



Performance Audit of
Airport - Maintenance of Passenger Boarding Bridges
Audit No. 22-05
September 21, 2022

Report Highlights

Page(s)

- | | |
|---|-------|
| • Lack of policies and procedures for daily operations | 5 |
| • Lack of preventive maintenance schedule | 7 |
| • Untimely completion of work orders and lack of detail | 12-15 |



The Council
City of Shreveport

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September 21, 2022

Councilman James Green
Chairman, Shreveport City Council

Dear Councilman Green:

Subject: Audit No. 22-05 – Performance Audit of Airport - Maintenance of Passenger Boarding Bridges

Attached please find the report mentioned above. Management comments are included in the report.

Sincerely,

A handwritten signature in blue ink that reads "Leanis L. Steward".

Leanis L. Steward, CPA, CIA
City Internal Auditor

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EXECUTIVE SUMMARY

Performance Audit of Airport – Maintenance of Passenger Boarding Bridges

Why We Did This Audit

We have completed a Performance Audit of the Shreveport Regional Airport - Maintenance of Passenger Boarding Bridges (PBBs). This audit was conducted as a request of the City Council and the Chief Administrative Officer due to concerns with the PBBs.

Our objectives were to determine the following:

- Whether operating policies and procedures are current, clear, concise, and complete.
- Compliance with PBB Inspections Policy/Schedule.
- Whether preventive maintenance on PBBs was performed timely and tracked.
- Compliance with Maintenance/Repair Agreement for PBBs.
- Whether work orders were correctly recorded and completed timely.
- Whether Maintenance Division employees received required training related to the operation and maintenance of PBBs.

What We Recommended:

- Develop operating policies and procedures that address daily operations of maintenance division.
- Revise inspections policy for bridges.
- Establish preventive maintenance schedule for bridges.
- Ensure work orders are completed timely and determine feasibility of work order system upgrade.
- Establish a training policy and maintain records of training.

What We Found

In conducting this audit, we found that during the period reviewed of January 2016 - July 2021, maintenance of the airline - owned PBBs were the responsibility of the airlines. Maintenance for the Shreveport Airport Authority (SAA) - owned PBBs was the responsibility of either a specific airline or the SAA with responsibility assigned through a Jet Bridge Use and Lease agreement. However, maintenance for the common use gate PBB was the responsibility of the SAA. Airlines paid a pay per use maintenance fee to the SAA to cover maintenance costs of the common use gate bridge. We did note that during year 2021, SAA employees started performing monthly inspections, and the SAA entered into a maintenance agreement with a contractor to perform quarterly and annual thorough inspections and perform preventive maintenance on the SAA owned PBBs.

We have identified the following areas that need improvement:

- Policies and procedures that address daily operations for maintenance.
- Preventive maintenance schedule for PBBs.
- Inspections policy for PBBs.
- Untimely completion of work orders and lack of detailed information.
- Evidence of initial and periodic operating or preventive maintenance training on PBBs.

INDEX

Executive Summary	1
Index.....	2
Introduction.....	3
Scope and Methodology	4
Findings and Recommendations	
Policies and Procedures.....	5
Preventive Maintenance of Passenger Boarding Bridges.....	7
Inspections of Passenger Boarding Bridges	10
Work Orders	12
Training on Passenger Boarding Bridges.....	16
Appendix A : Findings Risk Ranking Criteria.....	18



Introduction

A Passenger Boarding Bridge (PBB) (also known as a jet bridge, jetway, and sky bridge as well as by other terms) is an enclosed, elevated passageway which extends from an airport terminal gate to an airplane. It allows passengers to enter (board) and exit (deplane) the aircraft quickly and easily, without exposure to the weather, directly to the terminal. This is a safer and more efficient method than using stairs or ramps that could lead to passengers potentially tripping, slipping, and falling, especially when wet.

The PBBs ranged from 16 to 21 years old as reflected in the below chart.

Gate #	Airline	Manufacture Date	Install Date	Approximate Age
5	American Airlines	November 20, 2000	November 15, 2017 (Used)	21
9	Delta Air Lines	August 1, 2000	August 1, 2000 (New)	21
11	Common Use / Allegiant Airlines	November 7, 2005	November 7, 2005 (New)	16

Source: Shreveport Airport Authority

This report contains five findings with 10 recommendations. Appendix A contains the risk descriptions for the recommendation risk levels throughout the report.

The objectives of this audit were to determine the following:

- Maintenance Division operating policies and procedures are current, clear, concise, and complete.
- Preventive maintenance work performed on PBBs is current, completed/performed timely as required for safety regulations and tracked and monitored and in compliance with the most current agreement with vendor(s) to maintain/repair the PBBs.
- Compliance with PBB Inspections Policy/Schedule.
- Compliance with Maintenance/Repair Agreement for PBBs.
- Work Orders are correctly recorded and completed timely for PBBs.
- Maintenance Division employees have received required training, education, and any required certifications are current related to the operation and maintenance of PBBs.



Scope and Methodology

The scope of this audit was limited to determining the efficiency and effectiveness of the Airport Maintenance Division's operations and compliance with regulations, standards, best practices, policies, and procedures specifically related to the maintenance of the PBBs. The period reviewed was January 2016 through July 2021 and any historical information related to the PBBs maintenance. To answer our objectives, we reviewed relevant internal controls and developed audit procedures that included, but were not limited to, the following:

- Interviewing staff to understand roles and responsibilities and processes
- Reviewing policies and procedures, rules and regulations, invoices, and agreements
- Reviewing and performing test work on work orders

We conducted this performance audit in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings, conclusions, and recommendations based on our audit objectives.

The Internal Audit Office expresses appreciation to the management and personnel of the Shreveport Regional Airport for their cooperation and assistance provided during the audit.





Objective: Determine if Maintenance Division operating policies and procedures are current, clear, concise, and complete.

Policies and Procedures

Policies and procedures provide guidance, answers questions, solves ambiguities, details best practices, and keeps employees safe and in compliance. Standardized policies and procedures define the standards for conduct and appropriate behavior for all employees within an organization.

Policies and procedures are the framework that a company is built on, reflecting values, and defining roles, processes, and setting rules and guidelines for daily operations.

A policies and procedures manual should be a comprehensive text that details every aspect of company policy, the procedures for following those policies and the forms needed to complete each process. It is a reference tool for all managers, supervisors, and employees to adhere to and follow. The manual can contain references to federal and state laws/regulations. Managers and supervisors then have access to the rationale for the policies, thus providing them with assistance for rule enforcement and reducing potential bias.

Airport Maintenance Division did not have any evidence that it had a current copy of policies and procedures for employees to follow and consult in their daily operations such as maintenance activities and assignment and completion of work orders. This can provide guidance for decision making and streamlining internal processes.

Airport management provided the PBB Inspection Policy Standard Operating Procedure (SOP) #1. However, there was no evidence to show that the Airport Maintenance Division employees had read the policy. There was a signature page in the policy for employees to sign but, there were no signatures.

Recommendation 1: Airport Maintenance Division should have a current comprehensive operating policies and procedures manual to cover daily operations such as maintenance activities and assignment and completion of work orders, code of conduct, health and safety, training, and certification, etc. The current Inspection Policy should be included in the manual. All Airport Maintenance Division employees should have the opportunity to read the manual and should sign off on the signature page as evidence that they have read the manual and understand it. **Risk: Medium**



AUDIT NO. 22-03
June 14, 2022

Management Response:

Recommendation 1: Airport Management will be working with the Maintenance Division to develop a set of policies and procedures to be adopted. This document will address maintenance specific activities and reference the COS personnel rules as applicable. The deadline will not be all inclusive as new procedures will be added as necessary. Employees will review and sign they have read the policies and procedures once adopted.

Due Date: 1-1-2023





Objective: Determine if preventive maintenance work performed on PBBs is current, completed/performed timely as required for safety regulations and tracked and monitored and in compliance with the most current agreement with vendor(s) to maintain/repair the PBBs.

Preventive Maintenance on Passenger Boarding Bridges

Regularly scheduled preventive maintenance activities are intended to keep equipment operating at its best, to prevent or minimize malfunctions and breakdowns, prevent deterioration and to extend its useful life.

The SAA did not have a preventive maintenance schedule for the PBBs from January 2016 to July 2021. However, the SAA entered into a maintenance/repair agreement with Airport Bridge Company (ABC) August 15, 2021 - December 31, 2021. The agreement required ABC to provide:

- One quarterly maintenance check of each of the four PBBs
- One annual maintenance check of each of the four PBBs

The ABC performed the quarterly and annual maintenance checks in accordance with the agreement.

Auditor Note: The agreement was to cover four PBBs. Per Airport management, they anticipated that all four PBBs purchased in December 2020 would have been installed but they were not. Therefore, inspections were performed on three PBBs instead of four PBBs. Airport management is researching whether a credit will be provided by ABC since they paid for inspections for four instead of three PBBs.

Airport management stated there previously was a preventive maintenance service agreement until September 2009 for the PBBs #5, #9, and #11.

Although there was not a Preventive Maintenance Schedule, SAA Maintenance personnel started performing monthly inspections of the PBBs in January 2021. These inspections included observing the general cleanliness of the PBBs and performing operational checks. The monthly inspections did not consist of thorough/in-depth inspections and performance of preventive maintenance tasks such as adjusting parts, checking brakes, checking tire air pressure and condition, checking for rust, and chipped or cracked paint, etc. These types of thorough preventive maintenance tasks were performed by ABC.

The SAA collected approximately \$586,600 in PBB use and maintenance fees from airlines from January 2016 through July 2021 to cover the cost and maintenance of the PBBs. The SAA provided invoices totaling \$279,880 for maintenance expenses of PBBs for October 2016 - April 2021. Internal Audit was unable to determine if this expense amount captured all maintenance expenses; because there was not a



corresponding work order with cost details to reconcile to each invoice.

The SAA was not responsible for performance of maintenance on all PBBs from January 2016 to July 2021 because either the airlines owned the PBB or if SAA owned the PBB, the use and lease agreement required that the airlines would be responsible for maintenance and repairs. Please see the timeline of assignment of maintenance responsibility in chart below.

Old Passenger Boarding Bridges (PBBs) Timeline of Assignment of Maintenance Responsibility		
#5 American Airlines	#9 Delta Air Lines	#11 Common Use <small>(Any airline can use)</small>
<p style="text-align: center;">2009-2017</p> <p style="text-align: center;">American Airlines</p> <p>American owned the bridge and was responsible for all maintenance.</p>	<p style="text-align: center;">Jul. 2009-2021</p> <p style="text-align: center;">Delta Air Lines</p> <p>SAA owned the bridge. Delta paid \$3,802.08 for monthly use of the bridge to SAA and was responsible for all maintenance.</p>	<p style="text-align: center;">Jul. 2009-Dec. 2016</p> <p style="text-align: center;">Delta Air Lines</p> <p>SAA owned the bridge. Delta paid \$4,766.30 for monthly use of the bridge to SAA and was responsible for all maintenance until Jan. 2017 when Delta relinquished the use of the bridge.</p>
<p style="text-align: center;">2018-2021</p> <p style="text-align: center;">Shreveport Airport Authority (SAA)</p> <p>In 2018 American Airlines installed and donated a new (used) bridge to SAA and paid \$5,200 monthly (\$4,000 for monthly use and \$1,200 for maintenance) to SAA. SAA was responsible for all maintenance.</p>		<p style="text-align: center;">Jan. 2017-2021</p> <p style="text-align: center;">Shreveport Airport Authority (SAA)</p> <p>Allegiant and any other airline paid \$60 per use (\$40 for use and \$20 for maintenance). SAA was responsible for all maintenance.</p>
<p>Note: This timeline only pertains to the old PBBs. SAA will be responsible for maintenance on the new (used)PBBs purchased in December 2020 after installation.</p>		

Recommendation 2: Establish a preventive maintenance schedule for the PBBs and ensure it is followed either by Airport Maintenance Division personnel or a contractor through a service agreement. **Risk: High**



AUDIT NO. 22-03
June 14, 2022

Management Response:

Recommendation 2: There is a current inspection/preventative maintenance contract in place. Work will be completed per the recommendations of the Passenger Boarding Bridge manufacturer. This item has been completed.

Due Date: N/A





Objective: Determine compliance with inspections policy/schedule.

Inspections of Passenger Boarding Bridges

There was no inspection policy established prior to December 2020 to perform mandatory, daily, weekly, or monthly inspections of the PBBs, nor were there any records of monthly inspections during 2016-2020. The Shreveport Airport Authority (SAA) developed an inspection policy (Standard Operating Procedure (SOP) #10) for inspections for PBBs on December 11, 2020. The policy was established as a result of the former Airport Director discovering that the PBBs had not been inspected by SAA personnel regularly for several years prior to his employment with the Airport. The SOP #10 states monthly inspections are to be performed by the 15th of each month by airport personnel (Maintenance Mechanic III or above). Adherence to the policy will ensure a continuous record of inspection and repair activities, that PBBs are safe and prevention of equipment failure that could result in PBBs being out of service.

However, there is a contradiction between SOP #10 and the Airline Use of PBBs Policy regarding the frequency/timing of inspections. The Airline Use of PBBs Policy's purpose is to provide guidance in the use and operation of the PBBs by the airlines and their employees and contractors. According to the Airline Use of PBBs Policy, in the section titled "Inspections, Maintenance, Repairs", part c, inspections should be performed not less than once every two weeks by SAA maintenance staff. The contradiction could cause inconsistency in the scheduling of inspections.

We reviewed 14 monthly inspection forms completed in 2021 (January - July) for PBB #5 and PBB #11 that are the responsibility of the Shreveport Airport Authority.

(Auditor Note: These inspections were for the old PBBs, not the PBBs purchased in December 2020. The new (used) PBB #5 was installed in August 2021. PBB #11 had not been installed at time of fieldwork.)

Maintenance and repairs for PBB #9 (Delta) and PBB #4 (United Airlines) were the responsibility of the Airlines, not the SAA. Therefore, no monthly inspections were performed by SAA personnel.

Per the SOP #10, the inspection process includes:

1. Completing the monthly inspection form.
2. The completed monthly inspection form is to be reviewed by the Superintendent of Maintenance.
3. A corresponding work order should be issued for any noted issues.
4. Once repairs have been completed, the PBB is to be re-inspected before it is placed back in service.



AUDIT NO. 22-03 June 14, 2022

The Superintendent of Maintenance performed the Inspections. There was no evidence of review of the 14 completed inspection forms.

There were issues noted on seven inspections for PBB #5 but, there were no corresponding work orders found to address the issues. However, there were handwritten notes in the jet bridge maintenance logs explaining any work performed, actions taken to address the issues found, and/or requests for work on the PBBs. There was no evidence of re-inspection of PBB after repairs were made.

Recommendation 3: Ensure that completed inspections are reviewed by someone other than the personnel that completed the inspection, corresponding work orders are issued for noted problems, and document when the PBB is re-inspected before placed back in service. **Risk: Medium**

Recommendation 4: Revise Inspections Policy (SOP#10) or the Airline Use of PBB Policy so they do not contradict regarding the frequency/timing of inspections. **Risk: Medium**

Management Response:

Recommendation 3: The PBB Inspection Policy will be updated to require the monthly inspection to be completed by a trained Maintenance Mechanic III and reviewed by a supervisor who will ensure any repairs have a corresponding work order in the system. The following process will remain the same and the policy will be reviewed and updated to reflect any changes:

- Completing the monthly inspection form.
- The completed monthly inspection form is to be reviewed by the Superintendent of Maintenance.
- A corresponding work order should be issued for any noted issues. Any item fixed on the spot will be noted afterwards in a work order.
- Once repairs have been completed, the PBB is to be re-inspected before it is placed back in service.

Due Date: 10-1-2022

Recommendation 4: Management has revised the Airline Use of PBB policy to ensure the frequency/timing of inspections does not contradict.

Due Date: 9-1-2022



Objective: Determine if work orders are correctly recorded and completed timely for PBBs.

Work Orders

Work orders are critical for Airport Maintenance Division. They are used to document work performed to detect and correct problems, keep equipment operating at its best, to minimize breakdowns and to extend the life of valuable equipment. They help track work, hold personnel accountable, report progress of work and resources used.

Work Orders at a minimum should include:

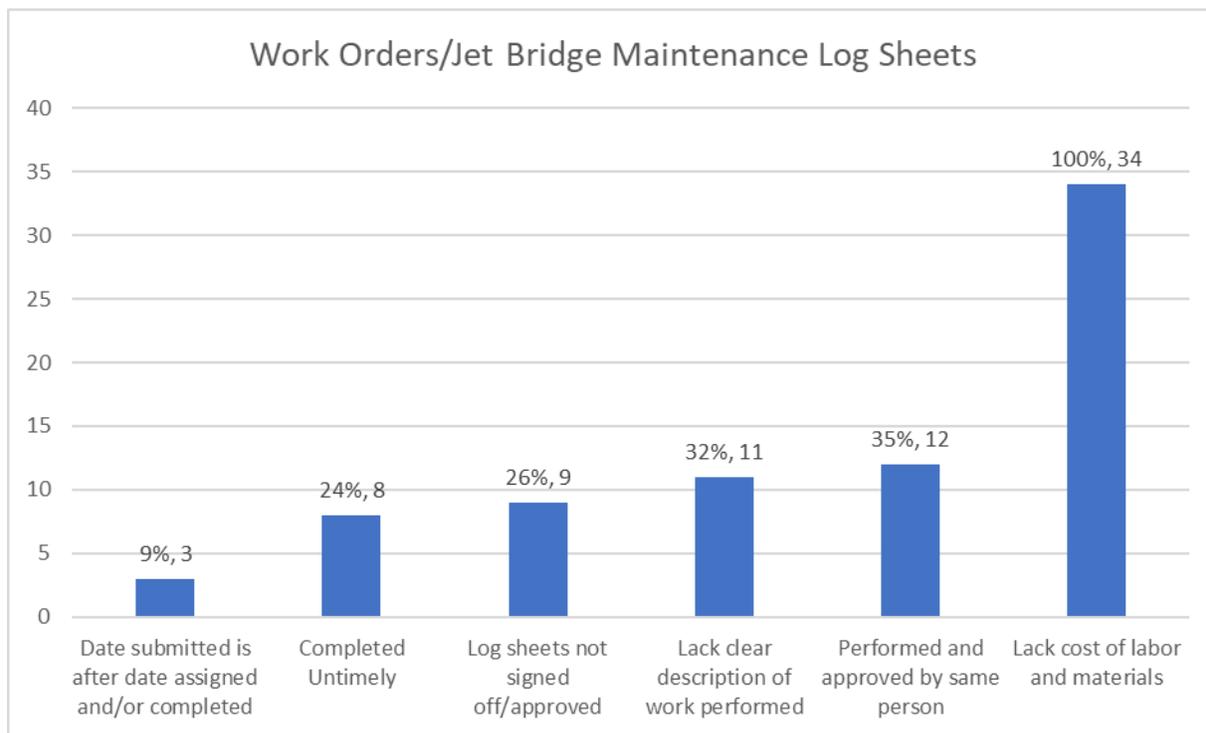
- Date of request/submission
- Who requested the work order
- Personnel assigned to work order
- Explanation of the problem, repair, or installation
- Task(s) to be performed
- The location or identification of equipment with the problem
- Labor, materials, and resources used to complete the work
- Work performed
- Who made changes to work orders
- Date completed
- Approval/signoff of the completed work order

In 2018, Airport maintenance implemented and currently uses a work order system called ProdigIQ, a web-based program that tracks work orders. However, it does not have the capability to track changes to the work orders, such as who made the changes and when, without upgrading the program.

The Airport Maintenance Division provided 34 work orders and Jet Bridge maintenance log sheets for review for the audited period.

The results of our review found there were:

- 3 work orders that the date submitted (i.e., problem reported) is after the date assigned and/or completed,
- 8 work orders not completed timely,
- 9 Jet Bridge Maintenance Log Sheets not signed off/approved,
- 11 work orders without clear descriptions of work performed,
- 12 work orders performed by and signed off/approved by the same person,
- 34 work orders and Jet Bridge Maintenance Log Sheets without the cost of labor and materials.



Although, all work orders are to be entered in ProdigIQ, there were nine Jet Bridge Maintenance Log Sheets (handwritten work orders/request notes) that were not entered into ProdigIQ. These work orders/request notes were from May 4, 2021, to July 6, 2021. The logs were prepared by an employee who did not have access to the ProdigIQ system after hours or while working in the field.

Employees of the Airport Maintenance Division did not use ProdigIQ fully to maximize its effectiveness. ProdigIQ should be used to explain the problems and to communicate between maintenance employees and members of Airport Management.

There were 11 work orders from Shreveport Airport Maintenance Division for the PBBs and they were marked as completed/done and signed off by Airport Maintenance Division Management. Those work orders did not have any detailed explanations about how the problems were solved or any evidence of the work that was performed.

The reason for delay in completion of work orders was not documented on the eight work orders that were not completed timely (i.e., three weeks or less). The completion of these work orders ranged from one month to 8 months.

Due to incomplete information on work orders, Internal Audit could not determine what was the root cause(s), which employee did the work, and what were the remedies/corrective actions to close out those work orders.



AUDIT NO. 22-03 June 14, 2022

In each of the Work Orders, there were fields within the Work Order about financial data such as "Estimated Cost", "Estimated Labor Hours", "Actual Cost", and "Actual Labor Hours".

This data would help the Airport Maintenance Division to keep track of its costs (estimated vs. actual) and how much money and employee hours were spent each year for all PBBs' maintenance. This data could help airport management determine which PBBs used more resources (employee man hours plus materials) than what was budgeted and whether they should replace the PBB that used the most resources to save their limited resources of materials and labor hours.

Not all the work orders and Jet Bridge Maintenance Logs we reviewed had the financial data fields filled out. Three of 34 had entries about estimated hours of labor.

Internal Audit was unable to reconcile invoices for repairs with the work orders due to the lack of data on those work orders. We were unable to determine how much was spent on each PBB.

Recommendation 5: Management should perform a cost/benefit analysis to determine if they should upgrade the current ProdigIQ system or switch to a different work order system to allow the capability to track changes made to the work orders and assign accountability for the changes. **Risk: Medium**

Recommendation 6: Superintendent of Maintenance or other authorized personnel should ensure that proper follow up and/or timely inspections are done to ensure the work has been completed as required by the work order and that an explanation is provided on the work order for those that are delayed in their completion. **Risk: Medium**

Recommendation 7: Maintenance data should be in a centralized location for ease of data control and to ensure data integrity. Therefore, management should provide access to the ProdigIQ after hours and/or while employees are in the field. If this is not feasible, management needs to ensure that all manual jet bridge maintenance logs and handwritten notes are timely entered into the ProdigIQ program. **Risk: Medium**

Recommendation 8: Management should ensure that all completed work orders/log sheets (if continued to be used) are signed off/approved by a different person than the person who performed the work. **Risk: Medium**

Recommendation 9: Management should ensure that all applicable fields in the work order are completed accurately before signing off/approving for close out. Specifically, make sure a detailed description of the work performed is stated to address the cause of the problem that was reported, as well as fields for labor hours, cost, date request submitted, date assigned, date completed, etc. are completed. **Risk: Medium**



Management Response:

Recommendation 5: Airport Management has been looking into other work order systems that have the recommended capabilities. If a better system is found, the airport will work on implementing the new system.

Due Date: 1-2-2023

Recommendation 6: Airport Management is actively working on procedures that would regulate how and by whom the work orders are completed and reviewed. This includes more detailed explanations of any delays in completion and what actions were taken during the repair.

Due Date: 1-1-2023

Recommendation 7: All employees who conduct work on the PBBs will be required to adhere to the work order policy.

Due Date: 2-1-2023

Recommendation 8: Airport Management will ensure that these items for the work order process are addressed within the Work Order Policy. The airport maintenance division supervisors will ensure that the policy is adhered to by their employees through regular review of the system. Airport management agrees with the recommendations as presented.

Due Date: 1-1-2023

Recommendation 9: Airport management will look into systems that can capture the financial data in other work order systems. The financial information is tracked through the COS Logo's System however, the data is not filled in once the invoice has been paid. This would require additional steps by multiple divisions to complete and may not be feasible. We will look into options or a procedure to capture costs.

Due Date: 1-1-2023



Objective: Determine if Maintenance Division employees have received required training, education, and any required certifications are current related to the operation and maintenance of PBBs.

Training on Passenger Boarding Bridges

To adequately perform maintenance activities and operate equipment, maintenance staff must have knowledge and training to perform the required work.

Shreveport Airport Authority does not have a documented policy that requires initial and periodic/refresher preventive maintenance and operational training on PBBs for maintenance division employees, specifically the mechanics and/or those employees who are responsible for ensuring the PBBs are maintained, repaired, and operating properly. There were no training records as evidence that preventive maintenance and operational training on PBBs had been completed during the period under review.

Recommendation 10: Establish a documented training policy that requires initial and periodic/refresher preventive maintenance and operational training on PBBs for Shreveport Airport Authority maintenance division employees and maintain training records as evidence that training was completed. **Risk: Medium**

Management Response:

Recommendation 10: Airport Management agrees that a documented training policy should be developed that requires initial and periodic/refresher preventive maintenance and operational training on PBBs for Shreveport Airport Authority maintenance division employees and maintain training records as evidence that training was completed. This will be addressed in the policies and procedures manual.

Due Date: 1-1-2023



AUDIT NO. 22-05
June 14, 2022

Prepared by:

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City Internal Auditor

tf:bn:ts

- c: City Council
- Clerk of Council
- Mayor
- Chief Administrative Officer
- Carr Riggs and Ingram
- City Attorney
- Director of Airports
- Deputy Director of Airports





Appendix A: Findings Risk Ranking Criteria

The chart below summarizes our evaluation of risk for the recommendations outlined in the report. Each recommendation was assessed at a high, medium, or low risk level based on a qualitative assessment of exposure and/or corrective action priority.

Risk Levels	Risk Description
High Risk	Represents a significant level of risk exposure to city assets, public safety, or achievement of objectives or mission. Corrective action should have the highest priority.
Medium Risk	Represents a moderate level of risk exposure to the city from extensive operating inefficiencies or high-level non-compliance issues. Corrective action should occur expeditiously.
Low Risk	Represents a minimal level of risk exposure to the city from inefficiencies or low-level non-compliance issues. Corrective action should occur as appropriate.