



Maintenance Review Report

Governance & Audit Report No. 2024-3

Issued on April 5, 2024

EXECUTIVE SUMMARY

Background

The Internal Audit Work Plan approved by the Governance and Audit Committee for fiscal year 2024 included a Maintenance Review.

IndyGo maintains a full-service maintenance and repair center for all Fixed Route and Bus Rapid Transit (BRT) coaches at the West Campus facility. The Maintenance Department has developed a detailed plan as required by the Federal Transit Administration.

Paratransit bus maintenance and repair is contracted to the IndyGo Access Service paratransit 3rd party vendor.

Our audits are performed in accordance with the professional practice standards of the Institute of Internal Auditors. This report was prepared for use by IndyGo’s Board of Directors, Governance and Audit Committee, and management.

Objective and Scope

Examine the policies, procedures, and controls in place supporting the contracted and in-house maintenance of fleet. Considerations may include:

- Review fleet and status
- Determine percentage of buses not in operation by type
- Identify consistent issues affecting getting buses returned to service.

Overall Report Rating & Observations

(See Appendix A for definitions)

	Report Rating	Number of Observations by Rating		
		High	Medium	Low
Maintenance Review	Medium	1	0	2

Overall Summary and Review Highlights

This report covers the process of fleet management and maintenance issues by age, type, make and model.

Governance and Audit selected a sample period consisting of four months of data records (Oct '23 – Jan '24). All results, charts and statistics provided in this report cover this four-month period. Normal fleet scheduled preventive maintenance data has been removed for the purpose of this report to show actual fleet breakdowns and failures.

This report for this period includes four observations and recommendations on the following pages. These observations are designed to improve vehicle down time and demonstrate data related to issues faced by the Maintenance Department.

1. Duration of Out of Service (Fixed Route & BRT)
2. Maintenance Issues by Fleet Type and Age
3. Paratransit Fleet Maintenance by Vendor
4. IndyGo Fleet Maintenance Plan

The observations and management’s responses are presented in our accompanying report.

Our overall report rating for this Maintenance Review Report is a “Medium” risk.

We would like to thank IndyGo staff and all those involved in assisting us in connection with the review.

Questions should be addressed to the IndyGo Department of Governance and Audit at batkinson@indygo.net.

1. Duration of Out of Service (Fixed Route & BRT)

<p><u>Observation:</u> Extended time for buses to be out of service related to shortage of Classified Maintenance Technicians.</p>	<p><u>Recommendation:</u> Increase the recruiting efforts for Classified Maintenance Technicians and review and update the onboarding test.</p>	
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Observation Rating: High

<p>The duration of time a bus is out of service for the four-month period was reviewed. Delays in getting repairs completed are directly related to the number of Classified Maintenance Technicians currently employed.</p> <p>Management has stated that IndyGo is currently short 32 (40%) Classified Maintenance Technicians to fully staff the Maintenance Department.</p> <p>The Interim Chief of People Officer verified the shortage of technicians. There is a review being performed regarding the testing given to applicants before they are to be considered for interviewing and hiring. Currently an applicant is provided a link to an online screening test. IndyGo is experiencing an uptick in the number of applicants for the technician positions but few are able to pass the initial test. In many instances a technician may be very good with hands on processes and repairs but may fall short in passing a written or online test. This could be attributable to reading comprehension, online and computer experience etc.</p> <p>The number of buses in for a repair during the sample period was 191 representing a duration of 58,725 hours of down time during the 4-month period. In an effort to minimize the duration of downtime, the Maintenance Department is offering overtime hours to current staff as well as outsourcing repairs.</p>	<p>It is recommended that IndyGo Maintenance Department and the Department of People review the methods currently be used for recruiting new Classified Maintenance Technicians. Efforts should be made to evaluate the screening process to ensure a larger percentage of applicants are considered and make it further in the recruiting process.</p> <p>Consideration of expanding recruiting efforts at local job fairs, trade shows and parts suppliers.</p> <p>The inability to pass the applicant test is a key issue with the technician hiring process. IndyGo Management should consider reviewing the testing procedure, changing the test type or eliminating the online/written test before granting an interview. Currently, experienced applicants may not be considered in the recruiting process causing a missed opportunity. In person hands-on testing or demonstration by an applicant may be the best method to determine the ability and experience of the applicant. Develop a series of hands-on exercises to demonstrate the applicant’s mechanical ability when they may fall short with online or written testing.</p>	<p><u>Management Action Plans:</u> Both departments are reviewing current recruiting practices and implementing new ways to recruit and expediting the hiring process.</p> <p><u>Responsible Parties:</u> Department of People & Maintenance Department</p> <p><u>Due Dates:</u> April 2024</p>
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Summary of out of service by bus model year

Year	Sum of Duration (Hours)	# of Buses	Avg Duration by Year
2010	3,969.21	18	220.51
2013	220.00	3	73.33
2014	4,528.95	13	348.38
2015	2,348.66	13	180.67
2016	1,816.36	13	139.72
2017	7,449.76	14	532.13
2018	13,540.49	29	466.91
2019	13,316.46	34	391.66
2020	4,418.89	28	157.82
2021	5,735.69	23	249.38
2022	1,381.08	3	460.36
	58,725.55	191	307.46

Summary of out of service by Make/Model

Make/ Model	Sum of Duration (Hours)	# of Buses	Avg Duration by Make/Model (Hours)
BYD Electric 60' Articulated BRT	15,382.62	30	512.75
Gillig 40' Low Floor	34,089.88	123	277.15
Gillig 40' Low Floor Hybrid	7,871.97	35	224.91
Gillig 40' Low Floor Hybrid GenFlex	1,381.08	3	460.36
	58,725.55	191	307.46

2. Maintenance Issues by Fleet Type & Age

Observation:
 During this review the mechanical failures were reviewed by fleet type and age to determine which are more likely to have mechanical failures. 1,549 repairs were made to the fixed route and BRT fleet during the 4-month sample period.

Recommendation:
 Continue using fleet maintenance date to determine disposal of buses and maintaining inventory of Contingency Fleet.

Observation Rating: Low

A review was done of the number of mechanical failures by model year of the fleet. The average number of repairs was eight per bus for the 4-month period reviewed. The average number of repairs by model year did not fall within the oldest buses as would be expected. The highest average number of repairs fell to model year 2014.

Model Year	# of Buses	# of Repairs	Avg/Bus
2010	18	127	7.1
2013	3	19	6.3
2014	13	157	12.1
2015	13	104	8.0
2016	13	118	9.1
2017	14	120	8.6
2018	29	257	8.9
2019	34	302	8.9
2020	28	201	7.2
2021	23	131	5.7
2022	3	13	4.3
	191	1,549	8.1

It is recommended that IndyGo continue to use detailed maintenance data when determining which buses to dispose that have met useful life standards. Upon review of the number and type of required repairs, it is noted that the oldest fleet does not have the most repairs as expected. It may better fit the agency to retain an older bus and dispose of one newer, if it has surpassed the useful life period as required by the FTA.

The FTA guidance for the spare ratio of revenue vehicles in fixed-route urbanized areas should not exceed 20%.

The FTA recognizes two types of vehicles – active and contingency. Agencies are permitted to maintain a contingency fleet to include vehicles that have met minimal useful life standards if documented in a contingency plan. These vehicles are not included in the calculation of the spare ratio.

It is recommended that IndyGo use the maintenance records to determine which buses make up the spare ratio. These should include the older buses that have the least mechanical issues to fill the spare requirements. If IndyGo has a spare ratio greater than 20%, develop a written contingency plan and include those spare buses in that plan.

Management Action Plans:
 Maintenance will continue to collect data on equipment by series.

Responsible Parties:
 Maintenance Department

Due Dates:
 April 2024

The number of issues by make and model of the fleet was also reviewed. As expected the largest number of repairs matched up with the largest number of bus type in the fleet. The average number of repairs by bus type ranged from 4.3 to 8.65 during the review period.

Bus Type	Avg # of Repairs
Gillig 40' Low Floor	8.658536585
Gillig 40' Low Floor Hybrid	6.285714286
Gillig 40' Low Floor Hybrid GenFlex	4.333333333
BYD Electric 60' Articulated BRT	8.366666667

The most common mechanical issue across the fleet was the Check Engine Warning and Stop Engine Warning. The Maintenance Department explained that the number of warnings relate to the high volume of sensors and emission control requirements.

The top 10 reasons for repair are listed in the following chart.

Description	# of Issue
CHECK ENGINE / STOP ENGINE / MIL	218
COOLANT LEAK	58
TIRE INSPECTION/REPAIR/REPLACE	48
BRAKE SYSTEM INSPECTION WM	47
AIR PRESSURE - LOSS/LEAK	38
ACCIDENT DAMAGE REPAIR	35
No Heat	29
HVAC - HEAT SYSTEM FAILURE	27
FRONT END INSPECTION	21
TRANSMISSION TROUBLESHOOT	18

People with disabilities make up a large quantity of the IndyGo Ridership. As part of this review, the number of ADA related mechanical issues were considered. Out of 1,549 repairs required during the sample period, only 60 items could be considered related to an ADA device. This represented only 3.8% of the repairs. It is obvious that the Maintenance Department prioritizes the proper functionality of the ADA devices due to the low number of issues in this category. The type of devices considered as ADA related in this report are as follows:

- Entrance/Exit Doors
- Bus Kneeling Function
- Wheelchair Accessible Seating Functionality
- Handrails
- Ramp
- Internal PA annunciators Functionality
- Wheelchair access Preventive Maintenance on B-PMs
- Bridge Plates Inspection on BRT Fleet

IndyGo maintains a contingency fleet made of up past useful life buses that can be placed in service as demand would require.

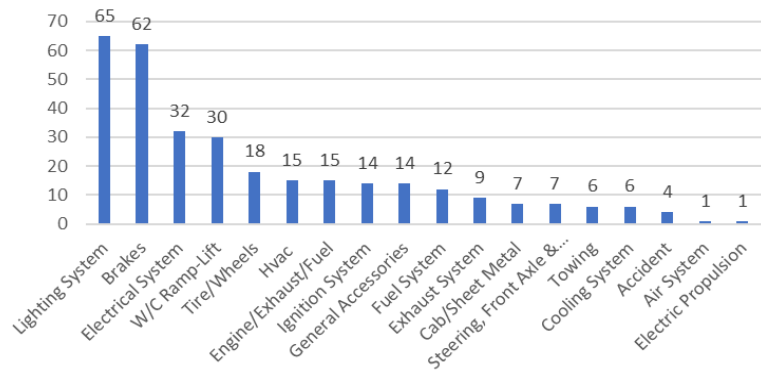
3. Paratransit Fleet Maintenance by Vendor

<p><u>Observation:</u> IndyGo contracts the maintenance of the paratransit fleet to the same vendor that provides the IndyGo Access paratransit service. The reports provided by the vendor did not include downtime by vehicle for the repair.</p>	<p><u>Recommendation:</u> Request the vendor begin tracking downtime by vehicle in for repair.</p>	
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Observation Rating: Low

<p>A review of the paratransit fleet repairs was done over the same 4-month sample period that was used for the fixed route and BRT review.</p> <p>The vendor provided various detailed repair reports for the sample period. The reports are very robust and include, quantity of repairs, labor hours, labor costs and parts costs.</p> <p>It was determined that missing from the report is a method of tracking the downtime of each bus that out of service for repair. Governance and Audit contacted the vendor maintenance supervisor and verified this was not available for the report.</p> <p>To report the number of necessary repairs performed, the routine preventive maintenance numbers were removed for this report.</p> <p>A total of 318 repairs were completed during this 4-month period with an approximate cost of \$125,000. The top two issues being the lighting system and brakes.</p> <p>Charts displaying the number or repairs by type as well as cost are provided:</p>	<p>It is recommended that the IndyGo Maintenance Management request the vendor to provide regular updates as to the downtime of a vehicle due in for repair.</p> <p>This would help IndyGo realize the most accurate number of vehicles required for the IndyGo Access Service and if downtime for repairs is affecting the success of the service.</p>	<p><u>Management Action Plans:</u> Work with the Vendor to implement a downtime report.</p> <p><u>Responsible Parties:</u> Maintenance Director</p> <p><u>Due Dates:</u> April 2024</p>
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4 Month Partransit Repairs



4 Month Totals					
Repair Type	Quantity	Labor Hours	Labor Cost	Parts Cost	Total Cost
Hvac	15	31.44	2,829.60	2,912.55	\$ 5,742
Cab/Sheet Metal	7	5.57	501.30	5,137.02	\$ 5,638
Air System	1	2.00	180.00	124.17	\$ 304
Brakes	62	88.73	7,985.70	6,563.11	\$ 14,549
Steering, Front Axle & Suspension	7	8.00	1,378.98	629.35	\$ 2,008
Tire/Wheels	18	19.21	1,728.90	3,407.92	\$ 5,137
Ignition System	14	5.52	496.80	769.15	\$ 1,266
Lighting System	65	28.97	2,607.30	1,543.15	\$ 4,150
Towing	6	-	1,680.00	-	\$ 1,680
Accident	4	4.50	14,102.45	3,372.31	\$ 17,475
Cooling System	6	9.70	873.00	615.36	\$ 1,488
Exhaust System	9	10.22	919.80	120.26	\$ 1,040
Fuel System	12	3.05	274.50	167.27	\$ 442
Engine/Exhaust/Fuel	15	12.78	43,921.14	299.79	\$ 44,221
Electric Propulsion	1	1.00	90.00	173.89	\$ 264
General Accessories	14	8.15	733.50	71.52	\$ 805
Electrical System	32	33.11	2,979.90	8,062.05	\$ 11,042
W/C Ramp-Lift	30	47.88	4,729.20	2,754.98	\$ 7,484
Totals	318	319.83	88,012.07	36,723.85	\$ 124,736

4. IndyGo Fleet Maintenance Plan

<p><u>Observation:</u> Written Maintenance Plan</p>	<p><u>Recommendation:</u> G & A has no recommendations as this plan meets required standards.</p>	
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Observation Rating: Not Rated

<p>The Federal Transit Administration (FTA) required that recipients who control FTA-Funded assets must have maintenance plans for those assets.</p> <p>The plan must be written and must describe a system of periodic inspections and preventive maintenance to be performed at certain defined intervals.</p> <p>IndyGo has just released a new revised Vehicle Maintenance Plan in February 2024. Preventive Maintenance within the policy relate to general preventive maintenance activities undertaken by the maintenance department for both revenue vehicles and non-revenue vehicles.</p> <p>The Written Maintenance Plan demonstrates that the Vehicle Maintenance Division has a comprehensive program to prioritize the reliability and cleanliness of the diesel, hybrid, and electric fleets.</p> <p>The primary goals of the Bus Maintenance team are to:</p> <ul style="list-style-type: none"> • Maintain vehicles in safe operating condition • Ensure each vehicle is operating at peak efficiency • Maximize vehicle life • Minimize vehicle service failures (road calls) • Minimize loss of accessibility due to equipment failure • Meet or exceed manufacturers’ maintenance requirements 	<p>No recommendation is being made for this observation. The newly issued Written Maintenance Plan is very robust and detailed.</p> <p>The Maintenance Standards, Preventive Maintenance, Inspections and Corrective Maintenance are all covered in detail withing this plan.</p>	<p><u>Management Action Plans:</u> Maintenance Department will continue to update as needed.</p> <p><u>Responsible Parties:</u> Maintenance Director</p> <p><u>Due Dates:</u> April 2024</p>
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- Maintain vehicle exterior and interior appearance
- Maintain a system of permanent vehicle maintenance records
- Adhere to a strict preventive maintenance schedule
- Administer an efficient equipment warranty recovery program
- Allocate resources effectively

APPENDIX A – RATINGS DEFINITIONS

Observation Rating Definitions		Report Rating Definitions	
Rating	Definition	Rating	Explanation
Low	Process improvements exist but are not an immediate priority for IndyGo. Taking advantage of these opportunities would be considered best practice for IndyGo.	Low	Adequate internal controls are in place and operating effectively. Few, if any, improvements in the internal control structure are required. Observation should be limited to only low risk observations identified or moderate observations which are not pervasive in nature.
Medium	Process improvement opportunities exist to help IndyGo meet or improve its goals, meet, or improve its internal control structure, and further protect its brand or public perception. This opportunity should be considered in the near term.	Medium	Certain internal controls are either: <ul style="list-style-type: none"> • Not in place or are not operating effectively, which in the aggregate, represent a significant lack of control in one or more of the areas within the scope of the review. • Several moderate control weaknesses in one process, or a combination of high and moderate weaknesses which collectively are not pervasive.
High	Significant process improvement opportunities exist to help IndyGo meet or improve its goals, meet, or improve its internal control structure, and further protect its brand or public perception presents. This opportunity should be addressed immediately.	High	Fundamental internal controls are not in place or operating effectively for substantial areas within the scope of the review. Systemic business risks exist which have the potential to create situations that could significantly impact the control environment. <ul style="list-style-type: none"> • Significant/several control weaknesses (breakdown) in the overall control environment in part of the business or the process being reviewed. • Significant non-compliance with laws and regulations. • Observations which are pervasive in nature.
Not Rated	Observation identified is not considered a control or process improvement opportunity but should be considered by management or the Board, as appropriate.	Not Rated	Adequate internal controls are in place and operating effectively. No reportable observations were identified during the review.