



# MEMORANDUM

**TO:** Howard Crane

**FROM:** Brian Breen

**DATE:** 9/13/19

**SUBJECT:** Elmwood Single-Ended Light Rail Vehicle (LRV) Vehicle Inspection & Maintenance Process Audit

**CC:** E. Abel  
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System Safety Officer B. Breen conducted an audit of the Elmwood Single-Ended LRV fleet Vehicle Inspection and Maintenance Process on Tuesday August 6, 2019 and Wednesday August 7, 2019 at the Elmwood Shop.

## PURPOSE OF THE AUDIT

The purpose of this audit was to verify that the current inspection activity was being administered and documented properly and in accordance with established Authority standards and practices.

## SCOPE OF THE AUDIT

1. Identify applicable written procedures (exclusive of standards) for performing inspections and determine whether they are readily available and used.
2. Identify applicable written worksheets for performing inspections – and determine whether they are readily available and used.
3. Qualitatively review inspection documentation / worksheets – and determine if the documentation was appropriately completed and processed.
4. Identify applicable inspection frequency – and determine whether inspections are conducted in the time-frame specified by the Authority, and if a tracking mechanism was in place to ensure conformance.
5. Determine if inspection information is recorded / tracked electronically – and if the electronic data comports with the hardcopy documentation.

6. Determine whether Vehicle Inspection & Maintenance (I & M) records were centralized and secured in a reasonable manner.
7. Determine whether training was adequate to support the inspection process.
8. Determine if the criteria for returning a vehicle to service was adequate for ensuring that only safe and reliable vehicles are released for service.

The scope of the audit included a comprehensive examination of twelve (12) randomly selected Elmwood Single-Ended LRV vehicle records, representing ten percent (10%) of the one hundred and twelve (112) car fleet. Vehicle records were examined for car numbers: #9011, #9024, #9031, #9053, #9062, #9075, #9085, #9087, #9088, #9091, #9098, and #9099.

## **FINDINGS**

### **1. Availability of Written Procedures:**

The Elmwood LRV Fleet Management Plan and the Elmwood LRV Fleet Preventative Maintenance Inspection Manual are issued and authorized by SEPTA Vehicle Engineering, Light and Heavy Rail, and documents the process and procedures to be used in performing the inspections. Presently, they are being followed by the Elmwood Shop LRV management staff.

Vehicles that require work after the inspection process are documented on a VMIS Work Order. Vehicles are held out of service until all incomplete work/repair is completed. Once the repair has been completed, the Maintenance Manager approves the repair work and the work order is then closed. The inspection worksheet is signed and dated by the Inspection Maintenance Manager and the Director of Maintenance before filing.

The inspections reviewed were governed by the following Engineering Change Notice's (ECNs):

- 10 - Day Safety Inspection: ECN 4086-2
- 60 - Day Inspection (A): ECN 3858-8
- 120 - Day Inspection (B): ECN 3858-8
- 180 – Day State Inspection: ECN 3858-8
- 360 - Day Inspection (C) : ECN 3858-8

Therefore, System Safety takes no exceptions.

### **2. Availability of Written Worksheets:**

The Elmwood Shop utilizes the LRV Single-Ended Vehicle Inspection Manual, which includes all of the Preventative Maintenance Inspection Worksheets. This document is further supported by the LRV Running Maintenance Manual and the Heavy Repair Manual, of which

all inspection activity and recorded data required by the SEPTA Vehicle Engineering, Light and Heavy Rail and the State of Pennsylvania is documented. The required State inspection items are conspicuously identified by the keystone icon. The inspection process requires inspectors to complete the appropriate worksheet by coding the pre-printed inspection items and approving it with their initials. The “codes” are as follows:

- (▼) “State Inspection Item”
- (✓) OK if “no trouble found”
- (✓) REJ if “repairs are required”
- MECH = “Mechanics Initials”

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- 180 – Days State Inspection: ECN 3858-8
- 360 - Days Inspection (C) : ECN 3858-8

System Safety finds that the Elmwood LRV fleet Vehicle Inspection Manual, including the vehicle maintenance worksheets for the Safety, A, B, State, and C inspections issued by SEPTA Vehicle Engineering, Light and Heavy Rail, are being followed by the management staff except for removing 600V and tag-out before entering the under car portion of the safety inspection.

System Safety takes exception to the shop not following the Light Rail Safety Inspection Manual for removing the 600V and tag-out before entering under the car to perform the under car inspection (ECN- 4086-2 page 11). System Safety recommends that the shop follow all requirements of the Light Rail Safety Inspection Manual (ECN-4086-2).

**(Recommendation 1)**

**3. Qualitative Review of the Documentation:**

The selected random samples of vehicle maintenance and safety inspection records on file were compared against the vehicle history file. VMIS history identified selected vehicles inspections as complete. The vehicle numbers were #9011, #9024, #9031, #9053, #9062, #9075, #9085, #9087, #9088, #9091, #9098, and #9099. All hard copy records were complete and through, appropriately initialed by the inspector, and signed by management.

Therefore, System Safety takes no exceptions.

#### **4. Applicable Inspection Frequency:**

Fleet Safety Inspections are performed in accordance with written instructions in the Elmwood LRV Fleet Management Plan. The Inspection Maintenance Managers utilize the VMIS software systems and the Crystal List to generate a schedule for cars requiring Pennsylvania State Inspections or Preventative Maintenance Inspections.

Maintenance Inspections are performed in accordance with the Elmwood LRV Fleet Management Plan. The maintenance protocol prescribes routine periodic inspections of the fleet according to written instruction at the following intervals:

- Safety Inspections are performed every 10 days.
- “A” Inspections are performed every 60 days.
- “B” Inspections are performed every 120 days
- PA State Inspections are performed every 180 days.
- “C” Inspections are performed every 360 days.

The Elmwood LRV Safety Maintenance Inspection cycle occurs every 10 days. System Safety reviewed Four-Hundred and Ninety (490) random inspections files approximate one year period (from August 2018 to August 2019)(See Exhibit A). No exceptions were noted.

Therefore, System Safety takes no exceptions.

The Elmwood LRV “A” Preventative Maintenance Inspection cycle occurs every 60 days. System Safety reviewed Seventy-five (75) random inspection files approximate one (1) year period (from August 2018 to August 2019) (See Exhibit B). No exceptions were noted.

Therefore, System Safety takes no exceptions.

The Elmwood LRV “B” Preventative Maintenance Inspection cycle occurs every 180 days. System Safety reviewed Thirty-four (34) random inspection files approximate one (1) year period (from August 2018 to August 2019) (See Exhibit C). No exceptions were noted.

Therefore, System Safety takes no exceptions.

The Elmwood LRV PA State Preventative Maintenance Inspection cycle occurs every 180 days. System Safety reviewed Twenty-three (23) random files approximate one (1) year period (from August 2018 to August 2019) (Exhibit D). No exceptions were noted.

Therefore, System Safety takes no exceptions.

The Elmwood LRV “C” Preventative Maintenance Inspection cycle, occurs every 360 days. System Safety reviewed eleven (11) random files approximate one (1) year period (from August 2018 to August 2019) (Exhibit E). No exceptions were noted.

Therefore, System Safety takes no exceptions

#### **5. Inspection Information Properly Recorded:**

Inspectors complete the appropriate worksheet by coding the inspection results and initialing each item. Where values are required, they are recorded in additional tables on the worksheet.

Work orders are prepared and input into the new VMIS computer System for each inspection and all significant items are repaired or replaced. The Inspection Maintenance Manager then inspection worksheet reviews and endorses the maintenance and the State inspections. Once the review is completed by him, he will sign and date the worksheet. Next, the Director of Maintenance will review it and then sign and date the worksheet. This document is then filed by the Inspection Maintenance Manager in a secured, locked cabinet in the Director's office.

The Inspection Maintenance Manager also reviews the worksheets, vehicle histories, and all open work orders for each vehicle. System Safety audited the twelve (12) vehicle files for their completeness of the maintenance inspection process. The following was found:

- Two (2) safety inspection (car 9031 work order 3357687 and car 9085 work order 332444) had the wrong date. *The shop has corrected the dates on the inspection forms (Suggested Improvement 1)*
- Two (2) safety inspection (car 9075 work order 3337790 and 3382586) was missing comments on discrepancy. *The shop has added the missing comments to inspection forms. (Suggested Improvement 1)*

#### **6. Inspection Records Centralized:**

Hard copy vehicle inspection car history files of up to two (2) years are to be kept in a locked file cabinet in the Inspection Maintenance Managers office. Files exceeding two (2) years old are to be stored in a locked filing cabinet archived in the shop away from the Inspection Maintenance Manager's office in a secured area. After five (5) years of the records being stored in the shop, they are then to be archived at a secure SEPTA facility away from the shop. The management office offers a reasonable degree of security.

All hard copy vehicle inspection car history files contained in the car history folders were found to be archived and filed properly in the Director's office and secured in a locked file cabinet per Records Management requirements. Three folders were found in vehicle history file. One folder was for the safety inspections, one folder was for the vehicle Preventive Maintenance and State inspections, and one folder was for any vehicle accident documents as they occur. Therefore, System safety takes no exceptions.

## **7. Adequate Training Provided:**

Maintenance inspectors are trained by the SEPTA Training department via On the Job Training (OJT) classes and on-hands instruction and testing. The Maintenance Managers are recertified annually for the State certification. The SEPTA Training Department retains an ongoing personnel database of the Maintenance Managers.

The following Maintenance Managers are trained and recertified annually to perform and document the SEPTA and State inspections for the Elmwood LRV fleet:

- S. Bauer, License #18091397
- R. Cheesman, License #C33086587101825
- A. Mobley, License #24345107
- C. Powell, License #27390559
- J. Schlernitzauer, License #19322927

Therefore, System Safety takes no exceptions.

## **8. Criteria for returning Vehicles Back to Service:**

All vehicles requiring repairs of safety critical items are held out of service until repairs are performed. However, the Inspection Maintenance Manager may release a vehicle for service if the repair does not require a safety critical part and that part is not available. Upon procurement of the part, the repairs are performed when the vehicle is next in the shop. Therefore, System Safety takes no exceptions.

After the inspection activity has been concluded, each car is subject to a final operational check conducted by the inspector. Any system found not to function within established engineering standards is viewed as cause for holding a vehicle out of service.

The inspector then performs a final vehicle visual inspection and checks the work order on VMIS to ensure that all of the discrepancies found on the inspection are checked off and completed with all applicable notes. He then signs and dates the worksheet and gives it to the inspection Maintenance Manager for his review.

The Inspection Maintenance Manager then reviews the worksheet and the work order in VMIS to verify that it is complete. He then signs and dates the approval of the worksheet that the maintenance and State inspections have been completed. He then gives it to the Director for his signature and date. The Director then releases the vehicle for service and returns the worksheet to the Inspection Maintenance Manager for filing.

Therefore, System Safety takes no exceptions to the above process for returning a vehicle to service.

## **RECOMMENDATIONS**

*Recommendations address identified deficiencies regarding the audited department's conformance to its own protocols or AHJ requirement – plus, any activities and/or conditions that auditors believe constitute a hazard, safety exposure, or risk of loss.*

Based on findings discussed in this report, consideration should be given to improving the following elements of the Single-Ended LRV fleet Vehicle Inspection and Maintenance Process:

- The Shop Director and the Inspection Maintenance Managers should be follow all requirements of the Light Rail Safety Inspection Manual (ECN-4086-2). *The Shop Director will contact Vehicle Engineering to reevaluate the removal of 600V and tag out requirement for the under car safety inspection.*

## **SUGGESTED IMPROVEMENTS**

*Suggested Improvements are proposed enhancements to any observed activity determined to be “compliant” – but in which auditors believe further changes will improve existing protocols.*

Based on findings discussed in this report, consideration should be given to improving the following elements of the Single-Ended LRV fleet Vehicle Inspection and Maintenance Process:

- System Safety suggests that all parts of the inspection cards and worksheets are checked and corrected before filing. *The shop has corrected the issues found on the inspection card and worksheets during the audit. The Vehicle Maintenance group has created and piloted a QA Inspection process to verify that Vehicle Inspections are being complete and documented properly. This proactive approach will minimize the number of inspection card and worksheets being incomplete.*

## **POST AUDIT DEBRIEFING and FINDINGS REVIEW**

A post audit debriefing to review the findings of the audit report was held on Wednesday September 4, 2019 in the Elmwood Shop director's office.

At the meeting the Shop Director, Assistant Director, and Maintenance Manager State Inspector went over System Safety's findings and showed the corrections that were made to the inspection cards and worksheets that had issues.

The following employees participated in the post audit debriefing:

- H. Crane – Shop Director
- S. Cooke- Shop Assistant Director
- J. Schlernitzauer – Maintenance Manager State Inspector

- Brian Breen – System Safety Officer


**CLOSING REMARKS**

System Safety would like to thank the Elmwood Shop LRV Staff involved in the audit for their courtesy and cooperation.

**ATTACHMENTS ENCLOSED : *Exhibit A, B, C, D, E***



Hazard Classification					System Safety Corrective Action Plan (CAP)		
Probability	Severity				SOURCE	Mode	
	Catastrophic 1	Critical 2	Marginal 3	Negligible			
Frequent	A	1A	2A	3A	4A	<input type="checkbox"/> Accident/Incident <i>Specify:</i> <input type="checkbox"/> Hazard <i>Specify:</i> <input checked="" type="checkbox"/> Internal Audit <i>Specify: I &amp; M Audit</i> <input type="checkbox"/> AHJ / External <i>Specify:</i> <input type="checkbox"/> Other <i>Specify:</i>	<input type="checkbox"/> Railroad <input checked="" type="checkbox"/> Rail Transit <input type="checkbox"/> Bus <input type="checkbox"/> CCT
Probable	B	1B	2B	3B	4B		
Occasional	C	1C	2C	3C	4C		
Remote	D	1D	2D	3D	4D		
Improbable	E	1E	2E	3E	4E		

 High (Cease / Correct Immediately)

Audit / Occurrence Date: 9/7/19  
Location: Elmwood Shop

REC #	Issue / Hazard	Haz Class	Recommendation / Suggested Improvement	Responsible Party	Completion Dates		Corrective Action Status	Post Fix Class
					Target	Actual		

1	The shop is not removing the 600V and tag-out before entering under the car to do the under car portion of the safety inspection (ECN 4086-2 page 11)	2C	<input checked="" type="checkbox"/> Rec <input type="checkbox"/> SI The Shop Director and the Inspection Maintenance Managers should be follow all requirements of the Light Rail Safety Inspection Manual	Shop Director - Howard Crane				
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