

# A GUIDE TO PREVENTIVE MAINTENANCE



Ohio Department of Transportation Office of Transit

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# **A PREVENTIVE MAINTENANCE GUIDE**

## **I. INTRODUCTION**

Preventive maintenance (PM) is an essential element of every effective maintenance program to ensure maximum vehicle reliability, longevity, and passenger safety. Preventive maintenance entails performing regularly scheduled maintenance in order to prevent breakdowns, rather than simply making repairs when something goes wrong. It also involves performing necessary repairs promptly to prevent further damage and maintain vehicle safety. While preventive maintenance may be more expensive in the short run, it reduces overall operation and maintenance costs over the life of the vehicle.

All transportation providers should implement a preventive maintenance program. There are several options when developing a preventive maintenance program. Each vehicle manufacturer provides a checklist for preventive maintenance for their vehicles. Transit vehicles are used to transport large numbers of people often on very short trips, resulting in what manufacturers call “severe use.” This guide is designed to help you ensure your vehicles receive proper maintenance, sustain accurate maintenance records, and lower total repair and related operating costs.

## **II. DEVELOPING A SUCCESSFUL PREVENTIVE MAINTENANCE PROGRAM**

A successful preventive maintenance program consists of several different elements. The following discussion highlights these elements and the issues you should consider when developing your program.

Routine service and maintenance is essential to ensure each vehicle meets its useful life. (See Example A and B at the end of this chapter for vehicle disposition and useful life criteria.) Every vehicle has its own maintenance requirements and recommended program outlined by the manufacturer. In all cases it is absolutely crucial to service the vehicle at the appropriate mileage recommended by the manufacturer or within the recommended time frame. In some cases, it is desirable to add services, depending on factors such as weather, terrain, service type, and annual mileage. Maintenance intervals should never exceed those recommended by the manufacturer or what is outlined in this maintenance guide. This guide outlines maintenance recommendations of the vehicle manufacturers, manufacturers of lifts or ramps, vendors that made vehicle modifications, and the experience of several seasoned technicians. (Refer to Example C at the end of this chapter for an example of a maintenance mileage table)

## **INTRODUCTION**

## **DEVELOPING A SUCCESSFUL PREVENTIVE MAINTENANCE PROGRAM**

It is highly recommended that the manufacturer's maintenance schedule be used to develop maintenance plans for your vehicles. This document can be used in conjunction with the manufacturer's guidelines and will serve to document all maintenance performed on your vehicles. You may wish to address other maintenance items when establishing your own program.

The following issues should be considered:

- **Mileage Intervals.** Make all service intervals mileage multiples of a common denominator. For instance, if the oil change interval is every 5,000 miles consider rotating the tires every 10,000 and performing brake checks at the same time. It is highly recommended that regular service intervals be between 3,000 and 7,500 miles based on the engine manufacturer's guidelines. Consistent service intervals increase the efficient use of labor and minimize the number of times the vehicle is in the shop.
- **Seasonal Variations.** There are separate checks that should be completed in the spring and fall. Plan seasonal fleet-wide service checks such as a spring campaign to prepare air-conditioning systems for the summer, and a fall campaign to prepare for adequate winter heating and defrosting.
- **Environmental Conditions.** Incorporate local conditions when planning your maintenance program. For example, services operated over unpaved, dusty roads may require more frequent oil changes, air filters, and suspension system components. Constant slow or stop-and-go driving and low annual mileage are other examples of situations where service intervals for some items such as brakes should be shortened. *(The maintenance program provided in this guide was created based on Ohio's geography and climate.)*
- **Vehicle Cleanliness.** Establish a regular program for washing and cleaning the vehicles. Accumulated road salt or brine will greatly accelerate rusting. Dust from the roads can cause poor driving conditions and safety issues. Passengers are not comfortable in a dirty vehicle. Keeping the vehicles clean on both the interior and exterior is an important part of your company's image.

### **III. VEHICLE INSPECTIONS**

Vehicle inspections are a key element in the early detection and remedy of potential failures. Both drivers and certified vehicle mechanics should perform them, to varying degrees. Drivers can be excellent judges of vehicle condition because they spend more time with the vehicle than any one else. In many cases, they take personal responsibility for the vehicle's condition especially the interior and exterior condition. Because of this, drivers may possess a wealth of information for recognizing minor problems before they become major headaches.

A crucial part of vehicle maintenance is performing daily vehicle inspections. (See Example D for a sample pre-trip inspection sheet.) The driver is the best person in the organization to perform this inspection. Vehicle checklist inspections take a relatively short period of time to complete and can greatly increase vehicle safety and decrease repair cost. Additionally, the Americans with Disabilities Act (ADA) requires that vehicle accessibility features (lifts, securements, etc.) be maintained in an operative condition. A daily trial run of the lift equipment will help ensure such equipment is operable and signs of trouble or possible failure are detected early.

Drivers should perform a regular pre-trip inspection of the vehicle. Although drivers are excellent detectors of vehicle problems, they may over look smaller issues. In some cases drivers can actually get used to strange noises and smells, causing them not to report problems. Mechanics and drivers should both inspect the vehicle through observations and checks including routine service procedures. If drivers are not sure if there is a problem, they should always refer the problem to the appropriate person for safety reasons.

When choosing a service facility it is important to look for places with certified mechanics. Most garages or dealerships will gladly show you the mechanics certifications, if they don't have them displayed. Some of the certifications to ask for are Automotive Service Excellence (ASE), Air Conditioning, and specific dealer training for the type of vehicle or vehicle system you will need repaired. Keep in mind that mechanics who work on wheelchair lifts must be trained by the lift manufacturer. It is very important to trust the place that is working on these vehicles. Because of the modified nature of some of the vehicle components and the severe operating conditions, it is crucial that the mechanic knows how to work with these vehicles. If you do not feel comfortable with the repair facility, take it somewhere else. There are many good, honest shops that are professional and courteous.

Refer to Example E for a sample mechanics inspection sheet. This is a highly recommended way to perform vehicle inspections. However, it will only be as

successful as you make it. The services must be performed as defined on the schedule. All safety and performance checks must be performed at the proposed intervals. This will ensure the vehicle lasts its entire useful life.

#### **IV. REPLACEMENT VERSUS REPAIR**

“If it ain’t broke, don’t fix it!” is a time-honored cliché, and if we could always predict the exact point of any component failure, maintenance would be much easier. With such unpredictability, it makes sense to replace or rebuild certain components prior to failure, as long as you can do so without incurring extraordinary costs.

“Condition Based” is the maintenance philosophy used to monitor the condition of the vehicle components to predict pending failure. Diagnosis is made based on inspection or trend monitoring to identify imminent failure; the repair is then scheduled and performed before the vehicle becomes inoperable. One advantage to this approach is the achievement of a maximum useful life from the component.

While this routine replacement concept can be applied to a wide variety of components, it requires experience with particular vehicles in a unique environment. If you have no prior experience with a new vehicle, it is recommended that you contact other operators that use the same vehicle. This information may be obtained by contacting ODOT. Ensure they have similar circumstances with good maintenance records to assist you in developing a routine component replacement schedule.

Example F at the end of this chapter outlines some examples of a replacement schedule, the average replacement cost, and failure warning signs. As you will see, this type of maintenance can save time, frustration, and money.

#### **V. WARRANTIES**

Your vehicle will come with a number of warranties including the chassis, the body modifications, and major components. These can take many forms, but generally include some combination of mileage and time, and will often contain exclusions for “consumable” items such as brake pads, batteries, and tires. Additionally, warranties generally have stipulations regarding operating and maintaining the vehicle in accordance with the manufacturer or supplier’s recommendations.

Thoroughly examine and become familiar with all the warranties provided with the vehicle when it is delivered. Make sure you have read all of the “fine print.” In rare instances, the warranty covers 100 percent of all repair costs for the entire

#### **REPLACEMENT VERSUS REPAIR**

#### **WARRANTIES**

period. The component coverage and mileage can vary greatly from vehicle to vehicle. There can be many exclusions depending on the mileage and operating environment. It is crucial to understand the service agreements and extended warranties. Do not enter into any agreements unless you completely understand the contract. All ODOT supplied vehicles have warranties, which at minimum cover all labor and replacement parts for a period of three years or 36,000 miles on the chassis, whichever comes first. Warranties cover the basic vehicle with separate warranties for ancillary equipment (i.e. air conditioner, wheelchair lift, wheelchair securement systems, seats, vehicle modifications, etc.) Some components will have warranties that last much longer. For instance, emission systems (catalytic converter and oxygen sensors) can have warranties that last up to 100,000 miles. It is very important to read and completely understand the warranty prior to paying for repairs.

Adjustments may be needed to the vehicle. Therefore, make arrangements for the vehicle to be serviced at an authorized warranty repair facility. It is highly recommended that you take care of problems quickly, before they cause major failures (which often occur after the warranty period.) Documentation and attempts to repair a problem while still under warranty usually result in a favorable claim. Unrepaired warranty items may result in your vehicle being out of commission for a longer period of time and you may have to pay costly repair bills.

Most chassis repairs can and should be handled by the local auto or truck dealership representing the chassis manufacturer (e.g. Ford, Chevrolet or Dodge). For other items involving vehicle modifications you will need to contact the vendor. If the vendor is uncooperative or unresponsive to your requests, it is imperative that you contact ODOT to resolve the issue. (See Attachment G for ODOT contact and technical support information).

Use the warranties as a basis for future maintenance activities by ensuring that any required servicing is directly incorporated into your preventive maintenance program (i.e., lubrication schedules for lifts.) Plan to review the performance and condition of specific warranty-related items and components at a service interval shortly before any major warranty milestones in order to ensure that you recoup as much benefit as possible from your warranties.

In many cases, extra-cost extended warranties are available. These should be closely examined before any purchase is made. Extended warranties often have limitations regarding which components are covered. They can be progressive in nature, diminishing the ability to recover the cost of labor and parts. Therefore, it is essential to think in terms of annual mileage and whether you are authorized to conduct warranty repairs in-house or through a repair shop of your choice. It can be difficult to find a repair facility that will accept extended warranties.

## **VI. MONITORING SUPPLIERS**

Tracking your suppliers' performance (price, quality, and reliability) is another essential element of a successful preventive maintenance program. For instance, your fuel consumption can have a significant impact on the service and repair level required on the electronic systems, catalytic converter and emission systems.

Another area that requires close monitoring is the performance of rebuilt and aftermarket parts. Rebuilt parts, such as alternators and pumps, may offer up-front cost savings. However, such units may have a shorter operational life than new parts. By monitoring the life of rebuilt parts, you can determine whether true savings are realized, or whether total cost is actually greater once you factor in the cost of another rebuilt unit and the labor associated with multiple replacements.

You should also be aware that in many cases involving heavy-duty items such as starters and compressors, a trade in (core) unit is required. This "core" is generally not used in your rebuilt unit, rather it becomes the rebuilt product for another operation.

Like rebuilt parts, after-market parts (i.e., new parts built by a company other than the original equipment manufacturer, or OEM) may offer an up-front cost savings. After-market parts may be advertised as built to the same specifications as the OEM part, but only through monitoring can you determine whether the part's life is truly comparable.

The best way to monitor the suppliers is to keep track of parts replaced and other repairs. You can track suppliers performance based on historical trends. For instance, if you buy a part from a supplier and it breaks more often than normal, it is a safe bet that the supplier does not provide the best parts. You should use this information to find a supplier who will give you reliable parts.

Only through experience will you gain the background necessary to make informed decisions in the future. Good maintenance records and purchasing documentation are essential and must be initiated when you first begin operation or introduce a new type of vehicle into service.

There are resources to help you gain access to bus part suppliers. A quick search of the web will produce many results and provide you with new and used part suppliers. If you are unable to find the parts you are looking for, ODOT has access to useful information to assist you in your quest. Please call or email the Office of Transit for additional help or information.

## **VII. DOCUMENTATION**

Another key to any successful maintenance program is up-to-date, accurate record keeping. Please download the appropriate maintenance forms for your vehicle from ODOT's website. While documentation is necessary for purposes of budget control, good records will also enable you to optimize your preventive maintenance program by providing:

- The database to enable you to establish proper intervals for routine maintenance and servicing;
- Information on repetitive failures or replacement intervals, and the performance of rebuilt or after-market parts and of consumable supplies;
- Early warning of impending major problems through tell-tale signs such as increased oil consumption;
- Back-up information for warranty claims (particularly marginal claims near the end of the warranty period where supporting documentation can often be the "clincher" in claim payment); and
- Documentation of any personnel-related patterns (e.g. more frequent tire or brake replacement on a particular driver's vehicle versus the fleet average).

In situations where maintenance is contracted to a third party, good documentation is the key to minimizing disputes. Under this scenario, management should make the extra effort to review the repair bills and develop/maintain the database required for adjustments to the preventive maintenance program. Maintenance is never "out of sight/out of mind" to the smart operator. Utilize the maintenance program to make record keeping and documentation simpler and less time consuming.

## **VIII. PERSONNEL / DEPARTMENTAL RELATIONSHIPS**

Internal conflicts plague many organizations and unfortunately, transportation operators are no exception. Good communication and interpersonal relationships among your staff and departments is the key to effective execution of maintenance and, if anything, this importance increases with the size and complexity of the organization. (See Example H for a sample communication web.)

Most transportation operations encounter internal conflicts between the various personnel and departments by virtue of the priorities inherent in their duties. For example, drivers who take the time to report a defect may be convinced that the maintenance staff is incompetent if problems are not corrected prior to the time they are next assigned that vehicle. They are likely unaware, for example, that the dispatcher had an urgent need for an extra vehicle or that since the defect was not

### **DOCUMENTATION**

### **PERSONNEL/ DEPARTMENTAL RELATIONSHIPS**

safety related, maintenance had decided to handle the problem at the next scheduled servicing; or that the replacement part was not available at the time (keeping inventory small is an essential part of a low cost operation).

Similarly, dispatchers tend not to understand that repairs and repair times are not entirely predictable, particularly on older vehicles where rusted nuts and bolts do not always easily yield to the wrench, or where making one repair can uncover another problem. Finally, mechanics believe that if they had the dispatcher's job there would be no last minute calls for extra vehicles, or for a vehicle that was just raised on the garage hoist.

Consistent execution of a preventive maintenance program requires the cooperation and interaction of all parties, both in establishing the program and making it work on a day-to day basis. The following actions will help improve communication among your staff and reduce organizational conflicts.

- Involve all parties in the development of documentation for inspection, service intervals and other inter-departmental maintenance activities;
- Be realistic in your expectations (for example, a proper pre-trip driver inspection will improve reliability, but may take up to 20 minutes to perform); and
- Pay attention to administrative details. To whom does the driver turn in a defect report? Who is responsible for notifying maintenance and/or dispatch? Who prioritizes the repairs or decides that a vehicle is no longer roadworthy? Who tells maintenance what the future vehicle needs may be and how much notice they can expect?

## **IX. TRAINING AND DIAGNOSTIC**

Effective training is essential to the proper diagnosis of vehicle problems and their subsequent repair or replacement. As vehicles become increasingly complex and rely upon electronic and computerized controls and monitoring systems, the need for adequate training becomes that much more important.

We suggest that you encourage or even require your mechanics and/or drivers to take advantage of the training offered by vehicle manufacturers and component suppliers. Some manufacturers run training schools on a regional basis, and suppliers, as well as converted vehicle manufacturers, may supply service representatives to provide in-house training. Ask to see the certifications of anyone who is working on your vehicles. Remember, it is an ODOT requirement that mechanics who work on wheelchair lifts must be trained by a lift manufacturer.

## **TRAINING AND DIAGNOSTIC**

If you are performing maintenance in-house, purchasing diagnostic equipment is a sound investment. It is essential, in this electronic era, to take as much of the guesswork out of the trouble shooting process as possible. Diagnostic equipment will pay for itself in increased maintenance department productivity and vehicle reliability.

## **X. PERFORMANCE MEASURES**

While thorough documentation of vehicle servicing and repair is essential, reporting and analyzing summaries and trends related to vehicle maintenance is essential for overall program management. An individual vehicle's service record may be of little interest to an Executive Director or Board of Directors, but they will likely be interested in knowing the trends such as the mileage accumulated between road calls. It is essential to keep track of factors that affect your customers' view of the system and to publicize them within your operation. Such items include:

- Miles between road calls (service required when a vehicle breaks down away from the garage)
- Number of complaints of dirty, smoking, or damaged vehicles
- Number of complaints of inoperable air conditioners, heaters, lifts, etc.
- Number of miles between a chargeable accident attributable to vehicle conditions

## **XI. WHO WILL MAINTAIN THE VEHICLES?**

Every maintenance program will be unique due to the mix of vehicle types and ages, fleet size, services provided and arrangements for maintaining the vehicles. Determining who will perform vehicle maintenance is an important decision. Options include:

- Contracting part or all of your maintenance to commercial mechanics
- Contracting part or all of your maintenance to other agencies, municipal garages or others such as school bus operators, MRDD facilities, etc.
- Performing part or all of your maintenance in-house

Who will perform which elements of your maintenance program will largely depend upon your ability and desire to obtain the staff, parts inventory, equipment, and facilities to perform your own maintenance, as well as your proximity to existing maintenance facilities that have the ability to service your

### **PERFORMANCE MEASURES**

### **WHO WILL MAINTAIN THE VEHICLES?**

vehicle. Remember that if you contract out your maintenance, you still bear the responsibility of verifying and documenting the work performed. Talk to several garages if possible. Look at their shops and review the type of records they keep. Ask for the certifications for the people who will be working on your vehicles. Provide them with your fleet roster and a copy of your vehicle's maintenance manual. You can even ask for proposals to compare the different garages. Take your time and don't hesitate to ask questions.

## **XII. SUMMARY**

Preventive maintenance is an essential element of an effective vehicle maintenance program and key to any transportation operation. A good preventive maintenance program tailored to your vehicle fleet and system's needs may increase vehicle reliability, vehicle longevity, and passenger safety. Preventive maintenance is more than routine services such as changing oil and rotating tires, it is a methodical system of regularly scheduled maintenance procedures that include daily inspections, prompt attention to minor repairs, knowing thoroughly and taking full advantage of your vehicle warranties, and monitoring your suppliers for fuel and vehicle parts for low prices, highest quality, and maximum reliability. With the information and forms provided in this guide, you should be well on your way to implementing an effective preventive maintenance program.

## **SUMMARY**

**EXAMPLE A:**

**DISPOSITION GUIDELINE**

**Rural Transit Program and Specialized Transportation Program  
vehicle, *minimum* useful life criteria  
Ohio Department of Transportation  
Office of Transit**

**DISPOSITION  
CRITERIA**

	<b>5 Years &amp; 120,000</b>	<b>6 Years &amp; 150,000</b>	<b>150,000 miles</b>	<b>200,000 miles</b>
<b>Sedans</b>	X		X	
<b>Standard Minivan (SMV )</b>	X		X	
<b>Modified Minivan (MMV)</b>	X		X	
<b>Basic Standard Van (BSV)</b>	X		X	
<b>Non Revenue vehicle (service truck)</b>	X		X	
<b>Converted Van (CV)</b>	X		X	
<b>Light Transit Vehicle (LTN)</b>	X		X	
<b>Light Transit Vehicle (LTV)</b>		X		X

*Example A: Depicts the useful life of each of the eight (8) vehicle types used in small transit operations. Vehicles must be properly maintained to successfully reach their useful life. These are standards set by the Ohio Department of Transportation*

*Note: You may request disposition when the vehicle meets the guidelines in the table; the disposition decision is ODOT's. Disposition before the established guidelines may be granted under special circumstances, such as excessive maintenance expenses. ODOT reserves the right to ask for maintenance records and other documentation.*

**EXAMPLE B**

**SAMPLE DISPOSITION REQUEST FORM**

**DISPOSITION REQUEST  
For Rural Transit Program**

**DISPOSITION  
REQUEST FORM**

Note: Request should be printed on grantee's letterhead

**(DATE)**

Administrator  
Office of Transit  
1980 West Broad Street, 2<sup>nd</sup> Floor  
Columbus, Ohio 43223  
ATTN: (Specify name of Transit Representative)

Dear

RURAL TRANSIT PROGRAM DISPOSITION REQUEST

**(AGENCY NAME)** requests permission to dispose of the following real property, equipment and/or vehicle(s) purchased through the Rural Transit Program:

(a) Inv/Fleet Number	(b) ODOT Contract Number	(c) Equip. Desc./Vehicle Type/Real Property Location*	(d) Purchase Date/Date Placed in Service	(e) Date Removed from Service	(f) Serial Number	(g) Current Mileage	(h) Current Value

(Please attach additional sheet if necessary)

\* Sedan, SMV, MMV, CV, etc.

(i) We request vehicle disposition because **(AGE, MILEAGE, MAINTENANCE COST, ETC.)**  
Attached are necessary supporting documents.

If you have any questions, please contact **(CONTACT PERSON)** at **(PHONE NUMBER)**

Respectfully,

**(AGENCY DIRECTOR'S NAME)**  
**(TITLE)**

**Rural Transit Program and Specialized Transportation Program  
vehicle, *minimum* useful life criteria  
Ohio Department of Transportation**

**SAMPLE DISPOSITION REQUEST  
For Specialized Transportation Program**

**(DATE)**

Administrator  
Office of Transit  
1980 W. Broad Street, 2<sup>nd</sup> Floor  
Columbus, Ohio 43223

Dear

**VEHICLE DISPOSITION REQUEST**

AGENCY NAME requests permission to dispose of the following vehicle(s) purchased through the Specialized Transportation Program:

ODOT CONTRACT NUMBER	VEHICLE YEAR & MAKE	VEHICLE TYPE*	DATE PLACED IN SERVICE	DATE REMOVED FROM SERVICE	SERIAL NUMBER	CURRENT MILEAGE

(Please attach additional sheet if necessary)

\* Sedan, Mini-Van, Standard Van, Converted Van, LTV, etc.

We request vehicle disposition because (AGE, MILEAGE, MAINTENANCE COST, ETC.). Attached are necessary supporting documents.

If you have any questions, please contact (CONTACT PERSON'S NAME) at (PHONE NUMBER).

Respectfully,

(AGENCY DIRECTOR'S NAME)  
(TITLE)

*Example B: These forms are used to request vehicle disposition. The information must be filled out completely and correctly. Maintenance records and invoices may be requested along with the form. This form along with other useful disposition information can be found on the Ohio Department of Transportation Office of Transit website.*

**EXAMPLE C:**

**PREVENTIVE MAINTENANCE TABLE**

**Preventative Maintenance Spread Sheet for 3.5L Modified Mini Van**

	5,000	10,000	15,000	20,000	25,000	30,000	35,000	40,000	45,000	50,000	55,000
Air Filter	I		I		I		I		I		I
Front Brakes	I	I	I	I	I	I	I	I	I	I	I
Rear Brakes		I		I		I		I		I	
Cabin Air Filter		R		R		R		R		R	
Cooling System	I	I	I	I	I	I	I	I	I	I	I
Drive Belt				I				I			
Engine Oil/Filter	R	R	R	R	R	R	R	R	R	R	R
Exhaust System				I				I			
Transmission Fluid		I		I		I		I		I	
Fuel Supply line						I					
Ignition Cable											
Spark Plugs											
Steering Gear and Suspension		L		L		L		L		L	
Tires		RO		RO		RO		RO		RO	
Washer Fluid	F	F	F	F	F	F	F	F	F	F	F
Windshield Wipers		I		I		I		I		I	
Wheel Chair Ramp		L&A		L&A		L&A		L&A		L&A	

	80,000	85,000	90,000	95,000	100,000	105,000	110,000	115,000	120,000	125,000	130,000
Air Filter	I		I		I		I		I		I
Front Brakes	I	I	I	I	I	I	I	I	I	I	I
Rear Brakes		I		I		I		I		I	
Cabin Air Filter		R		R		R		R		R	
Cooling System	I	I	I	I	I	I	I	I	I	I	I
Drive Belt				I				I			
Engine Oil/Filter	R	R	R	R	R	R	R	R	R	R	R
Exhaust System				I				I			
Fluid A/T		I		I		I		I		I	
Fuel Supply line				I						I	
Ignition Cable				I							
Spark Plugs				I							
Steering Gear and Suspension		L		L		L		L		L	
Tires		RO		RO		RO		RO		RO	
Washer Fluid	F	F	F	F	F	F	F	F	F	F	F
Windshield Wipers		I		I		I		I		I	
Wheel Chair Ramp		L&A		L&A		L&A		L&A		L&A	

<b>Key</b>
F= Fill to capacity
I= Inspection
RO= Rotate four tires
L&A= Lube and adjust
R= Replace

*Example B: The table above depicts the suggested service intervals specific to transit vehicles. These service intervals can change depending on the vehicle and its use.*

**DRIVER DAILY  
INSPECTION  
CHECKLIST**

**Example D:**

**DRIVER DAILY INSPECTION CHECKLIST**

DAILY VEHICLE INSPECTION CHECKLIST					
YEAR	MAKE	VIN #	DATE / /		
FUEL ADDED		PM TRACKER			
gal \$		ENGINE MILEAGE		MECHANICAL FAILURE	<input type="checkbox"/>
FLUID ADDED		STARTING MILEAGE		MAINTENANCE DUE	<input type="checkbox"/>
qts \$		TOTAL DAILY MILEAGE			
PERFORM A BRIEF INSPECTION ON THE FOLLOWING COMPONENTS. INDICATE AND DESCRIBE ANY FAILURE THAT IS NOTED DURING THE INSPECTION. IF THERE IS MAINTENANCE DUE OR MECHANICAL FAILURE NOTED CHECK THE APPROPRIATE PM TRACKER BOX					
		CONDITION OKAY	ATTENTION NEEDED	DESCRIPTION	
<b>UNDER HOOD INSPECTION</b>					
* WASHER FLUID LEVEL					
RAISE THE HOOD AND COMPLETE A VISUAL INSPECTION OF THE ENGINE COMPONENTS.					
<b>INTERIOR INSPECTION</b>					
* PARKING BRAKE OPERATION					
* SEATBELT OPERATION					
* DEFROSTER SYSTEM					
* MIRRORS					
* WINDSHIELD WIPER OPERATION					
* WINDSHIELD WASHER OPERATION					
* HORN OPERATION					
* VEHICLE INSURANCE CARD					
* VEHICLE REGISTRATION CARD					
* CLEANLINESS OF INTERIOR					
<b>SAFETY EQUIPMENT</b>					
* BIO HAZARD KIT					
* TRIANGLE REFLECTORS					
* FIRE EXTINGUISHER FULLY CHARGED					
* VEHICLE ACCIDENT PACKAGE					
* WHEELCHAIR RAMP OPERATION					
<b>EXTERIOR VEHICLE</b>					
* WINDSHIELD GLASS					
* TAIL LIGHTS					
* BRAKE LIGHTS					
* TURN SIGNAL LIGHTS					
* BACK UP ALARM					
* EMERGENCY FLASHERS					
* EXTERIOR BODY OF VEHICLE					
* TIRE CONDITION & INFLATION					
* WINDOWS AND DOORS					
INDICATE ANY PHYSICAL DAMAGE TO THE EXTERIOR OF THE VEHICLE. DESCRIBE THE DAMAGE ON THE LINES PROVIDED					
					
Driver's Side		Front	Passenger's Side	Back	
Driver Name _____		Driver Signature _____		Time & Date : / /	

*Example D: The form above is an example of a daily vehicle inspection sheet. This form is to be utilized primarily by the vehicle driver, but can be completed by anyone within the organization. The first few lines request specific information about the vehicle. The box immediately following is the Preventive Maintenance (PM) Tracker. It can be used to determine the need for mechanical repair or preventive maintenance. The lines that follow are for the inspector to provide any information that was noticed while completing the inspection. Also, the driver must complete the checklist to ensure all items were properly inspected. (Sample forms are included in the next section)*

**EXAMPLE E:**

**MECHANIC'S INSPECTION REPORT**

**MECHANIC'S  
INSPECTION  
REPORT**

Preventive Maintenance Inspection 5,000 Mile Service Modified Mini Van ( 2006 Chevy Uplander)				
Manufacturer _____		Year _____		
Mileage _____		Date _____		
Vin Code _____		Facility _____ Technician _____		
<b>Please complete the following:</b>				
1. Change engine oil, and replace oil filter <input type="checkbox"/>		2. Refill Washer fluid <input type="checkbox"/>		
3. Lubricate Steering and suspension system <input type="checkbox"/>		4. Rotate Tires <input type="checkbox"/>		
Under Hood Inspection		G	F	R
1. Coolant condition degree ____ (minimum -20 degrees)				
2. Power steering fluid				
3. Engine oil level				
4. Brake fluid level				
5. Drive belts				
6. Pulleys				
7. Master cylinder/ power brake booster				
8. Wiring connections				
9. Battery condition				
10. Air filter element				
Under Vehicle Inspection		G	F	R
11. Front shocks				
12. Rear shocks				
13. Spring condition				
14. Differential condition				
15. Driveshaft/ U joints				
16. Fluid leaks				
17. Motor mounts				
18. Transmission mounts				
19. Cooling system & radiator				
20. Ball joints/ king pins				
21. Steering box/ linkage				
22. Stabilizer/ Idler Arms				
Wheelchair Ramp inspection		G	F	R
24. Wheelchair ramp base catch operation (manually)				
25. Wheelchair ramp door operation (manually operate the				
26. Wheel chair lift pins and bushings				
23. Wheelchair ramp inspection				
Interior Inspection		G	F	R
27. HVAC System (LF vent) Heat temp ____				
28. Emergency exit operation				
29. Window operation				
30. Interior lighting				
31. Horn operation				
32. Seat and floor condition				
33. Windshield wipers				
34. Defroster				
35. Door operation				
36. Instrument panel & gauges				
Outside of Vehicle		G	F	R
37. Body damage or corrosion				
38. Headlight operation (high/low)				
39. Turn signals/ Hazard lights				
40. Marker lights				
41. Tail Pipe				
42. Reverse lights				
43. Break lights				
44. License plate lights				
45. Mirrors				
Wheel Off Inspection		G	F	R
46. Front rotors				
47. Rear rotors				
48. Brake calipers/ wheel cylinders				
49. Brake linings LF ____/32"				
50. Tire tread depth LF ____/32"				
G-Component is in good condition				
<b>Please describe any other mechanical problems noted during the inspection:</b>				
Sign _____	Date and Time _____			

**Example E:** The form above is to be used by the certified mechanic performing the service. The maintenance items to be completed are itemized at the top of the page with boxes to indicate their completion. This sample has the different options that determine if the component is in good condition (meaning no repairs are currently needed), fair condition (meaning it will need to be replaced some time soon), and replace now (meaning that the component is in severely poor shape and will need to be replaced as soon as possible.) (A Sample program is described in this Manual)

**EXAMPLE F:**

**REPLACEMENT SCHEDULE AND COST ESTIMATION**

<b>Component</b>	<b>Estimated Failure Mileage Cycle</b>	<b>Inspection Process</b>	<b>Number of Times per Life of Vehicle</b>	<b>Replacement Cost</b>	<b>Estimated Total for Life of Vehicle</b>
Hoses	20,000	The hose must be replaced if you are able to squeeze it and make it collapse	7	Under \$30	\$210
Shock Absorbers	60,000	Visually examine for leakage or wetness. At 60,000 miles remove lower bolt and if the shock can be moved up and down by hand, replacement is necessary	2	Under \$80	\$160
Alternator (normal use)	70,000	Check output from terminals and battery corrosion at every second inspection cycle or every 10,000 to 12,000	2	Under \$160	\$320
Alternator (heavy use)	40,000	Check output from terminals and battery corrosion at every second inspection cycle or every 10,000 to 12,000 .	2	Under \$160	\$320
Drive Belts	40,000	Belts are critical and should be inspected during every service (5,000 miles). Any excess cracking requires replacement. Failure to replace a worn belt can result in engine failure	4	\$50	\$200
Door Pin	80,000	Check door by ensuring that it operates smoothly and closes securely.	2	Under \$120	\$240
Alignment	40,000	Ensure the vehicles drives in a straight line without pulling to either side of the road	4	Under \$50	\$200
Steering Rods and Arms	40,000	Steering rods and arms can make a noise in the front end and cause the steering to feel loose when going bad	4	Under \$150	\$600
Tires (set of 4)	35,000	Check tread depth with every service	4	\$450	\$1,800
Brakes (front)	20,000	Check front brake pads and rotors at every other service	7	\$150	\$1,050
Brakes (Rear)	40,000 – 75,000	Rear brake shoes should be checked every other service	3	\$200	\$600
Check Engine light and emissions problems	50,000	This light indicates a problem although it may not be major to start with. Usually the EGR or emissions system. Failure to have this item checked results in shortened engine life and higher	3	Under \$300	\$900

Component	Estimated Failure Mileage Cycle	Inspection Process	Number of Times per Life of Vehicle	Replacement Cost	Estimated Total for Life of Vehicle
		gasoline and oil usage			
Exhaust Muffler	100,000	Indications of failure are rattling, loud noise, and exhaust smells. Failure to keep operable can result in total engine failure	1	Under \$200	\$200
Exhaust Converter	100,000	Indications of failure are rattling noises, check engine light, failed emissions checks, and a rotten smell. Failure to keep operable can result in total engine failure.	2	Under \$400	\$400
Water pump and thermostat	80,000	Indications of a water pump failure are rattling noise from under hood, vehicle over heating, leaking coolant	2	\$250	\$500
150,000 miles		Estimated total repair expense for life of vehicle			\$7,380

**Example F:** The chart above describes the normal estimated life of components on the modified minivan. However, parts may fail at any time and it is best to be prepared for those expenses. This chart is meant to serve as a reference so you can estimate repair costs and frequency. Depending on the environment and the vehicle use this information may vary. These are average costs, the prices may also differ.

**EXAMPLE G:**

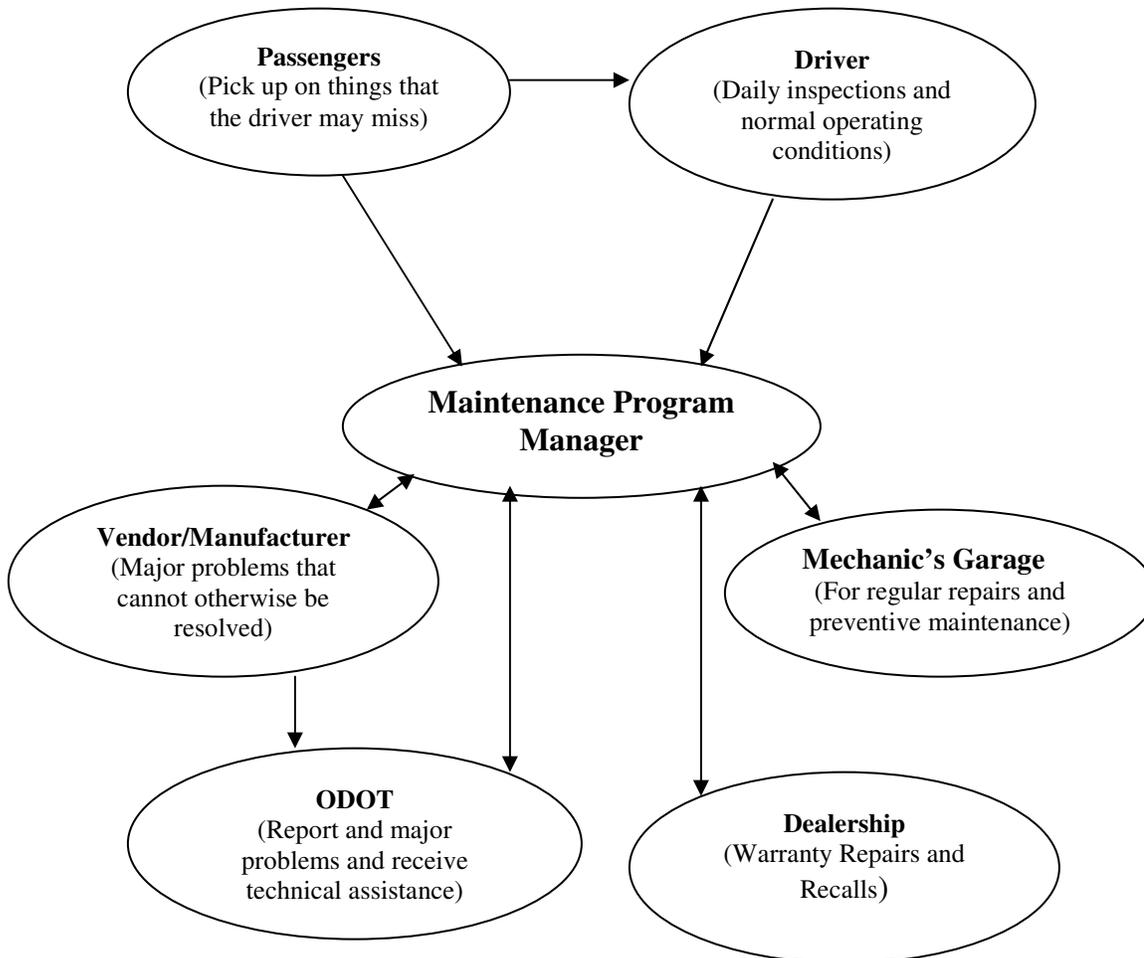
**ODOT CONTACT AND SUPPORT INFORMATION**

*Ohio Department of Transportation  
Office of Transit  
1980 West Broad Street  
Columbus, Ohio 43223  
Phone: 614-644-7237  
Fax: 614-466-0822  
[www.dot.state.oh.us/ptrans](http://www.dot.state.oh.us/ptrans)*

**ODOT CONTACT  
AND SUPPORT  
INFORMATION**

**EXAMPLE H:**

**MAINTENANCE COMMUNICATION WEB**



*Example H: The web graph above depicts the paths of communication required to administer an effective preventive maintenance program. It is crucial to keep in mind the maintenance program manager is the most important part of this web. Without the support and oversight of the manager, departmental relationships and personal communication would cease to exist. To properly administer a preventive maintenance program there must be a steady flow of communication.*