

The Washington Metrorail Safety Commission



Safety Audit

of the Washington Metropolitan
Area Transit Authority

**Audit of Station Maintenance,
Elevators and Escalators**



Final Report:
May 25, 2022

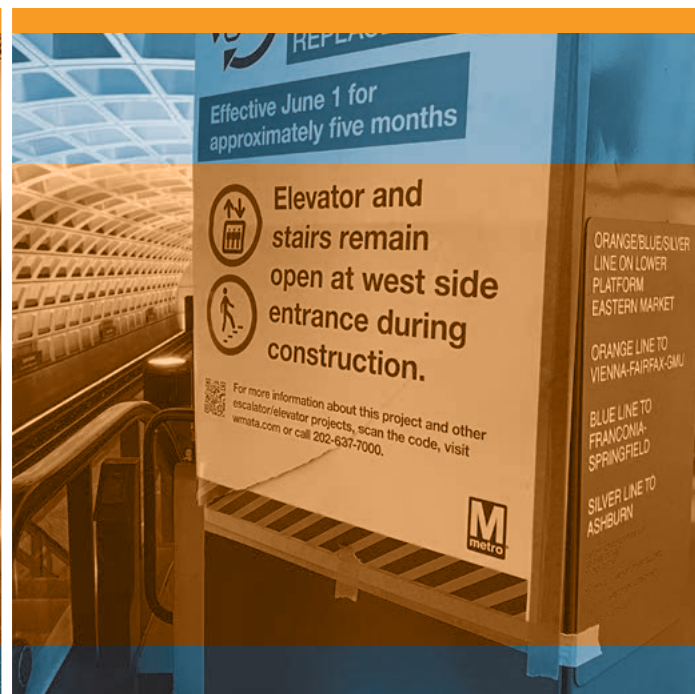
Prepared under the authority of the Washington Metrorail Safety Commission

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Executive Summary

Maintaining stations in a state of good repair—including elevators and escalators, lighting, and safe surfaces for mobility—keeps the Metrorail system safe and accessible for riders, Metrorail personnel, and first responders.

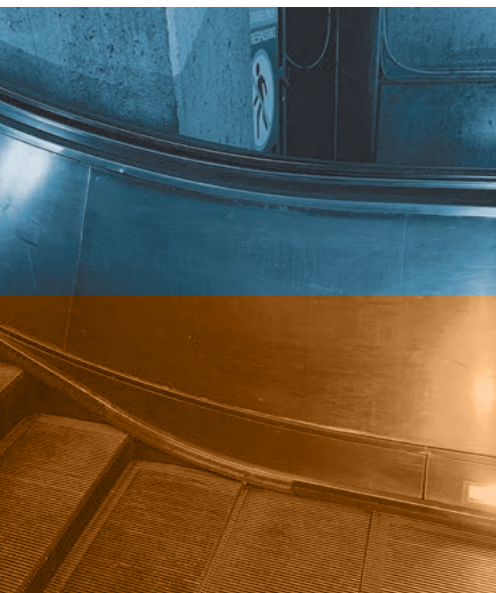
The Washington Metrorail Safety Commission (WMSC) performed this audit of the Washington Metropolitan Area Transit Authority (WMATA) Metrorail's station maintenance, elevator and escalator practices through in-depth interviews, site visits, and document and data reviews conducted in 2021 and early 2022. The audit's scope includes station, elevator and escalator inspection, maintenance, operational practices and procedures, and associated training. These are assessed in relation to rules, procedures, regulations and best practices, and the related aspects of Metrorail's safety plans governing policy and procedure development, implementation and compliance, management structure, planning and governance, and associated training.

Maintaining stations in a state of good repair—including elevators and escalators, lighting, and safe surfaces for mobility—keeps the Metrorail system safe and accessible for riders, Metrorail personnel, and first responders. Maintaining and modernizing stations requires coordination among personnel, including station managers, elevator and escalator technicians, supervisors, and engineers.

The audit demonstrates that Metrorail has ongoing, funded long-term plans for elevator and escalator rehabilitation and replacement, and that Metrorail's Elevator and Escalator (ELES) Department's engineering and maintenance groups generally coordinate with each other and with training instructors. However, this audit also demonstrates that there are additional areas where Metrorail is not meeting its own written requirements, does not have adequate procedures, processes or requirements, or does not have adequate training, coordination and supervision. As a result, the WMSC is issuing 9 findings requiring Metrorail to develop corrective action plans (CAPs). The WMSC is also issuing 4 recommendations that Metrorail must address.

As described in the findings below, Metrorail has not developed and implemented a comprehensive water intrusion and remediation program covering stations, elevators and escalators, which contributes to damage and deterioration of structures and other assets, to electrical hazards and to other safety risks.

In addition, Metrorail does not consistently communicate and follow its procedures governing change management and requiring interdepartmental coordination. For example, Metrorail did not follow its change management procedures when Plant Maintenance (PLNT) personnel began painting escalator panels at some stations, which made it difficult for ELES mechanics to safely remove the panels as required for their maintenance and inspection work and introduced additional hazards to the Metrorail system.



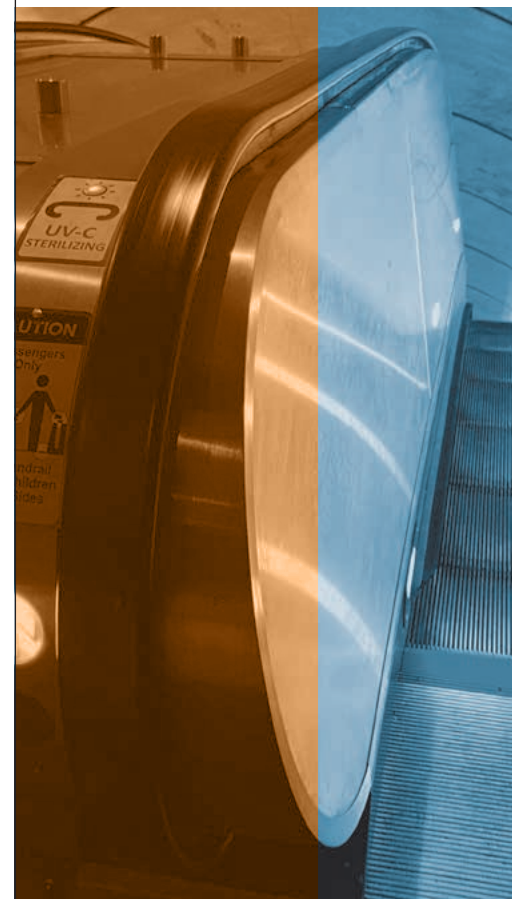
Other findings regarding elevators and escalators include:

- Metrorail is not ensuring that ELES personnel work only on the specific types of equipment that they are trained to inspect, maintain, and repair.
- Metrorail has not reviewed its ELES standard operating procedures on a regular basis as required by WMATA policy, and has conflicting procedures for elevator and escalator employees.
- Metrorail does not clearly define what helpers (entry-level ELES personnel) are authorized to do or prohibited from doing, including whether helpers are permitted to work alone and any restrictions required to ensure that work is done safely.
- Metrorail does not ensure that ELES personnel sign in on log books as required by WMATA SOP to ensure their safety.
- Metrorail has not maintained a formalized, documented training process for ELES mentors (on-the-job training instructors) who play a key role in the training of entry-level ELES personnel.
- Metrorail began new inspections referred to as “visual” or “routine” ELES inspections prior to finalizing, communicating and formally implementing an effective procedure.
- ELES Supervisors are not completing all aspects of required QA checks.

The recommendations in this audit relate to opportunities for Metrorail to improve safety by ensuring an adequate number of trained personnel are available to perform tasks that are assigned to Plant Maintenance, and by taking steps to match ELES training instructor job requirements to the experience of the existing, effective instructors, to formalize procedures to ensure escalators are regularly operated opposite their normal direction when safe to do so, and to improve data collection and analysis necessary under its Public Transportation Agency Safety Plan (PTASP) by providing more PLNT and ELES personnel with improved, formal training on the use of Metrorail's maintenance management information system (Maximo).

WMATA is required to propose a Corrective Action Plan (CAP) for each finding and to respond to each recommendation no later than 30 days after the issuance of this report.

Metrorail has not maintained a formalized, documented training process for ELES mentors (on-the-job training instructors) who play a key role in the training of entry-level ELES personnel.





Background and Scope

Background and Scope

The scope of this audit includes Metrorail's station maintenance, elevator and escalator programs. This includes station, elevator and escalator inspection, maintenance, operational practices and procedures and associated training. These are assessed in relation to rules, procedures, regulations and best practices, and the related aspects of Metrorail's safety plans governing policy and procedure development, implementation and compliance, management structure, planning and governance, and associated training.

Maintaining stations in a state of good repair– including elevators and escalators, lighting, and safe surfaces for mobility – keeps the Metrorail system safe and accessible for riders, Metrorail personnel and first responders. Maintaining and modernizing stations requires coordination among personnel, including station managers, elevator and escalator technicians, supervisors, and engineers. This requires a dedicated staff with the training and authority to accomplish their work safely.

Among other areas, this audit focuses on elements of the System Safety Program Plan (SSPP) for the period through December 31, 2020, and, for more recent information, elements of WMATA's first Public Transportation Agency Safety Plan (PTASP), titled the WMATA Transit Agency Safety Plan, which replaced the SSPP on December 31, 2020. The first revision of the WMATA Transit Agency Safety Plan became effective on December 31, 2021, after the conclusion of the audit work. All references in this audit to WMATA's PTASP reflect the initial version, which was in effect at the time of this audit.

Due to the timing of the PTASP's approval and the required phased approach for effective implementation, aspects of the PTASP had not yet been fully implemented at the time of this audit. The specific elements of the PTASP (and, for earlier records, elements of the SSPP) covered in this report are listed in Appendix D.

Open Corrective Action Plans (CAPs)

Prior to this audit, the WMSC issued a finding on August 13, 2021, requiring Metrorail to develop a CAP (C-0118) to address Metrorail's noncompliance with its Safety and Security Certification Program Plan (SSCPP). This finding was based on information identified during WMSC oversight work including inspections, document reviews, interactions with Metrorail personnel, and work on other audits. This includes aspects related to the lack of communication and coordination among departments. Metrorail was in the process of implementing this CAP at the time of this audit.

During the course of this audit, the WMSC found that Metrorail's Department of Safety and Environmental Management (SAFE or Safety Department) was not consistently issuing temporary use notices or certificates of compliance for new

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The SMI also identified that elevator and escalator maintenance had made “great strides” compared to prior periods in large part due to Metrorail dedicating significant resources to improving escalator and elevator availability.

escalators before Metrorail put them into passenger service, as required by Metrorail's Safety and Security Certification Program Plan (SSCPP). The process is designed to ensure that hazards are identified and mitigated. The implementation steps of CAP C-0118 include action items to address this issue systematically, therefore the WMSC is not issuing a new finding as part of this audit.

History

The Federal Transit Administration's (FTA) 2015 Safety Management Inspection of WMATA identified that WMATA was not implementing its documented maintenance procedures and standard operating procedures as required. The SMI also identified that elevator and escalator maintenance had made “great strides” compared to prior periods in large part due to Metrorail dedicating significant resources to improving escalator and elevator availability.

Tri-State Oversight Committee (TOC) Audits issued in 2015 and 2017 identified additional safety gaps.

The TOC's July 2, 2015, Elevator/Escalator Maintenance audit found a “high rate of non-compliance with procedures”, including inconsistent completion of check sheet items suggesting some steps were being skipped, and conflicting versions in use of the same form. The TOC identified that nearly half of monthly PM inspections were not being completed on time, with 43 percent of PM sheets completed more than 35 days after the previous inspection, and that mechanics were frequently not performing required job hazard analyses and were not following lockout/tagout requirements.

The TOC also identified several escalator units with panel gaps wider than 1/8-inch, uneven panel joints and deck panels with loose or raised edges. In addition, ELES did not have clearly documented or communicated tool calibration requirements and tracking, had many open limited maintenance (LM) work orders, and did not have a documented, comprehensive, current maintenance plan.

The TOC's July 25, 2017, Elevator/Escalator Maintenance Audit included findings that:

- A culture of non-compliance with safety rules and departmental processes exists within ELES.
- WMATA operates elevators and escalators with lapsed certificates.
- Some ELES Supervisors are not completing a sufficient number of monthly PM audits (QC) as required under 212-SOP-39, Quality Control Preventative Maintenance and Station Audit.
- Completed PM check sheets are not consistently submitted by mechanics to ELES management in a timely manner.

- Technicians' complete portions of PM procedures out-of-sequence and populate the PM check sheet only after many items have been completed, increasing the likelihood that steps could be skipped or omitted.
- There is no signage on elevators or escalators explaining that certificates are stored in station kiosks.
- Some certificates could not be found on file in station kiosks.
- Elevator/Escalator Apprenticeship Employee Performance Review forms are not consistently completed on a quarterly basis by supervisors.

In 2017, the TOC also found that ELES had still not developed a single maintenance plan summarizing all PM activities, schedules, staffing requirements, and training requirements, as previously noted in the 2015 audit and in the FTA's, finding codified as CAP R-4-27-a related to the need for documented maintenance procedures and standard operating procedures.

The TOC also identified concerns about escalators being placed into service outside of the safety certification process.

A TOC Station Maintenance Audit issued December 14, 2017 included findings that PLNT did not have detailed PMI work instructions and tool lists developed for all station-related preventive maintenance and inspections completed by its technicians. This audit also found that Metrorail departments responsible for station maintenance were operating under outdated documents.

Metrorail's most recent internal safety reviews related to this audit included:

- **A November 2017 Quality Assurance, Internal Compliance & Oversight (QICO) review of Escalator Maintenance and Inspections that found:**
 - ◆ A lack of a formal maintenance control program as required by ASME A17.1.
 - ◆ Ineffective maintenance planning and scheduling.
 - ◆ Lack of correct asset identification within station monitoring systems, frequently due to control wires being swapped during troubleshooting, making historical information unreliable.
 - ◆ Use of unapproved communications devices by field personnel in order to communicate over long distances for work on longer escalators.



A TOC Station Maintenance Audit issued December 14, 2017 included findings that PLNT did not have detailed PMI work instructions and tool lists developed for all station-related preventive maintenance and inspections completed by its technicians.



- ◆ A need for analysis of work order data to determine accurate failure trends and proactively manage maintenance activities.
- ◆ A lack of a consistent method for documenting and performing calibration of tools and test equipment.
- ◆ Incomplete documentation and completion of maintenance activities.
- ◆ No clear requirements for fire extinguisher placement and inspection.
- ◆ No consistent capture of maintenance data to ensure data integrity for future analysis and maintenance planning.
- **An April 2018 QICO review of Elevator Maintenance and Inspections that found:**
 - ◆ Elevators in service beyond the 30-day deadline from the date a safety work order was issued.
 - ◆ Elevators with expired or unavailable certificates.
 - ◆ Lack of compliance with lockout/tagout procedures.
 - ◆ Incomplete maintenance and maintenance records.
 - ◆ Conflicting information among different procedures and manuals.
 - ◆ Inconsistent data in Maximo preventing effective monitoring, tracking and analysis of completed maintenance, including the use of problem codes that are not specific.
 - ◆ Not following established measures for approving rehabilitated equipment.
 - ◆ Trash and debris in work areas (housekeeping issues).
- **An April 2018 QICO review of the Office of Elevators & Escalators that found:**
 - ◆ A lack of a departmental-specific procedure governing configuration changes in collaboration with SAFE approval as needed for safe and reliable change management and safety certification.
 - ◆ Inadequate safety data collection, sharing and analysis.
 - ◆ ELES was not completing its safety and quality control plan related to rulebook compliance.
 - ◆ ELES was not timely inspecting and calibrating facilities and equipment.

- ◆ ELES was not maintaining up to date procedures, policies and checklists with origination and revision dates, revising and reviewing procedures as required by policy, and ensuring no conflicts among procedures.
- ◆ ELES did not maintain and control an up to date training matrix, have a procedure to periodically review training records, or have documentation that employees had received all required training.
- ◆ ELES was not complying with material handling and storage safety requirements.
- **A November 2019 QICO review of the Elevator/Escalator Operations Center (EOC), the call and dispatching center for ELES personnel, that found:**
 - ◆ A lack of comprehensive procedures for EOC.
 - ◆ EOC personnel were unaware of existing SOPs and were not following those SOPs including those related to communication and shift turnover.
 - ◆ Work orders open beyond the dates specified by SOP.
 - ◆ Incomplete incident reports.
 - ◆ No documented training program for EOC.
 - ◆ No recorded instructions or requirements for training.
 - ◆ Training activities are not documented.
 - ◆ OJT with verbal direction/demonstration as the only training provided.
 - ◆ No quality control program for EOC job performance and data quality.
 - ◆ No team meeting or communication records.
 - ◆ EOC only records sound in the control room, and does not record EOC phone communication.

WMSC inspections, other oversight work, and multiple safety event investigations have also identified areas that require improvements.

For example, WMSC inspections have found water leaking into station, elevator and escalator facilities including at Cheverly Station in September 2021, and during work in 2021 on the Audit of Emergency Management and Fire and Life Safety Programs at locations including Forest Glen Station. WMSC inspections have also found inspection measurements for items such as load settings that are recorded on

WMSC inspections, other oversight work, and multiple safety event investigations have also identified areas that require improvements.

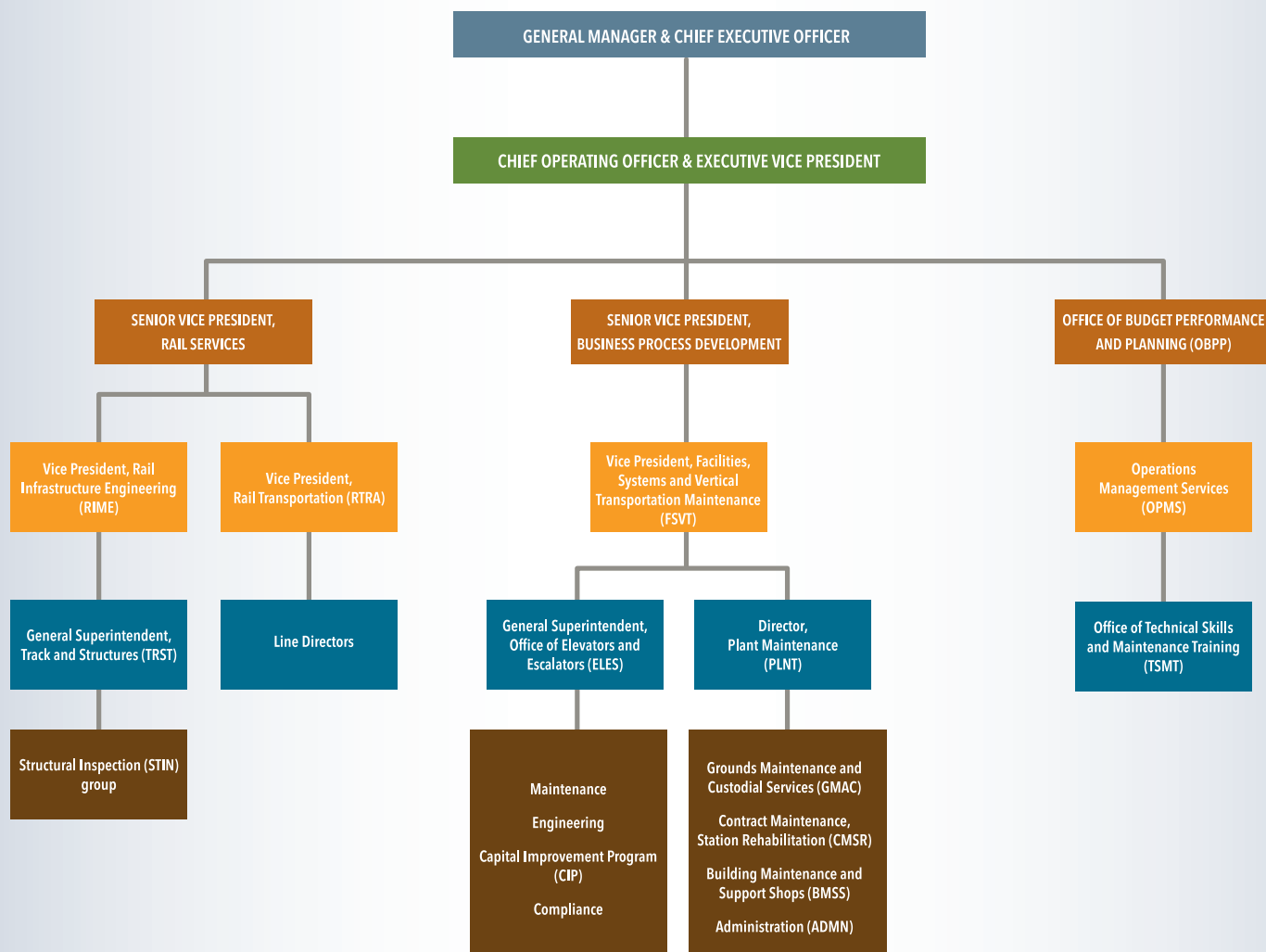


elevator/escalator data sheets that are outside of allowable load requirements, such as at Dupont Circle Station in August 2021.

Investigation W-0143 into an evacuation for life safety reasons of Capitol South Station on October 4, 2021, determined that smoke emitting from an escalator originated from a failed fluorescent light bulb tombstone connection in under-step lighting. Due to the investigation, and following a hazard assessment, Metrorail disconnected all under-step lighting on older escalators until the light fixtures have been replaced with LEDs. The investigation found that Metrorail had an opportunity to more proactively identify equipment beyond its useful life as part of an effective hazard identification and management process.

Current Structure

ORGANIZATIONAL CHART



Metrorail's station maintenance, elevator and escalator responsibilities are distributed across several groups.

Station inspection, maintenance and repair are primarily the responsibility of Structural Inspection (STIN) within Track and Structures (TRST) and of Plant Maintenance (PLNT). Rail Transportation (RTRA) station managers are also required to conduct regular station checks and may report issues requiring repair work.

Plant Maintenance is divided into divisions that include Grounds Maintenance and Custodial Services (GMAC), Contract Maintenance, Station Rehabilitation (CMSR), and Administration (ADMN).

Metrorail's Elevator and Escalator (ELES) Department includes maintenance teams reporting to the assistant general superintendent, an engineering group, a special projects group, a capital improvement program (CIP) group and a compliance group. The department is responsible for service, maintenance, inspection and repair of more than 300 elevators and 600 escalators across all WMATA facilities. Maintenance work is carried out by master technicians, journeymen, apprentices and helpers. Journeyman is the primary position for mechanics, with a limited number qualifying for and passing master technician tests. Helpers are entry-level personnel who do not have the level of training of a journeyman. Apprentices are part of a four-year Metrorail training program to become journeymen by obtaining their license. Metrorail generally hires contractors to conduct full rehabilitation and replacement work. At the time of this audit, Metrorail was in the process of getting its mechanics who did not have the required licenses in each jurisdiction licensed in Maryland and Virginia (rather than just one jurisdiction) so that all mechanics can participate in all state inspection activities. This requires form submissions, including of the mechanics' existing journeyman or master technician credentials.

Additional elevators and escalators are expected to become part of the department's responsibilities soon after the completion of this audit when Metrorail accepts Silver Line Phase 2 and other capital projects such as the new Potomac Yard Station.

Technical Skills and Maintenance Training (TSMT) is the group responsible for delivering most training to the above personnel. TSMT has specific instructors for elevator and escalator staff and for other areas such as Plant Maintenance.

Some electrical work in stations is the responsibility of the Department of Low Voltage Electrical Maintenance (LVEM). LVEM is part of the Office of Systems Maintenance (SMNT).

Metrorail's Elevator and Escalator (ELES) Department includes maintenance teams reporting to the assistant general superintendent, an engineering group, a special projects group, a capital improvement program group and a compliance group.





The WMSC received initial documents related to this audit from WMATA in November 2021, conducted extensive interviews and site visits in December 2021, and received follow-up documents and conducted final document reviews into January 2022.

Audit Work

The WMSC received initial documents related to this audit from WMATA in November 2021, conducted extensive interviews and site visits in December 2021, and received follow-up documents and conducted final document reviews into January 2022.

Lists of documents reviewed, site visit locations, radio recordings audited, and personnel interviewed for this audit are provided in the appendices.

An exit conference was held on January 26, 2022, with Metrorail staff to summarize the status of the audit to that point.

The WMSC later provided a draft of this report to WMATA for technical review and incorporated any technical corrections as appropriate.



What the **WMSC** Found



Positive Practices

The WMSC identified a number of positive practices while conducting this audit including:

- **Metrorail's implementation of a structural inspection manual** following the WMSC's findings and required corrective action plan related to the Elevated Structures Audit issued January 25, 2021.
- **ELES engineering works with ELES maintenance** to create new documents and procedures when necessary.
- **ELES engineering works closely with ELES maintenance** and TSMT instructors.
- **ELES has an interactive system map that helps** personnel identify equipment, equipment status and associated bulletins, manuals or schematics.
- **Metrorail has ongoing, funded long-term plans** for elevator and escalator rehabilitation and replacement.
- **ELES has an up to date and effective training** lab with elevators and escalators for hands-on experience.
- **Metrorail updates specifications for new elevator and** escalator systems based on issues identified in and lessons learned from current systems, such as recent changes to require an improved lubrication device.
- **The ELES Apprenticeship Program** provides a pipeline of future ELES journeymen (see Finding 7 for lack of a training process for mentors).

ELES has an up to date and effective training lab with elevators and escalators for hands-on experience.



Water intrusion creates structural, electrical and other safety risks.



Findings and Minimum Corrective Actions

Metrorail has not developed and implemented a comprehensive water intrusion and remediation program covering stations, elevators and escalators, which contributes to damage and deterioration of structures and other assets, to electrical hazards and to other safety risks.

Site visits and documents reviewed as part of this audit identified numerous locations with water intrusion issues inside stations and into, under or around elevators and escalators. Water intrusion creates structural, electrical and other safety risks.

For example, at Forest Glen Station, there is running water from leaks that is pooling and flowing in egress pathways and in ancillary rooms including room 612 with circuit breakers inside. At Farragut West Station, opening a ceiling tile in the area between the fare gates and escalator at the east end as part of a WMATA inspection that the WMSC observed as part of this audit revealed stalactites and a leak along a joint. At Friendship Heights Station, there is evidence of numerous ceiling water leaks and damaged ceiling tiles over electrical fixtures, particularly around the mezzanine area entrance to Elevator N01. The WMSC has also observed water intrusion in escalator and elevator areas, including at Pentagon City Station, and indications of water intrusion such as pooling water or mineral deposits inside multiple other stations. Records provided for this audit included work orders for temporarily removing water from the Pentagon City Station units, but no long-term fix to address the cause of the water intrusion.

The WMSC also noted temporary mitigations in place such as a bucket being used to catch water that appeared to be dripping from a system in the elevator machine room at Glenmont Station.

ELES provided a list for this audit of 30 stations where water enters elevator and escalators or their pits during heavy rain events, and one location where there is a leak from cooling tower condensate. However, there were no noted mitigations in place and no known causes specified for a majority of these locations.

This list from ELES is a positive attempt that can help contribute to the start of a water intrusion and remediation program following additional analysis to identify all locations facing water intrusion issues, not just those that primarily flood during rainstorms.

ELES management stated that they do not currently lead or participate in a comprehensive water remediation program. Such a program requires coordination and cooperation across departments (see Finding 2), but PLNT managers interviewed for this audit stated that lines of responsibility at WMATA are “very blurry”, which can make addressing even a specific reported maintenance issue a challenge.

Metrorail's PTASP states that Metrorail must identify and document hazards and other safety issues, and the associated safety risks must be prioritized, mitigated, monitored and controlled.

Metrorail also provided a list of 11 stations with known water intrusion problems (Medical Center, Bethesda, Tenleytown-AU, Woodley Park, Forest Glen, Largo Town Center, Stadium-Armory, McPherson Square, Anacostia, Shaw-Howard U and Georgia Ave-Petworth), none of which have effective long-term mitigations in place. The only noted mitigation was ongoing testing of tunnel grouting meant to reduce tunnel leaks on part of the Red Line.

Plant Maintenance personnel similarly described a focus on areas known to flood during storms, such as the entrance to Cleveland Park Station or the Pentagon City Station street elevator where Metrorail regularly places sandbags to protect shafts, escalators and stairwells. Around Cleveland Park Station, the District Department of Transportation has initiated a streetscape project that is intended, in part, to reduce the risk of flooding into the station entrance. Plant Maintenance focuses on steps such as drain cleaning prior to forecasted heavy rain or flooding, but this process does not include permanent steps to broadly address water intrusion through groundwater, plumbing or other sources besides heavy rainstorms or river flooding. Plant Maintenance does not conduct inspections of stations, except when supervisors conduct quality control checks on work that has been conducted.

Metrorail developed processes designed to address water intrusion in tunnel segments in response to NTSB recommendation R-16-09 issued as part of the investigation into the fatal 2015 smoke accident near L'Enfant Plaza Station. Metrorail's underground station facilities require the same attention to ensure the safety of riders, workers and first responders. Similarly, comprehensively addressing, preventing and mitigating water intrusion issues for elevators and escalators provides for the safety of riders, workers and others.

Metrorail's PTASP states that Metrorail must identify and document hazards and other safety issues, and the associated safety risks must be prioritized, mitigated, monitored and controlled.

Minimum Corrective Action: WMATA must develop and implement a comprehensive water intrusion and remediation program for stations, elevators and escalators that identifies and mitigates hazards and evaluates those mitigations as required under its PTASP.



Document review for this audit demonstrated a separate safety issue at L'Enfant Plaza Station related to structural deficiencies in a beam supporting escalators that was known but not addressed for a prolonged period of time.

Metrorail does not consistently communicate and follow its procedures governing change management and requiring interdepartmental coordination.

Metrorail did not follow its change management procedures when PLNT personnel began painting escalator panels at stations such as Benning Road and Rosslyn. The paint made it difficult for ELES mechanics to safely remove the panels as required for their maintenance and inspection work and introduced additional hazards to the Metrorail system. The panel removal is typically conducted using suction cups, which did not hold on to the painted panels. The inability to safely move these panels can also contribute to incomplete inspections and maintenance. No one interviewed for this audit could confirm how or why the decision was made to paint these panels on multiple escalators, or why this occurred outside of required change management and interdepartmental cooperation requirements.

Although management later ordered the removal of the paint once notified, the change made safe work on these escalators difficult or impossible for months.

ELES management stated that they believed the panels had been painted as part of PLNT station rehabilitation projects in an apparent effort to make the panels look better more quickly as compared to following the proper rebronzing process.

PLNT management said they were not involved in the painting decision, and the issue was not raised to their level until after the paint had been applied. Even at that point, PLNT management was not aware that this had occurred at more than one station. PLNT management stated that there had, in the past, been coordination for these types of projects to include an ELES mechanic on site.

At the time of this audit, Metrorail was conducting trials of efforts to remove the paint and refinish the panels.

As another example of inadequate interdepartmental coordination, audit interviews indicated that scaffolding was constructed by a Metrorail contractor partially resting on elements of escalators at L'Enfant Plaza Station, and was only removed following an ELES mechanic and station manager identifying this safety issue in the field and raising it to others. ELES had not been included in the site-specific work plan review.

Document review for this audit demonstrated a separate safety issue at L'Enfant Plaza Station related to structural deficiencies in a beam supporting escalators that was known but not addressed for a prolonged period of time. Those interviewed for this audit stated that interdepartmental coordination challenges were one reason for the repair project only being scheduled to begin in 2022 even though Metrorail had identified the deficiency at least as early as 2017. At the time of this audit, temporary shoring had been installed as a mitigation. Accomplishing a complete replacement

of the support would have required effective coordination and communication of inspection information between ELES, TRST and Capital Delivery (CAPD), among other units.

Other people interviewed for this audit also reported that collaboration across departments does not happen for some projects or at the right time in some projects, which leads to missed opportunities such as the ability to salvage parts from older items being removed or decommissioned or to complete safety-related projects in conjunction with other capital work. Metrorail is required to address some aspects of this collaboration related to safety certification under CAP C-0118 developed in response to the WMSC's August 13, 2021 finding that Metrorail is not following its safety certification processes, including coordination across all relevant construction, maintenance, safety and operation departments from project initiation through project implementation.

In another example of information not being conveyed among Metrorail departments, Metrorail's training department personnel responsible for training automatic fare collection employees on new station faregates were not even aware of the extent to which those new faregates were already in place and active at the time of this audit at stations across the Metrorail system.

Minimum Corrective Action: Metrorail must ensure that its change management procedures are followed to prevent future changes to stations, elevators and escalators from introducing hazards to the Metrorail system. As part of this effort, Metrorail must ensure that all frontline, supervisory and management employees with responsibilities related to these areas are provided with initial and recurring training appropriate to their roles and responsibilities on change management principles, procedures and requirements to ensure proper review and coordination on the identification and treatment of hazards. This must include examples of issues that must be elevated to management and that must be reviewed by other departments. This training must be consistent with WMATA's established change management processes in the PTASP and related procedures.



Metrorail is not providing training on newer models of elevators and escalators to all personnel who may work on such elevators or escalators.

Metrorail is not ensuring that ELES personnel work only on the specific types of equipment that they are trained to inspect, maintain, and repair.

Metrorail is not providing training on newer models of elevators and escalators to all personnel who may work on such elevators or escalators.

Multiple people interviewed for this audit stated that they inspect, maintain or repair elevator and escalator equipment that they have not been specifically trained on, meaning that, contrary to Metrorail's PTASP, they are being allocated tasks not commensurate with their skills. This creates the safety risk that equipment is not being properly inspected, maintained and repaired.

The original equipment manufacturer that installs the equipment for Metrorail provides initial training to some Metrorail personnel as part of Metrorail's contractual requirements for new escalators and elevators, but Metrorail must then carry out training of other individuals using those or improved materials. However, one mechanic interviewed for this audit said, "If you work on the unit, you can learn it by yourself." If a mechanic does not have training on the unit, it is up to the mechanic to determine whether to try to fix it without the training, or to defer the work order. An inspector stated that they had not been offered any training on new equipment or features. Other mechanics stated that they have not had training on new equipment in several years, even as new types of units have been added to the system and they are regularly assigned to work on those new units.

A supervisor and Metrorail training personnel stated that the initial training from the manufacturer frequently is not sufficient for Metrorail's needs, and further training must be developed by Metrorail's training department. Training department personnel have attended at least some initial training only after the unit has already been installed in the Metrorail system, creating a lag in development of Metrorail-specific programs. Training personnel stated that involvement and coordination earlier in the procurement and project development process would lead to improved training materials. These training improvements are more important given the shift in the elevator and escalator industry in recent years from traditional mechanical controls to digital controls.

After the WMSC communicated this safety gap during the audit process, Metrorail stated in May 2022 in response to the draft of this report that it is initiating a two-week ELES refresher training class that will be a requirement for all ELES journeymen and that Metrorail stated will cover all new ELES equipment.

Minimum Corrective Action: Metrorail must ensure that all personnel who may work on an elevator or escalator have all necessary training. This must include providing the training on current models and each new model installed, tracking that training, and establishing processes to ensure that personnel have the necessary training to safely carry out each assigned task.

Multiple other procedures reviewed as part of this audit were beyond their review dates by more than two years.

Metrorail has not reviewed its ELES standard operating procedures on a regular basis as required by WMATA policy, and has conflicting procedures for elevator and escalator employees.

Metrorail's Elevator and Escalator Maintenance and Operations Safety Manual (also labeled 212-SOP-35) provided by WMATA as part of this audit in late 2021 was dated June 15, 2015, with a review due by June 14, 2017. The manual, which is primarily a compendium of SOPs that had existed prior to the creation of the manual, had not been reviewed in compliance with the biennial schedule specified for each SOP.

The manual, which was provided to the WMSC as currently in-effect procedures, includes a version of the ELES work alone policy. However, this version conflicts with a separate work alone policy provided in response to follow up requests during the audit process. That separate work alone policy labeled 212-SOP-22, also provided as an in-effect procedure, is dated July 27, 2017, with a review due by July 27, 2019.

Multiple other procedures reviewed as part of this audit were also beyond their review dates by more than two years. ELES management acknowledged that there are procedures beyond the review period required by Metrorail policy.

Other documents, such as a QA audit list, referred to differently numbered procedures for tasks to be checked, such as the procedure requiring entries in log sheets.

This was also identified by QICO in a 2018 review, prior to the WMSC assuming direct safety oversight of Metrorail, which resulted in internal corrective action plans (iCAPAs) that were due to be completed in 2019. Specifically, this included conflicts between 212-SOP-35 and other policies including the separate SOP 212-22 Work Alone Policy, and other SOPs that had the same titles but different information.

Minimum Corrective Action: Metrorail must review and update all ELES procedures as required by WMATA policies. Metrorail must implement a log and/or other system to ensure that each procedure is reviewed as required in the future.



Metrorail maintains sign-in log books for elevator and escalator work, which provides an important layer of accountability, information-sharing and safety protection.

Metrorail does not clearly define what helpers (entry-level ELES personnel) are authorized to do or prohibited from doing, including whether helpers are permitted to work alone and any restrictions required to ensure that work is done safely.

Metrorail's ELES work alone policy predates the use of the current helper position, which was created in the last few years, and therefore does not include safety requirements to ensure that these entry-level personnel are only assigned to work that they can perform safely. The work alone policy is among those procedures that are past-due for review (see Finding 4).

ELES personnel had a general understanding that helpers generally should not work alone unless responding to a non-technical issue, but this safety requirement to have another more experienced individual with them for most tasks is not documented.

Regardless, some TSMT training instructors for ELES personnel were unaware of the work alone policy and therefore could not train anyone on it or communicate the existence of this safety procedure, and some ELES personnel expressed concern that the policy allows for working conditions that are not safe, due to work that is more safely conducted with a second person being assigned to a single person.

Metro worked to make progress on addressing this issue after the WMSC communicated this deficiency during the audit process by revising two procedures to include information about helpers. However, the initial revision to the work alone policy does not appear to match the helper job description which states that helpers assist journeymen and operate under the direct supervision of a journeyman. The revised work alone policy revision states that helpers can work alone under the policy, and can be directed by management to return escalators to service on their own.

Minimum Corrective Action: Metrorail must clearly define what ELES helpers are authorized or unauthorized to do alone, and what level of employee is required to complete each task. This must include a safety-based review and update of the work alone policy.

Metrorail does not ensure that ELES personnel sign in on log books as required by WMATA SOP to ensure their safety.

Metrorail maintains sign-in log books for elevator and escalator work, which provides an important layer of accountability, information-sharing and safety protection against another employee taking actions that could put personnel already working on an elevator or escalator at risk. When properly utilized, the log book also provides important information in the event of an emergency regarding the presence or absence of personnel. However, during site visits for this audit, the WMSC observed

A review of the log sheet at Glenmont Station on December 9, 2021, found that the last two entries in the ELES Station Log Book were December 2, 2021, and August 31, 2021, demonstrating that personnel are not regularly signing into this book that, among other things, provides a level of protection.



Metrorail personnel conducting work without signing in on the elevator/escalator repair log sheet at Glenmont Station, and document review and interviews identified these safety issues in other locations.

The first mechanics on site perform a routine set of steps before starting work. If they are not aware that another mechanic has already started work or that the other mechanic may be on a break, the actions may compromise safety and introduce the risk of electric shock, falling, injuries from counterweights, or other injuries caused by equipment that is being worked on moving unexpectedly.

ELES Maintenance and Operations Safety Manual Policy 2.1.01, ELES Personnel Safety Requirements, 212-SOP-35 Section 5.9 (also cited in other documents reviewed for this audit as what appears to be a previous version, 112-SOP-06, see Finding 4) states that before starting any work, “The employee shall contact the on-duty Station Manager to inform him or her that the employee will be working in the station and on which asset(s) during revenue hours. The employee shall complete all required documentation in the station’s log book.”

A review of the log sheet at Glenmont Station on December 9, 2021, found that the last two entries in the ELES Station Log Book were December 2, 2021, and August 31, 2021, demonstrating that personnel are not regularly signing into this book that, among other things, provides a level of protection by indicating that turning something on or off in the area where workers are present could cause serious injury or death.

When the WMSC raised the need to sign into the log book, the station manager initially indicated that workers do not sign in and out using the book. An ELES Supervisor had the mechanics sign in.

WMSC document review found Metrorail supervisor quality assurance audits conducted at various locations throughout the Metrorail system that did not verify that the station log books were signed and completed. These included forms dated August 3, 2021 at Fort Totten Station, August 4, 2021 at Georgia Ave-Petworth Station, August 13, 2021 at Takoma Station, August 24, 2021 at Ballston Station and September 23, 2021 at Huntington Station. Other reports stated the log book “needs work” (Greensboro, Wiehle-Reston East stations, August 19, 2021, and Pentagon Station, August 31, 2021).

Supervisor quality assurance audits, including those from Eisenhower Ave Station and Van Dorn Street Station on August 27, 2021 and Braddock Road Station on August 30, 2021, stated that the book was not complete due to COVID, however there was no documentation shared during this audit about changes to procedures due to the public health emergency, or any consistency of these notations elsewhere in the system.



Mechanics the WMSC spoke with during this audit indicated that the lack of a formal program means that they are not fully prepared to serve in the OJT or mentor role.

QICO's 2018 elevator review identified that log book recordkeeping was not in accordance with regulatory code ASME (American Society of Mechanical Engineers) A17.1, including limited information in service call notes and locations such as the Silver Spring Transit Center not having any log book entries for many consecutive months. A17.1 is a safety standard adopted by Maryland, Virginia and the District of Columbia.

Personnel interviewed for this audit expressed concern for their safety and the safety of others due to incomplete log books, because it could lead to someone getting hurt. The log book also provides accessible information to a mechanic arriving on site about work that has been previously conducted on the unit.

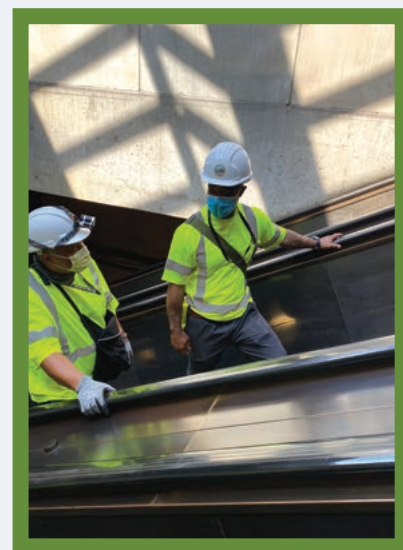
Minimum Corrective Action: Metrorail must provide regular refresher training to all ELES personnel on the importance of and process for signing in and out of log books (or any alternative hard copy or electronic format as specified in A17.1 that Metrorail may adopt in the future). Metrorail must conduct and document regular supervisory oversight of proper log book entries that includes development and completion of corrective actions to address areas where deficiencies are identified. Metrorail must assess whether additional safety protections are required when work is being conducted on elevators and escalators.

Metrorail has not maintained a formalized, documented training process for ELES mentors (on-the-job training instructors) who play a key role in the training of entry-level ELES personnel.

Metrorail does not provide specific training to personnel serving as ELES mentors, the on-the-job training instructors for new ELES apprentices.

The overall nature of the apprentice program, which includes six-month rotations through various subject areas and some field visits from TSMT training instructors, is positive, but without specific training for the on-the-job-training instructors Metrorail cannot ensure that consistent, appropriate and accurate training and guidance are being provided in the field.

Mechanics the WMSC spoke with during this audit indicated that the lack of a formal program means that they are not fully prepared to serve in the OJT or mentor role, including not having any specific policies or processes they are supposed to reference when working with apprentices.



Metrorail could not provide any procedure or work instructions for these inspections.

Other Metrorail departments have developed or are in the process of developing formalized, documented mentor or on-the-job training instructor processes and positions that are in line with training best practices, including as a result of WMSC findings such as those in the 2020 Rail Operations Control Center (ROCC) Audit and the 2021 Automatic Train Control (ATC) and Signals Audit.

The functionality of the ELES program today depends on the particular staff who are present, rather than an official process and guidance for mentors. A formal plan will improve this program to prevent hazards from developing over the long-term if personnel change.

Minimum Corrective Action: Metrorail must establish and implement a documented training process for ELES personnel serving as on-the-job training instructors or mentors for ELES apprentices.

Metrorail began new inspections referred to as “visual” or “routine” ELES inspections prior to finalizing, communicating and formally implementing an effective procedure.

Metrorail has not clearly reviewed and communicated ELES inspection changes related to “visual” or “routine” inspections that were added to work assignments just prior to this audit.

Metrorail could not provide any procedure or work instructions for these inspections, and could not provide any inspection reports of this type from December 2019 through February 2021. Metrorail provided one such report from March 2021, several for September 2021 and larger numbers of these inspection reports from later in 2021.

The blank and completed forms that were provided do not have version control information, and included two different forms, one labeled in the file name as “updated” and the other as “not used.”

Personnel interviewed for this audit stated that 2021 was the first time they were informed of this type of inspection via a phone meeting or email, and that inspectors were expected initially to carry this work out with a mechanic but were then told in at least some cases to do the inspection alone.

The time spent on this visual inspection work replaced time previously spent on tasks such as re-inspections to determine whether work had been properly done to address previously identified deficiencies.

Other personnel interviewed for this audit stated that aspects of this type of inspection had begun around late 2020 or early 2021, but that there is not a “full-blown” official procedure.



Multiple reports did not include checks of stop time and gear reduction.

Minimum Corrective Action: Metrorail must define procedures and standards for all ELES inspection and maintenance work, and provide all necessary training on those procedures to all relevant personnel.

ELES Supervisors are not completing all aspects of required QA checks.

WMSC review of ELES Supervisor QA forms identified forms that are not completed as required by SOP 212-SOP-39 and the associated QA forms.

For example, multiple reports including those listed below did not include checks of stop time and gear reduction, and, as noted in Finding 7, multiple station inspection reports did not include required review of ELES log books.

Deficient reports in addition to those noted in Finding 7 include:

- **Did not check escalator brake stopping distance or visually inspect gear reducer:**
 - August 4, 2021: Unit S02 at Silver Spring Station
 - August 14, 2021: Unit X02 at Takoma Station
 - September 3, 2021: Unit X04 at Glenmont Station
 - September 8, 2021: Unit S03 at Judiciary Square Station
- **Used incorrect report (Station QA form) to inspect, which does not have same requirements:**
 - ♦ **Escalators**
 - October 12, 2021: Unit N01 at NoMa-Gallaudet U Station
 - October 26, 2021: Unit S01 at U Street Station
 - ♦ **Elevators**
 - August 7, 2021: Unit X03 at Mt Vernon Square Station
 - September 18, 2021: Unit X04 at Glenmont Station

In an additional example of potential gaps in supervisory oversight, during field observations for this audit, the WMSC observed mechanics conducting elevator preventive maintenance not conducting step 11, door force/opening, as specified on the PM checklist. The mechanics stated that they did not know it was required as part of a regular PM and believed it to only be required for an annual PM, even though they were completing all other tasks specified as “B” level inspection items on the Elevator PM Check Sheet-Hydraulic Unit dated February 2020. They stated that they did not bring the proper tool with them to carry out this step.

Minimum Corrective Action: Metrorail must include training requirements on QA checks for all ELES supervisors, and must ensure that these QA checks are being properly completed.

Challenges expressed during audit interviews include vacancies, particularly on night shifts, and a lack of internal feeder programs for hard to fill positions such as overnight painting (surface finishing) work.

RECOMMENDATIONS

- 1 Metrorail has an opportunity to improve safety by ensuring an adequate number of trained personnel are available to perform tasks that are assigned to Plant Maintenance.**

Metrorail has unfilled vacant positions in Plant Maintenance, particularly on the night shift, which multiple people interviewed for this audit stated is creating challenges in carrying out assigned station-related work and in providing an appropriate ratio of supervisors on each shift. Plant Maintenance has also had additional responsibilities placed on personnel due to capital projects or changes to contractor procurement plans. This has led to the CMSR group being asked to augment capital project work when tasks or responsibilities are removed from or not included in capital plans or other contracts without specific additional resources for Plant Maintenance to support these tasks.

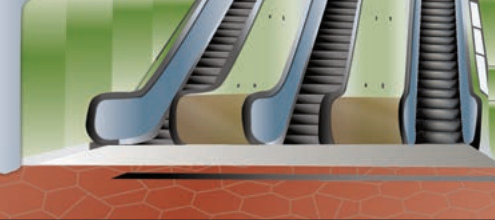
Challenges expressed during audit interviews include vacancies, particularly on night shifts, and a lack of internal feeder programs for hard to fill positions such as overnight painting (surface finishing) work.

Plant Maintenance management stated that they had not conducted a staffing analysis to determine appropriate staffing levels and work assignments for each shift and area of responsibility.

Such an assessment would identify the most efficient use of resources, any necessary adjustments to the organizational structure, and the areas where the most aggressive recruitment and retention approaches are required.

Overall, CMSR personnel described their group in audit interviews as “not built to be proactive; we’re more built to be reactive” and as falling behind on some repairs. Metrorail can take advantage of the staffing assessment and subsequent actions to address any changes necessary to meet the PTASP’s commitments to a proactive safety management systems approach.

Possible Corrective Action: Metrorail may conduct and act upon a staffing assessment to identify the required number and type of trained personnel and work assignments required for each shift and area of responsibility for Plant Maintenance to carry out its responsibilities, and the recruitment and retention actions necessary to ensure needed positions are filled with qualified personnel.



One PLNT manager stated that they had not received any formal Maximo training that was robust enough to do their job, which has left them in the dark about an important area of responsibility.

② Metrorail has effective training instructors for ELES personnel, however their experience does not match the written requirements for the positions.

Metrorail's elevator-escalator training instructors are knowledgeable about their subject matter and carry out Metrorail's training program. However, the instructors do not meet the written requirements for the positions that require five years of course development experience (but do not require experience working on elevators or escalators).

Metrorail should adjust these requirements to include appropriate elevator-escalator expertise and the specific educational or course development experience that Metrorail actually requires.

Possible Corrective Action: Metrorail may adjust the job descriptions to reflect the actual requirements of the role, including experience and expertise in the subject area.

③ Metrorail has an opportunity to improve data collection and analysis necessary under its Public Transportation Agency Safety Plan (PTASP) by providing more PLNT and ELES personnel with improved, formal training on the use of Metrorail's maintenance management information system (Maximo).

ELES and PLNT Personnel interviewed for this audit identified deficiencies in the use of and training on Maximo that prevent effective identification of safety issues and limit the quality of the data entered into Metrorail's maintenance management information system that can be analyzed for emerging or past safety hazards and trends.

One PLNT manager stated that they had not received any formal Maximo training that was robust enough to do their job, which has left them in the dark about an important area of responsibility.

Frontline ELES personnel do not routinely access Maximo, and instead rely on the ELES call center or supervisors. Records provided as part of this audit demonstrated Metrorail had only recently offered basic computer-based training

to ELES managers and master technicians in 2021 on features such as how to log into Maximo. This training did not include any journeymen, and master technicians who did receive the training described it as “awful” and not directly related to their work.

Providing effective training on Maximo use and data entry would improve the speed that data is available and would increase the quality of data, allowing for more effective hazard identification and trend analysis across station maintenance, elevators and escalators.

Metrorail has begun to enter ELES calibrated tools into Maximo to identify and flag calibration dates, rather than use spreadsheets for this purpose, but this task had not been completed at the time of this audit. At the time of this audit, ELES personnel were aiming to complete that entry no later than July 2022 for the approximately 600 tools that require calibration.

Effective use of Maximo would allow for improved reliability tracking and analysis, improved data quality and data assurance checks, and improved scheduling and tracking of maintenance work among other safety benefits.

Possible Corrective Action: Metrorail may develop and provide sufficient Maximo training for each role ranging from frontline workers and supervisors through management, and implement quality assurance processes for this data. Metrorail may use the improved data collection to improve and expand reliability analysis.

④ Metrorail can improve the safety of escalators by formalizing procedures to ensure that escalators are regularly operated opposite their normal direction when safe to do so.

A Rail Transportation SOP, the details of which ELES personnel were not familiar with, currently states that escalators should generally not be reversed from their normal direction of use, and specifies the orientation of operations. Such provisions are warranted during times an escalator is in service for riders to ensure that there is no undue accessibility challenge posed to customers, but there are other opportunities to reverse newer escalators at other times if properly planned and coordinated.





This audit identified a disconnect between the provisions in the RTRA SOP and the expectations of ELES personnel regarding when it is and is not acceptable to run escalators in reverse of the normal direction.



Personnel interviewed for this audit expressed positive ideas about ensuring that escalators are regularly run opposite their normal direction to prevent settling over many years; this settling can result in escalators malfunctioning when run in the opposite direction during a large event or in an emergency. However, Metrorail has not formally documented ongoing practices to run newer escalators next to the one being worked on in the opposite direction of its usual travel while mechanics are on site during overnight hours and the station is closed. This can only be done for escalators that have not already settled due to years of consistent use in a single direction. This audit identified a disconnect between the provisions in the RTRA SOP and the expectations of ELES personnel regarding when it is and is not acceptable to run escalators in reverse of the normal direction.

Possible Corrective Action: Metrorail may establish procedures to exercise escalators in the opposite direction of normal travel when safe to do so to provide for safe operations in the event of an emergency or large crowd.

Other Observations

This audit was conducted during the ongoing, long-term COVID-19 public health emergency.

In addition to the items specifically noted above as being identified during site visits for this audit, the WMSC also identified and communicated other safety issues in real-time for Metrorail to address including:

- Safety netting below the under-construction Dupont Circle Station entrance canopy was not fully opened when work began. This was corrected when brought to the attention of a Metrorail supervisor.
- Two of three fire extinguishers out and visible at the Dupont Circle Station entrance canopy project were past their required service date, and the third did not have the proper tag.
- A lack of NFPA 704 signage on a cabinet where combustible chemicals were being stored in a service corridor at Glenmont Station.
- Items such as a trash can, ladder and signs left in areas where storage is not permitted such as the area of refuge at Glenmont Station and a hallway near the area of refuge at Forest Glen Station.
- Single emergency lights not properly illuminated at Glenmont Station.



- Groups of platform edge lights that were not properly illuminating at Glenmont, Forest Glen and Farragut West stations.
- Excessive shaking felt particularly near the top of escalator N04 at the Friendship Heights Station while the escalator was operating in the exit (up) direction. Metrorail contacted ELES engineering to initiate further investigation. During audit interviews, the WMSC was told this is a known problem that had been raised by the ELES CIP group.

During this audit, Metrorail was in the process of preparing for the opening of the Silver Line Phase 2 extension from Wiehle-Reston East Station to Ashburn Station, which will add more stations, elevators and escalators to the rail system. Additional capital projects of smaller scale were also nearing completion, such as the new Potomac Yard Station. Metrorail is adding positions intended to address the increased workload from Silver Line Phase 2 and will need to similarly monitor potential needs based on other capital projects or system modifications.

Next Steps

WMATA is required to propose CAPs for each finding and to respond to each recommendation no later than 30 days after the issuance of this report. Each proposed CAP must include specific and achievable planned actions to remediate the deficiency, the person responsible for implementation, and the estimated date of completion. Each proposed CAP must be approved by the WMSC prior to WMATA implementation. For each recommendation, WMATA must either propose a CAP or submit a hazard analysis and associated documentation as required by the WMSC Program Standard.



Appendices

Appendices **A, B, C** and **D**

Appendix A: Personnel Interviewed

- General Superintendent, ELES
- Assistant General Superintendent, ELES
- Superintendent, ELES
- Assistant Superintendent, ELES
- Assistant Project Manager, ELES
- Project Manager CIP, ELES
- Vertical Transport Safety Inspector, ELES
- Maintenance Supervisor, ELES
- ESC/ELE Journeyman, ELES
- Master Technician, ELES
- Apprentice, ELES
- Structures Evaluation Technician AA, TRST
- Director, PLNT
- Assistant Director, PLNT
- Superintendent, PLNT
- Supervisor, Custodial Maintenance, PLNT
- Supervisor, Special Construction, PLNT
- Supervisor, TSMT
- Training Instructor, TSMT (2)

Appendix B: Site Visits

- **December 9**
 - ◆ Farragut West Station: station inspection with TRST inspector
 - ◆ Glenmont Station: escalator PMI and independent observation of station conditions
 - ◆ Friendship Heights Station: elevator PMI and independent observation of station conditions
 - ◆ Dupont Circle Station: north entrance project observation
- **December 10**
 - ◆ Forest Glen Station: elevator CIP and independent observation of station conditions
 - ◆ Pentagon City Station: escalator CIP and independent observation of station conditions



Appendix C: Documents Reviewed

- System Safety Program Plan (SSPP) (1/2019)
- WMATA Transit Agency Safety Plan (V1.0, 10/8/2020)
- WMATA Safety and Security Certification Program Plan (1/2020, Rev. 4)

ORGANIZATIONAL CHARTS

- ELES (10/2021)
- TRST (10/27/2021)
- Automatic Fare Collection (AFCS) (10/2021)
- TSMT (6/1/2021)
- PLNT (11/2021)
- Low Voltage Electrical Maintenance (LVEM) (11/2021)

POSITION DESCRIPTIONS

- Parking Lot Equipment Mechanic (A, B, C, Helper), Automatic Fare Collection Systems (6/6/2019)
- Elevator/Escalator Technician (A, B, C) (4/10/2018)
- Project Manager, CIP (10/10/2018)
- Elevator Escalator Support Assistant (6/6/2019)
- Service Dispatcher (Elevator and Escalator) (4/10/2018)
- Material Handler (6/26/1991)
- Parts Runner (11/6/2019)
- ELES Material Specialist (7/1/2005)
- Engineer II (7/6/2012)
- Manager, Engineering (11/21/2018)
- ELES CIP Engineer (8/13/2018)
- Elevator/Escalator Engineer (10/23/2018)
- Project Coordinator/Scheduler (6/29/2020)
- Project Manager/Assistant Director/Director (12/4/2014)
- Project Coordinator (12/4/2014)
- Reliability Engineer (12/23/2013)
- **PLNT:**
 - Assistant Manager, Facilities (12/18/2018)
 - Assistant Project Manager (12/4/2014)

- Assistant Superintendent (4/29/1992)
- Assistant Superintendent, Grounds Maintenance & Custodial Services (12/18/2018)
- Associate Project Coordinator (5/15/2018)
- Boiler/Chiller Operator (5/17/2019)
- Carpenter (4/12/2019)
- Cleaning Machine Operator (8/26/2020)
- Director, Plant Maintenance (3/20/2019)
- Equipment Operator (3/29/2000)
- Facilities Maintenance Clerk (12/18/2018)
- Fire Equipment Technician (12/12/2019)
- Gardener (11/3/2017)
- General Equipment Mechanic (4/12/2019)
- Heavy Cleaning Equipment Operator (3/19/2019)
- HVAC PLNT Technician Lead (5/17/2019)
- HVAC Refrigeration Equipment Mechanic (5/17/2019)
- Industrial Control Technician (11/13/2018)
- Janitor (1/31/2018)
- Locksmith (4/20/2018)
- Machinist (4/12/2019)
- Maintenance Coordinator, Quality Assurance (9/12/2019)



PLNT: (Continued)



- Manager, Corrective Action Plan and Compliance (4/11/2019)
- Manager, Incident Investigation (2/13/2019)
- Manager, Special Projects, Grounds Maintenance and Custodial Branch (2/24/2020)
- Manager, Special Projects (8/26/2019)
- Mason (4/9/2019)
- Mobile Lift Mechanic (4/30/2019)
- Office Engineer (12/17/2010)
- Personnel Administrator (12/28/2016)
- Plumber (11/21/2018)
- Program Manager, Capital Funded Programs (9/17/2010)
- Project Manager (3/12/2018)
- Project Manager, Capital Funded Programs (12/4/2014)
- Project Manager, Facilities (12/4/2014)
- Record Center Clerk (4/30/2019)
- Sheet Metal Technician (4/12/2019)
- Sign Fabricator (5/1/2019)
- Small Engine Mechanic (4/9/2019)
- Superintendent, Contract Maintenance and Station Enhancement (1/16/2003)
- Superintendent, Grounds Maintenance and Custodial (3/20/2019)
- Superintendent (7/3/2018)
- Supervisor, Craft Crew (10/17/2019)

- Supervisor, Craft Crew Carpentry (8/17/2021)
- Supervisor, Craft Crew General Equipment (5/25/2021)
- Supervisor, Craft Crew Heavy Cleaning Equipment Operations (10/14/2021)
- Supervisor, Craft Crew Plumbing (7/7/2021)
- Supervisor, Craft Crew Vehicle Lifts (3/22/2021)
- Supervisor, Custodial Maintenance (3/20/2019)
- Supervisor, Landscape Maintenance (4/1/2021)
- Supervisor, Operations Support (3/21/2019)
- Supervisor, Records and Distribution (3/30/1992)
- Supervisor, Special Construction (3/21/2019)
- Support Services Clerk (4/9/2019)
- Surface Finisher (4/9/2019)
- Technical Software Support Analyst (12/18/2018)
- Technical Writer (6/27/2016)
- Truck Driver (5/17/2019)
- Vehicle Lift Mechanic (3/7/2019)
- Welder (5/17/2019)
- Window Washer (no date)

► LVEM

- Assistant Superintendent, Low Voltage Electrical (9/5/2017)
- Mechanic AA Electric Power/LV (8/3/2020)
- Mobile Lift Mechanic (4/30/2019)
- Shift Supervisor, Low Voltage Power Systems Maintenance (10/19/2018)
- Superintendent, Low Voltage Electrical (12/16/2016)
- Systems Maintenance Clerk (8/5/2019)

► ELES Employee and Budgeted Positions, spreadsheet (10/4/2021)

► PLNT Budgeted Positions, spreadsheet (10/4/2021)

► Low Voltage Budgeted Positions (10/4/2021)

- List of ELES midnight shift supervisors, spreadsheet (2021/2022)
- AFCS Completed Training, spreadsheet (10/26/2021)
- ELES Completed Training, spreadsheet (10/26/2021)
- PLE Completed Training, spreadsheet (10/26/2021)
- PLNT LVEM Trainer ELM files, spreadsheet (11/9/2021)
- 100 level courses materials for elevator/escalator personnel
- 200 level courses materials for elevator/escalator personnel
- 300 level courses materials for elevator/escalator personnel
- 401 level course materials for elevator/escalator personnel
- Systems Maintenance (SMNT) Training Schedule, spreadsheet (9/2021)
- ELES Training Journeyman Calendar, spreadsheet (fall 2021)
- ELES Training calendar for journeyman and apprentice, spreadsheet (fall 2020)
- ELES Training matrix worksheet, spreadsheet form
- AFC/PLE Training Matrix, spreadsheet (10/27/2021)
- Training records for current trainers
- List of PLNT personnel with fall protection and confined space training as of 12/27/2021 (spreadsheet)
- List of Maximo training for ELES personnel as of 12/22/2021
- List of escalator station assets (10/22/2021)
- List of elevator station assets (10/22/2021)
- TRST Email, Re: Known problem areas in stations (10/27/2021)
- Known Water Intrusion Areas Related to ELES Assets or Areas During Heavy Rain, spreadsheet (10/30/2021)
- L'Enfant Plaza Escalator F03N02 Well/Way
- Transit Asset Inventory and Condition Assessment Project, Condition Scoring Procedures (revised 11/2020)
- Hazards for ELES, spreadsheet (10/25/2021)
- 1329 elevator/escalator inspection reports from 2021
- 88 elevator/escalator inspection reports from 2020
- 7 elevator/escalator inspection reports from 2019
- 2 elevator/escalator inspection reports from 2018
- Elevator Condition Assessment Matrix (2021)
- Escalator Condition Assessment Matrix (2019)
- Elevator Downtime & Availability Detail Report (10/1/2020 through 9/30/2021)
- Escalator Downtime & Availability Detail Report (10/1/2020 through 9/30/2021)
- Elevator and Escalator High Failure Rate Reports (January and August 2021)
- ELES supervisor QA Audits for regions 1 and 4 (August, September, October of 2021)
- Calibrated Tool List, spreadsheet (10/21/2021)
- QICO Internal Review, Engineering & Maintenance, Metrorail Vertical Transportation: Elevator Maintenance and Inspections (4/27/2018)
- QICO Internal Review, Engineering & Maintenance, Elevator/Escalator Operations Center (11/1/2019)
- QICO Internal Review, Service Delivery, Elevator/Escalator Operations Center (11/1/2019)
- QICO Comprehensive Internal Review, Metrorail Engineering and Maintenance (11/17/2017)





- QICO Internal Review, Internal Safety & Security, Office of Elevators & Escalators (ELES) (4/27/2018)
- ASME QEI/1/2013, Standard for the Qualification of Elevator Inspectors (10/31/2013)
- ASME A17.1.2016/CSA B44/16, Safety Code for Elevators and Escalators (11/30/2016)
- Traction Elevators Maintenance Control Program
- Hydraulic Elevators Maintenance Control Program
- Modular Escalators: Multi/Drive Load Share, Turnaround Adjustment, and Drive Chain Replacement Procedures
 - Procedure nos. 212/14, 212/15, 212/16, 212/17, 212/18 (4/30/2012)
- Comb Impact Device Adjusting Procedures (10/11/2011)
- Mod 100/250 Escalator Preventive Maintenance Procedure (1/7/2019, Rev. 1.0)
- Schindler (EWE/EWG, 9300, 9700) Escalator Maintenance Control Program (2/14/2020)
- Elevator Industry Field Employees Safety Handbook, Section 3, Personal Protective Equipment (2020)
- Open Maximo corrective maintenance work orders as of 12/19/2021
- Open Maximo LM work orders as of 12/19/2021
- Maximo work orders for Pentagon City street elevator water intrusion

- Work Order 16548443 regarding AFCS, Monthly, Exitfare (procedure no. AFC/SSRM/PM/20180710 Rev. 01)
- Work Order 16548117 regarding AFCS, Monthly, SSRM (procedure no. AFC/SSRM/PM/20180710 Rev. 01)
- Work Order 16548289 regarding AFCS, Monthly, Standard Vendor (procedure no. AFC/SSRM/PM/20180710 Rev. 01)

➤ **Service bulletins:**

- Elevator/Escalator Service Bulletin, Escalator Handrail Cleaning Instructions, #20210503
- Elevator/Escalator Service Bulletin, Medical Center Emergency Doors, #20210510

➤ **Plans**

- MTPD/OEM Severe Weather Plan (2/6/2020)
- PLNT Maintenance Management Plan (8/11/2020)

➤ **SOPs & work instructions**

- AFC-SSRM PMI 20180710, AFC SmarTrip Sale and Reload Machine PMI Procedures (7/10/2018)
- AFC-EFV PMI 20180627, AFC Exitfare PMI Procedures (6/27/2018)
- AFC-TVM PMI 20180710, AFC Ticket Vending Machine PMI Procedures (7/10/2018)
- 212-SOP-01, Test Measurement and Diagnostic Equipment (TMDE) (origination date 10/31/2018, Rev. 0)
- 212-SOP-19, ELES Preventative Maintenance Procedure (last revised 8/13/2018, Rev. 3)
- 212-SOP-22, ELES Staff Work Alone Policy (7/27/2017, Rev. 1)
- 212-SOP-23, ELES Management of Electrical and Mechanical Lock out/Tagout (LOTO) (origination date 7/2/2018, Rev. 1)
- 212-SOP-30, Procedure-Elevator and Escalator Inspections (2/21/2018, Rev. 2)
- 212-SOP-35, Maintenance and Operations Safety Manual (6/15/2015, Rev. 1)

SOPs & work instructions (Continued)

- 212-SOP-39, Quality Control Preventative Maintenance and Station Audit (9/19/2019, Rev. 1)
- 712-SOP-03, ELES/CIP Safety Security Certification Plan Compliance Procedures (Origination date 3/19/2018)
- COO-DP-100-23-00, Asset Inspection and Maintenance Division of Responsibility (7/6/2021, Rev. 0)
- SOP 208-07, Structures Inspection Procedures (Latest revision 10/20/2021, Rev. 5.0)
- Metrorail Stations Standard Operating Procedures (9/2015)
- SOP-509-02, Documenting and Tracking Professional License/Certification Renewals and Required Refresher/Recertification Training for PLNT Employees (11/23/2018, Rev. 03)
- 212-SOP-30, Procedure Elevator and Escalator Inspections (last revision 7/20/2019, Rev. 4.0)

➤ Manuals

- NEII Elevator Industry Field Employees' Safety Handbook (May 2015)
- Structural Inspection Manual Pocket Book (2021)
- Structural Inspection Manual (9/27/2021, Rev. 2.0)

➤ Checklists/forms:

- Escalator and Elevator Routine Inspection Checklists (12/1/2019 through 12/1/2021)
- Escalator Routine Checklist (form)
- Hydraulic Elevator Routine Inspection Checklist (form)
- Escalator PM Check Sheet (blank)
- Elevator PM Check Sheet/Traction Unit (blank)
- Elevator PM Check Sheet/Hydraulic Unit (blank)

➤ Capital Improvement Program

- ELES/SPPM Capital Program Joint Project Statement, Escalator Rehabilitation Program (7/28/2021)

- ELES/SPPM Capital Program Joint Project Statement, Elevator Rehabilitation (7/28/2021)
- ELES/SPPM Capital Program Joint Project Statement, Escalator Replacement Project (7/28/2021)
- ELES/SPPM Capital Program/Joint Project Statement, Elevator Rehabilitation FQ14021 contract with Tompkins Mid/American (7/28/2021)
- ELES CIP FQ14021 100 Elevator Rehabilitation Project Schedule
- ELES CIP F20064 Escalator Replacement Schedule
- ELES CIP Escalator Rehab Planned FQ19006 Approved Baseline Summary Bar Chart (4/22/2021)
- ELES CIP Daily Activity Reports (11/2021)



Appendix D: Public Transportation Agency Safety Plan (PTASP) (and, for earlier records, System Safety Program Plan (SSPP) elements covered

➤ PTASP elements covered include:

1. Safety Management Policy

- d.** Functional area common SMS responsibilities
- e.** Functional area specific SMS responsibilities
 - ii.** Technical Management (supervisors, managers, superintendents, directors, program managers) level
 - iii.** Front Line and Represented Employees
 - iv.** Safety risk coordinators (key personnel)
- g.** SMS documentation

2. Safety Risk Management

- a.** Develop and implement a Safety Risk Management (SRM) process for all system elements
- b.** Risk Assessment Process
- c.** Risk assessment methodology
- d.** Hazard identification
- e.** Hazard investigation
- f.** Hazard analysis and evaluation of safety risk
- g.** Hazard resolution (mitigation, elimination)
- h.** Hazard tracking

3. Safety Assurance

- a.** Systematic, integrated data monitoring and recording of safety performance
- b.** Real/time assessment with timely information as to safety management and performance
- c.** Internal reviews
- d.** Departmental controls
- e.** Compliance and sufficiency monitoring
- f.** Document assurance activities
- g.** Preventive, Predictive, and Corrective Maintenance
- i.** Change management
- j.** Safety and Security Certification
- k.** Corrective action plans

4. Safety Promotion

a. Training

- i. Competencies and Training
- ii. Employee Safety Training
- iii. Safety Rules and Procedures Training
- iv. SMS/specific training requirements
- v. Training Recordkeeping and Compliance with Training Requirements

b. Contractor Safety

c. Safety Communications

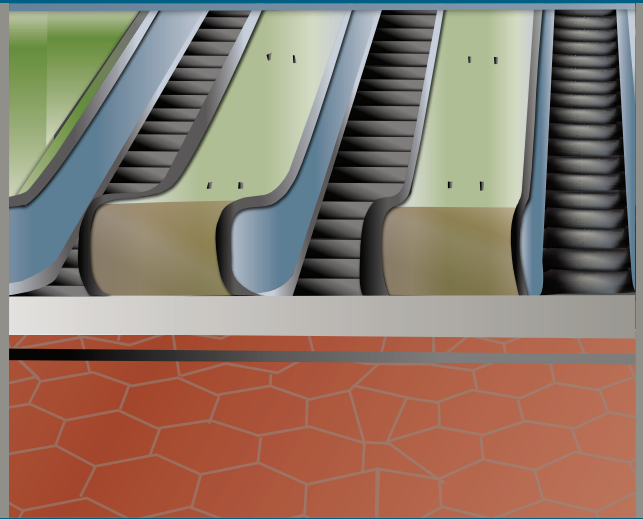
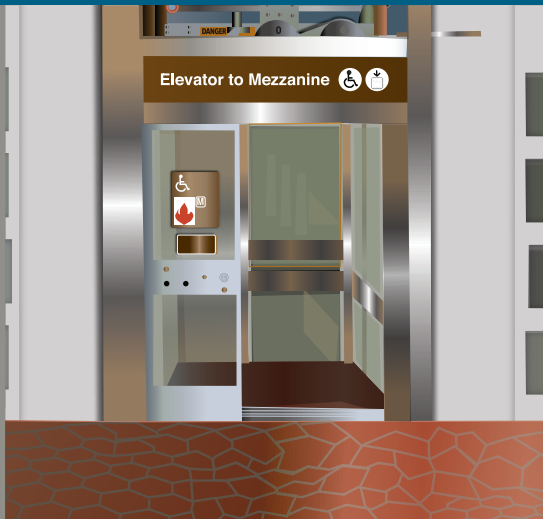
d. Hazard and safety risk information

e. Safety committees

► SSPP elements covered (for documents and records prior to December 31, 2020) include:

- 3. Overview of Management Structure
- 5. Implementation Activities and Responsibilities
- 6. Hazard Management Process
- 7. System Modification
- 8. Safety Certification
- 9. Safety Data Collection and analysis
- 12. Internal Safety Audits
- 13. Rules Compliance
- 14. Facilities and Equipment Inspections
- 15. Maintenance Audits and Inspections
- 16. Training and Certification for Employees and Contractors
- 17. Configuration Management and control
- 18. Compliance with Local, State and Federal Requirements
- 21. Procurement Process





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