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16. Abstract

This study was conducted to examine existing conditions at Virginia's interstate rest areas and welcome centers and to assess what impact additional services, such as vending machines, might have on the service delivery of these facilities. A selected sample of seven rest areas and four welcome centers were visited in October 1986, May 1987, and August 1987 for a 1- to 2-day period for the purpose of obtaining data. Traffic counts, vehicle occupancy, length of stay, restroom and amenity usage, and parking lot occupancy rates were all recorded. Videotapes were made to record general condition. Stopping motorists were asked to respond to a mailback survey, and interviews were conducted with rest area custodians. The impact of vending machines, which were installed at 7 sites in May 1987, was also assessed. The study generally revealed that the interstate traveler is quite dependent on rest areas and welcome centers. It also pointed out the need for additional and refurbished facilities in Virginia, especially with respect to women's restrooms. Vending machines were found to be enthusiastically received by the public, to generate approximately 30 percent more refuse but little in the way of litter, to incur some vandalism but only while attendants were not on duty, and to generate a substantial amount of revenue for the VDOT and Virginia State Department for the Visually Handicapped.

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AN EXAMINATION OF THE OPERATION AND MOTORIST USAGE OF VIRGINIA'S HIGHWAY REST AREAS AND WELCOME CENTERS

by

Michael A. Perfater
Research Scientist

(The opinions, findings, and conclusions expressed in this report are those of the author and not necessarily those of the sponsoring agencies.)

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BACKGROUND, PURPOSE, AND SCOPE

The origin of today's rest area system was a provision in the Federal-Aid Highway Act of 1938 that stated "the States with the aid of Federal Funds may include . . . such sanitary and other facilities as may be deemed necessary to provide for the suitable accommodation of the public . . . ." The intent of the Act was to increase motorist safety and comfort by providing facilities for stopping and resting. Subsequent Federal-Aid Highway Acts, the Highway Trust Fund, and the Highway Beautification Act of 1965 gave authority, funding, and substance to the rest area program. Ultimately, each state prepared a master plan for the development of rest areas. The primary guidelines used to prepare these plans were the Federal Highway Administration's (FHWA) "Instructions for Highway Beautification Cost Estimate," the 1968 AASHTO "Guide on Safety at Rest Areas," and FHWA Policies and Procedures memoranda 80-1 and 90-3.

Using these guidelines, the Virginia Department of Highways developed a master plan for the inclusion of rest areas in the design and construction of Virginia's interstate highway system. Working with the FHWA and the Virginia Fine Arts Committee, the Department established sites and building designs for these facilities. All of the facilities contained parking areas as well as specific amenities such as picnic tables, drinking fountains, trash receptacles, and walkways centered around brick buildings containing restrooms. At the state borders, these buildings were combined with tourist information centers operated by the Virginia Department of Economic Development's Division of Tourism.

During the 1970s, as interstate construction neared completion and additional rest areas were added, particular attention was paid to landscaping and the addition of amenities such as picnic areas, pet rest areas, cooking grills, hiking trails, and play areas for children. Rest areas have become an integral part of Virginia's interstate system and are deemed by both planners and motorists to be important to the safety and comfort of the highway traveler.

Rest areas and welcome centers in Virginia were designed and constructed to meet the needs of travelers based on 20-year traffic projections. Since most of them were built during the late 1960s or early 1970s, many have been, or very shortly will have been, in operation for 20 years. During this period, traffic speeds and conditions as well as vehicle types and sizes have changed. Driving habits have also changed owing to the increased mobility of certain segments of the population such as senior citizens, the handicapped, and young families. These factors have resulted in demands for additional services at these facilities. In

order to assess both the current conditions at Virginia's 28 interstate rest areas and 9 welcome centers and how they measure up to the needs of the traveling public, the study reported herein was undertaken.

The purpose of this study was to determine baseline conditions for the safe and efficient operation of Virginia's interstate rest areas. The following objectives were established:

1. To determine the frequency of motorist use of rest area amenities such as restrooms, picnic areas, telephones, and other site-specific facilities.

2. To determine the numbers of the various classes of vehicles that enter rest areas as well as the numbers of individuals in those vehicles.

3. To determine the average length of stay for the various classes of vehicles that stop at rest areas.

4. To document the adequacy of parking for the various classes of vehicles using rest areas.

5. To determine motorists' opinions, attitudes, and perceived needs of Virginia's rest area system.

6. To document the condition and general aesthetics of rest area facilities and grounds.

7. To document special problems or site-specific conditions at rest areas.

METHODOLOGY

The study consisted, for the most part, of fact-finding visits to a selected sample of Virginia's rest areas and welcome centers. Since manpower and funding limitations did not permit an evaluation of all such sites in the Commonwealth, the author chose a representative sample of the 28 interstate rest areas and 9 welcome centers shown in Figure 1 that are currently in operation. The sample was selected so as to include sites with certain specific characteristics and facilities. Mainline traffic volume was considered to assure evaluation of both low and high volume rest areas. Geographical location, physical condition, and other site-specific features were also considered in the sample selection process.

The 11 sites chosen for evaluation, 4 of which are combination rest areas and welcome centers, are shown in Table 1. At each site, the following tasks were performed by a 5-member study team for a 2-day period in the fall of 1986, for a 1-1/2 day period during the spring of 1987, and for a 1-day period during the summer of 1987:

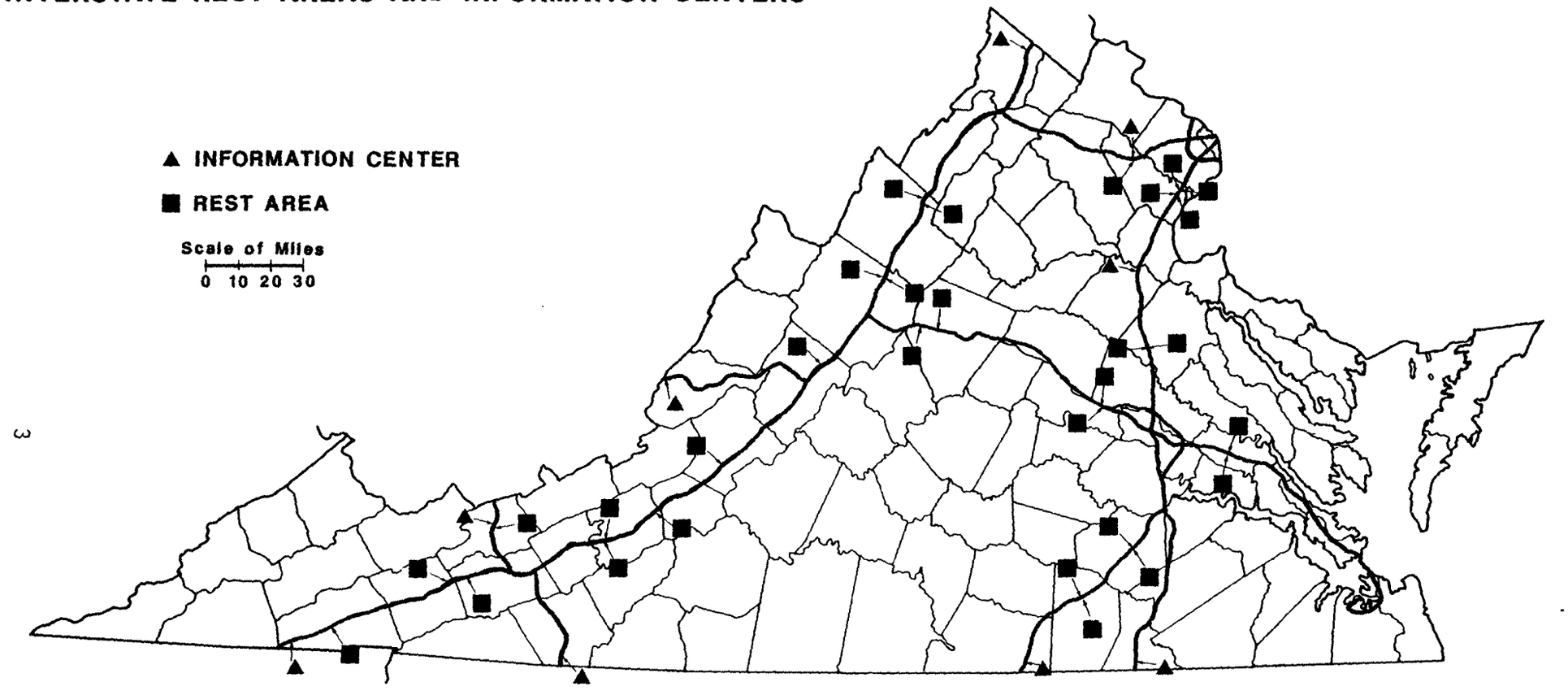
COMMONWEALTH OF VIRGINIA
INTERSTATE REST AREAS AND INFORMATION CENTERS
▲ INFORMATION CENTER
■ REST AREA
Scale of Miles
0 10 20 30

Figure 1.

800

Table 1

Rest Area Sample Sites

Site #	Classification	Year Built	Location
1	Rest Area	1968	I-81 SBL .8 mi S of Rt 177 near Radford
2	Rest Area	1979	I-81 NBL .9 mi N of Rt 603 near Ironto
3	Welcome Center	1965	I-95 NBL .1 mi N of VA/NC state line
4	Welcome Center	1966	I-85 NBL .7 mi N of VA/NC state line
5	Rest Area	1977	I-64 EBL 2.4 mi E of Rt 609 near New Kent
6	Rest Area	1977	I-64 WBL 1.1 mi W of Rt 155 near New Kent
7	Rest Area	1965	I-95 NBL 3.4 mi N of Rt 207 near Ladysmith
8	Rest Area	1965	I-95 SBL 2.6 mi S of Rt 609 near Ladysmith
9	Welcome Center	1968	I-95 SBL 1.8 mi S of Rt 17 near Fredericksburg
10	Rest Area	1965	I-66 EBL 1.5 mi E of Rt 234 near Manassas
11	Welcome Center	1965	I-66 WBL .3 mi W of Bull Run

1. Twenty-four-hour traffic counts were made at rest area entrance ramps. These counts were usually made for seven days unless interrupted by malfunctioning or damaged counter hoses and included the number of vehicles entering both the passenger car and truck lots.

2. Length of stay was computed for all vehicles entering rest areas during daylight hours. This was accomplished by placing one member of the study team each at the entrance and exit ramp of the rest area to note the license plate number of and time that vehicles entered and exited. This information was keyed into an IBM Convertible Model 2 lap-top computer. A program was written to identify matching license plate numbers and to compute the length of time the vehicle having that number remained at the rest area. The study team also noted the number of occupants in the vehicle and whether it was from Virginia or out-of-state.

3. Frequency of use of rest area facilities such as restrooms, picnic tables and grills, telephones, and other site-specific amenities were documented. In addition, hourly counts were made of the occupancy of both passenger car and truck parking lots.

4. A videotape was made of rest areas in the sample to record the physical condition, parking layout, and overall activity at each. In addition, the outside shoulder of the mainline two miles downstream from each site was videotaped to record the accumulation of litter.

5. Special problems, conditions, and evidences of vandalism were also documented. This was accomplished through on-site observations and inspections as well as discussions with the Department's rest area custodial staff.

6. Pre-stamped, mail-back questionnaires were distributed to motorists using the rest area facilities. The questionnaires contained both site-specific questions as well as ones that sought to ascertain motorists' stopping habits, frequency of use of the rest area system, and overall opinion of it.

In addition to the site evaluation, the author perused the published literature on rest areas, visited those in several other states and maintained contact with individuals conducting research on this subject. Continuous communication was also maintained with the Department's Maintenance and Environmental Divisions regarding their role in rest area planning, design, and maintenance as well as with the resident engineers in whose jurisdictions the 11 sample sites are located. In addition, information was obtained from Division of Tourism managers and employees who oversee the operation of welcome centers.

SERVICE DELIVERY CHARACTERISTICS OF SAMPLE SITES

Traffic Volumes

Rest areas and welcome centers were visited between the hours of 8 A.M. and 5 P.M. on weekdays for the purpose of gathering data. The 7-day, 24-hour traffic volume counts were made just prior to these visits. Table 2 presents a profile of the vehicles entering the rest areas and welcome centers for the three periods corresponding to the data gathering visits. For passenger car traffic, volumes were, on average, highest in the rest areas during the fall of 1986. The busiest was site 7, which is adjacent to I-95 northbound in Caroline County. Site 10, which is adjacent to the eastbound portion of I-66 near Manassas, did not have nearly the increased volume of traffic during the summer as did the other six rest areas. This is probably because traffic along this route tends to be commuter rather than through traffic. As the table shows, with the exception of the I-66 and I-95 southbound sites, the highest volume of traffic occurred during the summer. The welcome center sites show a similar pattern. Traffic volume remains fairly consistent at the I-66 welcome center (again a commuter oriented facility) and tends to be highest at the remaining sites during the summer season. Using VDOT mainline traffic counts as a basis, an average of about 12 percent of the mainline passenger cars can be expected to stop at rest areas. This number will, of course, be dependent on several variables, including proximity to other rest areas, location (welcome centers at state borders tend to attract a slightly higher volume of passenger car traffic), and facilities offered.

Table 2

Average Daily Car and Truck Traffic Volume
at Rest Areas and Welcome Centers

Site Type	Location	Site #	Cars*			Trucks**		
			Fall 86	Spring 87	Summer 87	Fall 86	Spring 87	Summer 87
RA	I-81 SB	1	1,079	553	854	565	604	577
RA	I-81 NB	2	1,073	775	1,125	342	363	399
RA	I-64 EB	5	2,104	1,499	2,532	244	282	349
RA	I-64 WB	6	1,977	1,396	2,175	325	315	396
RA	I-95 NB	7	2,855	2,175	2,636	491	561	642
RA	I-95 SB	8	1,674	1,121	1,540	361	410	461
RA	I-66 EB	10	1,425	1,466	988	267	309	488
Average			1,741	1,370	1,693	371	406	487
WC	I-95 NB	3	1,027	692	1,084	125	191	234
WC	I-85 NB	4	1,760	1,665	2,357	212	311	319
WC	I-95 SB	9	2,269	1,698	2,194	453	405	499
WC	I-66 WB	11	1,304	1,343	1,328	500	391	501
Average			1,590	1,370	1,740	323	325	388

*Passenger cars and light trucks.
**All vehicles entering truck parking areas including buses and recreational vehicles.

Truck traffic volume, like that of passenger cars, tended to be slightly higher during the summer, although the variance was not as great. The highest truck traffic volume was found at site no. 1 on I-81 south of Radford, followed closely by site no. 7 on I-95 in Caroline County. The percentage of mainline trucks entering rest areas was found to be higher than that for passenger cars. An average of 20.8 percent of the mainline trucks stopped at the eleven sites. This percentage varied from 44.6 percent to 10.4 percent and was the highest at the I-64 and I-66 sites. This latter figure is probably due to the lack of commercial truck facilities on both of these routes.

Vehicle Occupancy Rates

Research team members stationed at the exit ramps documented the occupancy of entering vehicles. These manual counts were made between the hours of 8 A.M. and 5 P.M. on weekdays during the three seasonal data-gathering visits mentioned earlier. This exercise included approximately 36 hours of observation at each of the 11 sites. Table 3 shows the average occupancy rates for entering vehicles for all seasons. Numbers in parentheses represent the number of vehicles for which the occupancy was documented. These numbers represent approximately 40 percent of the vehicles that entered during the data-gathering periods.

Table 3

Occupancy Rates of Vehicles Entering
Rest Areas and Welcome Centers

Vehicle Type	Rest Areas	Welcome Centers
Passenger Cars (10,256)	1.80	1.90
Light Trucks (455)	1.25	1.30
Tractor-Trailers (1,688)	1.05	1.05
Recreational Vehicles (424)	2.05	2.10
Buses (50)	24.00	28.60
Motorcycles (74)	1.20	1.30

Occupancy rates for all classes of vehicles are slightly higher during the summer than in the spring and fall. On average, buses and passenger cars contain 18 percent and 12 percent, respectively, more occupants in the summer than the fall and spring.

Length of Stay

In order to determine the duration of the rest area visit of vehicles at sample sites, a member of the research team was stationed at the entrance ramp equipped with a lap-top computer, to log the license plate number, classification, and entry time of each vehicle entering the rest area. Another member of the research team entered the same data as each

vehicle left the rest area. Using a computerized method by which license plates of the entering vehicles were matched with those of the exiting vehicles, the researcher was able to determine the duration of the rest area visit by vehicle class. The license plate identification procedure also included a notation as to whether the vehicle was from Virginia or out-of-state. Table 4 provides length-of-stay information for all classes of vehicles. Numbers in parentheses represent the number of vehicles for which license plate matches were achieved. As the table shows, vehicles that tend to remain the longest at rest areas are the larger ones, specifically tractor-trailers, recreational vehicles, and buses. Tractor-trailers and recreational vehicles tend to remain longer at rest areas than welcome centers, whereas the opposite is true for passenger cars. The table also shows that all classes of vehicles, with the exception of buses, tend to remain at rest areas and welcome centers longer in the summer than any other season. For example, for the 6,300 passenger cars for which license plate matches were achieved, the average length of stay was 9.1 minutes. In the summer, this stay was extended to almost 10 minutes. The data also show that the length of stay of double tractor-trailers does not vary much by season, though they tend to spend 30 to 50 percent less time at welcome centers than at rest areas.

In-State/Out-of-State Ratio

The license plate retrieval process also enabled the researcher to gather information regarding the in-state versus out-of-state mix of vehicles entering rest areas. Table 5 shows that the ratio of in-state versus out-of-state passenger cars is essentially identical for rest areas and welcome centers. Seasonal variations from this trend were minimal for all vehicle types except for passenger cars. As one might expect, during the spring and summer travel seasons, welcome centers had a higher influx of out-of-state users while rest areas tended to attract more in-state passenger cars. This phenomenon is probably indicative of the fact that during these seasons, out-of-state travelers tend to stop at the state's borders to obtain travel information, while in-state motorists have a tendency to need only "comfort" facilities that are available in a rest area. This presumption will be discussed further in the section of this report that presents the results of the survey of rest area and welcome center users.

Parking Lot Occupancy

In order to assess the adequacy of parking facilities at each of the subject sites, the number of spaces in all lots was inventoried. All sites contained at least one or more separate lot(s) for trucks and passenger cars. Between 8 A.M. and 5 P.M., hourly counts were made of the vehicles occupying these lots. None of the lots was at capacity at the time these counts were made. System-wide, the truck lots were, on average, at 41 percent of capacity and the passenger car lots were at 32 percent of capacity daily. Welcome center lots exceeded this average by 4 percent and 10 percent, respectively. As one might expect, summer travel raised these occupancy rates some, especially for the passenger car lots; but these increases also were meager--on average, less than 5 percent.

Table 4

Length of Stay at Sample Sites
(In Minutes)

Vehicle Classification	Fall Rest Areas	Fall Welcome Centers	Spring Rest Areas	Spring Welcome Centers	Summer Rest Areas	Summer Welcome Centers	Total Rest Areas	Total Welcome Centers
Passenger Cars	8.64 (2645)*	9.87 (1699)	8.92 (1732)	11.26 (1250)	9.87 (1826)	11.77 (1007)	9.10 (6300)	10.80 (3956)
Light Trucks	11.49 (154)	18.80 (55)	10.62 (86)	13.04 (41)	13.14 (77)	12.59 (42)	11.70 (317)	15.20 (138)
Tractor-Trailers	14.92 (517)	11.97 (213)	18.79 (347)	15.23 (145)	16.85 (302)	16.39 (118)	16.70 (1166)	14.10 (476)
Double Trailers	10.86 (15)	7.42 (5)	10.44 (9)	5.50 (2)	10.09 (14)	10.00 (1)	10.50 (38)	7.30 (8)
Rec. Vehicles	13.94 (96)	17.87 (108)	17.75 (53)	18.51 (64)	16.50 (65)	17.03 (38)	14.80 (214)	17.90 (210)
Buses	19.06 (19)	15.23 (12)	15.46 (9)	17.48 (6)	11.50 (4)	— (0)	17.10 (32)	16.00 (18)
Motorcycles	10.46 (20)	12.74 (15)	9.14 (7)	21.14 (7)	11.60 (18)	20.00 (8)	11.00 (44)	16.60 (30)

*numbers in parentheses ( ) represent matched license plate occurrences.

Table 5

In-State Versus Out-of-State Proportion of
Vehicles Entering Rest Areas & Welcome Centers
(by percentage)

Vehicle Classification	Welcome Centers		Rest Areas	
	In-State	Out-of-State	In-State	Out-of-State
Passenger Cars	42.5	57.5	41.5	58.5
Light Trucks	59.8	40.2	51.5	48.5
Tractor-Trailers	16.9	83.1	25.4	74.6
Double Trailers	25.0	75.0	0	100.0
Rec. Vehicles	9.8	90.2	8.6	91.4
Buses	53.9	46.1	18.2	81.8
Motorcycles	38.6	61.4	46.7	53.3

During the initial stages of this study, there was some conjecture, based partially on the personal experiences of members of the research team and partially on hearsay, that parking areas at some rest areas in the Commonwealth were, during certain periods, inadequate to meet demand. Although the research team was not able to personally document these occurrences, there was some evidence that during certain specified periods, parking demand exceeded capacity. Photographs taken prior to 8 A.M. by rest area custodians revealed trucks parked along the exit ramps and even on the mainline at some sites. These individuals attested to the fact that such occurrences were not infrequent, especially between 10 P.M. and dawn and attributed them to the tendency for truckers to ignore the two-hour parking limitation currently in effect at all rest areas and welcome centers in the Commonwealth. Although length-of-stay data were not accumulated during nocturnal hours, the researcher received sufficient commentary from truck drivers, motorists, and VDOT staff to support the custodians' claim that truck drivers are reluctant to heed the two-hour limit, especially at night. Enforcement of the two-hour limit is difficult especially since it does not have a high priority with the Virginia State Police. Increasing or removing it completely might only magnify the problem. While larger truck parking lots or separate "trucks only" rest areas are viable options, the availability and cost of land adjacent to the interstate renders either of these alternatives a costly one.

Some overcrowding in the passenger car and truck parking lots also occurred on weekends and/or holidays. Although data were not gathered during these periods, random visits to selected sites revealed some parking capacity problems in the passenger car lots. Unlike the truck situation, these occurrences appeared to be the result of the shear numbers of vehicles entering rest areas during peak periods rather than from nonobservance of the two-hour parking limit. Instances of demand exceeding capacity in these cases were rare, however. There were isolated instances of shoulder parking observed and some queuing for parking

spaces. However, in the opinion of this researcher, such occurrences did not present a significant safety problem in those areas where it was observed.

Perhaps a description of peak periods should be included here both for the benefit of those readers who are interested in such items and because they have a bearing on parking lot capacity. Table 6 provides a detailed look at the peak hours and days at the sites visited. For passenger cars the peak days tend to be Saturday in the fall, Sunday in the spring, and either Friday, Saturday, or Sunday in the summer. Peak hours for these days vary. On Saturdays peak hours are usually between 8:15 A.M. and mid-day. Sunday peak hours are usually between noon and 5:00 P.M., and Friday peak periods tend to be between mid-morning and noon. On the other hand, peak periods for the truck lots (which includes all vehicles entering the truck lots) vary. For all seasons, peak periods for truck lots usually occur on weekdays during the middle of the week. Interestingly, even though the truck category included recreational vehicles and buses, Saturday was never a peak day for the truck lots.

Amenity Usage

Rest areas and welcome centers provide a variety of amenities for use by the motoring public including restrooms, paved walkways, benches, drinking fountains, and pay telephones. Many include rest areas for pets, vending machines, and recreational facilities, and most include picnic tables, many of which are covered, and cooking grills. In addition, rest areas contain a display of the map of Virginia, while welcome centers are staffed by individuals who provide maps and other tourist information.

An attempt was made to determine the degree to which the aforementioned facilities are used by the public. The amenities used most often by most travelers are the restrooms. On average, about 66 passenger vehicles and 16 trucks and recreational vehicles enter rest areas and welcome centers hourly. Applying the occupancy rates mentioned previously in this report, this amounts to roughly 141 people per hour. Of these, an average of 87, or 62 percent, typically use the restroom facilities. Table 7 shows the system-wide use of restroom facilities for all sites observed. These frequencies are roughly 40 percent higher during the summer season and are even higher on weekends and holidays. As shown in the table, the greatest percentage of restroom users are males. Regardless of this fact, observations at most sites revealed that long lines outside women's restrooms were typical during peak stopping periods (Figure 2). According to many of the rest area custodians, this phenomenon becomes pronounced on weekends and holidays. Studies have shown that the length of stay for women in restrooms is longer than that for men. Although this phenomenon has been attributed to several factors, the most likely reason is that the use of urinals speeds things up. If this is true (and one would assume it is), women's restrooms in rest areas may need to contain more comfort facilities than the men's restrooms. Also, given the fact that many rest areas contain three restrooms (typically one is being cleaned while the other two are in service), opening two restrooms simultaneously to women is one means of alleviating any overcrowding that may occur during busy periods. In the late 1960s,

Table 6

Passenger Car Lot and Truck Lot Peak Day and Hour Volumes
For Sample Rest Area and Welcome Center Sites by Season

		Fall				Spring				Summer			
		Cars[1]		Trucks[2]		Cars[1]		Trucks[2]		Cars[1]		Trucks[2]	
Site/Type	Period	Count		Count		Count		Count		Count		Count	
#1/RA	Day - Sat.	1,567	Tue.	732		Sat.	802	Thu.	738	Sat.	1,042	Thu.	665
	Hour-12:15P*	128	7:45P	52		12:00P	84	1:45P	55	10:15P	98	12:15P	51
#2/RA	Day - Mon.	1,491	Mon.	492		Sun.	902	Sun.	468	Fri.	1,344	Sun.	477
	Hour-2:00P	149	2:30P	47		1:30P	85	2:45P	36	12:00P	139	3:45P	46
#3/WC	Day - Fri	1,357	Wed.	181		Sun.	970	Tue.	246	Fri.	1,510	Wed.	309
	Hour-12:00P	111	2:00P	27		1:15P	91	10:15A	22	12:00P	147	5:15P	30
#4/WC	Day - Sat.	2,322	Wed.	239		Sat.	1,949	Tue.	366	Sun.	2,856	Tue.	410
	Hour-3:15P	239	12:30P	24		10:30A	201	11:00A	34	1:30P	246	3:15P	30
#5/RA	Day - Sat.	3,074	Fri.	363		Sun.	2,118	Wed.	417	Fri.	3,644	Thu.	490
	Hour-9:15A	286	11:00A	28		5:15P	200	10:15A	57	10:00A	293	10:30A	36
#6/RA	Day - Sat.	2,696	Thu.	406		Sun.	2,113	Tue.	384	Sun.	3,461	Wed.	523
	Hour-10:00A	260	2:00P	44		1:30P	230	10:00A	37	1:45P	326	1:30P	46
#7/RA	Day - Mon.	3,704	Thu.	746		Sun.	3,018	Mon.	742	Sun.	3,607	Thu.	824
	Hour-2:30P	308	9:00A	52		12:00P	253	12:15A	50	12:45P	272	12:15A	54
#8/RA	Day - Sat.	2,845	Wed.	555		Sat.	1,628	Wed.	563	Sat.	2,627	Wed.	567
	Hour-8:15A	222	3:00P	40		10:30A	165	9:30P	43	10:45A	254	1:45P	37
#9/WC	Day - Sat.	3,659	Wed.	632		Sat.	2,346	Fri.	477	Sat.	2,972	Thu.	575
	Hour-10:30A	266	10:45A	44		9:15A	230	5:15A	33	10:30A	251	12:15A	40
#10/RA	Day - Sun.	1,877	Wed.	348		Sun.	1,890	Thu.	390	Sat.	1,986	Fri.	672
	Hour-4:45P	158	3:45P	30		4:00P	182	9:15A	37	11:00A	200	9:30A	57
#11/WC	Day - Fri.	1,912	Wed.	611		Sat.	1,952	Fri.	539	Sun.	1,526	Mon.	764
	Hour-7:00P	185	10:15A	56		10:00A	225	12:00P	98	4:30P	143	11:00A	59

*Start of the peak hour of peak day.

[1]Includes passenger cars, light trucks, and smaller recreational vehicles.
[2]Includes tractor-trailers, buses, and most recreational vehicles.

the Bureau of Public Roads developed the Design Guide for Interstate Safety Rest Areas With Comfort Stations, which, to this writer's knowledge, still sets the standards for comfort facilities. The Guide includes a formula for computing the number of comfort facilities necessary in a rest area that is the same for both women's and men's facilities. For example, if the formula calls for two urinals and two toilets in the men's restroom, then the adjoining women's restroom will receive four toilets. Based on the evidence noted in the foregoing, this formula may be dated.

Table 7

Average Restroom Usage at Rest Areas and Welcome Centers

	Welcome Centers	Rest Areas	Avg. for Both
Males/hr	58.0	44.5	49.3
Females/hr	46.2	33.4	37.9
Total/hr	104.2	77.9	87.2

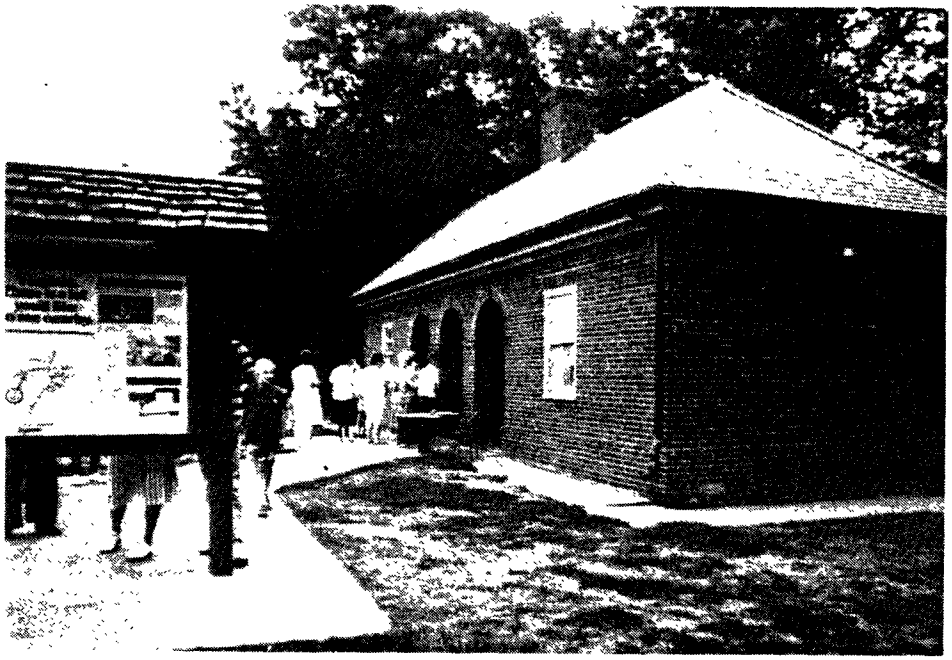

Figure 2. Women's restroom facility at site no. 10.

All sites visited by the research team contained picnic facilities. On average, 7 percent of these facilities were in use during daylight hours. Picnic areas showing the highest percentage of usage were those at site no. 7 (rest area on I-95 northbound near Ladysmith) and site no. 9 (welcome center on I-95 southbound near Fredericksburg). Average usage of these facilities during daylight hours at these sites was 17 percent and 12 percent, respectively. As expected, usage of these facilities was highest during the summer; but even then, these facilities were never found to be at or near capacity.

Finally, telephone usage was documented at each site in the sample. Each site has between one and four public pay telephones where, on average, about eight calls per hour are made. In general, more calls are made from rest areas than welcome centers, and the rate of usage is slightly higher in the summer than the spring or fall.

Physical Condition

Of the 37 (not including 2 "trucks only" facilities) rest areas and welcome centers adjacent to interstate highways in Virginia, 27 have been in operation for more than 10 years, 17 for more than 15 years, and 12 for more than 20 years. The average duration of operation of all sites in the system is 15.16 years. For the 11 sites evaluated in this research effort, 8 were built more than 20 years ago, and the average duration of operation is about 19 years. That the system is aging is clear. Further evidence of this fact was documented through observations made during the on-site visits accompanied by assessments obtained from rest area custodians.

First and foremost, most of the restrooms at the sites visited needed degrees of refurbishment. Most were of insufficient size to accommodate the number of people using them. This appears to be especially true of the women's restrooms. Larger, more modern facilities in almost all instances should be the first priority for any refurbishment plan. At many sites during the summer months, there was always a noticeable amount of water on rest room floors. According to the custodians, this was caused by condensation on the pipes dripping to the floor. While this phenomenon is not only unsightly and tends to cause odors to form, it renders the floor surface slippery, resulting in an unsafe condition. Although continual mopping of these areas helps, other less labor intensive remedies that would solve this problem might include air conditioning the restrooms, warming the water flowing to the rest room buildings, or insulating the pipes.

Vandalism has always been somewhat of a problem at rest areas and welcome centers. Although all sites showed evidence of vandalism, especially to the interiors of the rest rooms, instances were generally typical of any public facility and were not deemed by this researcher to be excessive or alarming. As one might expect, most vandalism occurs at night when custodians are not on duty. Most damages were found to be repaired rather quickly by the custodian or other maintenance staff, except in cases where parts had to be special ordered.

In general, except for the adequacy of the restroom facilities, the overall physical condition of the sites visited was fair to good. Table 8 provides a general overview of the overall physical condition of the sites evaluated. This overview represents a synthesis of the impressions of the research team, and where appropriate, the author has provided specific remarks about certain sites.

Table 8

Physical Characteristics of Sample Sites

Site #		Year Built	Location	Overall Condition	Remarks
1	Rest Area	1968	I-81 SBL .8 mi S of Rt 177 near Radford	Good to excellent	Rest rooms at times overcrowded; Grounds exceptionally clean; Odor noted in picnic table area
2	Rest Area	1979	I-81 NBL .9 mi N of Rt 603 near Ironto	Good to excellent	Excellent picnic facilities and grounds; Water fountains in general disrepair
3	Welcome Center	1965	I-95 NBL .1 mi N of VA/NC state line	Fair to good	Some overflow of automobile parking lots noted
4	Welcome Center	1966	I-85 NBL .7 mi N of VA/NC state line	Good	Fairly nice facilities; well groomed
5	Rest Area	1977	I-64 EBL 2.4 mi E of Rt 609 near New Kent	Fair to good	Odor noted; Wet floors in men's rooms; Waste receptacles overflowing; Rest rooms often overcrowded
6	Rest Area	1977	I-64 WBL 1.1 mi W of Rt 155 near New Kent	Fair to good	Odor noted; Wet floors in men's rooms; Waste receptacles overflowing; Rest rooms often overcrowded
7	Rest Area	1965	I-95 NBL 3.4 mi N of Rt 207 near Ladysmith	Fair	Odor and generally unclean condition noted
8	Rest Area	1965	I-95 SBL 2.6 mi S of Rt 609 near Ladysmith	Fair	Some loitering noted
9	Welcome Center	1968	I-95 SBL 1.8 mi S of Rt 17 near Fredericksburg	Good	Rest rooms often overcrowded; Some overflow of automobile parking lot noted.
10	Rest Area	1965	I-66 EBL 1.5 mi E of Rt 234 near Manassas	Poor	Generally unkempt; Overcrowded truck parking area; Odor in women's rest rooms
11	Welcome Center	1965	I-66 WBL .3 mi W of Bull Run	Poor*	Generally unkempt; Overcrowded truck parking area; Foul odor in men's rest room; Some loitering noted

*Subsequent to the data-gathering and observation periods, this site has undergone refurbishment.

Staffing and Costs

General maintenance of rest areas and welcome centers is the responsibility of a rotating three-person custodial staff. Each site has at least one custodian on duty between the hours of 6 A.M. and 10 P.M. seven days per week. (These hours may vary at some locations.) At certain rest areas in the Commonwealth, the Department has been forced to employ custodians on a 24-hour basis due to the occurrence of loitering and other undesirable activities. General responsibilities of the custodial staff include cleaning, refuse disposal, repairs, painting, mowing, and general maintenance. Although most custodians are VDOT employees, private contractors are currently employed to provide these services at 14 locations.

In FY 1987 (July 1, 1986 - June 30, 1987), the cost of operating Virginia's interstate rest areas and welcome centers was $4,151,949. Figure 3 shows how those expenditures were distributed. Expenditures per site average $109,261 yearly and ranged from a low of $63,530 to a high of $167,287 for FY 1987. These costs are dependent on a number of site-specific characteristics of the rest area, not the least of which is the sophistication of the water and sewage treatment systems. It should also be pointed out that the portion of expenditures for contractual services includes labor as well as certain supplies. The exact costs of each of these items was not extractable because of the accounting method used to record rest area activity charges.

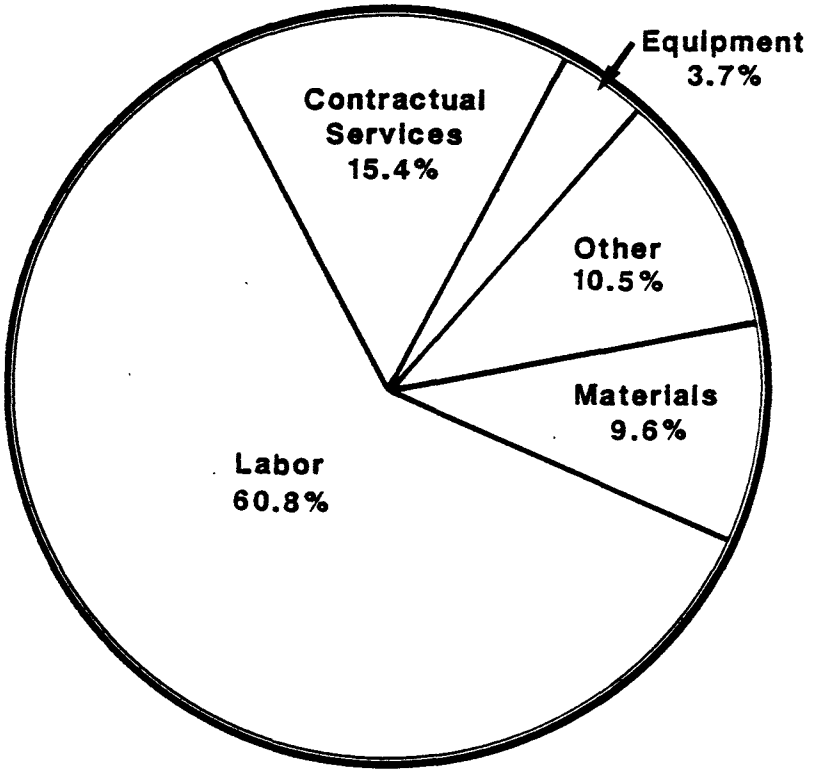

Figure 3. FY 1987 rest area expenditure.

Contract custodial services are being utilized at four of the rest areas evaluated in this study. While it was not within the scope of the study to delve too deeply into the pros and cons of utilizing such services, some relevant observations are warranted. From the research team's perspective, the contracted sites were generally not as well manicured and clean as those staffed by VDOT employees. Moreover, contract custodians were often difficult to identify since most were not dressed in clothing affixed with VDOT identification. Interviews with residency personnel revealed mixed feelings regarding the use of contract custodians. At some sites the use of contract services appears to be reducing expenditures and working well. This appears to be especially true of the truck rest area on Interstate 95 at Dale City. On the other hand, it was the opinion of some residency personnel that the use of contractual services at rest areas and welcome centers has resulted in a reduction in the level of service that has come to be expected by the public at these facilities.

Vending Machines.

Section 153 of the 1978 Surface Transportation Act authorized the establishment of a Federal Demonstration Project to permit the installation of vending machines in rest areas on the Interstate highway system. The states of California, Connecticut, Georgia, Kentucky, and Massachusetts were chosen to participate in the project. Each was required to evaluate the project based on public acceptance and the economic benefits derived, in addition to any problems related to litter and vandalism. After one year of operation, these states reported public reaction to be generally positive toward vending machines and found litter and vandalism problems to be insignificant. Based on these findings, the Surface Transportation Assistance Act of 1982 included language allowing states the option of placing vending machines in rest areas and requiring that the operation of such facilities be offered to the Randolph-Shepard Agencies (RSA) in those states. To date, 21 states have installed vending machines in at least one rest area, and the RSA participates in the vending machine operation in 19 of these states. The participation of the RSA varies such that in some states it installs and maintains the machines and receives all profits; in some the state highway agency installs and maintains the machines and receives all profits; and in some the state highway agency installs and maintains the machines and allots some or all profits to the RSA. While there are varying agreements between state highway agencies and RSAs as to the disbursement of profits, typically, these monies are split between the RSA and the state highway agency.

In 1984, the VDOT entered into an agreement with the State Department for the Visually Handicapped designating it as the procurement agency agent for vendors. Profits were to be shared between the two agencies, and it was anticipated that the Department's share of the profits would offset the cost of construction, operation, and maintenance of the facility. A sum of $278,000 was appropriated to construct refreshment center buildings at nine rest area and welcome center locations (Figure 4). These 12 ft by 28 ft brick buildings were constructed in early 1987. In May of that same year, machines dispensing soft drinks,

snacks, and cigarettes were placed in each. Figure 5 shows three of the vending machine installations.

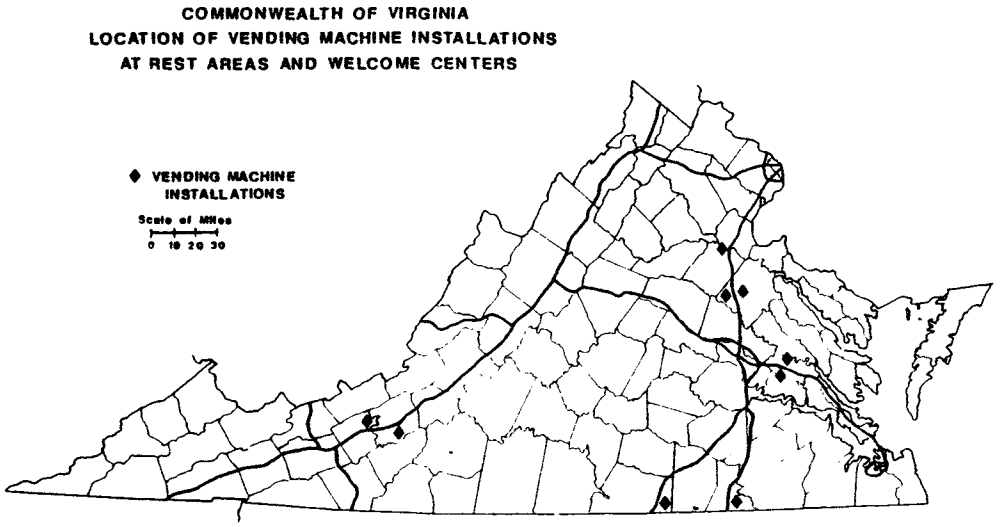

Figure 4.

Seven of the nine locations containing vending machines were included in this study. An attempt was made to assess the impact of these facilities during the period between installation and the summer data-gathering trip conducted in late August. This assessment included the documentation of litter and refuse accumulation, incidences of vandalism, public acceptance, and vendor performance. This assessment was accomplished through on-site observations, interviews with rest area custodians, and conversations with the resident engineers within whose jurisdictions these particular sites fell.

The public has been enthusiastic about the vending operation. Machines at all sites are kept in operation for 24 hours, and at several sites, vendors remain on duty to fill them continually during the daylight hours. It was not uncommon, especially during the summer, to find many machines empty each morning prior to the vendor's arrival. During the first three months of operation, the machines collected nearly $88,000. As anticipated, the cost of the buildings housing the vending machines was recouped after one year of operation.

Visits to the sites containing vending machines did reveal a few minor problems that have arisen as a result of the vending installations. Each will be discussed briefly.

Litter/Refuse

Both before and after the installation of vending machines, the research team videotaped the grounds of each rest area as well as the downstream shoulder of the mainline. An examination of these tapes revealed no evidence of additional litter accumulation subsequent to the installation of the machines. At some sites, some refuse cans were at

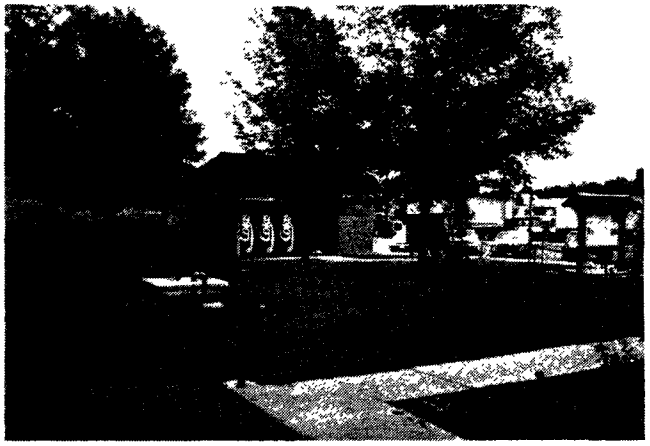

Figure 5. Vending machine operation.

capacity, especially during busy periods. Custodians report that, generally, refuse increased anywhere from 30 to 50 percent, depending on the site, once vending machines became operational. This additional accumulation was not deemed by those interviewed to result in substantial additional work, however. At several sites custodians reported that tiny cellophane wrappers were being discarded on the grounds and on the parking lots. These wrappers, they said, must be retrieved by hand since they are too small to be picked up with a litter stick. This activity is time-consuming and can result in less of the custodian's time being available for cleaning restrooms and performing other maintenance duties. The utilization of small vacuum sweepers or similar equipment to rid parking lots and the grounds of these small bits of paper may be necessary at some sites. Anti-litter reminders affixed throughout the rest area grounds and the distribution of automobile litter bags have also been suggested as means for reducing the accumulation of litter both within the confines of the rest areas as well as on the interstate mainline.

Use of Other Facilities and Amenities

The impact of the vending services on the use of specific facilities and amenities at rest areas is difficult to assess. There is a feeling among custodians and other residency personnel that the vending concession has generated an increase in the use of picnic tables. This occurrence could not be substantiated during this study due to the absence of sufficient before and after data during like seasons. A follow up to this study will be conducted during the late spring of 1988 to determine if specific amenities are being used more since the vending machines were installed. Studies in other states have shown some increase in the average length of stay after rest areas received vending machines. Whether or not this is occurring in Virginia will also be verified in the follow-up study.

Vandalism

After four months of operation, no occurrences of vandalism were documented in the vending machine buildings. Some vandalism did begin to take place at two sites during the fall and winter, however. It appears likely that vandalism will be minimal during peak travel seasons since during these periods rest areas and welcome centers are continuously busy. Once this activity begins to decrease, however, the machines may become vulnerable for would-be thieves. The same propensity for vandalism holds true with respect to the presence of an attendant or custodian. No vandalism occurred while an attendant was on duty. Studies in other states have also shown this to be the case, resulting in the closing of the vending machine buildings while an attendant is not on duty. In other instances, it has prompted the state to provide an attendant for 24 hours at rest areas containing vending machines.

The Department is presently seeking ways to deal with vandalism. One measure being considered is closing the vending machine building while no attendant is on duty. This alternative has already elicited criticism from the public, who appear to want accessibility to the vending machines on a 24-hour basis. Further assessment of vandalism and additional

alternatives for dealing with it will be included in the aforementioned follow-up study.

Miscellaneous Operations

One of the minor problems anticipated at the outset of the vending machine program in Virginia was the method by which change would be accessible to motorists. The hypothesis was that VDOT custodial and tourism staff would be inundated with requests from motorists to make change. While the installation of machines that will take a dollar bill curtailed many such requests, shortly after the installation of the machines, custodial and tourism staff were frequently requested to make change. The installation of signs stating that employees in the rest areas and welcome centers do not have change have helped eliminate most, but not all, such requests.

A similar concern was anticipated regarding the refunding of money lost in malfunctioning vending machines. In anticipation of the fact that requests for refunds would be made to rest area staff, each vendor posts a sign in the vending machine building containing an address to which refund requests can be made. According to some of the custodians interviewed, the public is not completely satisfied with this procedure, noting the fact that 25 cents of postage is required to obtain a 40-cent refund. This dissatisfaction was at times outwardly leveled at either the members of the custodial staff or the vending machine. An approach taken by the North Carolina Department of Transportation seems to help alleviate this frustration. Provided inside each vending machine building is a box into which refund requests can be placed (see Figure 6). Refunds are then mailed at no cost to the motorist.

Refund Request

To receive a refund of money you lost due to a vending machine malfunction, please fill in all of the following blanks, sign your name, and drop this in the box provided; all information must be filled in. Your refund will be mailed to you.

PLEASE PRINT:

Name: _____

Address: _____

_____

AMOUNT LOST

Drink Machine: _____ Snack Machine: _____

SIGNATURE: _____

Figure 6. North Carolina DOT refund request.

At certain locations, rest area custodians informed the researcher that motorists were having some difficulty locating the vending machine buildings. This was especially true at the Interstate 81 rest area near Ironto and the Interstate 85 welcome center near Bracey. Strategically placed signs informing motorists of the location of the vending machine buildings as well as "refreshments" signs on the buildings themselves have recently helped remedy this situation.

At some locations, custodians were of the opinion that vendors have provided less than satisfactory service to the machines. They felt that much revenue had been lost because vending machines were allowed to remain empty for extended periods. At all sites, especially during peak travel periods, the need exists for continual servicing of the vending operation by the vendor. This appears to be viewed positively by the motorist, ensures continuous operation of the machines, and provides revenue to the sponsoring agencies. It also assists the rest area custodian by reducing the time he has to spend responding to frustrated motorists.

Future Research

As mentioned earlier, a follow-up study of the vending machine program will be conducted during the late spring of 1988. A comparison of data gathered at that time with that gathered in the spring of 1987 will enable the researcher to make a more precise determination of the effects of the vending operation at the specific sites than that presented in this study. This study will again evaluate litter and refuse conditions, parking adequacy, length of stay, vehicle volumes and vandalism. Interviews conducted with residency and rest area custodial staff will help determine what effect, if any, the vending program has had on their work. It is anticipated that a report will be available in early summer 1988.

RESULTS OF REST AREA USER SURVEY

Survey Distribution Method

At each of the eleven sites included in this evaluation, self-addressed, pre-stamped questionnaires were distributed to stopping motorists (Appendix A). The questionnaires contained 16 questions regarding specific facilities, the rest area system in general, travel behavior, and demographic information. Table 9 displays the distribution of questionnaires and response rates by site. During the spring, summer, and fall visits, 7,543 questionnaires were distributed and 1,945 were returned, yielding a response rate of 25.8 percent.

Table 9

Questionnaire Distribution and Response Rate

	Fall 1986			Spring 1987			Summer 1987		
Site #	Dist.	Ret.	Response Rate (%)	Dist.	Ret.	Response Rate (%)	Dist.	Ret.	Response Rate (%)
1	250	91	36.4	225	69	30.7	200	30	15.0
2	300	115	38.3	250	59	23.6	200	63	31.5
3	250	63	25.2	184	39	21.2	200	39	19.5
4	250	79	31.6	250	47	18.8	200	28	14.0
5	250	104	41.6	250	77	30.8	200	42	21.0
6	250	81	32.4	250	74	29.6	200	54	27.0
7	250	80	32.0	250	63	25.2	200	32	16.0
8	250	69	27.6	250	54	21.6	200	33	16.5
9	300	92	30.7	250	47	18.8	200	37	18.5
10	250	70	28.0	150	53	35.3	200	48	24.0
11	250	59	23.6	109	34	31.2	200	37	18.5
TOTAL	2850	903	31.7	2418	616	25.5	2200	443	20.1

It was decided that if no significant differences existed between responses received on questionnaires distributed at rest areas and those distributed at welcome centers, they would be combined for analysis. A careful perusal indicated that little difference between the responses from persons stopping at the two types of facilities existed. The few exceptions will be noted in the ensuing paragraphs.

User Profile

Survey responses revealed that, on average, vehicles entering rest areas and welcome centers contained 2.08 persons. Pertinent demographic characteristics of the respondents are shown in Table 10. The average age of respondents was 52.73 years and 38 percent of those responding were 60 years of age or older. Of the 52.2 percent of the respondents that were employed, nearly 58 percent were white collar, 35 percent blue collar, and the remainder were self-employed or military. For the purposes of this report, housewives were classified as unemployed and comprised nearly 88 percent of that category. A large majority of the respondents were non-Virginians, and a very small percent (2 percent) were classified as local, meaning they resided within the jurisdiction of the subject rest area or welcome center. Since the table presents an average for all sites, it should be noted that out-of-state visitation is slightly higher at welcome centers than at rest areas.

Table 10

Demographics of Survey Respondents

Category	Percentage of Respondents
Age	
Under 21	1.0
21 - 30	7.7
31 - 40	13.5
41 - 50	17.3
51 - 60	22.5
61 - 70	27.4
Over 70	10.6
Sex	
Male	59.3
Female	40.7
Employment Status	
Employed	52.2
Unemployed	11.9
Retired	35.9
Place of Residence	
In-state	39.8
Out-of-state	58.2
Local	2.0
TOTAL FROM ALL CATEGORIES	100.0%

A question regarding stopping frequency revealed that, on average, the interstate traveler stops about every 2-1/2 hours. Table 11 presents the frequency of the responses to this question.

Table 11

Interval Between Stops
(N = 1,927)

Stopping Time	Percentage of Respondents
Every hour	5.3
Every 1.5 - 2 hours	38.3
Every 2.5 - 3 hours	31.3
Every 3.5 - 4 hours	10.7
Every 4+ hours	3.5
Don't usually stop	.6
No regular schedule	8.4
Every rest area	2.0
Total	100.0

Besides average travel duration between stops, these responses revealed that nearly 70 percent of the motorists using rest areas stop between every 1-1/2 to 3 hours. Finally, 75.7 percent of those responding to the survey said they use rest areas frequently.

Reason for Stopping and Usage Patterns of Rest Area Amenities

Respondents were asked their principal reason for stopping at the rest area or welcome center. Table 12 presents the responses to this question for all sites. Whereas the principal reason for stopping at rest areas and welcome centers is restroom use (81.8 percent of the respondents) at the four welcome center sites, restroom use was the principal reason for stopping by only about 72 percent of the respondents. As one might expect, a greater percentage of individuals (13 percent) stop at welcome centers to obtain travel information than do those stopping at rest areas (4.3 percent).

Table 12

Reason for Stopping at Rest Areas or Welcome Centers
(N = 1,947)

Reason	Percentage of Respondents
Use Restrooms	81.8
Rest, Relax, stretch	7.0
Obtain travel info	4.3
Picnic	1.8
Make a telephone call	1.8
To change drivers	1.2
Miscellaneous	2.1

Survey respondents were asked to indicate the rest area amenities they used during their stop. Table 13 presents a profile of that usage. This information helps to point out those items which are important to the traveler who stops at the rest area. As was the case with the previous question, travel information is more important for those stopping at welcome centers than those stopping at rest areas. In fact, almost half of the respondents stopping at welcome centers did so to obtain travel information compared to 8-10 percent of those stopping at rest areas. As Table 13 shows, facilities used the least are benches, cooking grills, and pet rest areas. These usage patterns corroborate similar ones observed during the on-site visits, which revealed that the predominant reason people stopped at rest areas was to use the restrooms.

Table 13

Profile of Use of Rest Area and Welcome Center Amenities
(N = 1,937)

Amenity Used	Percentage of Respondents*
Restroom	97.2
Water fountain	43.7
Travel information	20.2
Parking lot	16.3
Trash cans	15.6
Telephone	11.5
Picnic table	8.6
Paths/grounds	7.2
Pet rest area	4.0
Benches	3.8
Cooking grill	.3

*There were 4,423 total responses tabulated due to the allowance of multiple responses to the question, therefore, percentages do not total 100.

Respondents were given the opportunity to suggest additional amenities to the rest area at which they stopped or to any other rest area along the interstate system. Table 14 presents a profile of these suggestions.

Table 14

Additional Amenities Desired
(N = 1,832)

Amenity	Percentage of Respondents*
Vending machines	34.8
Nothing	29.9
Paper towels	19.9
Gas, food, hotel info	14.7
Additional rest rooms	14.5
Better water fountains	10.4
Hot water	8.4
Weather/road condition info	7.4
Larger truck lot	7.0
Larger car lot	5.1
Additional telephones	4.9
Restaurants	4.7
Children's play equipment	4.7
Diapering table	3.9
Pet watering troughs	3.2
Motor home dump stations	2.6
More picnic equipment	2.1
More landscaping	.9

*Percentages do not total 100 due to multiple responses.

The additional amenity desired most by the greatest majority of the respondents is vending machines. The obvious popularity of this amenity is strengthened by the fact that seven of the sites evaluated during the summer data gathering contained vending machines. If the surveys from these seven sites had not been included in the Table 14 responses, the sentiment for placing vending machines at rest areas and welcome centers would have been well above 50 percent.

A significant number of respondents suggested that paper towels be made available in the restrooms. This suggestion was probably made for either of two reasons. First, to reduce the magnitude of refuse disposal, all rest area restroom facilities are equipped with wall-mounted, electrically powered, hot-air hand dryers. Excessive use of these dryers results in frequent malfunctions which can result in less than optimum conditions for drying one's hands. Secondly, paper towels have an assortment of uses for the typical motorist; thus, an available supply of them at the rest area would be desirable to many. A significant number of respondents also suggested that rest areas include information regarding motorists' services available both in the immediate vicinity as well as upstream and downstream of the rest area facility. This suggestion was more prevalent on surveys received from respondents stopping at rest areas that those stopping at welcome centers, thus indicating that a significant number of respondents desire the inclusion of this information at rest areas. Finally, a significant number of respondents, the majority of whom were female, pointed out the need for additional restroom facilities.

In an attempt to discern more about the utility of rest areas, respondents were asked why they chose to stop at the rest area rather than exiting the interstate. Table 15 presents the responses to this question. Of obvious importance to the motorist is the fact that the rest area offers a convenient, quick means for achieving a break from driving. The existence of restrooms is of primary importance as is the fact that there is no charge to use the facilities.

Table 15

Reason for Choosing Rest Area Rather Than Exiting Interstate

Response	Percentage of Respondents
Convenience	68.9
Existence of restrooms	58.0
Save time	57.1
Needed a quick rest stop	44.3
No charge for use of facilities	18.4
Rest areas cleaner than those off interstate	15.0
Wanted to picnic	5.9
Observe the scenery	4.4
Needed travel info	4.3
Other	2.5

Based on survey responses, the overall opinion of the rest areas by travelers using them is quite high. Eighty percent of the survey respondents rated them good or excellent, while only about 4 percent rated them poor. Seventy-six percent of the unsolicited comments received from respondents were positive in nature. Negative commentary was usually directed to the cleanliness and/or size of specific restrooms. Just over one-third of the respondents felt that additional rest areas were needed, specifically in the northbound interstate 81 corridor between Montgomery and Augusta Counties, a stretch that contains no rest area for roughly 100 miles.

SUMMARY AND CONCLUSIONS

As part of the effort to improve motorist safety and comfort, the Virginia Department of Transportation has constructed 28 rest areas and 9 welcome centers along its interstate system. The first such facility opened in 1964 on Interstate 81 in Botetourt County; the last opened in 1983 on Interstate 95 in Prince William County. Concomitant with its plans for developing additional rest area sites, representatives from the Department's Environmental Division perceived a need for an assessment of the service delivery characteristics of the existing sites, many of which were built more than 20 years ago. This study examined existing conditions at selected sites and assessed what impact the provisions of new services might have on that service delivery. This report presents the results of that assessment.

Twenty-four-hour traffic volume counts revealed that, on average, 1,600 passenger cars and 421 tractor-trailer trucks or recreational vehicles enter Virginia's rest areas and welcome centers daily. During peak periods, which are typically Saturdays, Sundays, and holidays, these daily volumes can rise to 2,800 and 650, respectively. At welcome centers, passenger car volumes are about the same as they are at rest areas, whereas truck volumes tend to be roughly 20 percent lower at welcome centers than at rest areas. The highest traffic volume at all sites generally occurs in the summer. Out-of-state passenger cars comprise roughly 58 percent of the rest area users, while 80 to 90 percent of large vehicles, including buses, tractor-trailers, and recreational vehicles are from out-of-state. The data showed that for all sites, an average of roughly 12 percent of the mainline passenger car traffic stops at rest areas. This percentage is slightly higher at welcome centers, probably because of their nature and location. Truck traffic volume at these sites remained fairly constant regardless of the season, and the percentage of the mainline truck traffic entering rest areas averages 20.8 percent. At some sites, especially those on Interstates 64 and 66, as many as 44 percent of the mainline trucks stopped at rest areas on selected days. It is surmised that these occurrences may be due to the absence of commercial truck facilities on both of these routes.

On average, passenger cars and large trucks entering rest areas and welcome centers contain 1.85 and 1.05 occupants, respectively. Occupancy rates are highest during the summer for all classes of vehicles. This

rates are highest during the summer for all classes of vehicles. This means that, on average, in excess of 3,500 persons may use rest areas and welcome centers on a typical day. During the summer, on holidays, and weekend peak periods, this number exceeded 7,000. The average duration of stay for these individuals was found to be 9.1 minutes for passenger car occupants and about 15 minutes for occupants of large trucks and recreational vehicles. This interval was not found to vary a great deal by season. The average stopping interval for the trucks and recreational vehicles did not include overnight stays. Since data were only gathered during the daylight hours, a precise determination as to the frequency and duration of overnight stays could not be ascertained. Early morning observations by the research team as well as reports received from rest area custodial personnel, however, indicated that stays in excess of the two-hour limit are frequent during nocturnal hours. Moreover, enforcement of the limit is not a high priority of the Virginia State Police. At some sites, extended stays were found to result in trucks being forced to park along entrance and exit ramps as well as the interstate mainline, thus creating a safety hazard. The Department appears to be faced with a dilemma here. The extension or removal of the two-hour limit might compound the problem. A better solution might be the enlargement of truck parking lots and/or the construction of additional "trucks only" rest areas. The latter alternative has proven successful in one area of the Commonwealth and would likely be welcomed by the trucking industry. Another alternative might be the reduction of the two-hour limit to, say, 30 minutes, which might be more easily enforced by the Virginia State Police. Regardless of which alternative is chosen, the Department is faced with taking some action which will result in removing the safety hazard resulting from trucks parking along ramps and on the interstate mainline.

The average number of users per hour of the men's and women's restrooms at rest areas and welcome centers is 49 and 38, respectively. These frequencies rise to 70 to 100 males per hour and 50 to 75 females per hour during peak periods. Even though the greatest percentage of restroom users are males, the women's restrooms were the ones found to be at or exceeding capacity most often. It was not uncommon to find long lines of females waiting to use restrooms, especially on weekends. Observations made by this writer and information received from other sources point to the fact that the length of stay for females in restrooms is longer than that for men. Although this phenomenon might be attributable to several factors, the most likely reason for its occurrence is simply that urinal usage is faster than toilet usage. This fact seems to indicate that women's restrooms need more comfort facilities than men's restrooms. In this regard, standards set forth in the Design Guide for Interstate Rest Areas With Comfort Stations appear questionable and, in fact, may be in need of updating.

Many of Virginia's rest area and welcome center buildings were built more than 20 years ago. The average duration of operation for all sites in the system is 15-16 years. Eight of the sites evaluated during this research effort were built more than 20 years ago. Although the overall physical condition of the sites evaluated is fair, the facilities are aging. Many of the restroom facilities are in need of modernization, and most were not built to accommodate the number of motorists that presently

use the comfort facilities. Refurbishment and enlargement appears warranted at a number of sites. Standing water, which was a result of condensation dripping from pipes to the floor, was noticed in many restrooms. Means for alleviating this condition need exploration, as it renders the facilities unsightly, unsafe, and often produces foul odors.

General maintenance and upkeep of all but 14 of the Commonwealth's rest areas and welcome centers are the responsibility of custodians employed by the Virginia Department of Transportation. Each site usually has one custodian on duty between the hours of 6 A.M. and 10 P.M. These individuals were found to be a dedicated group of employees who take a great deal of pride in the work they perform. Aside from keeping the rest areas manicured and clean, they are important public relations people because they usually possess a wealth of knowledge regarding destinations, facilities and services, attractions, and other information regarding the region surrounding their workplace--not to mention their helpfulness in assisting motorists with malfunctioning automobiles, emergencies, and in various other capacities. As a cost-saving measure, the Department has chosen to contract custodial service at 14 rest area locations. Observations made at 4 of these locations revealed the following: First, when compared with the other 7 sites in the evaluation, the contracted sites did not measure up in terms of overall cleanliness and appearance. Second, the contract custodial employees were often difficult to identify since most were not dressed in clothing affixed with VDOT insignia. It is not unreasonable to conclude that the absence of a uniformed attendant at these sites might considerably lower the comfort index of the stopping motorist. Though data are not available to prove or disprove this conclusion, information received in interviews with VDOT custodial and residency personnel support the fact that acts of vandalism and other undesirable behavior do not tend to occur when a uniformed attendant is on duty. Moreover, a courteous, uniformed attendant who is accessible to travelers in the rest area complex seems to provide considerable assistance to rest area users. In this writer's view, rest area custodial workers provide the Department with a means for enhancing its public image. While the contracting of rest area maintenance services may have merit from the standpoint of cost and manpower allocation, the result may be a net loss to both the public and the Department from the standpoint of services and image, respectively.

In late 1987, vending machines, operated on a 24-hour basis, were installed at 9 rest area and welcome center locations. Public acceptance thus far has been enthusiastic. Custodians reported a 30 to 50 percent increase in refuse and some additional accumulation of litter on the rest area grounds, but not a sufficient amount to warrant additional manpower. Requests for custodial assistance in making change and recovering lost money were frequent until signs were erected informing patrons that custodians were not responsible for these services. Signs directing motorists to vending locations were found to be necessary at some sites where the buildings housing the machines were not entirely visible from parking areas. Signs noting vending machine services were also placed on the directional guide signs on the interstate mainline. The addition of all the aforementioned signage was found to be of significant assistance to motorists and in reducing demands on custodians' time.

During the summer months, no cases of vending machine vandalism were documented. However, as peak travel periods subsided, vandalism did begin to occur at two sites. These break-ins always occurred during periods when attendants were not on duty. The Department has been forced to close the vending buildings during these periods at these two locations. The action has resulted in some criticism from the public, who desire 24-hour accessibility to the vending machines. Many alternatives exist for coping with the vandalism of vending machines, and although vandalism has not reached mammoth proportions as yet, the Department needs to address the issue before the losses become great. Studies in other states have shown that having an attendant on duty for 24 hours seems to help. Other alternatives include vandal-proof machines, partial or total closure of the vending operation, and alarm systems. The Department with the assistance of the vending machine operators as well as the Department of the Visually Handicapped, should consider some or all of these options before expanding the vending program. A follow-up study of the vending machine program will address methods for eliminating vending machine vandalism.

A survey questionnaire was distributed to 7,543 motorists stopping at the 11 study sites. Completed questionnaires were received from 1,945, yielding a response rate of 25.8 percent. The average age of the respondents was 52.73 years and 38 percent were 60 years of age or older. Responses revealed the average interstate traveler stops about every 2-1/2 hours. More than 75 percent of the respondents said they used rest areas frequently; the most common facilities used are restrooms, water fountains, and travel guides. At welcome centers especially, the availability of travel information is very important to the interstate traveler. When asked what additional amenities they would like to see included at rest areas, more than a third of those responding listed vending machines.

Motorists' opinions of Virginia's rest area and welcome center facilities is quite high, though there were repeated remarks regarding the absence of a rest area facility in the northbound corridor of Interstate 81 between Montgomery and Augusta Counties. Furthermore, more than one-third of the respondents felt that additional rest areas are needed system-wide.

The importance of rest areas and welcome centers to the interstate traveler cannot be overstated. In essence, they provide an indispensable means for enhancing the safety and comfort of the motorist. It is obvious that as traffic volumes and speeds have increased, so have the demands on these facilities, many of which were built in the 1960s. This, coupled with the fact that the driving population is getting older and more dependent upon rest area facilities, will require that steps be initiated to ensure that these facilities are adequate to meet the demands that are being placed on them. It is hoped that much of the information gathered during this study will assist decision-makers in initiating such steps.

SUGGESTIONS FOR IMPROVEMENT

A number of items have been identified that, if implemented, would improve rest area services. The opportunities for improvement presented here are those that have system-wide application except where noted.

1. Building and Restroom Facilities. Refurbishment of some of the older rest area buildings is necessary. During peak seasons, restrooms are not large enough to accommodate the number of motorists using these facilities. A program for enlarging these facilities should be initiated, and, in all cases, women's restrooms should contain more comfort facilities than the men's restrooms. It is essential that all equipment in these restrooms, including electric hand blowers, lavatories, and comfort facilities be kept in proper working order at all times.

   To eliminate the tendency for condensation to form on cold water pipes and to drop on the floor, thus creating an unsightly, unsafe, and potentially foul smelling condition, air conditioning of the restrooms is desirable. Should this measure prove to be too expensive, an alternative method for solving the standing water problem should be sought. This might involve simply insultating the pipes that supply cold water. Finally, at rest areas containing three restrooms, custodians should be encouraged to open all three simultaneously during peak travel periods.

2. Truck and Recreational Vehicle Parking. At sites where such is not presently the case, the feasibility of constructing truck and recreational vehicle parking areas that are opposite and apart from passenger car parking areas should be explored. This configuration helps to eliminate the tendency for truckers to utilize passenger car lots when truck lots become full. It is further recommended that the feasibility of constructing additional interstate rest areas to accommodate only trucks and recreational vehicles be investigated. Such rest areas should preferably be constructed in those interstate corridors containing a dearth of commercial truck facilities. Corridors for potential sites include Interstate 81 between Winchester and Bristol, Interstate 95 between Richmond and Emporia, and Interstate 66 between Fairfax and Gainesville.

   Should the Commonwealth continue to impose the two-hour parking limit at rest areas and welcome centers, stricter enforcement of it is needed. This is especially applicable to trucks and recreational vehicles, which were found to exceed the limit more often than other classes of vehicles. Because truck parking lots tend to become full during nocturnal hours, these vehicles are often forced to park along entrance and exit ramps as well as the interstate mainline. While it is not within the scope of this report to evaluate the merits of the two-hour parking limit, one would have to conclude that the absence of any effort to enforce it implies that it really doesn't matter. If the purpose of the two-hour limit is to curtail undesirable activities, the Department may wish to seek other means for doing so, such as requesting additional surveillance from the Virginia State

Police implementing a 30-minute limitation on parking, installing additional lighting and/or surveillance equipment, or having an attendant on duty for 24 hours. It is unlikely that any parking limitation is going to reduce overcrowded truck lots unless it is enforced. Beyond enforcement, the only alternative may be the enlargement or further partitioning of truck parking areas. It is of utmost importance that whatever the measure decided upon, the incidence of trucks parking on ramps and the mainline be curtailed immediately.

3. Custodial Services. All rest areas and welcome centers should be staffed with a custodial crew whose responsibilities include routine maintenance as well as providing assistance and information to motorists. All members of the crew should wear a uniform that is consistent in style and color throughout the state and is adorned with the VDOT logo. Consideration should be given to the utilization of such crews on a 24-hour basis at the larger rest areas on heavily traveled routes or at sites where undesirable nocturnal activities have been documented.

   Custodial services at Virginia's rest areas are performed by VDOT maintenance employees at all but 14 locations. Although the utilization of contract services at these sites has reportedly yielded a 10 percent savings in maintenance costs, a reduction in the level of service may have resulted. Before expanding the contracting of service to additional locations, the Department should periodically inspect those sites that are currently under contract and compare them with those maintained by VDOT personnel. As a further test, the Department may wish to seek the public's viewpoint on the matter. Finally, cost comparisons of these two alternatives for maintaining rest areas should be made on a continuing basis.

4. Additional Sites. It is recommended that the Department proceed with its plans to construct additional rest area sites along Interstate 81, especially the northbound segment lying between Montgomery and Augusta Counties. In an effort to reduce the volume of traffic at the rest area on Interstate 64 in New Kent County, the feasibility of placing additional rest area facilities on this route between Hampton and Providence Forge should also be explored.

5. Vending Machines. The evidence from this study suggests that the inclusion of vending machines at most rest areas and welcome centers is appropriate. Wholesale expansion of this activity to all locations should not be made until the follow-up examination of all aspects and effects of the vending program is conducted. Notwithstanding the pending investigation, some preliminary suggestions based on the existing vending operation can be made. First, custodial staff should be prepared to handle 30 to 50 percent additional refuse once vending machines are installed. Each site will need additional trash receptacles and equipment that will enable quick and easy retrieval of small pieces of litter that will inevitably appear on the grounds and in the parking lot. A vacuum may be the best means for accomplishing this task. Second, strategically placed signs are necessary to inform the public of

(1) the location of the vending machines; (2) the fact that custodians and tourist center staff do not possess change; (3) the name, address, and telephone number of the vendor supplying the vending machine items; and (4) the fact that machines will take dollar bills. In addition, messages as to the proper disposition of litter, such as those often seen on refuse receptacles and litter bags, might do much to reduce the accumulation of litter. Third, it is important that vendors contracted to service vending machines be required to keep them reasonably stocked at all times. Contracts may need to include provisions calling for continuous daily on-site service by vendors, especially during peak travel seasons. Vendors should also be encouraged to remove money from all machines daily, and place notification of this practice on the machines. In addition, a means for refunding money lost in machines at no cost to the patron should be initiated. This could be accomplished by placing refund envelopes and a collection box for them near the machines. Fourth, since vandalism can be anticipated during the hours when no attendant is on duty, the Department and the vendors may wish to explore methods to minimize the opportunity for vandalism to occur. Such methods might include one or all of the following: (1) employing custodians on a 24-hour basis, (2) closing the vending machine buildings during the hours no attendant is on duty, (3) installing vandal-proof machines, (4) installing alarm systems, and (5) posting signs noting that money is removed from machines daily.

6. Future Needs/Privitization. In both the long- and short-term, the demands placed on rest areas by the public will continue to grow. Given the fact that some degree of refurbishment and reconstruction of existing facilities is necessary, a comprehensive analysis of the feasibility and desirability of various alternatives for addressing future demands that will be placed on providing rest area services needs to be initiated. Among the alternatives to be included in such an analysis is complete or partial privitization.

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APPENDIX

REST AREA SURVEY

VIRGINIA DEPARTMENT OF TRANSPORTATION REST AREA SURVEY

Any information given will be strictly confidential. It will be used to help the Virginia Department of Transportation improve its rest area system for your use.

1. What was the main reason you stopped at this rest area today? (circle one answer)
   (a) Use rest rooms
   (b) Rest, relax
   (c) Picnic, eat a meal
   (d) Get a drink of water
   (e) Work on vehicle
   (f) Make telephone call
   (g) Change drivers
   (h) Walk dogs/feed animals
   (i) Obtain travel information
   (j) Stretch legs/wake up
   (k) Saw the sign
   (l) Use vending machines

2. Which of the following rest area facilities did you use? (circle one or more)
   (a) Rest rooms
   (b) Telephone
   (c) Picnic table
   (d) Charcoal grill
   (e) Water fountain
   (f) Pet rest area
   (g) Travel information
   (h) Benches
   (i) Paths, general rest area grounds
   (j) Parking lot
   (k) Trash cans

3. What additional facilities do you think should be added to this or any rest areas? (circle one or more)
   (a) More rest room facilities
   (b) Additional telephones
   (c) Larger truck parking area
   (d) Larger automobile parking area
   (e) Vending machines
   (f) Additional picnic facilities
   (g) Motorist service information (gas, restaurants, lodging)
   (h) Play equipment for children
   (i) Nothing, everything is satisfactory
   (j) Hot water
   (k) Paper towels
   (l) Additional landscaping/paths/picnic areas
   (m) Better water fountains
   (n) Dump station for motor homes
   (o) Pet watering trough in pet areas
   (p) Diapering table for babies
   (q) Restaurants
   (r) Weather/motor conditions information

4. Why did you choose to stop at the rest area rather than leaving the interstate? (circle one or more)
   (a) Wanted to picnic rather than buy food
   (b) Convenience
   (c) To save time
   (d) Observe the scenery
   (e) Quick rest stop was all I needed
   (f) No charge for use of facilities
   (g) The existence of rest rooms
   (h) Feel safer
   (i) Rest areas are cleaner than those off interstate
   (j) Needed travel information
   (k) Mechanical trouble
   (l) Pet areas
   (m) Handicapped facilities were there

5. What is your overall opinion of the rest area you stopped at today?
   (a) Excellent (b) Good (c) Fair (d) Poor

6. On what do you base this opinion? _____

_____

7. On the average, how often do you travel on Virginia's interstate system?
   (a) Daily
   (b) Very frequently (2 times/week or more)
   (c) Frequently (1 to 4 times/month)
   (d) Occasionally (2 to 11 times/year)
   (e) Rarely (once a year or less)

8. Counting yourself, how many people were with you on this trip? _____

9. When traveling the interstate system, about how often do you stop?
   (a) Every hour
   (b) Every 1½-2 hours
   (c) Every 2½-3 hours
   (d) Every 3½-4 hours
   (e) Every 4 or more hours
   (f) Don't usually stop
   (g) Every rest area
   (h) No regular stopping schedule

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10. When traveling the interstate system, would you say you use rest areas
(a) frequently? (b) occasionally?, or (c) hardly ever?

11. Do you think Virginia has too few, too many, or about the right number of rest areas?
(circle one) (a) Too few (b) Too many (c) About right

12. Do you feel rest areas are spaced too far apart, too close together, or about right?
(circle one) (a) Too far apart (b) Too close together (c) About right

13. What is your age? (circle one only)
(a) Under 21
(b) 21-30
(c) 31-40
(d) 41-50
(e) 51-60
(f) 61-70
(g) Over 70

14. What is your sex? (circle one only) M F

15. What is your occupation? _____

16. In what city and state do you reside? _____

Please take time to enter any comments or suggestions regarding Virginia's rest areas.

_____

_____

_____

THANK YOU - PLEASE FOLD AND MAIL