The two main parts of the logbook are the body, which the Signal Maintainers and signal helpers use to sign in and out and record the actual work done; and the back, which is used to summarize the work performed, including: a description of the device, the interval in which the MIT should be performed, each test/task performed, and the date that the MIT was performed. Information from the logbook is entered, usually by a Maintenance Supervisor, into the Integrated Signals' Equipment Information System (iSEIS), Signals' internal database.

In 1991, Congress directed the Federal Transit Administration (FTA) to establish a State Safety Oversight Program (SSOP). Congress later passed legislation that greatly expanded FTA safety authority and required states with rail transit systems to strengthen their own SSOPs. Under Code of Federal Regulations (CFR) Section 49, Part 659, the primary responsibility of the State is to designate an entity – other than the rail transit agency – to oversee the safety and security of a rail fixed guideway system. In New York State, it is the Public Transportation Safety Board (PTSB) that reviews and approves NYCT's System Safety Program Plan (SSPP), which outlines when MIT is required. According to information reported in iSEIS, Signal Maintainers completed 348,143 MIT activities from January 1, 2015 to October 31, 2017.

## Audit Findings and Recommendations

For the devices we sampled at four section locations (Pelham, Howard Beach, Compressors, and New Technology-East New York), Signals did not always perform MIT of signal equipment within the prescribed intervals. For example, at Howard Beach and Pelham, we found that 450 of the 1,280 MIT activities (35 percent) that were required from January 1, 2015 to May 16, 2017 were not done within the required intervals.

We also found non-compliance with MIT intervals among Maintenance Supervisors. For example, 76 percent of their annual signal device inspections were not done on time. In addition, Supervisors did not always perform semi-annual Supervisory Validations to ensure Signal Maintainers are proficient at performing inspections and tests.

Non-compliance with MIT activities increases the risk that devices will not function properly, which may negatively impact the reliability and availability of train service. We recommend NYCT officials review and allocate resources to ensure that MIT, annual inspections, and Supervisory Validations are performed in accordance with standards.

### Maintenance, Inspections, and Testing

#### *Pelham and Howard Beach*

#### Compliance With Required MIT Intervals

Signal equipment at Pelham and Howard Beach consists of signals, stops, and switches. Our review of MIT activities for a judgmental sample of 49 devices at these two sections found that 450 of the 1,280 MIT activities (35 percent) that were required from January 1, 2015 to May 16, 2017 were not performed within the required intervals. The combined results of our findings are summarized below.

Task Codes	Description	Number of MIT Activities Not in Compliance		Totals
		Howard Beach	Pelham*	
90	Partial General Maintenance	**	24	24
100	Maintenance	49	11	60
102	CC Operated BY SW. & Lock Movement	2	**	2
105	Ground Test	21	**	21
107	Track Circuit Test	65	34	99
118	Mainline Switch Locking & Adjustment Test	**	23	23
121	Roadway Element (Train Stop ) Test	38	183	221
<b>Totals</b>		<b>175</b>	<b>275</b>	<b>450</b>

\* Pelham Program - Pelham had a separate practice that deviated from the written guidelines. They added Task #90, described as a "Partial General Maintenance," which is a visual inspection performed every 90 days. They also adjusted the maintenance interval for "General Maintenance" from 90 days to 180 days.

\*\* Task not reviewed at this section.

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Of the MIT activities examined, 367 were between 1 to 10 days late and the other 83 were between 11 and 170 days late.

When asked why MIT work was not always performed according to Signals' frequency standards, the Maintenance Supervisors for Pelham and Howard Beach told us that they lack resources, and that stringent flagging rules dictate what work can be performed daily. To substantiate these statements, at Howard Beach we randomly selected and reviewed 20 dates on which MIT activities were expected to be performed but were delayed. We found that, on nine dates, maintenance personnel were sent to other sections to assist with MIT work, and on another two dates, they responded to emergency situations/incidents. On the remaining nine dates, MIT work was delayed for various reasons, such as flagging and staffing shortages.

Our review of the 2016 and 2017 target monthly reports to NYCT's Executive Management showed that signals and switches were being maintained on time for most of the year. However, timing was based upon the criteria that the MIT activities occurred within 30 days of the due dates (defined as the interval period) rather than within the time frame that work was required to be performed. In response to our preliminary findings, NYCT officials stated that, although MIT was late, most were completed within five to ten days after the due dates.

We question the current reporting practice, as it de facto sets a new due date for when work must be complete (30 days after required due dates). MIT intervals are critical for the safety, reliability, and availability of train service at these section locations, and any slight deviation can impact these factors.

In addition to MIT work not being performed on time due to staff shortages, at Pelham we identified that at least one test (Test 18, which ensures that switches are operating safely and as designed) was being performed more often than required. Test 18 has to be performed every 30 days (or 90 days if in the yard). We reviewed 137 instances where this test was performed and found 102 times when it was done less than 30 days apart; in 40 instances, the test was done less than 10 days apart.

### **Discrepancies in Logbook iSEIS Entries**

Maintenance Supervisors are required to enter the task codes into iSEIS for the daily work that Signal Maintainers perform. This information is then used to determine subsequent MIT dates, so its accuracy is essential. At Pelham and Howard Beach, we identified 57 of the 1,280 entries where the MIT information in the logbook differed from the entries in iSEIS. For example, iSEIS indicated that, on January 28, 2017, two tasks were entered as completed at Howard Beach; however, the body of the logbook indicated that no work was performed that day.

According to Signals officials, under the "Pelham Asset Management," Signal Maintainers at Pelham were instructed to enter their own task codes into iSEIS, as part of a daily initiative, while Maintenance Supervisors were to ensure that the information was accurate – an additional review step. Despite the requirement of Signal Maintainers to enter their work in iSEIS, this did not occur in 458 instances, or 66 percent of the time. Rather, Maintenance Supervisors continued to enter the information, which defeated one of the reasons for the pilot.

Moreover, as an additional layer of oversight and to ensure compliance with policies and procedures, under section 7.05.001 of NYCT's Standard Operating Procedures (SOPs), Superintendents are to review iSEIS reports weekly and audit logbooks monthly. However, we found no evidence in the logbooks that Superintendents were performing signal management audits in accordance with procedures. In response to our preliminary findings, NYCT officials stated that they would issue a directive reminding all Signal Managers of proper logbook procedures. Subsequently, NYCT provided a copy of the directive, dated October 1, 2017, reminding employees of relevant procedures.

Officials also stated that in addition to signal management audits, their independent Enterprise Asset Management (EAM) group performs periodic logbook audits, which Signals must review and respond to. Our testing confirmed that EAM's logbook audits identified the same logbook/iSEIS differences we reported. However, based on NYCT's logbook audit results for 2017, we found that Superintendents did not always respond to the EAM reports on a timely basis as required.

In response to our preliminary findings, Signals officials gave us various explanations, such as both the Track and Electrical subdivisions had to perform the work together, but could not, due to scheduling reasons. While we found 24 instances in which Signals officials documented in the logbook that a joint switch Inspection occurred, we found no written justification why the test was performed so frequently or any evidence that the frequency of tests was regularly being examined to ensure that work was being performed in accordance with required guidelines.

### *System Safety Program Plan*

NYCT officials also did not update the SSPP in accordance with 49 CFR 659.25, resulting in work being performed that was no longer required. Task Code 103 (Shunt Fouling Test) was listed as an inspection test in the 2015 and 2016 SSPPs, even though the task was phased out (according to Engineering division officials) during 2011 and 2012. Despite this, iSEIS showed that Signal Maintainers performed this task 108 times from August 2015 through April 2017.

When we asked Signals officials about the work that was performed by Signal Maintainers during our audit scope period, they could not explain what work was performed when Maintenance Supervisors recorded Task Code 103 or why it was not disabled in iSEIS.

Weak information, communication, and monitoring activities are the key causes for why the SSPP was not updated as required. In response to our preliminary findings, NYCT officials stated that the 2017 SSPP was modified (in June 2017) to correctly reflect that Task 103 was "Not Applicable." In addition, officials stated that they modified the iSEIS database so that no entries could be made for Task Code 103.

## **Recommendations**

1. Remind Signal Maintainers and Maintenance Supervisors of logbook and iSEIS policies and guidelines.

2. Periodically review logbook entries to ensure compliance with Electrical Division guidelines and document such review.
3. Timely update the SSPP to reflect any procedural modifications to the SSPP internally.
4. Timely document and communicate procedural changes and updates to the SSPP to the PTSB.
5. Ensure iSEIS only lists valid Task Codes.
6. Review and allocate resources to ensure that all signal devices are maintained, inspected, and tested in accordance with applicable standards.

## Specialized Equipment

There are section locations responsible for maintaining specialized equipment other than signals and switches, such as compressors and new technologies – both of which are critical to preventing delays within the system. We examined the maintenance of this equipment and found that it was not always performed timely, and, in some cases, preventive maintenance intervals were extended due to resource shortages. Further, when we examined trouble calls for this equipment, we determined that Signals has not developed a target for when such calls should be addressed. In addition, these calls were not always appropriately documented, so it was unclear which device was associated with each trouble call, making analysis of data difficult.

### *Compressor Squad*

Compressor equipment is clustered in compressor plants throughout the subway system to supply compressed air to switches, stops, and gap fillers along the right-of-way. Compressors are integral to the signal system. In addition to providing compressed air for operations throughout the system, they control and maintain the flow of intercooling water and lubricating oils for the signal system. SOP 7-10-007 states, in part, that “when this equipment is properly inspected and maintained it will insure trouble free performance.”

Maintenance for compressor equipment is done by Section Maintainers and the centralized Compressor Squad. We examined two MIT activities for the Compressor Squad: regular maintenance and trouble calls.

We reviewed a judgmental sample of 22 devices (out of a population of 439) that had 70 maintenance tasks from January 4, 2016 to July 13, 2017, and found that 60 maintenance tasks (86 percent) were performed late. We note that, during our scope period, maintenance intervals (per the SOPs) were increased. For example, for three devices classified as “tanks” (which hold the compressed air), the interval increased from 90 days to 182 days in 2016, before increasing again to 365 days in 2017.

We also found that the parts inventory is not properly maintained and up to date, which further contributed to delays. For example, at 149 Street Grand Concourse, maintenance repairs were

delayed because, according to the Compressor Squad, the parts required for the repairs were not available. As a result, no maintenance was performed between November 28, 2014 and February 24, 2016. Moreover, required documentation of preventive maintenance work was sometimes not available, and when available did not, in many cases, appear to have been signed off and reviewed.

In addition to the logbook, Section Maintainers are required to submit weekly reports on work performed to the Compressor Squad. The information in these reports is reviewed and used to schedule maintenance and trouble calls, which can help prevent a major compressor breakdown, compressor plant failure, and, in some cases, a delay or loss of train service. However, we found that 168 of the 450 reports (37 percent) that were required for the weeks ending January 2, 2016 to July 29, 2017 were not submitted. Even when submitted, weekly reports were not always reviewed or approved by the supervisory personnel as provided for on the form. In response to our preliminary findings, NYCT officials noted that the information from these reports is also contained in iSEIS, which is reviewed by management.

We also reviewed 18 trouble calls related to the 22 devices and found that 12 of them took between 1 to 489 days to be resolved, with most addressed within 30 days. This variation is not surprising as Signals has not set guidelines for when such calls should be resolved. Further, in several instances, trouble calls were associated with devices where maintenance interval periods were increased. For example, four of the trouble calls were associated with three devices where the interval period increased from 90 to 275 days. However, due to problems with the quality of data kept on trouble calls, a more complete analysis could not be performed.

### *Issues at New Technology-East New York*

NYCT has undertaken the task of upgrading the systems to replace old equipment with new technology equipment based on electronic/computer-based systems. The new technology equipment is a microprocessor-based signal control system, and includes a Speed Enforcement System that measures and enforces train speed by activating warning signs and trip stop mechanisms.

Our review of the maintenance of 27 new technology devices found 55 maintenance activities; 30 (55 percent) were between 2 and 464 days late. We found one device (which had a maximum maintenance interval of 200 days) that had not been maintained for 885 days (as of October 31, 2017, the date of our review).

Although the logbook and iSEIS list specific intervals when maintenance should be performed, rather than performing the maintenance at the appropriate interval or earlier, according to Signals officials, management may decide to forgo maintenance to utilize its resources elsewhere. Additionally, in our review of 32 trouble calls, we found that 19 were resolved on the same day and 10 did not have a resolution date. We could not trace the status of the ten due to the insufficient information that was recorded. The three remaining trouble calls were resolved within one to seven days. We determined that there were no standard written guidelines for maintenance and trouble calls in the SOP even though the new technology department dates back to 1995. Thus,

the time it should take to respond to and resolve trouble calls and what information should be recorded is left up to the discretion of the Signal Maintainer.

We note that four of the trouble calls were related to the Bergen Street location. There were multiple and repeated instances when this equipment failed. Officials told us this was because the devices were already technologically obsolete at the time of installation. According to NYCT officials, the problem cannot be properly addressed unless the current devices are returned to the vendor to be replaced or reconditioned, or NYCT replaces the devices with newer models, which are in use at other locations.

### *Master List Change Form*

NYCT officials stated that, in consultation with MOW's Engineering division, maintenance intervals are determined based on the age, past reliability, and operational environment of the equipment. Officials consider manufacturer guidelines as well as safety and service requirements. However, when we inquired about changes to the maintenance intervals for specialized equipment areas, Compressor Squad and New Technology-East New York officials told us that maintenance intervals were extended based on staff resources.

To determine how interval levels were changed, we requested copies of the Master List Change Forms for 2015 through 2017. We received forms for the Compressor Squad and other section locations that listed signal devices, with the exception of New Technology-East New York. As such, we lack assurance that the changes at this section were documented and approved.

Based on our review of the forms provided, we found no written justification was required to request a change. The Master List Change Forms were signed by a Signal Supervisor and approved by a Superintendent. In addition, NYCT officials were not able to support their statement that Engineering division officials are required to review and/or approve requests for changes to the maintenance intervals.

In response to our preliminary findings, NYCT officials stated that they will update their internal processes by the end of 2018 to clearly define the approval requirements for interval changes. In addition, the Master List Change Form will also include the reason for the change as well as Engineering approval, where required.

## **Recommendations**

7. Ensure inventory of parts is up to date to prevent delays in repairs.
8. Ensure weekly reports are submitted, reviewed, and approved timely, and develop procedures to address when reports are submitted.
9. Review the resources allocated to the Compressor Squad and the logistics of assignments and equipment.

10. Develop and document the following for new technology equipment:

- Written procedures or responsibilities for staff in charge of the trouble call desk to ensure consistency and continuity in services for each tour; and
- Standards for handling trouble calls and documenting the actions taken, including when follow-up is required.

11. Ensure all changes to maintenance interval levels comply with NYCT policies and procedures.

12. Revise the Master List Change Form to require that the originator and the approver state the reason for the change and attach supporting documents.

13. Require that all Master List Change Forms be approved by the Engineering division.

## Supervisory Reviews

### *Annual Inspections*

Maintenance Supervisors are required to inspect all devices in their section locations annually, indicated as Task Code 200 in iSEIS. During the inspection, the Maintenance Supervisor is required to complete a Supervisory Inspection Form to assess various components of the device, such as its external structure, internal components, and mechanical components. The Maintenance Supervisor must determine if the device needs to be repaired or renewed. The purpose of the procedure is “to provide Maintenance Supervisor (supervisor) with a procedure on how to perform supervisory inspections on signal devices to enhance safety, reliability, quality, and production.”

According to iSEIS, 93,757 annual inspections were performed from January 1, 2016 to May 16, 2017. We reviewed 51,603 of these annual inspections to determine whether they were done as required. We did not review the other 42,154 because the inspection interval start dates preceded January 1, 2015. We found that 39,194 (76 percent) annual inspections were not performed on time.

In addition, 2,345 devices on the Signal Device Master List (SDML) were not inspected during the entire period. To determine whether these devices should have had an annual inspection, we judgmentally selected 12 sections based on the number of devices without an annual inspection and then randomly selected devices from each section. In total, we selected 385 devices and found at least 278 devices (72 percent) that required annual inspections according to iSEIS but were not inspected. We excluded the remaining 107 inspections because there were gaps in the MIT activities from January 1, 2015 through May 16, 2017. If equipment is placed out of service for a period of time, the schedule for MIT stops until the equipment is put back in service.

We noted that at one section (14th Street and 8th Avenue) there were no annual inspections performed on 180 of the 192 devices (94 percent). According to the SDML report, all the signal devices in this section were classified as new technology. For the remaining 12 devices, supervisory inspections were performed once for each device (nine in 2015 and three in 2016).

To determine if annual inspection forms were completed as required, we selected a random sample of 80 Task Code 200 entries from iSEIS for three locations. Signals officials could only provide support for 3 of the 80 entries. In response to our preliminary findings, NYCT officials stated they will issue a directive reminding all Signals personnel of proper procedures regarding documentation, and will review compliance through their internal control process. Officials added that electromechanical positions, such as Signal Maintainers, have been difficult to fill in recent years, and that Supervisors are sourced from the Signal Maintainer workforce. They have taken a number of steps to resolve the staffing situation, including the addition of trainees, signal helpers, and apprentice programs. However, during the audit period, there was a significant number of supervisory vacancies.

Officials also stated that new technology equipment is self-monitoring and self-diagnosing, and therefore does not require periodic inspections like other conventional devices. We question this statement because the manufacturer specifications state “preventive maintenance tasks consist of periodic general cleaning and visual inspection.” They also indicate that if the preventive maintenance is not done, there is an increased risk that equipment may malfunction due to dust build-up.

NYCT officials provided documentation to support their efforts to fill electromechanical positions in 2017 and 2018. In addition, NYCT officials provided the audit team with a copy of the directive, dated March 1, 2018, reminding Maintenance Supervisors of how to perform supervisory inspections.

### *Validation Reviews*

On November 1, 2015, the Chief Electrical Officer issued the “Supervisory Validation Procedure” to supplement procedures implemented in 2009, requiring Maintenance Supervisors “to monitor the performance of each assigned Signal Maintainer, at least, once every 180 days to assess performance, identify deficiencies, and improve test process quality” for each test that Signal Maintainers perform routinely.

For eight judgmentally sampled Signal Maintainers we determined there should have been at least three Supervisory Validations completed for each of the 69 unique tests Signal Maintainers performed from January 1, 2016 to August 31, 2017 (207 total Supervisory Validations). We found that 106 Supervisory Validations were completed, 56 of which were more than 180 days late. The remaining 101 were not completed at all. For one of the tests (Test 5), seven of the eight Signal Maintainers were never evaluated. This test detects any ground condition that may cause a failure to the Signal Control Train System.

After each Supervisory Validation, Signal Maintainers should be rated on their proficiency level. However, for the validations that were completed, 43 percent were missing ratings. As a result, there is less assurance that Signal Maintainers performed tests correctly. We also found that, for eight validations, the actual tests were not listed in the body of the logbook, even though the validations were recorded in iSEIS. In addition, seven of the tests were not entered into iSEIS. Thus, we have no assurance that these entries were valid, and they were not counted in our total number of Supervisory Validations performed.

In response to our preliminary findings, NYCT officials stated that the “intent of their procedure is that at a minimum one test, chosen at the Supervisor’s discretion, requires an efficiency test every 180 days” and, further, that they “will revise in the wording of the procedure where required to clarify this intent.” However, based on a “Positive Compliance Directive” officials issued to Signal Maintainers on January 1, 2018, “Supervisors are to validate assigned signal maintainer’s performance on **each test** (emphasis added) routinely performed during their current job assignment and assess proficiency.”

## Recommendations

14. Periodically review Supervisory Inspection Form records to ensure compliance with procedures.
15. Develop reporting systems that alert management personnel of instances of non-compliance with supervisory inspections.
16. Periodically review logbook entries and information recorded in the Supervisory Validation to ensure compliance with departmental guidelines.
17. Implement a control in iSEIS to check whether Signal Maintainers have been proficiency tested within the prior six months every time a device test is entered.

## Equipment Inventory

Inventory keeps track of materials and goods held by an organization and, as such, should be accurately counted and valued. Organizations whose inventory items have a large unit cost generally keep day-to-day records of inventory changes to ensure accurate and ongoing control.

Signals does not have an inventory list for all of its equipment (units). According to the 2016 SSPP, “Signals is responsible for maintaining the following equipment,” which totals 410,205 units. However, we were provided the SDML as of February 22, 2017, which only shows 44,536 units.

To determine if the SDML was a comprehensive listing of all devices, we requested a reconciliation report of the devices listed in the SSPP to the SDML. On April 27, 2017, officials informed us that the units listed in the SSPP are estimates, and include signal relays (the largest category of units on the SSPP, at 350,000 units), which are not currently listed individually in iSEIS; instead, iSEIS lists relay racks, which contain multiple relays. As a result, they stated that it would be difficult to connect the number of units in the SSPP to the SDML.

We selected a few items from the listing of units maintained in NYCT’s SSPP to determine the estimated value based on the cost of the units. The results are as follows:

Category of Equipment	Total in the 2016 SSPP	Estimated Cost of Devices (Per Unit)	Estimated Total Cost
Signal Relays	350,000	\$500	\$175,000,000
Model 5 – Switches	1,082	\$37,219	\$40,270,958
Spring (Air) Stops	2,122	\$9,145	\$19,405,690

Without a complete inventory list, NYCT cannot account for all its equipment, and has no assurance that all equipment is maintained and that it has an adequate supply of replacement parts when needed. In response to our preliminary findings, NYCT officials stated that an inventory system is currently under development through MTA's EAM initiative and they expect the data collection process to be completed within the next three years.

## Recommendation

18. Develop a perpetual inventory system for signal maintenance equipment.

## Audit Scope, Objective, and Methodology

To determine if NYCT performed signal maintenance, inspections, and testing in compliance with federal, State, agency, and manufacturer standards. The audit covers the period January 1, 2015 through October 31, 2017.

To accomplish our objective, we reviewed policies, procedures, and guidelines related to the MIT activities. We interviewed Signals officials and employees to evaluate the internal controls related to these areas. For our logbook reviews, we judgmentally selected one section location in each of the four boroughs – the Bronx, Brooklyn, Manhattan, and Queens. For the supervisory annual inspections, we analyzed iSEIS data and selected Maintenance Supervisors based upon red flag indicators, such as duplicate entries. Our sample of annual inspection forms was selected from three locations. The population for each section was 575, 264, and 92. The sample for each section was 29, 26, and 25.

We conducted our performance audit in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objective. We believe that the evidence obtained 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. These include operating the State's accounting system; preparing the State's financial statements; and approving State contracts, refunds, and other payments. In addition, the Comptroller appoints members to certain boards, commissions, and public authorities, some of whom have minority voting rights. These duties may be considered management functions for purposes of evaluating organizational

independence under generally accepted government auditing standards. In our opinion, these functions do not affect our ability to conduct independent audits of program performance.

## Authority

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The audit was performed pursuant to the State Comptroller's authority as set forth in Article X, Section 5 of the State Constitution and Section 2803 of the Public Authorities Law.

## Reporting Requirements

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A draft copy of this report was provided to MTA officials for their review and formal comment. Their comments were considered in preparing this final report and are attached in their entirety at the end of it.

In its reply to the draft report, the MTA said that its Subway Action Plan (SAP), which started in July 2017 but did not receive full funding until long after, has dedicated considerable resources to the expedited repair of NYCT's signal system. In addition, the MTA stated that it was already in compliance with most of the recommendations made by the audit. While we acknowledge NYCT's efforts in issuing the SAP, we do not agree that it "already complies" with the audit's recommendations. Moreover, NYCT, while given significant opportunity to do so, did not provide any information to support statements made in its response regarding additional hiring or outcomes, which would enable us to validate the information. Our rejoinders to specific comments are included in the report's State Comptroller's Comments, which are embedded in the MTA's response.

Within 90 days after the final release of this 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 where the recommendations were not implemented, the reasons why.

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## Contributors to This Report

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A team of accountability experts respected for providing information that decision makers value.

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To improve government operations by conducting independent audits, reviews, and evaluations of New York State and New York City taxpayer-financed programs.

# Agency Comments and State Comptroller's Comments

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Joseph J. Lhota  
Chairman



## Metropolitan Transportation Authority

State of New York

September 4, 2018

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

**Re: Draft Report #2017-S-6 (NYC Transit: Signal Maintenance, Inspections, and Testing)**

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 Andy Byford, President, MTA NYC Transit, which address this report.

Sincerely,

A handwritten signature in black ink that reads "Joseph J. Lhota".

Joseph J. Lhota

c: Veronique Hakim, MTA Managing Director  
Michael J. Fucilli, Auditor General, MTA Audit Services

Attachments

*The agencies of the MTA*

MTA New York City Transit  
MTA Long Island Rail Road

MTA Metro-North Railroad  
MTA Bridges and Tunnels

MTA Capital Construction  
MTA Bus Company

# Memorandum



**Date** August 30, 2018

**To** Joseph Lhota, Chairman, MTA

**From** Andy Byford, President, New York City Transit

**Re** **New York State Comptroller Report #2017-S-6 – Signal Maintenance, Inspections, and Testing: 30 Day Response**

This information is being provided in response to the State Comptroller’s draft audit report on Signal Maintenance, Inspections, and Testing (2017-S-6), which covers the period from January 1, 2015 through October 31, 2017. The stated purpose of the audit was to determine if New York City Transit (NYCT) performed signal maintenance, inspections, and testing in compliance with federal, state, agency, and manufacturer standards. NYCT already complies with the majority of the recommendations contained in the State Comptroller’s draft audit report. In addition, NYCT is already working on improvements to its signal system through several initiatives, as discussed below.

**State Comptroller’s Comment** - The audit showed that maintenance, inspections, and testing were not done timely, and in several cases there was no evidence these activities were performed. Therefore, we question NYCT’s response that it was already in compliance with the majority of the recommendations contained in the draft report.

The report focuses primarily on the timing of inspections, documentation by maintainers and supervisors, and NYCT’s signal inventory system. These areas of focus have been under ongoing review by NYCT, which has worked to address these issues through measures to ensure Signal Maintainer vacancies are filled and to establish a new automated Enterprise Asset Management (EAM) system. The audit fails to note, however, as a part of its review that the signal system is a “fail-safe system,” and, as such, these issues pose no risk to the safety of NYCT’s customers.

**State Comptroller’s Comment** - A fail safe is defined “as a system or plan that comes into operation in the event of something going wrong or that is there to prevent such an occurrence.” As the subway system is currently in a state of emergency, the functioning of the fail-safe system is of critical import because it is the system that will prevent a safety incident from occurring. It is therefore surprising that NYCT believes problems with its “fail-safe” system would pose no risk to its customers – as, by definition, a failure in the “fail-safe” system can potentially result in a safety incident. Additionally, NYCT is defining safety narrowly – and overlooking the direct impact on customers if trains stop operating due to a signal problem. For instance, the number of riders on platforms will increase rapidly, especially during the rush hours, resulting in crowding both on platforms and on trains. As the temperature in the stations and cars increase during the warmer months, this creates a potential issue of safety of a different nature.

As you know, the Subway Action Plan (SAP), which just started three months before the end of

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this 10-month audit, and did not receive full funding until long after the audit period ended, has dedicated considerable resources to the expedited repair of NYCT's signal system. The very substantial work and improvements brought on by this emergency stabilization plan are not reflected in this audit.

**State Comptroller's Comment** - We are pleased that NYCT has developed the SAP to improve its service, but without continued maintenance, inspections, and testing the benefits of this effort will be short-lived.

With the SAP, NYCT has added 123 budgeted positions to the Signal Division, including 91 for maintenance and repair and the balance for Combined Action Team emergency response to incidents. The SAP also budgeted capital funding for signal modernization.

**State Comptroller's Comment** - As discussed, this is an emergency stabilization plan. Maintenance, on the other hand, is a long-term issue that requires a sustained effort. Additionally, NYCT, while given significant opportunity to do so, did not provide any information to support statements made in its response regarding additional hiring or outcomes, which would enable us to validate the information.

Through the SAP, dedicated teams were established to fix 1,300 of the most problematic signal components - those that cause incidents that delay customers. Not only was that goal met by July 2018, but the goal was expanded to more than 1,700 signal components by the end of the year. These targeted efforts have begun to show a substantial reduction in major incidents attributable to signals: for July 2017 to June 2018 (the period that SAP has been active), the number of average monthly major incidents attributed to signals is more than 12% lower than the six months before the SAP began.

More information on steps taken to address the issues raised in this audit are as follows:

- A phased rollout of EAM in the Signals Division that began in November 2016 is addressing documentation challenges and is streamlining the current manual data entry requirements through an efficient database and the use of mobile devices. Almost 400 devices are now in use by Signal Maintainers and responses to signal trouble calls are now all recorded in the EAM system. As the remaining components of the EAM system are phased in, NYCT is ensuring better information during the rollout period through strengthening current documentation procedures and issuing directives to remind Signals Division personnel of documentation requirements. These are reinforced at regular staff meetings and through the annual internal control process. While NYCT is committed to improving data and documentation, it should be noted that the auditors devote much of their report to a data entry error that applied to one test (out of dozens) pertaining to three track circuits (out of over 10,000).

**State Comptroller's Comment** - We disagree with NYCT's comment that much of the report was devoted to one test. The audit found 450 of the 1,280 MIT activities (35 percent) were not done within the required intervals, Maintenance Supervisors did not perform 76 percent of their annual device inspections on time, and Supervisory Validations were not always performed.

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- NYCT has advanced a variety of initiatives to better ensure a continued source of trained staff in hand to fill titles. The strategy includes expanding partnerships with technical schools, creating new trainee and apprentice titles, and developing internal training programs tailored to these roles. NYCT has also added more Signal Helper positions which are easier to fill, along with revised work assignment and practices, to ensure that more Signal Maintainers are available for core work. These initiatives were advanced due to difficulty the NYCT has seen over the last several years in filling budgeted skilled trades positions, including signal maintainers and supervisors. This is due, in many cases, to competition from the private sector for these electro-mechanical trades.

**State Comptroller's Comment** - While we did not audit those efforts, we applaud NYCT for its initiatives to better ensure a trained workforce as that is critical to preventing several of the issues identified within the report.

- The report also recommends the development of a perpetual inventory system for signal maintenance equipment. As explained to the auditors, the EAM system, which has been under development for several years and is precisely what the report recommends, has begun its phased rollout and will provide a more concise accountability of NYCT's inventory.

**State Comptroller's Comment** - According to NYCT, EAM started in November 2016 and the projected date for full implementation is end-of-year 2021. However, there is no indication of any actions to be taken in the interim to address the issue of the lack of an inventory for signal maintenance equipment.

#### Response to Recommendations

*Comptroller Recommendation #1: Remind Signal Maintainers and Maintenance Supervisors of logbook and iSEIS policies and guidelines.*

NYCT Response: NYCT already complies with this recommendation. NYCT issues annual directives reminding all Signals Division personnel of the policies and guidelines for logbook and iSEIS database entries. The most recent directive (#017-36) was issued on October 21, 2017, and the next directive will be issued by the end of November 2018. Hard copies of these directives are distributed through the local field offices, and each supervisor is required to discuss the issues outlined in the directive with all staff members.

**State Comptroller's Comment** - The audit report (page 8) is correct: Directive (#017-36) was issued October 1, 2017, not October 21, 2017.

*Comptroller Recommendation #2: Periodically review logbook entries to ensure compliance with Electrical Division guidelines and document such review.*

NYCT Response: NYCT agrees with this recommendation. Signals Division management perform monthly logbook audits and discuss corrective actions at management and divisional staff meetings to ensure compliance with guidelines. Directive #F18-07, issued on February 1, 2018, reminds all Signals Division managers of proper procedures regarding documentation of the monthly logbook audit. In addition, NYCT's EAM group, which is independent from the Signals Division, performs 20 to 25 logbook audits (representing a sample of approximately 15 percent). These audits require a formal

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response. Compliance is also monitored through the annual internal control process. In 2019, NYCT plans to increase the number of logbook audits from 25 to 30.

**State Comptroller's Comment** - Contrary to the response, there was no evidence that Signals Division management was performing monthly logbook audits. At a meeting on August 17, 2017, we were advised that the logbook audits were not done due to a miscommunication regarding who was responsible for the logbook audits in 2017, the supervisors or EAM.

*Comptroller Recommendation #3: Timely update the SSPP to reflect any procedural modifications to the SSPP internally.*

NYCT Response: NYCT already complies with this recommendation. The auditors base much of their report on a single test, Test 103, which was not deleted from the System Safety Program Plan (SSPP) as quickly as it should have been. Test 103 was eliminated because it was duplicative of another test, Test 107. While both tests addressed shunting of track circuits, Test 103 targeted three specific sites that utilized only parallel circuits. As a result of ongoing signal upgrades, parallel circuits have been eliminated from the system, and Test 107 can now be used to test the full subway system, including the sites previously covered by Test 103. Following the upgrades, Test 103 was mistakenly entered instead of Test 107. An internal audit found that Test 103 was still listed as active in the database, and NYCT subsequently updated the database to show Test 103 as "not applicable" and corrected the SSPP accordingly. No additional labor hours were expended as a result of this test remaining active; the results of the tests were used to inform the results for Test 107. This corrective measure had been taken before the auditors provided their recommendation, which again, is based on this one instance in which the SSPP was not updated in a timely manner.

**State Comptroller's Comment** - The response is limited to the one test where the SSPP was eventually updated. However, we noted changes in the intervals for signals and stops from 90 days to 180 days that were not reflected in the 2017 SSPP, which shows 90 days plus 15 days tolerance. There are other maintenance intervals that were changed using the Master List Change Form that are also not in the SSPP.

*Comptroller Recommendation #4: Timely document and communicate procedural changes and updates to the SSPP to the PTSB.*

NYCT Response: NYCT already complies with this recommendation. 49 CFR 659 requires an annual submittal of SSPP updates to the PTSB and requires PTSB to review and recertify the SSPP annually. PTSB recertified the 2017 SSPP update on September 19, 2017. The 2018 update will be submitted to PTSB by November 15.

*Comptroller Recommendation #5: Ensure iSEIS lists only valid Task Codes.*

NYCT Response: See response to Recommendation #3. NYCT modified the database so that no entries can be made for Task 103.

**State Comptroller's Comment** - NYCT is not in compliance with Recommendation 3 because it was not limited to Test 103. NYCT needs to ensure that all Task Codes in iSEIS are valid.

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*Comptroller Recommendation #6: Review and allocate resources to ensure that all signal devices are maintained, inspected, and tested in accordance with applicable standards.*

NYCT Response: NYCT already complies with this recommendation. NYCT regularly reviews staffing needs associated with maintenance and testing compliance requirements and budgets positions accordingly. Filling skilled-trade positions is a well-documented national challenge as the workforce ages, skilled-trade professionals retire and high schools are increasingly focused on college preparation. The skilled-labor shortage restrains growth in the transportation sector, and transit agencies routinely cite equipment maintenance jobs as challenging positions to fill.

NYCT has taken significant steps to address this labor shortage. Over the past year, NYCT hired 95 Signals Division staff for maintenance, inspection, and testing through aggressive recruiting. As noted above, the strategy includes expanding partnerships with technical schools, creating new trainee and apprentice titles, and developing internal training programs tailored to these roles. NYCT also is working with the private sector to identify ways to develop an ongoing pipeline for signal maintainers and other hard-to fill titles.

Given the current skilled labor challenges, NYCT seeks to maximize its workforce by strategically deploying personnel. As part of NYCT's *Fast Forward* plan, the Signals Division has increased its focus on enhanced preventative maintenance of critical switches specifically those that impact multiple subway lines. This effort includes developing targeted action plans for specific switches, development of step by step procedure guides for signal personnel for specific equipment and additional maintenance of signal-related equipment. NYCT has also engaged a consultant to review maintenance procedures and implement best practices.

*Comptroller Recommendation #7: Ensure inventory of parts is up to date to prevent delays in repairs.*

NYCT Response: NYCT already complies with this recommendation. NYCT maintains a stock of parts that can be used for all emergency repairs and corrective maintenance. As explained to the auditors, 56 percent of signal equipment is more than 50 years old. Many replacement parts are no longer manufactured and must be custom built. NYCT has a dedicated staff of approximately 80 mechanics who proactively refurbish existing equipment and fabricate specialized components so parts that are not available for purchase from suppliers are in inventory and available for immediate use when they are needed.

**State Comptroller's Comment** - NYCT's response did not address the issue regarding parts for New Technology-East New York, where the four trouble calls at one location were attributed to devices that were already obsolete when they were installed.

The audit cited lack of availability of non-critical compressor components. In this case, parts were not available due to an extended procurement lead time. At no time did the lack of compressor parts impact daily service. NYCT has made internal efforts to streamline the procurement process and has improved the availability of spare parts for compressors.

*Comptroller Recommendation #8: Ensure weekly reports are submitted, reviewed and approved timely, and develop procedures to address when reports are submitted.*

NYCT Response: NYCT agrees with this recommendation. Current procedures call for field maintainers to fill out a weekly inspection sheet that is signed off by the manager and sent to the

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compressor squad, which makes repairs. NYCT will issue a memorandum in September 2018 reminding employees of the proper procedure. In conjunction with EAM, NYCT is revisiting its procedures for capturing inspection data and identifying how it can leverage EAM technology to streamline the process by replacing the current paper reports with real-time electronic reporting.

*Comptroller Recommendation #9: Review the resources allocated to the Compressor Squad and the logistics of assignments and equipment.*

NYCT Response: NYCT already complies with this recommendation. As stated previously in response to Recommendation #6, NYCT regularly reviews staffing resources to ensure alignment with maintenance and testing compliance requirements, and onboard staff accordingly. The staffing is currently appropriate on the Compressor Squad. As NYCT modernizes its signal system, pneumatic signal equipment requiring air compressors is being phased out.

*Comptroller Recommendation #10: Develop and document the following for new technology equipment:*

- *Written procedures or responsibilities for staff in charge of the trouble call desk to ensure consistency and continuity in services for each tour, and*
- *Standards for handling trouble calls and documenting the actions taken, including when follow-up is required.*

NYCT Response: NYCT agrees with the first bullet of this recommendation and already complies with the second bullet.

NYCT is in the process of developing written procedures related to new technology equipment for use by staff in charge of the trouble call desk to ensure consistency across tours. Formalized procedures, which will be finalized by the first quarter of 2019, will be informed by the recently-implemented standards for handling trouble calls and documenting the actions taken, including when follow-up is required.

In June 2018 NYCT implemented a system that addresses trouble calls in a consistent manner. The system covers signal-related equipment such as signal heads, insulated joints, track circuits, stops, track relays, switches, and switch machines.

*Comptroller Recommendation #11: Ensure all changes to maintenance interval levels comply with NYCT policies and procedures.*

NYCT Response: NYCT already complies with this recommendation. Current interval levels are documented in NYCT policies and procedures. To strengthen the process, NYCT will update its internal processes by year end to clearly define the approval requirements for interval changes.

**State Comptroller's Comment** - The response is limited to the one test where the SSPP was eventually updated. However, we noted changes in the intervals for signals and stops from 90 days to 180 days that were not reflected in the 2017 SSPP, which shows 90 days plus 15 days tolerance. There are other maintenance intervals that were changed using the Master List Change Form that are also not in the SSPP.

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*Comptroller Recommendation #12: Revise the Master List Change Form to require that the originator and the approver state the reason for the change and attach supporting documents.*

NYCT Response: NYCT now complies with this recommendation. NYCT has revised the Master List Change Form to include the reason for change with appropriate signature approvals.

Previously, the reason for the change had only been included in the database.

*Comptroller Recommendation #13: Require that all Master List Change Forms be approved by the Engineering Division.*

NYCT Response: NYCT disagrees with this recommendation. As explained to the auditors, only changes that may impact safety require Engineering Division approval. Routine maintenance interval changes are based on recommended practices from operations staff, including the maintenance division, which has first-hand understanding of asset performance. Interval changes impact reliability but not safety. As stated in NYCT's response to Recommendation #11, NYCT will update its internal processes by year end to clearly define the approval requirements for interval changes. The Master List Change Form has been revised to include a line for Engineering Division approval, where required.

**State Comptroller's Comment** - A fail safe is defined "as a system or plan that comes into operation in the event of something going wrong or that is there to prevent such an occurrence." As the subway system is currently in a state of emergency, the functioning of the fail-safe system is of critical import because it is the system that will prevent a safety incident from occurring. It is therefore surprising that NYCT believes problems with its "fail-safe" system would pose no risk to its customers – as, by definition, a failure in the "fail-safe" system can potentially result in a safety incident. Additionally, NYCT is defining safety narrowly – and overlooking the direct impact on customers if trains stop operating due to a signal problem. For instance, the number of riders on platforms will increase rapidly, especially during the rush hours, resulting in crowding both on platforms and on trains. As the temperature in the stations and cars increase during the warmer months, this creates a potential issue of safety of a different nature.

*Comptroller Recommendation #14: Periodically review Supervisory Inspection form records to ensure compliance with procedures.*

NYCT Response: NYCT already complies with this recommendation. NYCT reviews Supervisory Inspection form records to ensure compliance with procedures annually. The auditors claimed that most annual supervisory inspections were not performed. This is incorrect. NYCT's review found that these missing inspections were performed and entered into the database, but that the appropriate inspection form backup was not completed. NYCT has therefore issued Directive #M18-15 on March 1, 2018, reminding supervisors of proper documentation procedures, and NYCT will review compliance through its internal control process. The EAM system under development will capture real-time testing and maintenance data through hand-held devices, eliminating the need for paper forms.

**State Comptroller's Comment** - While the response implies that the missing inspections were performed, when we requested the support, NYCT provided a printout from iSEIS but no forms. Without documentation, it is unclear how NYCT knows that the inspections were performed.

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*Comptroller Recommendation #15: Develop reporting systems which alert management personnel of instances of non-compliance with supervisory inspections.*

NYCT Response: NYCT agrees with this recommendation. The EAM system previously referenced will be configured to alert management of instances of non-compliance via email and/or auto-generated reports. In the meantime, NYCT will periodically reviews the inspection records and addresses instances of non-compliance at management staff meetings.

*Comptroller Recommendation #16: Periodically review logbook entries and information recorded in the Supervisory Validation to ensure compliance with departmental guidelines.*

NYCT Response: NYCT already complies with this recommendation, which refers to both logbook entries and Supervisory Validation. As discussed above in response to Recommendation #2, NYCT reviews logbook entries on a monthly basis.

NYCT also reviews the Supervisory Validation on a quarterly basis to ensure compliance with departmental guidelines. NYCT issued Directive # J18-06 on January 1, 2018 reminding all Signals Division personnel of proper procedures regarding Supervisory Validations.

NYCT is in the process of clarifying the wording of the procedure to specify, that a supervisory validation is needed only for the tests that a maintainer routinely performs. The auditor mistakenly interpreted to mean that the procedure required a supervisory validation on all tests that a maintainer could potentially perform.

**State Comptroller's Comment** - NYCT's response is incorrect. The audit report does not make any reference to "test that a maintainer could potentially perform" and the auditors did not interpret the procedure. The report quotes from the original procedure. The response stated that NYC is in the process of clarifying the wording of the procedure and will make clear that a supervisor validation is needed only for the tests that a maintainer normally performs; however, NYCT's logic regarding this change appears flawed. If a maintainer is conducting work that is not routinely performed, they still need to comply with departmental guidelines. Moreover, under those circumstances as the work is not routinely performed, supervisory review would seem to be more important.

*Comptroller Recommendation #17: Implement a control in iSEIS to check whether Signal Maintainers have been proficiency tested within the prior six months every time a device test is entered.*

NYCT Response: NYCT disagrees with this recommendation. NYCT is not devoting resources to enhancements of iSEIS because the EAM system under development will replace this legacy system. The new system is expected to produce an auto-generated report to proactively notify the managers or Signal Maintainers who are approaching the 6-month expiration of their proficiency test.

**State Comptroller's Comment** - While we did not audit those efforts, we applaud NYCT for its initiatives to better ensure a trained workforce as that is critical to preventing several of the issues identified within the report.

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*Comptroller Recommendation #18: Develop a perpetual inventory system for signal maintenance equipment.*

NYCT Response: NYCT agrees with this recommendation. Currently, NYCT has an inventory system for signal maintenance equipment. As noted in the report, the current system includes 35,000 assets, but it does not include all the individual component parts of these assets. NYCT is developing a much larger inventory system through the EAM initiative, which will include major component parts. Current efforts are focused on identifying, tagging, and logging subcomponents of a larger asset, such as signals, stops, and switches.