

Potomac and Rappahannock  
Transportation Commission

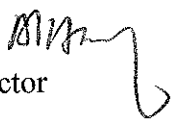
ITEM 12-C.1

( 26 PAGES )

14700 Potomac Mills Road  
Woodbridge, VA 22192

January 7, 2010

TO: Chairman May and Commissioners

FROM: Alfred H. Harf   
Executive Director

RE: November 2009 Fleet Maintenance Audit

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The most recent fleet maintenance audit was conducted in November and the results continue to be impressive. PRTC's independent outside contractor's Transit Resource Center (TRC) report is attached, and the findings are summarized in this informational memorandum. The Board will recall that audits are conducted three times per year and one-third of the fleet is inspected at each audit.

For this audit, the average number of per-bus defects increased slightly to 3.9 defects per bus (156 in total), from an average of 3.2 for the previous audit. First Transit has now averaged less than four defects per bus for four of the past six audits. The average for the past six audits is 4.0 defects per bus. On-time adherence to preventive maintenance inspections (PMIs) scheduled at 6,000 mile intervals was again perfect at 100% for the tenth consecutive audit.

The number of "A" defects decreased substantially to six, to an average of 0.15 per bus, the lowest of the past six audits. This compares to 0.33 per bus in July, where a total of 13 "A" defects were identified. For the purposes of these audits "A" defects are more serious in that once identified during a scheduled preventive maintenance inspection (PMI), PRTC requires that they be repaired before the bus can be released for revenue service, as opposed to other defects that can be scheduled for repair at a later time.

"A" defects are further classified into two categories: those that are "safety-critical" and those that are not. Safety-critical defects have the potential of causing serious injury or accident, so they warrant such differentiation. In this category, safety-critical defects decreased significantly to only three, compared to 10 such defects identified during the previous audit. The average of 0.07 safety-critical defects per bus is the lowest it has been since we began tracking this statistic in July 2008. It should be noted that on any audit there will be defects that appear between preventive maintenance inspections. In addition, many critical defects would be identified by bus operators during pre/post trip inspections.

Chairman May and Commissioners

January 1, 2010

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Other aspects of the audit revealed:

- The workshop continues to be clean.
- PMI records continue to be extremely well organized and easy to locate.
- Bus interiors and exteriors continue to be exceptionally clean, although interior-related defects increased slightly from a per-bus average of 0.33 last audit to 0.45 for this one. The number of exterior defects, however, dropped to an average of 0.25 per bus compared to 0.45 per bus last audit.
- When cosmetic (interior and exterior related) defects are removed from the totals, the number of mechanical defects totals 3.2 per bus compared to 2.4 per bus in July.
- Bus areas where no defects were found on any of the 40 buses inspected include Exhaust, Tires, and the Structure/Chassis/Fuel Tank category.
- Three categories saw significant decreases in the number of average defects per bus: Air/Brake System, Transmission, and Exterior Body.
- Three categories also saw significant increases: Passenger Controls, Lights, and Safety Equipment.
- The road test of 10 buses selected at random revealed five defects. This compares to six defects found during the last audit.
- All refrigerant-related air conditioning (AC) repairs examined continued to be performed by qualified personnel.
- First Transit management continues to be as cooperative with regard to providing the buses and workspace needed for carrying out inspections in a timely fashion.
- First Transit contested five defects, compared to contesting no defects during the previous two audits. One defect was changed as a result of further review by TRC.
- First Transit management continues to show a willingness to minimize defects by immediately repairing the majority of "A" related defects shortly after being identified.
- First Transit management continues to provide historical maintenance data to mechanics prior to them making repairs or conducting inspections. Historical data also includes information generated from driver reports.
- The review of PMI records revealed that First Transit continues to have a process to follow-up on defects identified during PM inspections.
- Fluid samples tested showed no abnormal findings.
- First Transit is fully compliant with PRTC's requirement that all technicians meet ASE certification and work experience levels.
- Required annual refresher training is also at full compliance.
- First Transit is also compliant with the requirement that the ratio of buses per mechanic not exceed eight; the ratio at the time of this audit was 7.4 buses for each mechanic.

Chairman May and Commissioners

January 1, 2010

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We continue to be impressed with the high standard to which First Transit is maintaining our fleet – it is truly a comfort to know that these critical assets, which are a tremendous capital investment, are in such good hands.

The full audit report is attached for your perusal.

Attachment: As stated



TRANSIT RESOURCE CENTER

Presents:

# Fleet Maintenance Audit Report

## November 2009

Presented to:



### Potomac & Rappahannock Transportation Commission

14700 Potomac Mills Road  
Woodbridge, VA 22192

December 8, 2009

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**Potomac and Rappahannock Transportation Commission  
(PRTC)**

**VEHICLE MAINTENANCE AUDIT  
Conducted November 15-20, 2009**

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# POTOMAC AND RAPPAHANNOCK TRANSPORTATION COMMISSION

## VEHICLE MAINTENANCE AUDIT Conducted November 15-20, 2009

### SUMMARY

This is the seventh maintenance audit conducted of First Transit since a new maintenance management team took over in October 2007. Audits are conducted three times annually (one every four months) on behalf of the Potomac and Rappahannock Transportation Commission (PRTC) by Transit Resource Center (TRC). Audits consist of a physical inspection of 40 buses (approx. one-third of the fleet); and a fluids analysis, records review and road test of 10 buses (approx. one-fourth of the fleet sample). A review was also made of maintenance worker qualifications as agreed to by PRTC and First Transit. New to this audit is a redefining of road test defects into two categories: those that would render a bus out of service, and those that would not.

For this audit, the average number of per-bus defects increased slightly to 3.9 defects per bus (156 in total) from an average of 3.2 for the previous audit. First Transit has now averaged less than four defects per bus for four of the past six audits. The average for the past six audits is 4.0 defects per bus. On-time adherence to preventive maintenance inspections (PMIs) scheduled at 6,000 mile intervals was again perfect at 100% for the tenth consecutive audit. The summary table below compares the average number of defects per bus and adherence to PMI intervals, two of the most critical performance indicators, for the past six audits.

	Feb. '08	July '08	Nov. '08	Feb. '09	July '09	Nov. '09
<b>Average # of Defects per Bus</b>	5.1	3.9	3.6	4.3	3.2	3.9
<b>PMI Adherence</b>	100%	100%	100%	100%	100%	100%

The number of "A" defects decreased substantially to six, an average of 0.15 per bus, the lowest of the past six audits. This compares to 0.33 per bus in July, where a total of 13 "A" defects were identified. For the purposes of these audits "A" defects are more serious in that once identified during a scheduled PMI, PRTC requires that they be repaired before the bus can be released for revenue service, as opposed to other defects that can be scheduled for repair at a later time. "A" category defects were reported to First Transit shortly after being identified.

The table below summarizes the average number of "A" defects identified per bus for the past six audits.

	Feb. '08	July '08	Nov. '08	Feb. '09	July '09	Nov. '09
<b>Average "A" defects per Bus</b>	0.70	0.25	0.17	0.17	0.33	0.15

"A" defects are further classified into safety-critical defects, defects more severe than others with greater likelihood of causing serious injury or accident. In this category, safety-critical defects decreased

significantly to only three, compared to 10 such defects identified during the previous audit. The average of 0.07 safety-critical defects per bus is the lowest of the last five audits. It should be noted that on any audit there will be defects that appear between preventive maintenance inspections. In addition, many critical defects would be identified by bus operators during pre/post trip inspections. The table below summarizes the average number of safety-critical "A" defects found per bus since July 2008.

	July '08	Nov. '08	Feb. '09	July '09	Nov. '09
<b>Average Safety-critical Defects per Bus</b>	0.15	0.12	0.07	0.25	0.07

Other aspects of the audit revealed:

- The workshop continues to be clean.
- PMI records continue to be extremely well organized and easy to locate.
- Bus interiors and exteriors continue to be exceptionally clean, although interior-related defects increased slightly from a per-bus average of 0.33 last audit to 0.45 for this one. The number of exterior defects, however, dropped to an average of 0.25 per bus compared to 0.45 per bus last audit.
- When cosmetic (interior and exterior related) defects are removed from the totals, the number of mechanical defects totals 3.2 per bus compared to 2.4 per bus in July.
- Bus areas where no defects were found on any of the 40 buses inspected include Exhaust, Tires, and the Structure/Chassis/Fuel Tank category.
- Three categories saw significant decreases in the number of average defects per bus: Air/Brake System, Transmission, and Exterior Body.
- Three categories also saw significant increases: Passenger Controls, Lights, and Safety Equipment.
- The road test of 10 buses selected at random revealed five defects compared to six such defects found during the last audit.
- All refrigerant-related air conditioning (AC) repairs examined continued to be performed by qualified personnel.
- First Transit management continues to be cooperative with regard to providing the buses and workspace needed for carrying out inspections in a timely fashion.
- First Transit contested five defects, compared to contesting no defects during the previous two audits. One defect was changed as a result of further review by TRC.
- First Transit management continues to show a willingness to minimize defects by immediately repairing the majority of "A" related defects shortly after being identified.
- First Transit management continues to provide historical maintenance data to mechanics prior to them making repairs or conducting inspections. Historical data also includes information generated from driver reports.
- The review of PMI records revealed that First Transit continues to have a process to follow-up on defects identified during PM inspections.
- Fluid samples tested showed no abnormal findings.
- First Transit is fully compliant with PRTC's requirement that all technicians meet ASE certification and work experience levels.
- Required annual refresher training is also at full compliance.
- First Transit is also compliant with the requirement that the ratio of buses per mechanic not exceed eight; the ratio at the time of this audit was 7.4 buses for each mechanic.

Audit details are presented in the various sections found in the body of this report. Various tables used throughout this report are based on more complete data contained in Excel spreadsheets included on a separate CD.

## BACKGROUND

This is the seventh maintenance audit of First Transit since a new maintenance management team took over in October 2007 and the 13th audit TRC has conducted since First Transit began providing services to PRTC in July 2003. Audits are conducted three times annually in a consistent manner to determine the contractor's maintenance performance over time.

## BUSES INSPECTED

TRC selected 40 buses at random for a physical fleet inspection and then selected ten of them at random to receive a Records and Fluids Analysis Audit. Ten of the 40 buses were selected separately by TRC to undergo a road test.

**Table 1** shows the buses that received a physical inspection, and the ten (10) buses selected at random for a Records and Fluids Analysis and Road Test Inspection

<b>TABLE 1</b> <i>Buses Inspected</i>		
<b>FLEET INSPECTION</b>	<b>RECORDS &amp; FLUIDS ANALYSIS</b>	<b>ROAD TEST INSPECTION</b>
<b>2000 – ORION</b> (171-183)		
171		171
175		
177	177	
183		
<b>2005 GILLIG 40'</b> (184-188)		
185		
188	188	188
<b>2004 GILLIG 30'</b> (250-265)		
250		
252		
254		254
260	260	
264		
<b>2005 GILLIG 30'</b> (266-267)		
267		
<b>2006 GILLIG 30'</b> (268-271)		
270	270	
<b>2002 – MCI</b> (300-337)		
302		

<b>TABLE 1</b>		
<i>Buses Inspected</i>		
<b>FLEET INSPECTION</b>	<b>RECORDS &amp; FLUIDS ANALYSIS</b>	<b>ROAD TEST INSPECTION</b>
304		
307	307	
310		
315		315
326		
336		336
<b>2003 – MCI</b> (338-345)		
339		
340	340	340
342		
344		
<b>2005 – MCI</b> (346-350)		
348	348	
350		
<b>2006 – MCI</b> (351-360)		
352	352	352
354		
356		
358		
<b>2008 – MCI</b> (361-375)		
362		
363	363	363
364		
366		366
368		
371		
374		
<b>2009 – MCI</b> (376-383)		
377		377
380		
382	382	
<b>TOTAL: 40</b>	<b>TOTAL: 10</b>	<b>TOTAL: 10</b>

#### **EVALUATION CRITERIA & METHODOLOGY**

TRC continued its audit process of evaluating fleet condition, records, fluids, and worker certification/training using identical procedures from the previous audits. A team of three bus inspectors were assigned to physically inspect the buses, conduct road tests, and draw oil samples: Roger Matthews, Scott Jorstad and Bruce French. Roger Matthews also served as on-site supervisor and was responsible for entering the defects identified by the inspection team. John Schiavone served as Project Manager,

organized the overall inspection process, performed the Records and Fluids Analysis Audit, and prepared the final report. All TRC staff identified above had participated in previous PRTC audits.

The material which follows describes the evaluation criteria and methodology used by TRC to conduct the various audit inspections.

### **Fleet Inspection**

Specific defects noted during the bus inspections were classified under 18 functional categories:

- 1) Accessibility Features
- 2) Air System/Brake System
- 3) Climate Control
- 4) Destination Signs
- 5) Differential
- 6) Driver's Controls
- 7) Electrical System
- 8) Engine/Engine Compartment
- 9) Exhaust
- 10) Exterior Body Condition
- 11) Interior Condition
- 12) Lights
- 13) Passenger Controls
- 14) Safety Equipment
- 15) Structure/Chassis/Fuel Tank
- 16) Suspension/Steering
- 17) Tires
- 18) Transmission

An "A/B" designation system was used to denote defects requiring immediate repair from those that could be repaired at a later time.

**A** – Indicates a critical defect that when identified during a regularly scheduled PMI requires immediate repair and would keep the vehicle from returning to revenue service until the defect is corrected. A subset of "A" defects that are more severe than others with greater likelihood of causing serious injury or accident is also identified as "safety-critical."

**B** – Indicates a non-critical defect, the repair of which could be deferred to a later time.

A third "BR" classification was used to note those "B" defects that were "R"eported to First Transit upon being identified because TRC considers them to be critical even though they are not on the "A" list.

"A" category defects were agreed upon by PRTC and First Transit during previous inspections. A copy of the "A" defect guidelines used for this audit is attached as Appendix B. TRC informed First Transit management of "A" and "BR" category defects shortly after they were identified, which First Transit

repaired immediately or scheduled for repair soon afterwards. First Transit was given an opportunity to contest "A" and "BR" defects as soon as they were brought to their attention; "B" defects were reviewed by First Transit at the end of the day when copies of noted defects were presented to them.

TRC shared the entire list of preliminary defects found during each day's inspections with First Transit management with the understanding that the defects would need to be reviewed by TRC and may be changed based on that review. The sharing of defects was intended to keep First Transit informed of TRC's findings as part of a cooperative and objective evaluation process. TRC inspectors also worked with First Transit personnel to confirm operation of certain controls in advance to ensure that defects were legitimate and not the result of the inspectors not being familiar with specific PRTC bus equipment. If there was any doubt about a defect, TRC either removed it from the list or downgraded "A" defects to "B" level status.

### **Records and Fluids Analysis Audit**

Ten buses were selected at random for the Records and Fluids Analysis Audits. The records examination set out to determine if:

- Preventive maintenance (PM) had been performed correctly and at prescribed intervals;
- Repairs had been performed properly and made promptly;
- Qualified mechanics performed maintenance tasks by virtue of documented training certification; and
- The fluids analysis program is being administered properly.

### PM Intervals

To determine if preventive maintenance inspections (PMIs) were performed correctly and on time, TRC examined the PMI records of the ten buses selected at random. Mileage between the last two PMIs was calculated to determine if the inspections were performed on time (within 10% or 600 miles of the scheduled 6,000-mile interval).

### Repairs

To determine if repairs were performed properly and made promptly, two audit procedures were used:

- 1) PMI sheets going back three PMIs were examined for each of the ten buses selected at random to determine if and when defects noted during the PMI process were repaired.
- 2) Defects from the previous PMIs were then compared to determine if any defects were repeated from one PMI to the next.

From this comparison TRC could determine if the defects were repaired or if they were simply noted on subsequent inspections.

### Mechanic Qualification

To determine if qualified mechanics performed maintenance tasks by virtue of documented training and certification, TRC selected four (4) air conditioning (AC) repairs at random from the work orders.

TRC examined AC-related work orders to identify a) the nature of the repair, and b) the mechanics performing the actual work. TRC then compared the name of the mechanic performing the repair to the list of AC certified technicians that TRC updated with First Transit to determine if the technicians were

certified to perform the tasks. Technicians performing routine mechanical tasks to AC systems (i.e., those that do not involve Freon) are not required to be certified.

TRC also collected and reviewed a listing of Automotive Service Excellence (ASE) certifications and work experiences of all First Transit mechanics to allow PRTC to determine compliance with established requirements.

#### Fluids Analysis Management

To determine if the fluids analysis program is being administered properly, TRC examined oil analysis records for each of the ten buses selected at random for the Records Inspection. TRC noted if the oil analysis was being performed at the appropriate PMI interval, if oil analysis records were properly filed for easy reference, and if any actions were being taken as a result of the oil analysis findings.

TRC also drew engine oil, transmission fluid, and coolant samples from the ten buses selected at random and reviewed those results (30 samples total). In reviewing the results TRC looked for evidence of inappropriate levels of deterioration. TRC also looked for evidence that First Transit is making use of the fluids analysis results.

#### **Road Test Protocol**

New for this audit is a defined protocol for assigning defects identified during the road test. All road test defects continue to be listed separately and are not included in the fleet defect totals. Instead of assigning an "A" or "B" designation as is done with static inspection defects, road test defects are classified as either:

- Those that in the opinion of the operator would render the vehicle out of service according to PRTC's "Out of Service Defects – While Operating" list.
- Those that would not render the vehicle out of service in the opinion of the operator.

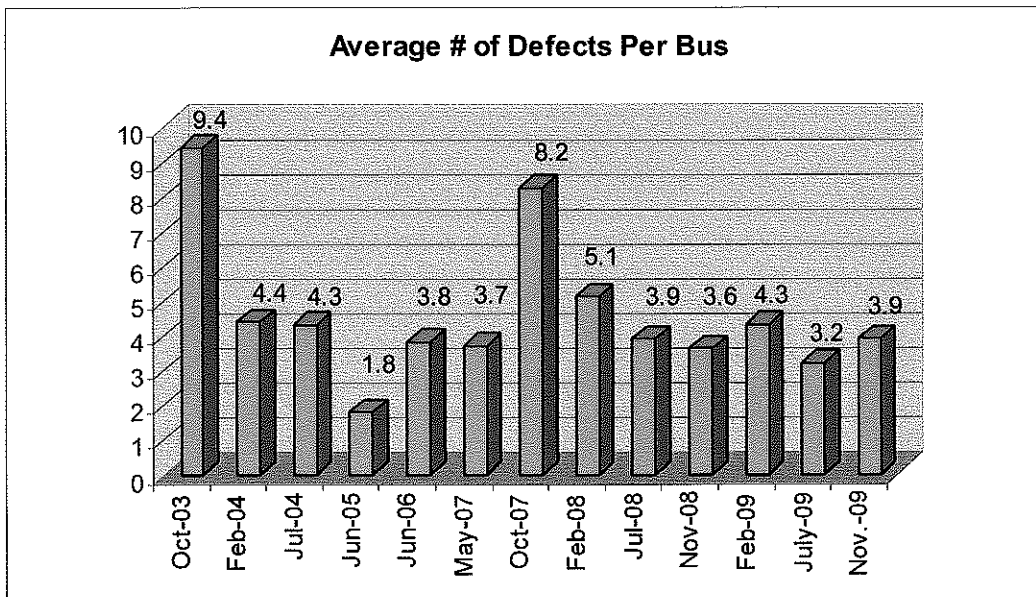
PRTC's "Out of Service Defects – While Operating" list is attached as Appendix E, which also describes the entire Road Test Protocol as agreed to by PRTC and First Transit.

### **FINDINGS**

#### **Overall Fleet Condition**

The PRTC fleet continues to be extremely clean inside and out. The number of defects identified by TRC during this inspection shows a slight increase to 3.9 defects per bus for the 40 buses inspected compared to an average of 3.2 defects per bus for the last audit. Although the industry does not have a standard for per-bus defects, an average of less than four per bus is exceptional based upon similar audits conducted for other transit agencies by TRC. Table 2 shows the historical defect trend for the last 13 audits of First Transit. A more detailed analysis of the defects, including the more critical "A" defects, is provided in report sections that follow.

**Table 2: Summary of Average Defects per Bus**



### Specific Defect Summaries

All defects identified during the inspections were entered in a database, which was used to generate a Master Defect Sheet. Data contained in that spreadsheet were then used to produce a series of detailed Excel reports.

The following Excel spreadsheets produced by TRC for PRTC are included as a CD attachment to this report:

- **Static Defects (Master Defect Sheet):** identifies all defects for all buses inspected
- **Road Test Defects (Master Road Test Defect Sheet):** identifies all defects found during road testing
- **Defect Summary:** includes a summary of defect totals and a summary of the 18 defect categories
- **Defects by Category:** identifies specific defects under each of the 18 categories
- **“A” Defects:** identifies all A-category defects
- **“BR” Defects:** identifies all BR-category defects
- **Buses Inspected:** A listing of all buses inspected

**Table 3** below summarizes defects under each of the 18 functional categories and compares them to the previous audit conducted in July. Three categories saw significant decreases in the number of average defects per bus: Air/Brake System, Transmission, and Exterior Body. Three categories also saw significant increases: Passenger Controls, Lights, and Safety Equipment. **Table 3** also summarizes defects from the previous three inspections to provide historical data in each of the 18 functional categories.

**TABLE 3**  
**Defects by Category**

<b>Defect Category</b>	<b>Nov. '08 Defects Avg. per Bus</b>	<b>Feb. '09 Defects Avg. per Bus</b>	<b>July '09 Defects Avg. per Bus</b>	<b>Nov. '09 Defects Avg. per Bus</b>	<b>Significant Increase (+) or Decrease (-) Current vs. Prior Audit</b>
Electrical System	0.03	0.03	0.05	0.05	
Air System/Brake System	0.20	0.10	0.33	0.15	-
Engine/Engine Compartment	1.15	1.60	0.68	0.75	
Suspension/Steering	0.10	0.10	0.15	0.25	
Exhaust	0.03	0.00	0.00	0.00	
Transmission	0.10	0.25	0.18	0.03	-
Safety Equipment	0.03	0.13	0.05	0.30	+
Climate Control	0.00	0.00	0.00	0.10	
Driver's Controls	0.75	0.53	0.60	0.75	
Passenger Controls	0.08	0.15	0.03	0.08	+
Interior Condition	0.28	0.70	0.33	0.45	
Exterior Body Condition	0.53	0.43	0.45	0.25	-
Tires	0.03	0.00	0.05	0.00	
Lights	0.13	0.15	0.13	0.35	+
Accessibility Features	0.13	0.08	0.13	0.08	
Differential	0.05	0.08	0.03	0.05	
Destination Signs	0.03	0.00	0.05	0.08	
Structure/Chassis/Fuel Tank	0.03	0.00	0.00	0.00	
<b>Defect Totals:</b>	<b>145</b>	<b>172</b>	<b>128</b>	<b>156</b>	
<b>Total Buses Inspected:</b>	<b>40</b>	<b>40</b>	<b>40</b>	<b>40</b>	
<b>Average Defects per bus</b>	<b>3.63</b>	<b>4.30</b>	<b>3.20</b>	<b>3.90</b>	

Each defect was given a severity code:

- A** – Indicates a critical defect that when identified during a regularly scheduled PMI requires immediate repair before the vehicle could resume revenue service.
- B** – Indicates a non-critical defect, the repair of which could be deferred to later time.

There were a total of six “A” defects. **Table 4** below shows a breakdown of those defects.

Defect Category	Number of Defects
<b>Air/Brake Systems</b>	
Air leak	2
<b>Safety Equipment</b>	
Emergency Exit Window	1
<b>Interior Condition</b>	
Sharp edge	2
<b>Accessibility Features</b>	
Lift restraint belt	1
<b>Total “A” Defects</b>	<b>6</b>

All A-Category defects identified during the Fleet Inspection were either repaired immediately or shortly afterwards by First Transit. First Transit was encouraged not to operate buses with “A” defects until repaired. Not all “A” defects will keep the bus from service; air leaks for example have an acceptable DOT allowance and can lose three pounds of air pressure in just two minutes.

Understanding that some “A” level defects are more severe, a review was conducted to identify those with greater likelihood of causing serious injury or accident. Of the six “A” defects identified, three were considered safety-critical, compared to ten for the last audit where a total of 13 “A” defects were identified. The average of 0.07 safety-critical defects per bus is the lowest of the last five audits conducted of First Transit. Appendix C shows critical versus non-critical “A” defects. **Table 5** below shows the per-bus average of safety-critical defects since July of 2008.

	July '08	Nov. '08	Feb. '09	July '09	Nov. '09
<b>Average Safety-critical Defects per Bus</b>	0.15	0.12	0.07	0.25	0.07

First Transit contested two of the "A" defects identified during this inspection. Reasons for contesting the defects and TRC's rebuttal are found in Appendix D. One "A" defect was changed to a "BR" designation after further review. (Fire extinguisher safety cable was missing but extinguisher itself was secured in place and charged).

### **Defect Analysis**

Defects identified by TRC were analyzed to determine the severity or detrimental impact they pose in terms of safety, comfort and convenience, structural integrity, and life expectancy of major components.

#### Safety

"A" category defects declined for this audit, down to six compared to 13 identified during the previous audit. The six "A" defects identified during this inspection would have kept five buses from returning to service if First Transit had not corrected them after being identified by TRC. This compares to 10 buses for the last audit. Despite the decrease in "A" defects, "B" category defects related specifically to safety equipment increased from two in July to 12 for this audit. Of the 12 safety defects, five relate to fire extinguisher/fire suppression, two are emergency window related, and two are associated with inoperative wheelchair lift door alarms.

#### Comfort and Convenience

Exteriors and interiors continue at a high level of cleanliness. Climate control defects, however, increased to four defects from zero such defects last audit. Interior-related defects also increased, from 13 to 19. Seven of those defects involve graffiti. Additionally, there were 14 defects related to malfunctioning lights at the driver's dashboard including those providing warning indications.

#### Structural Integrity

There were no defects that impacted structural integrity.

#### Life Expectancy of Major Components

First Transit's continued perfect adherence to scheduled PM inspections and the changing of fluids that occurs during these inspections maximizes the life expectancy of major components. Regarding fluid sample results, there were no abnormal findings for the 30 samples taken. No fluid analysis findings of a critical nature have been found since First Transit's new management team took control. Records also continue to show that First Transit has an aggressive program of following up on defects noted during PMIs (i.e., getting them repaired in a timely fashion), which helps extend vehicle and component life.

### **PMI Schedule Adherence**

TRC examined the records of ten buses selected at random to determine if the PMIs were being done at scheduled 6,000-mile intervals. PMI intervals were considered "on time" if performed on or before 6,600 miles ("late window" of 10% or 600 miles).

All PMI records were again well organized and very easy to access and locate.

**Table 6** below shows the PMI intervals going back to the previous PMI performed by First Transit for each of the ten buses selected at random.

<b>TABLE 6</b>		
<b><i>PMI Schedule Adherence</i></b>		
<b>Bus #</b>	<b>PMI Mileage Intervals</b>	<b>Notes</b>
177	6164	On time
188	6009	On time
260	6004	On time
270	6069	On time
307	5935	On time
340	5899	On time
348	6381	On time
352	6052	On time
363	5862	On time
382	5856	On time

The review of records by TRC revealed that all ten buses (100%) had their PM inspections done on time. The on time performance for PMI schedule adherence remains at 100% for the tenth consecutive audit. First Transit management has developed a process whereby upcoming PMIs are identified and reviewed daily to ensure on-time completion.

#### **Repair of Defects Identified During PMIs**

TRC selected a minimum of the last three PMI sheets for all ten buses chosen at random (minimum of 30 PMI records total) to determine if repairs were performed properly and made promptly. TRC examined the PMIs to determine if First Transit has:

- A process in place to distinguish those defects identified and repaired during the PMI from those scheduled for repair at a later date; and
- Actually followed-up and repaired the defects identified during the previous PMI.

From its investigation TRC determined that First Transit continues to have a record-keeping system that clearly distinguishes defects that are repaired as a follow-up to scheduled PM inspections. As was the case in previous audits, each PMI folder was found to have repair orders (ROs) showing repair of defects noted during the inspection process.

First Transit also continues to provide technicians with historical data, including reports made by bus operators, to assist with repairs and inspections. First Transit's QA program includes a random verification of 10 percent of the PM inspections performed. The maintenance manager also conducts spot QA follow-up inspections.

#### **Mechanic Training & Certification**

TRC set out to determine if qualified mechanics are performing maintenance tasks by virtue of documented training and certification. TRC selected four (4) HVAC repairs/inspections at random and asked First Transit to provide a copy of the repair order and the name of the mechanic performing the repair or inspection. As noted earlier, finding these defects was difficult due to the scarcity.

Table 7 below shows the four HVAC work orders examined.

<b>Bus #</b>	<b>Date</b>	<b>HVAC Repair</b>	<b>Mechanic</b>
267	9-09-09	Repair inoperative AC	Comfort
304	6-12-09	Repair inoperative AC	Krantz
336	7-24-09	AC Recharge	Farrell
348	10-14-09	Repair faulty evaporator	Krantz, Comfort

TRC then compared the mechanic who performed the HVAC repairs to the listing of certified technicians compiled and updated from the earlier audit. **Table 8** lists the mechanics certified to perform HVAC (refrigerant-related) repairs and their AC certification status.

<b>Mechanic's #, Name</b>	<b>Proof of AC Certification</b>
Andy Velez	AC 608
M. Alam	AC 609
M. Farrel	AC 609
F. Brownell	AC 609
W. Nickens	AC 609
M. Comfort	AC 608
D. Krantz	AC 608
J. Coburn	AC 609
F. Artieda	AC 609
D. Booze	AC 609

TRC found that all HVAC repairs involving refrigerant were performed by a certified AC technician. As a result of its examination, TRC finds that the contractor does have qualified mechanics performing HVAC maintenance tasks by virtue of documented training and certification.

As part of this inspection TRC also requested an updated listing of all First Transit technicians and a summary of their experience and Automotive Service Excellence (ASE) certifications to determine compliance with the following PRTC requirement:

Maintenance Personnel will be trained to proficiency on each of PRTC's vehicles and sub-systems prior to the start of service. Contractor will be required to ensure that all repairs involving warrantied vehicles, sub-systems, parts, etc., are performed at all times by maintenance personnel who are properly certified to perform such work such that qualifications cannot be questioned when submitting warranty claims. All mechanics (defined as mechanics and foremen) must have at least one ASE certification and five (5) years' experience on heavy duty trucks or buses. Alternately, mechanics may be graduates of a certified two-year technical/vocational institute and have two (2) years' experience with heavy duty trucks or buses. At least 30 percent of the maintenance staff (defined as mechanics only) shall be ASE Master Certified for medium and heavy duty

trucks, not including the maintenance manager. In addition, all mechanics (defined as mechanics and foremen) shall receive a minimum of 16 hours of technical/refresher training annually.

PRTC also requires that the ratio of buses per mechanic not exceed eight. Table 9 shows required versus actual staffing level, experience/certifications, and annual refresher/technical training compliance.

<b>Measure</b>	<b>Ratio of buses to mechanics</b>	<b>Mechanics/foremen with ASE &amp; 5 years exp. or voc. degree &amp; 2 years exp.</b>	<b>Mechanics/w/ ASE Master Certification</b>	<b>Mechanics/foremen w/ min. 16 hours annual refresher/technical training</b>
<b>Required</b>	Max. 8.0	100%	Min. 30% of techs	100%
<b>Actual</b>	7.4 (133:18)	100% (20 of 20)	33% (6 of 18)	100% (20 of 20)

Based on the findings/documentation provided, First Transit is fully compliant on all PRTC requirements.

#### **Management of Oil Analysis Program**

First Transit is required to send engine oil and transmission fluid samples to a laboratory for testing and evaluation at each PMI to determine if:

- a) fluid samples were taken at each PMI;
- b) fluid records were filed and easy to gain access to; and
- c) the contractor is making use of the fluids analysis results as part of its maintenance program.

In examining the last two PMIs for each of the ten buses selected at random (20 records), TRC found that:

- All engine and transmission oil samples were taken at the appropriate interval.
- Recordkeeping of the oil analysis program has been improved.
- None of the findings required First Transit to take any corrective active. .

TRC also drew engine, transmission, and coolant fluid samples from ten buses selected at random (30 samples). The results are as follows:

#### Coolant:

All readings were normal. However, the same recommendation was made for buses 307 and 340:

- Freeze point appears high indicating inadequate ratio of glycol to water. Recommend adjust coolant to a 50/50 mix. Resample at the next scheduled interval.

#### Transmission Fluid:

All results normal

#### Engine Oil:

All results normal

First Transit was informed of fluid analysis results as soon as they were received by TRC. Based on the review of sample results, there is no evidence of inappropriate levels of deterioration caused by vital drivetrain fluids.

**ROAD TEST INSPECTIONS**

TRC conducted a road test of ten buses selected at random after the static inspections had been conducted. The road testing began during the October 2007 audit. As indicated earlier, a protocol for assigning any defects identified during the road test was established for this audit. Road test defects are classified as those that would render a vehicle out of service or not according to PRTC’s “Out of Service Defects – While Operating” criteria. The Road Test protocol is fully described in Appendix E.

A total of five road call defects were identified during this audit. Of those only one, an inoperative driver’s seat belt, was classified as the type that would render a bus out of service. A summary of road call defects including those that would render a bus out of service is shown in Table 10.

<i>Table 10</i>					
<i>Summary of Road Call Defects</i>					
	<b>July '08</b>	<b>Nov. '08</b>	<b>Feb. '09</b>	<b>July '09</b>	<b>Nov. '09</b>
<b>Total Road Call Defects</b>	1	1	8	6	5
<b>Out-of-Service Total</b>	1	1	0	1	1
<b>Nature of Defect(s)</b>	Brakes Grab	Eng. shut down		Steering	Driver’s belt

All defects identified during the road tests were not included with the static inspection defects to maintain consistency with previous audits where road tests were not part of the audit. A listing of the defects identified during the road test inspections is found in the “Road Test Defects” tab of the attached spreadsheet.

**RECOMMENDATIONS**

- Alert technicians conducting preventive maintenance inspections to pay closer attention to interior passenger lighting and dashboard warning lights.

**APPENDIX A – Excel Spreadsheet Reports  
(Attached as a CD)**

## APPENDIX B

### PRTC "A" Defect List

#### "A" Defects

- Fire extinguisher
- Headlights
- Wipers (either)
- Cracked windshield in driver's view (larger than a quarter)
- Seat belts, driver
- Turn signals
- Horn
- Emergency Flashers
- Brake Lights (more than one)
- Air pressure/Air leaks (except series 60 EGR engines at drier and air operated wipers on delay)
- Brake lining thickness @ 7/32-inch
- Tire tread depth @ 2/32 rear; 4/32 front
- Fuel Leak
- Exposed wires (insulation missing)
- Oil/Grease on Brakes (saturated)
- Wheelchair lift/ramp & securement
- Sharp edges – interior
- Tripping hazard – interior
- Critical steering/suspension play, wear
- Sensitive edges – doors – not working at all
- Tire pressure below 80 psi (tag tires 70 psi)
- Wheel lug nuts
- Exhaust leak into bus
- Back up alarm
- Excessive slack adjuster throw: 30=2"; 36=2.5"
- Emergency window won't open

## APPENDIX C – Critical vs. Non-Critical “A” Defects

<b>Bus #</b>	<b>Category</b>	<b>“A” Defect</b>	<b>Safety Critical</b>
171	Safety Equipment	Emergency exit window S/S #4, won't open	YES
250	Interior Condition	Floor trim, C/S rear, protruding out-sharp edge	NO
264	Air System / Brake System	Air leak, S/S underneath front, PP1 valve leaking	YES
342	Interior Condition	A/C blower motor door, center of bus, door damaged with sharp edges	NO
364	Air System / Brake System	Air leak, C/S rear, leveling valve leaking air	YES
364	Accessibility	Restraint belt, W/C lift, lift operates with restraint belt unlatched	NO

## APPENDIX D – Listing of Contested Defects and TRC Response

Bus #	Category	Defect	Reason Contested by First Transit	TRC Response
364	Air System / Brake System	Air leak, C/S rear, leveling valve leaking air	Defect was noted on PMI, Inspectors were notified of Defect. Bus was still in the shop for PMI follow-ups	TRC was informed of this defect AFTER defect was found by TRC.
254	Interior Condition	Graffiti on seat backs	Graffiti was cleaned and very faint, considered normal wear and tear for an Urban Bus route	Graffiti was visible during the inspection.
254	Interior Condition	Graffiti on seat backs	Graffiti was cleaned and very faint, considered normal wear and tear for an Urban Bus route	Graffiti was visible during the inspection.
344	Suspension/Steering	Shock, S/S rear, loose	Shock was secured	Shock was found to be loose; inspector was able to move shock back and forth on bolt
358	Safety Equipment	Fire extinguisher pin missing	Fire extinguisher is secured and fully charged	Agree, changed to a "B" category defect

## **APPENDIX E – Road Test Protocol**

### **A) Process**

First Transit assigns a consistent operator(s) to road test approximately 25% of buses selected for each maintenance audit. The process consists of a TRC inspector accompanying the operator during the road test, asking questions if needed to ensure the operator has not overlooked a defect.

Defects and abnormalities are classified as either:

- Those that in the opinion of the operator would render the vehicle out of service according to PRTC's "Out of Service Defects – While Operating" list (see below).
- Those that would not render the vehicle out of service in the opinion of the operator.

Defects that render the vehicle out of service are then inspected by First Transit with a TRC inspector serving as an observer. First Transit indicates the findings of their investigation to the TRC inspector along with the proposed corrective action (if any). The TRC inspector records this information and gains concurrence from First Transit that the report is accurate. The TRC inspector then adds his observations separately.

All road test defects and reporting are itemized separately in the Audit Report and are not counted or reported with the static defect totals.

### **B) Out of Service Defects – While Operating**

Per the PRTC/First Transit Bus Service Operating Procedures, the following items require the operator to stop the bus as soon as it is safe to do so and contact dispatch. If they occur during a road test, they will be noted as such in the Audit Report.

1. Transmission
  - a. slips
  - b. will not shift
  - c. overheats
2. Engine Problems
  - a. hot engine
  - b. cuts off
  - c. unusual acceleration (e.g., bucks, hesitates, sticking accelerator)
3. Oil System Problems
  - a. Oil light
  - b. Severe oil leak

4. Air System Problems
  - a. No or low air pressure (under 80 psi)
5. Brake System Problems
  - a. Hot brakes or wheels
  - b. Slack brakes
6. Fuel leak or smell
7. Excessive steering condition
8. Exhaust fumes leaking into bus (obvious smell)
9. Inoperative defroster system
10. Flat tire(s)
11. Inoperative windshield wiper(s)
12. Any other defect rendering the vehicle unsafe to operate