

**PARTIAL  
STURAA TEST  
7 YEAR  
200,000 MILE BUS  
from  
SUPREME CORPORATION  
MODEL TROLLEY TR 31**

**MARCH 2003**

**PTI-BT-R0302-P**

PENNS<sup>T</sup>ATE



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## EXECUTIVE SUMMARY

Supreme Corporation submitted a model Trolley TR 31, gasoline-powered 29 seat (including the driver) 32-foot trolley, for a partial STURAA test in the 7yr/200,000 mile category. The Federal Transit Administration determined that the following tests would be performed; 2. Reliability and 5.7 Structural Durability Test. Testing started on January 3, 2003 and was completed on February 24, 2003. The Check-In section of the report provides a description of the bus and specifies its major components.

The primary part of the test program is the Structural Durability Test, which also provides the information for the Reliability results. The Structural Durability Test was started on January 7, 2003 and was completed on February 20, 2003.

The interior of the trolley is configured with seating for 29 passengers including the driver. Free floor space will accommodate 26 standing passengers resulting in a potential load of 55 persons. At 150 lbs per person, this load results in a measured gross vehicle weight of 23,760 lbs. In order to avoid exceeding the GAWR (7,000 lbs) of the front axle and (13,500 lbs) of the rear axle, ballast for all 26 standing passengers and four front seated passengers was eliminated. This reduction from full capacity resulted in an adjusted measured gross vehicle weight of 19,260 lbs and was used for all dynamic testing. The middle SLW segment was performed at the same 19,260 lbs. (Note; the SLW segment was performed with the ballast for the four front seated passengers removed). The final CW segment was performed at 15,530 lbs. Durability driving resulted in unscheduled maintenance and failures that involved a variety of subsystems.

The Reliability section compiles failures that occurred during Structural Durability Testing. Breakdowns are classified according to subsystems. The data in this section are arranged so that those subsystems with more frequent problems are apparent. The problems are also listed by class as defined in Section 2. The test trolley encountered no Class 1 or Class 2 failures. Of the 12 reported failures, eight were Class 3 and four were Class 4.

## ABBREVIATIONS

ABTC	- Altoona Bus Test Center
A/C	- air conditioner
ADB	- advance design bus
ATA-MC	- The Maintenance Council of the American Trucking Association
CBD	- central business district
CW	- curb weight (bus weight including maximum fuel, oil, and coolant; but without passengers or driver)
dB(A)	- decibels with reference to 0.0002 microbar as measured on the "A" scale
DIR	- test director
DR	- bus driver
EPA	- Environmental Protection Agency
FFS	- free floor space (floor area available to standees, excluding ingress/egress areas, area under seats, area occupied by feet of seated passengers, and the vestibule area)
GVL	- gross vehicle load (150 lb for every designed passenger seating position, for the driver, and for each 1.5 sq ft of free floor space)
GVW	- gross vehicle weight (curb weight plus gross vehicle load)
GVWR	- gross vehicle weight rating
MECH	- bus mechanic
mpg	- miles per gallon
mph	- miles per hour
PM	- Preventive maintenance
PSBRTF	- Penn State Bus Research and Testing Facility
PTI	- Pennsylvania Transportation Institute
rpm	- revolutions per minute
SAE	- Society of Automotive Engineers
SCH	- test scheduler
SEC	- secretary
SLW	- seated load weight (curb weight plus 150 lb for every designed passenger seating position and for the driver)
STURAA	- Surface Transportation and Uniform Relocation Assistance Act
TD	- test driver
TECH	- test technician
TM	- track manager
TP	- test personnel

# TEST BUS CHECK-IN

## I. OBJECTIVE

The objective of this task is to log in the test bus, assign a bus number, complete the vehicle data form, and perform a safety check.

## II. TEST DESCRIPTION

The test consists of assigning a bus test number to the bus, cleaning the bus, completing the vehicle data form, obtaining any special information and tools from the manufacturer, determining a testing schedule, performing an initial safety check, and performing the manufacturer's recommended preventive maintenance. The bus manufacturer must certify that the bus meets all Federal regulations.

## III. DISCUSSION

The check-in procedure is used to identify in detail the major components and configuration of the bus.

The test bus consists of a Supreme Corporation, model Trolley TR 31. The trolley is built on a Ford F-53 chassis. The trolley has a front door, rear of the front axle, and a rear door equipped with a Maxon model WL-6A handicap lift, located rear of the rear axle. Power is provided by a gasoline-fueled, Ford Motor Co., model 6.8L engine coupled to a Ford Motor Co. model E40D transmission.

The measured curb weight is 6,610 lbs for the front axle and 8,920 lbs for the rear axle. These combined weights provide a total measured curb weight of 15,530 lbs. There are 29 seats including the driver and room for 26 standing passengers bringing the total passenger capacity to 55. Gross load is calculated as  $150 \text{ lb} \times 55 = 8,250 \text{ lbs}$ . At full capacity, the measured gross vehicle weight is 23,760 lbs. In order to avoid exceeding the GAWR (7,000 lbs) of the front axle, and (13,500 lbs) of the rear axle, ballast for all 29 standing passengers and the ballast for four front seated passengers was eliminated. This reduction from full capacity resulted in an adjusted measured gross vehicle weight of 19,260 lbs and was used for all dynamic testing.

## VEHICLE DATA FORM

Bus Number: 0302	Arrival Date: 1-3-03
Bus Manufacturer: Supreme Corporation	Vehicle Identification Number (VIN): 1FCNF5354Y0A05969
Model Number: Trolley TR 31	Date: 1-3-03
Personnel: S.C.	

WEIGHT: \*Values in parentheses indicate the adjusted weights necessary to avoid exceeding the GAWR. These values were used for all dynamic testing.

Individual Wheel Reactions:

Weights (lb)	Front Axle		Middle Axle		Rear Axle	
	Right	Left	Right	Left	Right	Left
CW	3,170	3,440	N/A	N/A	4,590	4,330
SLW	3,550 (3,400)	4,110 (3,850)	N/A	N/A	6,050 (5,980)	6,110 (6,030)
GVW	3,850 (3,400)	4,350 (3,850)	N/A	N/A	7,790 (5,980)	7,770 (6,030)

Total Weight Details:

Weight (lb)	CW	SLW	GVW	GAWR
Front Axle	6,610	7,660 (7,250)	8,200 (7,250)	7,000
Middle Axle	N/A	N/A	N/A	N/A
Rear Axle	8,920	12,160 (12,010)	15,560 (12,010)	13,500
Total	15,530	19,820 (19,260)	23,760 (19,260)	GVWR: 20,500

Dimensions:

Length (ft/in)	32 / 1.0
Width (in)	96.0
Height (in)	131.5
Front Overhang (in)	61.5
Rear Overhang (in)	115.0
Wheel Base (in)	208.5
Wheel Track (in)	Front: 82.5
	Rear: 74.5

Bus Number: 0302	Date: 1-3-03
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CLEARANCES:

Lowest Point Outside Front Axle	Location: Bumper	Clearance(in): 10.6
Lowest Point Outside Rear Axle	Location: Fuel tank	Clearance(in): 13.2
Lowest Point between Axles	Location: Step well	Clearance(in): 8.9
Ground Clearance at the center (in)	14.0	
Front Approach Angle (deg)	9.8	
Rear Approach Angle (deg)	8.8	
Ramp Clearance Angle (deg)	7.6	
Aisle Width (in)	22.5	
Inside Standing Height at Center Aisle (in)	92.0	

BODY DETAILS:

Body Structural Type	Integral		
Frame Material	Steel		
Body Material	Steel		
Floor Material	Plywood		
Roof Material	Fiberglass		
Windows Type	<input type="checkbox"/> Fixed	<input checked="" type="checkbox"/> Movable	
Window Mfg./Model No.	KTG / AS3 M3 DOT 620		
Number of Doors	<u>  1  </u> Front	<u>  1  </u> Rear	
Mfr. / Model No.	Supreme / 32-D04		
Dimension of Each Door (in)	Front - 31.8 x 91.0	Rear - 34.0 x 72.5	
Passenger Seat Type	<input type="checkbox"/> Cantilever	<input checked="" type="checkbox"/> Pedestal	<input type="checkbox"/> Other (explain)
Mfr. / Model No.	Supreme / 35-017		
Driver Seat Type	<input type="checkbox"/> Air	<input checked="" type="checkbox"/> Spring	<input type="checkbox"/> Other (explain)
Mfr. / Model No.	C. E. White Co. / NA		
Number of Seats (including Driver)	29		

Bus Number: 0302	Date: 1-3-03
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BODY DETAILS (Contd..)

Free Floor Space ( ft <sup>2</sup> )	40.0
Height of Each Step at Normal Position (in)	Front 1. <u>10.7</u> 2. <u>7.3</u> 3. <u>7.3</u> 4. <u>7.3</u>
	Middle 1. <u>N/A</u> 2. <u>N/A</u> 3. <u>N/A</u> 4. <u>N/A</u>
	Rear 1. <u>N/A</u> 2. <u>N/A</u> 3. <u>N/A</u> 4. <u>N/A</u>
Step Elevation Change - Kneeling (in)	N/A

ENGINE

Type	<input type="checkbox"/> C.I.	<input type="checkbox"/> Alternate Fuel	
	<input checked="" type="checkbox"/> S.I.	<input type="checkbox"/> Other (explain)	
Mfr. / Model No.	Ford Motor Company / 6.8 L		
Location	<input checked="" type="checkbox"/> Front	<input type="checkbox"/> Rear	<input type="checkbox"/> Other (explain)
Fuel Type	<input checked="" type="checkbox"/> Gasoline	<input type="checkbox"/> CNG	<input type="checkbox"/> Methanol
	<input type="checkbox"/> Diesel	<input type="checkbox"/> LNG	<input type="checkbox"/> Other (explain)
Fuel Tank Capacity (indicate units)	75 gallons		
Fuel Induction Type	<input checked="" type="checkbox"/> Injected	<input type="checkbox"/> Carburetion	
Fuel Injector Mfr. / Model No.	Ford Motor Company / 6.8 L		
Carburetor Mfr. / Model No.	N/A		
Fuel Pump Mfr. / Model No.	Ford Motor Company / 6.8 L		
Alternator (Generator) Mfr. / Model No.	Pentex / PX-5R		
Maximum Rated Output (Volts / Amps)	14 / 200		
Air Compressor Mfr. / Model No.	N/A		
Maximum Capacity (ft <sup>3</sup> / min)	N/A		
Starter Type	<input checked="" type="checkbox"/> Electrical	<input type="checkbox"/> Pneumatic	<input type="checkbox"/> Other (explain)
Starter Mfr. / Model No.	Eiston / 11000 12V		



Bus Number: 0302	Date: 1-3-03
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TRANSMISSION

Transmission Type	<input type="checkbox"/> Manual	<input checked="" type="checkbox"/> Automatic
Mfr. / Model No.	Ford Motor Company / E 40 D	
Control Type	<input checked="" type="checkbox"/> Mechanical	<input type="checkbox"/> Electrical <input type="checkbox"/> Other
Torque Converter Mfr. / Model No.	Ford Motor Company / E 40 D	
Integral Retarder Mfr. / Model No.	N/A	

SUSPENSION

Number of Axles	2		
Front Axle Type	<input type="checkbox"/> Independent	<input checked="" type="checkbox"/> Beam Axle	
Mfr. / Model No.	Ford Motor Co. / F8103010AA		
Axle Ratio (if driven)	N/A		
Suspension Type	<input type="checkbox"/> Air	<input checked="" type="checkbox"/> Spring	<input type="checkbox"/> Other (explain)
No. of Shock Absorbers	2		
Mfr. / Model No.	Motorcraft / F81D-18045-CB		
Middle Axle Type	<input type="checkbox"/> Independent	<input type="checkbox"/> Beam Axle	
Mfr. / Model No.	N/A		
Axle Ratio (if driven)	N/A		
Suspension Type	<input type="checkbox"/> Air	<input type="checkbox"/> Spring	<input type="checkbox"/> Other (explain)
No. of Shock Absorbers	N/A		
Mfr. / Model No.	N/A		
Rear Axle Type	<input type="checkbox"/> Independent	<input checked="" type="checkbox"/> Beam Axle	
Mfr. / Model No.	Spicer / 00022952		
Axle Ratio (if driven)	5.38		
Suspension Type	<input type="checkbox"/> Air	<input checked="" type="checkbox"/> Spring	<input type="checkbox"/> Other (explain)
No. of Shock Absorbers	2		
Mfr. / Model No.	Motorcraft / F81D-18080-CB		

Bus Number: 0302	Date: 1-3-03
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**WHEELS & TIRES**

Front	Wheel Mfr./ Model No.	Accuride / NA
	Tire Mfr./ Model No.	Goodyear G670 / 245/70R 19.5
Rear	Wheel Mfr./ Model No.	Accuride / NA
	Tire Mfr./ Model No.	Goodyear G670 / 245/70R 19.5

**BRAKES**

Front Axle Brakes Type	<input type="checkbox"/> Cam	<input checked="" type="checkbox"/> Disc	<input type="checkbox"/> Other (explain)
Mfr. / Model No.	Kelsey Hayes / KH130307		
Middle Axle Brakes Type	<input type="checkbox"/> Cam	<input type="checkbox"/> Disc	<input type="checkbox"/> Other (explain)
Mfr. / Model No.	N/A		
Rear Axle Brakes Type	<input type="checkbox"/> Cam	<input checked="" type="checkbox"/> Disc	<input type="checkbox"/> Other (explain)
Mfr. / Model No.	Kelsey Hayes / KH130307		
Retarder Type	N/A		
Mfr. / Model No.	N/A		

**HVAC**

Heating System Type	<input type="checkbox"/> Air	<input checked="" type="checkbox"/> Water	<input type="checkbox"/> Other
Capacity (Btu/hr)	65,000		
Mfr. / Model No.	Pro Air / #466		
Air Conditioner	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	
Location	Interior roof, front & rear.		
Capacity (Btu/hr)	120,000		
A/C Compressor Mfr. / Model No.	TAMA / TM-15HD/SANDAN 00706303071		

**STEERING**

Steering Gear Box Type	Hydraulic gear
Mfr. / Model No.	Ross / TAS 402292
Steering Wheel Diameter	15.5
Number of turns (lock to lock)	5.0

Bus Number: 0302	Date: 1-3-03
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OTHERS

Wheel Chair Ramps	Location: N/A	Type: N/A
Wheel Chair Lifts	Location: Right rear	Type: Platform
Mfr. / Model No.	Maxon / WL-6A	
Emergency Exit	Location: Windows Doors Roof hatches	Number: 5 1 3

CAPACITIES

Fuel Tank Capacity (gallons)	75
Engine Crankcase Capacity (quarts)	6
Transmission Capacity (quarts)	17.7
Differential Capacity (gallons)	4.5
Cooling System Capacity (quarts)	28.5
Power Steering Fluid Capacity (quarts)	2.4



## COMPONENT/SUBSYSTEM INSPECTION FORM

Bus Number: 0302	Date: 1-3-03
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Subsystem	Checked	Comments
Air Conditioning Heating and Ventilation	✓	
Body and Sheet Metal	✓	
Frame	✓	
Steering	✓	
Suspension	✓	Corrected body frame rubbing on rear suspension.
Interior/Seating	✓	
Axles	✓	
Brakes	✓	
Tires/Wheels	✓	
Exhaust	✓	
Fuel System	✓	
Power Plant	✓	
Accessories	✓	
Lift System	✓	
Interior Fasteners	✓	
Batteries	✓	

## CHECK - IN



## SUPREME CORPORATION MODEL TROLLEY TR 31



## **1.2 SERVICING, PREVENTIVE MAINTENANCE, AND REPAIR AND MAINTENANCE DURING TESTING**

### **1.2-I. TEST OBJECTIVE**

The objective of this test is to collect maintenance data about the servicing, preventive maintenance, and repair.

### **1.2.-II. TEST DESCRIPTION**

The test will be conducted by operating the NBM and collecting the following data on work order forms and a driver log.

1. Unscheduled Maintenance
  - a. Bus number
  - b. Date
  - c. Mileage
  - d. Description of malfunction
  - e. Location of malfunction (e.g., in service or undergoing inspection)
  - f. Repair action and parts used
  - g. Man-hours required
  
2. Scheduled Maintenance
  - a. Bus number
  - b. Date
  - c. Mileage
  - d. Engine running time (if available)
  - e. Results of scheduled inspections
  - f. Description of malfunction (if any)
  - g. Repair action and parts used (if any)
  - h. Man-hours required

The buses will be operated in accelerated durability service. While typical items are given below, the specific service schedule will be that specified by the manufacturer.

- A. Service
  1. Fueling
  2. Consumable checks
  3. Interior cleaning
  
- B. Preventive Maintenance
  4. Brake adjustments
  5. Lubrication
  6. 3,000 mi (or equivalent) inspection

7. Oil and filter change inspection
8. Major inspection
9. Tune-up

C. Periodic Repairs

1. Brake reline
2. Transmission change
3. Engine change
4. Windshield wiper motor change
5. Stoplight bulb change
6. Towing operations
7. Hoisting operations

### 1.2-III. DISCUSSION

Servicing and preventive maintenance were performed at manufacturer specified intervals. The following Scheduled Maintenance Form lists the mileage, items serviced, the service interval, and amount of time required to perform the maintenance. Table 1 is a list of the lubricating products used in servicing. Finally, the Unscheduled Maintenance List along with Unscheduled Maintenance related photographs is included in Section 5.7, Structural Durability. This list supplies information related to failures that occurred during the durability portion of testing. The Unscheduled Maintenance List includes the date and mileage at which the malfunction occurred, a description of the malfunction and repair, and the time required to perform the repair.



(Page 1 of 1)  
**SCHEDULED MAINTENANCE**  
 Supreme 0302

<b>DATE</b>	<b>TEST MILES</b>	<b>SERVICE</b>	<b>ACTIVITY</b>	<b>DOWN TIME</b>	<b>HOURS</b>
01-14-03	814	P.M. / Inspection	Linkage, tie rods, universals/u-joints all lubed; all fluids checked.	4.00	4.00
01-21-03	1,862	P.M. / Inspection	Linkage, tie rods, universals/u-joints all lubed; all fluids checked.	4.00	4.00
02-04-03	2,797	P.M. / Inspection	Linkage, tie rods, universals/u-joints all lubed; all fluids checked.	4.00	4.00
02-11-03	4,444	P.M. / Inspection	Linkage, tie rods, universals/u-joints all lubed; all fluids checked.	4.00	4.00
02-20-03	5,964	P.M. / Inspection	Linkage, tie rods, universals/u-joints all lubed; all fluids checked.	4.00	4.00
02-18-03	6,614	P.M. / Inspection	Linkage, tie rods, universals/u-joints all lubed; all fluids checked.	4.00	4.00
02-20-03	Final	P.M. / Inspection	Linkage, tie rods, universals/u-joints all lubed; all fluids checked.	4.00	4.00

**Table 1. STANDARD LUBRICANTS**

The following is a list of Texaco lubricant products used in bus testing conducted by the Penn State University Altoona Bus Testing Center:

<u>ITEM</u>	<u>PRODUCT CODE</u>	<u>TEXACO DESCRIPTION</u>
Engine oil	#2112	URSA Super Plus SAE 30
Transmission oil	#1866	Automatic Trans Fluid Mercon/Dexron II Multipurpose
Gear oil	#2316	Multigear Lubricant EP SAE 80W90
Wheel bearing & Chassis grease	#1935	Starplex II

## 2. RELIABILITY - DOCUMENTATION OF BREAKDOWN AND REPAIR TIMES DURING TESTING

### 2-I. TEST OBJECTIVE

The objective of this test is to document unscheduled breakdowns, repairs, down time, and repair time that occur during testing.

### 2-II. TEST DESCRIPTION

Using the driver log and unscheduled work order forms, all significant breakdowns, repairs, man-hours to repair, and hours out of service are recorded on the Reliability Data Form.

### CLASS OF FAILURES

Classes of failures are described below:

- (a) Class 1: Physical Safety. A failure that could lead directly to passenger or driver injury and represents a severe crash situation.
- (b) Class 2: Road Call. A failure resulting in an enroute interruption of revenue service. Service is discontinued until the bus is replaced or repaired at the point of failure.
- (c) Class 3: Bus Change. A failure that requires removal of the bus from service during its assignments. The bus is operable to a rendezvous point with a replacement bus.
- (d) Class 4: Bad Order. A failure that does not require removal of the bus from service during its assignments but does degrade coach operation. The failure shall be reported by driver, inspector, or hostler.

### 2-III. DISCUSSION

A listing of breakdowns and unscheduled repairs is accumulated during the Structural Durability Test. The following Reliability Data Form lists all unscheduled repairs under classes as defined above. These classifications are somewhat subjective as the test is performed on a test track with careful inspections every two hours. However, even on the road, there is considerable latitude on deciding how to handle many failures.

The Unscheduled Repair List is also attached to provide a reference for the repairs that are included in the Reliability Data Forms.

The classification of repairs according to subsystem is intended to emphasize those systems which had persistent minor or more serious problems. There were no Class 1 or 2 failures. Of the eight Class 3 failures, six involved the suspension system and one each with the brakes and transmission. These, and the remaining four Class 4 failures are available for review in the Unscheduled Maintenance List, located in Section 5.7 Structural Durability.

### RELIABILITY DATA FORMS

Bus Number: 0302	Date: 2-20-03
Personnel: Bob Reifsteck	

Failure Type			
Class 4 Bad Order	Class 3 Bus Change	Class 2 Road Call	Class 1 Physical Safety

Subsystems	Mileage	Mileage	Mileage	Mileage	Man Hours	Down Time
Suspension	0				0.25	0.25
		0			0.50	0.50
	0				0.50	0.50
		1,491			0.50	0.50
		3,326			0.50	0.50
		3,907			0.50	0.50
		4,209			1.00	1.00
		5,128			0.50	0.50
Brakes		1,862			3.00	3.00
Doors	5,985				3.00	3.00
Engine/Transmission		1,862			2.00	2.00
Exhaust	0				0.25	0.25

## 5.7 STRUCTURAL DURABILITY TEST

### 5.7-I. TEST OBJECTIVE

The objective of this test is to perform an accelerated durability test that approximates up to 25 percent of the service life of the vehicle.

### 5.7-II. TEST DESCRIPTION

The test vehicle is driven a total of 200,000 miles; approximately 5,000 miles on the PSBRTF Durability Test Track and approximately 2,500 miscellaneous other miles. The test will be conducted with the bus operated under three different loading conditions. The first segment will consist of approximately 3,000 miles with the bus operated at GVW. The second segment will consist of approximately 1,500 miles with the bus operated at SLW. The remainder of the test, approximately 3,000 miles, will be conducted with the bus loaded to CW. If GVW exceeds the axle design weights, then the load will be adjusted to the axle design weights and the change will be recorded. All subsystems are run during these tests in their normal operating modes. All recommended manufacturers servicing is to be followed and noted on the vehicle maintainability log. Servicing items accelerated by the durability tests will be compressed by 10:1; all others will be done on a 1:1 mi/mi basis. Unscheduled breakdowns and repairs are recorded on the same log as are any unusual occurrences as noted by the driver. Once a week the test vehicle shall be washed down and thoroughly inspected for any signs of failure.

### 5.7-III. DISCUSSION

The Structural Durability Test was started on January 7, 2003 and was conducted until February 20, 2003. The first 3,000 miles were performed at a GVW of 19,260 lbs. The number of standing passengers was reduced from 26 to 0 and seated passengers from 29 to 25. The ballast for all 26 standing passengers and 4 seated passengers (30 passengers total) was eliminated. This reduction in weight was necessary to avoid exceeding GAWR (7,000 lbs) of the front axle and (13,500 lbs) of the rear axle. The GVW segment was completed on February 3, 2003. The next 1,500 mile SLW segment was performed at 19,260 lbs and completed on February 11, 2003. Note; the SLW segment was performed with the ballast for the four front seated passengers removed. The final 3,000 mile segment was performed at a CW of 15,530 lbs and completed on February 20, 2003.

The following mileage summary presents the accumulation of miles during the Structural Durability Test. The driving schedule is included, showing the operating duty cycle. A detailed plan view of the Test Track Facility and Durability Test Track are attached for reference also, a durability element profile detail shows all the measurement of the different conditions. Finally, photographs illustrating some of the failures that were encountered during the Structural Durability Test are included.

**SUPREME - TEST BUS #0302**  
**MILEAGE DRIVEN/RECORDED FROM DRIVERS' LOGS**

DATE	TOTAL DURABILITY TRACK	TOTAL OTHER MILES	TOTAL
01/06/03 TO 01/12/03	328.00	67.00	395.00
01/13/03 TO 01/19/03	896.00	244.00	1140.00
01/20/03 TO 01/26/03	264.00	63.00	327.00
01/27/03 TO 02/02/03	328.00	70.00	398.00
02/03/03 TO 02/09/03	934.00	853.00	1787.00
02/10/03 TO 02/16/03	1082.00	175.00	1257.00
02/17/03 TO 02/23/03	691.00	135.00	826.00
02/24/03 TO 03/02/03	477.00	895.00	1372.00
<b>TOTAL</b>	<b>5000.00</b>	<b>2502.00</b>	<b>7502.00</b>

Table 4. Driving Schedule for Bus Operation on the Durability Test Track.

STANDARD OPERATING SCHEDULE		
Monday through Friday		
	HOUR	ACTION
Shift 1	midnight	D
	1:40 am	C
	1:50 am	B
	2:00 am	D
	3:35 am	C
	3:45 am	B
	4:05 am	D
	5:40 am	C
	5:50 am	B
	6:00 am	D
	7:40 am	C
Shift 2	7:50 am	F
	8:00 am	D
	9:40 am	C
	9:50 am	B
	10:00 am	D
	11:35 am	C
	11:45 am	B
	12:05 pm	D
	1:40 pm	C
	1:50 pm	B
	2:00 pm	D
Shift 3	3:40 pm	C
	3:50 pm	F
	4:00 pm	D
	5:40 pm	C
	5:50 pm	B
	6:00 pm	D
	7:40 pm	C
	7:50 pm	B
	8:05 pm	D
	9:40 pm	C
	9:50 pm	B
10:00 pm	D	
11:40 pm	C	
11:50 pm	F	

B—Break

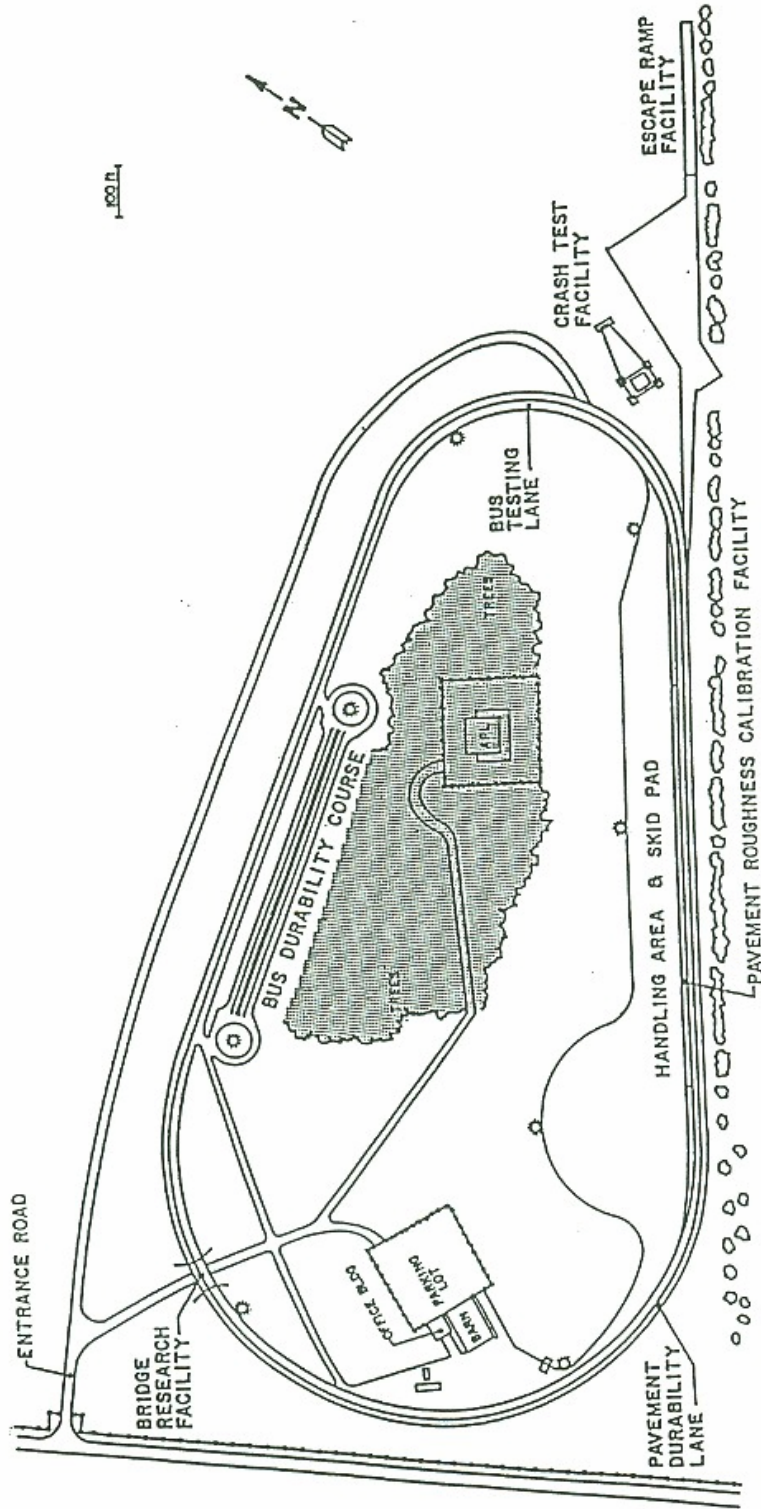
C—Cycle all systems five times, visual inspection, driver's log entries

D—Drive bus as specified by procedure

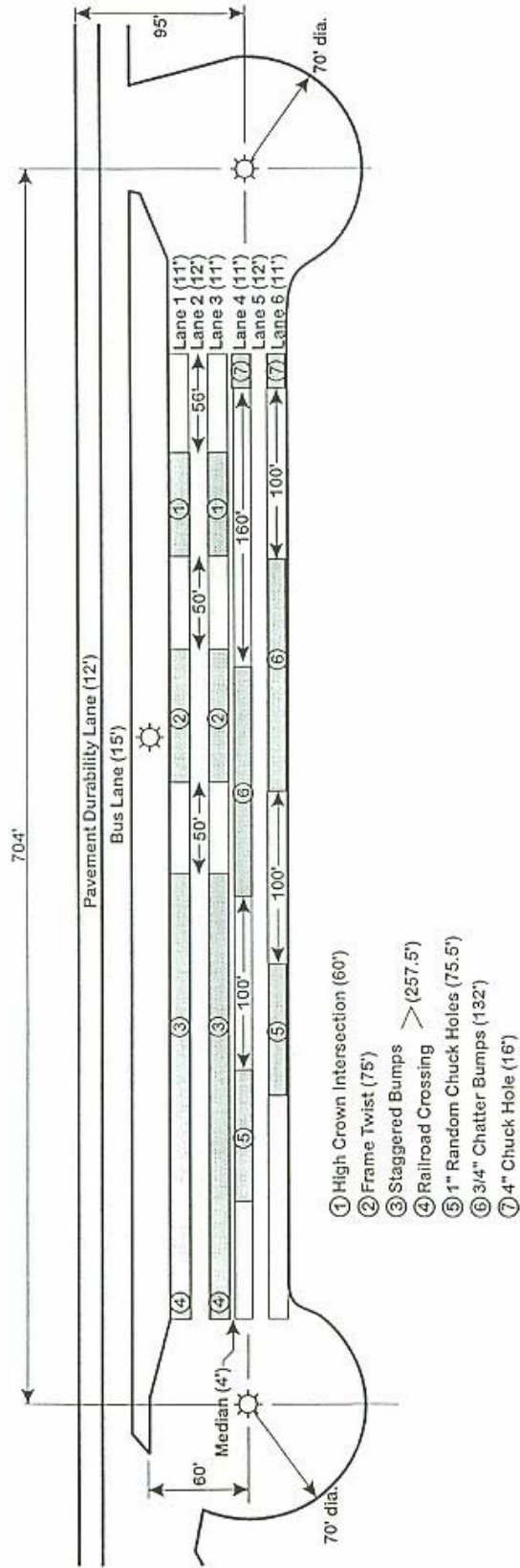
F—Fuel bus, complete driver's log shift entries



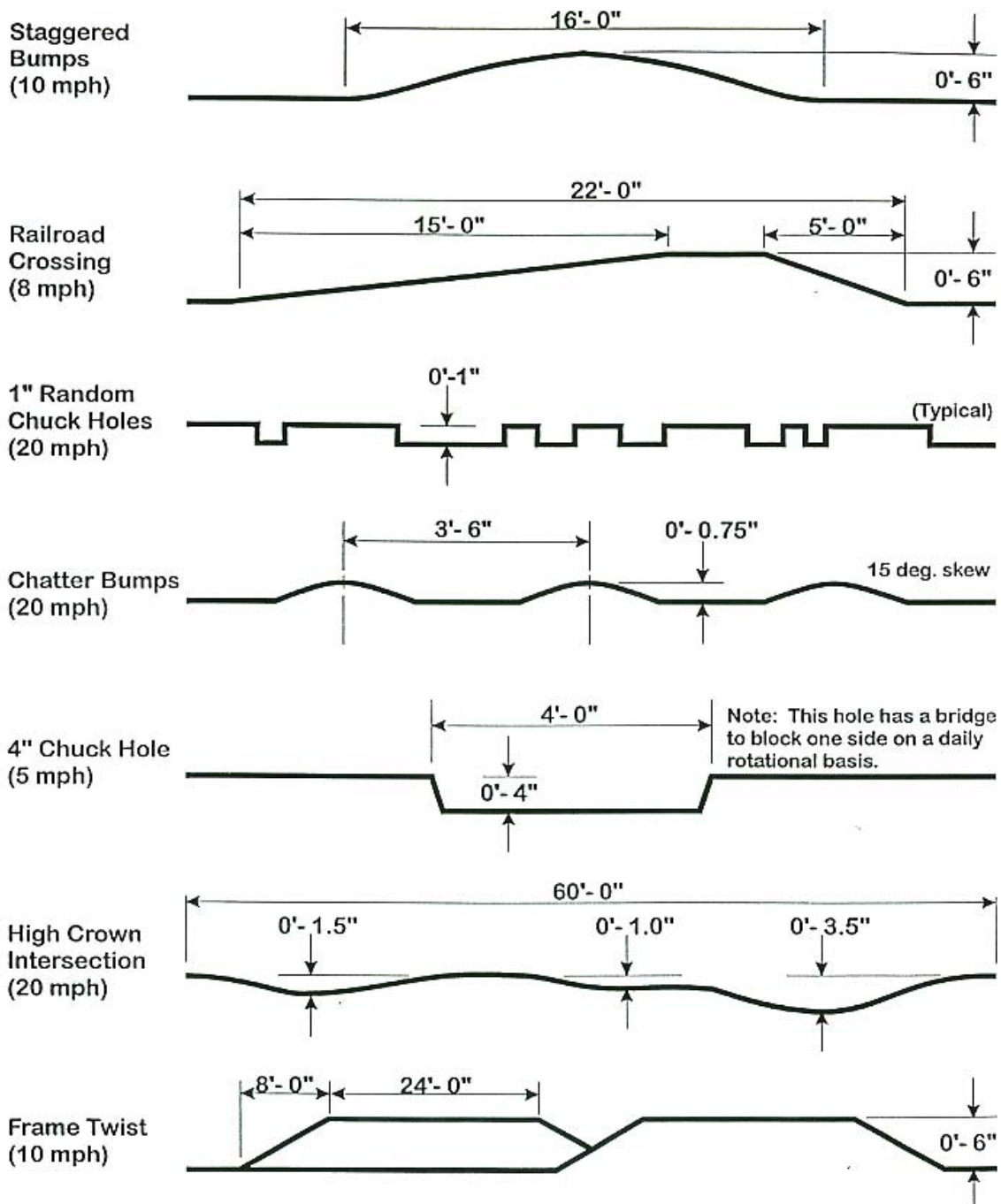
# “PLAN VIEW OF PENN STATE BUS TESTING AND RESEARCH FACILITY”



BUS TESTING AND RESEARCH TEST TRACK  
UNIVERSITY PARK, PA



Plan View  
**Vehicle Durability Test Track**  
 The Pennsylvania Transportation Institute  
 Penn State



## Durability Element Profiles

The Pennsylvania Transportation Institute  
 Penn State

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**UNSCHEDULED MAINTENANCE**  
 Supreme 0302

<b>DATE</b>	<b>TEST MILES</b>	<b>SERVICE</b>	<b>ACTIVITY</b>	<b>DOWN TIME</b>	<b>HOURS</b>
01-04-03	0	The left front shock is leaking oil.	Left front shock replaced.	0.25	0.25
01-04-03	0	The left mounting bolt on the rear sway bar is broken.	Bolt replaced.	0.50	0.50
01-04-03	0	The nut is off the front eye bolt of the left rear spring.	Front eye bolt and nut replaced.	0.50	0.50
01-04-03	0	The tailpipe hanger is broken.	Tailpipe hanger replaced.	0.25	0.25
01-17-03	1,491	The right sway bar link stud is broken on the rear sway bar.	Broken stud, bolt, and nut replaced.	0.50	0.50
01-22-03	1,862	The transmission will go into "Park" but the shift lever will not lock in place.	Disassembled steering column and replaced missing shift detent with a roll pin.	2.00	2.00
01-22-03	1,862	The "parking brake" is inoperative.	Brake shoes replaced.	3.00	3.00
02-05-03	3,326	The upper mounting bolt is broken on the right front shock.	Broken bolt replaced.	0.50	0.50

(Page 2 of 2)  
**UNSCHEDULED MAINTENANCE**  
 Supreme 0302

<b>DATE</b>	<b>TEST MILES</b>	<b>SERVICE</b>	<b>ACTIVITY</b>	<b>DOWN TIME</b>	<b>HOURS</b>
02-07-03	3,907	The left sway bar link bolt is broken on the rear sway bar.	Bolt and nut replaced.	0.50	0.50
02-10-03	4,209	The left sway bar link bolt is broken on the rear sway bar.	Bolt and nut replaced.	1.00	1.00
02-14-03	5, 128	The right sway bar link bolt on the rear sway bar is missing.	Realigned sway bar and installed new bolt and nut.	0.50	0.50
02-21-03	5,985	The entrance doors are loose at the lower pivots.	Cracks at both corners of the step-well welded/repared. Angle steel added for reinforcement.	3.00	3.00

