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Abstract This report addresses the development of a program of succession planning for the Virginia Department of Transportation (VDOT). Transportation industry findings, confirmed by VDOT demographics, indicate a greater-than-average turnover among senior transportation professionals during the 1990s. This problem is accentuated by experience gaps, economic disincentives within the agency, and decreasing numbers of university graduates with training in transportation. The replacement workforce will have to be recruited from a pool of applicants significantly different from that which VDOT has traditionally used. Accordingly, VDOT will require new recruitment programs to attract professionals with a new set of skills if it is to be successful in replacing its workforce in the decades ahead. Recommendations are presented in this report that can assist VDOT in addressing these changes in the makeup of its future workforce.				

FINAL REPORT

**SUCCESSION PLANNING: DETERMINING VDOT'S
PROFESSIONAL NEEDS FOR THE 21ST CENTURY**

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

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ABSTRACT

This report addresses the development of a program of succession planning for the Virginia Department of Transportation (VDOT). Transportation industry findings, confirmed by VDOT demographics, indicate a greater-than-average turnover among senior transportation professionals during the 1990s. This problem is accentuated by experience gaps, economic disincentives within the agency, and decreasing numbers of university graduates with training in transportation. The replacement workforce will have to be recruited from a pool of applicants significantly different from that which VDOT has traditionally used. Accordingly, VDOT will require new recruitment programs to attract professionals with a new set of skills if it is to be successful in replacing its workforce in the decades ahead. Recommendations are presented in this report that can assist VDOT in addressing these changes in the makeup of its future workforce.

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INTRODUCTION

During the 1990s, the Virginia Department of Transportation (VDOT) will experience the loss of many senior engineers and managers as a result of retirements. It is expected that between 1990 and the year 2000, one third of VDOT's professional workforce will become eligible to retire. This projection was accentuated by the early retirement incentive program implemented in 1991 by the Commonwealth of Virginia.

There are many factors that could affect VDOT's ability to replenish its professional staff during the 1990s. Among these are a slower-growing workforce, the changing composition of the working population, and shortages of technically trained replacements. Demographers forecast that during this decade, the number of people in the workforce will grow more slowly than in the recent past, and the average age of the working population will increase. Furthermore, the composition of the workforce will change as the number of women, immigrants, and minorities increases. Finally, statistics show that the number of graduating civil engineers has been declining. Since it is this area of specialization that includes such a large percentage of transportation professionals in the nation's federal and state transportation agencies, this shortage will certainly affect the makeup of the workforce that VDOT may wish to recruit in the not too distant future.

A number of studies have been undertaken in recent years to address these issues from a national perspective. Although these efforts have provided useful information for decision makers in responding to severe problems of professional shortages, the studies do not particularly address the specific condi-

tions and changes that are occurring within VDOT. Accordingly, a separate research study was undertaken to identify trends and suggest how VDOT can position itself to develop a professional workforce that will be responsive to the challenges it will face in the 21st century.

PURPOSE AND SCOPE

The original purpose of this study was to develop a succession planning process that VDOT could use to address issues related to the recruitment and retention of professional employees who would replace those who have recently or will shortly retire. The study was predicated on the assumption that these changes would occur over a period of 5 to 10 years. However, shortly after the study began, dramatic personnel changes occurred as a result of an early retirement program instituted by the Commonwealth of Virginia in 1991 and the hiring restrictions attached to that program. Since it was not clear at that time what the impact of these events would be, the authors in consultation with representatives of VDOT's Human Resources Division had to decide whether and to what degree the scope of the study should be altered or whether it should be continued at all. Rather than abandon the study, it was decided that the study would be redirected to concentrate on the following tasks: (1) a review of previous work on succession planning in an effort to enlighten those working in VDOT's Human Resources Division as to how the issue has been broached and dealt with elsewhere, (2) a determination of the demographic characteristics of professional VDOT employees with an emphasis on attrition patterns and a comparison of the attrition rates of engineers and nonengineers, (3) the development of a trend model that could assist in forecasting retirements, and (4) carrying out focus group discussions with VDOT's managers aimed at forecasting how VDOT will operate and what the makeup of its workforce will be in the next 5 to 10 years.

METHODOLOGY

The four major tasks mentioned above were undertaken as follows. First, a review was made of published professional manpower needs studies. Many of these were on hand, and others were procured following a DIALOG search of selected key words and literature published by the Transportation Research Board, the Federal Highway Administration, and other federal and state agencies. Next, an examination was made of the demographic profiles of current and former VDOT professionals. This was coupled with an investigation of historical trends with respect to attrition, especially retirements. Using those individuals

who occupied VDOT positions at grade 12 and higher between 1984 and 1991 for a case study, demographic and attrition data were examined and analyzed to determine the characteristics of individuals who left VDOT and why they did so. Information from Task 2 was used in performing Task 3, which was the development of a trend model that could be used as a tool for Human Resources to use to forecast attrition. It is envisioned that this forecasting model could be applicable for projecting retirement dates and ages for all classes of VDOT employees. Task 4, which was conducted simultaneously with Tasks 1 and 2, consisted of a series of focus group sessions with key VDOT managers and administrators as participants. These sessions were aimed at soliciting their views about what VDOT of the future will look like and the kinds of skills that will be required of its staff.

RESULTS AND DISCUSSION

Prior Transportation Professional Needs Studies

The expectation that many of the transportation professionals who had helped to plan, design, and build the interstate system would soon be leaving the workforce was recognized by Congress as early as 1982. The enactment of Section 135 of the Surface Transportation Assistance Act that year called for a “comprehensive study and investigation of future transportation professional manpower needs, including but not limited to prevailing methods of recruitment, training and financial, and other incentives and disincentives that encourage or discourage retention in service of such professional manpower by federal, state and local governments.” The act specified that the study be conducted by the National Academy of Science’s Transportation Research Board (TRB), which in 1985 published a report *Transportation Professionals: Future Needs and Opportunities*.¹ The TRB report predicted a greater-than-average turnover among senior professionals in the late 1980s and early 1990s and forecasted that during that period, approximately one-third of the professional engineers in state and county governments would retire. Such large-scale retirements were not expected among nonengineers, since average ages are lower and an employee pool with the required skills is much more readily available. The report points out that state highway agencies hired civil engineers extensively in the late 1940s and 1950s to meet the needs of a rapidly expanding national highway program. In the 1970s, hirings slowed, thereby creating a gap in age continuity. Thus, it goes on to say, what can be expected to happen is a retirement “bubble” (or perhaps several bubbles) during the 1990s, especially among civil engineers. This, coupled with decreases in college enrollments in civil engineering, could result in a shortage of qualified engineering applicants early in the decade. The report maintained, however, that such a crisis could be avoided if state DOTs would recognize that this shortage could occur and take

the appropriate steps to address the problem—such as increased use of high technology in design and drafting, reviews of recruitment practices and upgrades in compensation, and the establishment of professional development programs. The report also pointed out that the nation's colleges and universities, which are the key suppliers of new professionals to the transportation industry, should regularly broaden transportation curricula, promote career opportunities in transportation to prospective students and others who influence career choices, develop programs to attract women and minorities to transportation, and increase the interaction between university programs and government and industry to ensure that education and training stay closely matched to employers' needs.

The TRB study addressed the problem of a waning transportation workforce from a national perspective and provided an overall strategy for its resolution. At the state level, however, departments of transportation (DOTs) were also faced with the reality of a workforce that would radically change from what it had been in the past. A study completed in 1987 by the Hudson Institute for the U.S. Department of Labor entitled *Workforce 2000, Work and Workers for the 21st Century*² identified five demographic trends that will affect the work place of the future:

1. *The population and workforce will grow more slowly than at any time since the 1930s.* In the 1970s, the labor force increased by 2.4 percent per year. In the 1990s, increases are expected to be only 1 percent annually.
2. *The average age of the population will rise, and the pool of younger workers entering the labor market will shrink.* By the year 2000, the average age of the workforce will have increased from 36 to 39 years of age, whereas the number of young workers age 16 to 24 will decrease by 2 million (8 percent). An older workforce, though stable and reliable, could be less prone to relocate, change jobs, or respond to training opportunities than younger workers.
3. *More women will enter the workforce.* Almost two-thirds of the new entrants into the workforce by the year 2000 will be women, and 61 percent of all women of working age will be employed. Demands for day care, maternity benefits, and child care will increase as will interest in part-time, flexible, and stay-at-home jobs.
4. *Minorities will occupy a larger share of new entrants into the workforce.* Nonwhites will comprise 29 percent of new entrants into the labor force by the year 2000, which is twice the current share.
5. *Immigrants will represent the largest share of the increase in the population and workforce since World War I.* Approximately 600,000 immigrants are expected to enter the United States annually, of which two-thirds or more will likely enter the labor force.

In 1990, the American Association of State Highway and Transportation Officials (AASHTO) published a *Guide to Recruitment and Retention of Civil Engineers*.³ The guide sought to define and develop a recruitment and retention program and a national “marketing” program to expand interest in civil engineering as a career and create a joint effort among AASHTO member departments for supporting recruitment and retention and fostering interest in civil engineering. This guide contains practical ideas and suggestions for recruiting qualified applicants. It is directed at recruiters from state DOTs and contains sections on formulating a recruitment and retention strategy, producing attractive and effective recruitment and marketing materials, cultivating college students, refining recruitment tactics, and retention. In addition, it also contains an inventory of recruitment and retention programs, printed materials, and videos that are used in each of the states.

Also in 1990, the Transportation Research Board published a study entitled *Innovative Strategies to Upgrade Personnel in State Transportation Departments*.⁴ The purpose of the study was to synthesize recruitment, training, and management-development practices that were found to have long-term success. Personnel directors of the state DOTs and Canadian Provinces surveyed reported that increased emphasis on training and development is focused primarily on improving current job skills rather than meeting future needs. The study found heavy reliance on training assistance from other state agencies, professional associations, universities, community colleges, and private contractors. Of particular interest is the fact that a number of VDOT professional development programs are highlighted in this report including our manager training programs, construction inspector cooperative training, and the Executive Institute.

Two recent reports address methods for attracting students to careers in transportation engineering. The first, published by the Institute of Transportation Engineers (ITE) in January 1990 from a study that began in 1986,⁵ directs the transportation industry

1. to develop written and audio-visual materials for students in elementary school, high schools, and college that present a positive image of transportation engineering as a career
2. to secure a commitment from ITE members and others to assist in the distribution of these materials to students at all levels and to recruit them to the profession
3. to develop activities within the profession and with employers that promote recognition of the value of high quality professional transportation engineering

4. to encourage and promote adoption of policies that provide for effective competition for the best professionals, especially with regard to salaries and the work environment.

In May 1992, a report entitled *Civil Engineering Careers: Awareness, Retention and Curriculum*⁶ was published by the NCHRP. The study was conducted by the Pennsylvania Transportation Institute (PTI) and confirms a number of the demographic trends noted in other reports. Acknowledging that the future points to a population that will become increasingly diverse, the report also points out that both ethnic minorities and women are underrepresented in civil engineering and have poor retention records in engineering programs. The study also found that the market is demanding a higher skill level from its workers than ever before. The report proposes three strategies designed to be targeted at the different developmental stages of future civil engineers:

1. Heighten the *awareness* of technology, engineering, and civil engineering.
2. Increase the *retention* of the existing pool of future undergraduates.
3. Modify the existing *curriculum* from kindergarten through college.

Referred to as the ARC model, each element is adapted to five specific target markets: elementary grades (K through 6) junior high (grades 7 through 9), senior high (grades 10 through 12), students enrolled in civil engineering programs, and freshman/sophomore engineering students. To fully implement the ARC model, AASHTO in cooperation with FHWA and other professional societies and industry groups has organized a Transportation and Civil Engineer (TRAC) Career Center to help educate and inform students about career options.

Although much of the foregoing addresses initiatives made at the national level to enhance transportation as a professional career, much of it can be applied in Virginia. In the next two sections, we examine the current workforce at VDOT and discuss patterns of retirements and resignations that are likely to occur.

Who Works for VDOT and Why Do They Leave?

This section examines the demographic makeup of VDOT's existing workforce based on information obtained from historical monthly records of the Personnel Management Information System (PMIS).

Profile of the VDOT Professional Workforce

Table 1 presents a statistical summary of VDOT's professional workforce (grade 12 and above) as of 1990. The data in this table indicate that the typical VDOT professional staffer is white, male, and has an engineering title. He is a U.S. citizen, in his mid 40s and has 20 years of service. The typical VDOT non-engineering professional staffer is also white, male, a U.S. citizen, in his mid 40s with 16 years of service. There is a higher representation of females in this group than in the engineering group. Since engineering professionals have worked longer for VDOT than nonengineers and are slightly older, it is reasonable to expect that a higher percentage of them will be eligible to retire at age 55.

Although substantial progress has been made, various minority groups are still underrepresented in VDOT. This situation exists despite VDOT's vigorous affirmative action plan and supporting activities.

Profile of the Professional Workforce Recently Resigned or Retired

The data in Tables 2 and 3 indicate that the typical retiree who left VDOT during this period was a white male U.S. citizen about 60 years old with 35 years of service. Engineers tend to be slightly older than nonengineers at retirement and have worked for VDOT longer. As noted earlier, engineers typically

Table 1
PROFILE OF EXISTING VDOT PROFESSIONAL WORKFORCE* (1990)

(N = 1060)

	Professional Staff			Engineers			Nonengineers		
	Total	M	F	Total	M	F	Total	M	F
Employees (%)	100	88.8	11.2	69.5	63.9	5.6	30.5	24.9	5.6
Race (%)									
White	93.2	93.9	87.4	93.9			91.6		
Nonwhite	6.8	6.1	12.6	6.1			8.4		
American Indian	1.4	0	6.7						
Asian American	27.7	33.3	6.7	18			2		
African American	66.7	66.7	66.6	23			25		
Hispanic	4.2	0	20.0	3					
Citizenship									
U.S.	99								
Other	1								
Age (yr)	45.7			46.1			44.7		
Length of Service (yr)	20.0			21.6			16.4		

*Grade 12 and above.

Table 2
 PROFILE OF PROFESSIONAL WORKFORCE
 THAT RESIGNED OR RETIRED BETWEEN 1984 AND 1990*

(N = 157)

	All	M	F	Non-Engrs.	Engrs.	White	Non-White
Retirements							
Age (yr)	60.4			60.8	59.1		
Service (yr)	34.9			36.7	27.7		
Resignations							
Age (yr)	32.8	33.7	30.4	31.9	34.9	33.1	30.8
Service (yr)	5.2	5.4	4.9	4.6	6.8	5.7	2.4

* Grade 12 and above.

Table 3
 NUMBER OF ENGINEERS AND NONENGINEERS WHO RETIRED OR RESIGNED BY YEAR*

(N = 157)

Year	Engineers	Retired Non-Engineers	Total	Engineers	Resigned Non-Engineers	Total
1984	9	2	11	6	1	7
1985	8	5	13	9	4	13
1986	13	1	14	11	2	13
1987	14	2	15	6	2	8
1989	14	4	18	11	5	16
1990	9	2	11	10	8	18
	Total: 66	16	82	53	22	75
	Percentage: 80.5	19.5	100	70.7	29.3	100
	Average: 11.0	2.7	13.7	8.8	3.7	13.6

*Grade 12 and above.

professional VDOT employees who *retire* each year has been fairly constant, but the number of engineers who do so tends to be much greater than nonengineers. The disparity between these numbers occurs because engineers have made up a much greater proportion of the professional workforce and have more years of service. On the other hand, the number of professional nonengineering VDOT employees who *resign* each year has been fairly constant and is almost the same as the average number who retired. The average number of

engineers who resigned each year was lower than the average number who retired. The percentage of resignations from the engineers' group is in accord with the fact that this group comprised 70 percent of the workforce.

Not shown in Table 2 are the reasons those who separate from VDOT give for doing so. Of the 75 professional employees who resigned between 1984 and 1990, 68 percent left to accept a better job, 13 percent moved from the area, 4 percent had home responsibilities, 3 percent were dissatisfied, and the remaining 14 percent listed a variety of reasons. Eighty four percent of the employees who left were white, and 16 percent were minorities. These percentages are slightly less than the white employee population as a whole, and slightly more than the minority VDOT professional workforce, respectively. Females, a group that makes up 11.2 percent of the VDOT workforce, made up 29 percent of those who resigned during the study period. Unfortunately, employees who left VDOT during this period could not be interviewed during this study, so better data do not exist regarding the circumstances of their resignation.

Employees who leave VDOT are likely to do so within 5 to 7 years after they enter the workforce. Those who remain beyond 5 to 7 years tend to remain until retirement. Those who resign tend to be in their early thirties, which may be viewed as a critical age for a transportation professional. Beyond that age, other factors, such as family considerations, spousal employment, etc., tend to foster employment stability. Further, it stands to reason that as employees stay longer with an organization, they become vested with benefits such as accrued vacation, sick leave, and health benefits, thereby increasing their commitment to the agency. Engineers tend to resign from VDOT at a younger age than do nonengineers. One could surmise that this happens because it may take nonengineers longer to locate "better" jobs. Engineers and nonengineers who resign work about 5 or 6 years before doing so. Again, the details given for resigning are not specific but "obtaining a better position" is often entered on the separation form. The average entry age of engineers who do not resign is less than the average entry age of engineers who do, suggesting that the latter group might have more education or might have worked longer for other firms prior to joining VDOT.

The age and length of service for minorities who resign is less than that of whites. The data do not divulge the reason that nonwhites who resign do so much sooner during their term of employment with VDOT than do whites. Again, job opportunities elsewhere or the small percentage of minorities in the workforce may be factors in accelerating the time of leaving. Whatever the reason, these data seem to indicate that efforts made by VDOT to retain minorities should begin fairly soon after they are hired.

A Method For Predicting Retirements

The profile of retirees developed from historical data can be used to develop a trend model for making predictions about future attrition patterns at VDOT. In developing this model, which can be applied to forecast general trends in the workforce, probabilities were used to express retirements. In this section, the application of the model will be discussed along with the procedure used for developing it.

Figure 1 shows the cumulative distribution of the combined age and length of service of employees in grade 12 and above who retired between 1984 and 1990. For example, the graph shows that 50 percent of VDOT employees retired when their age and years of service totaled 98 years or less, and 100 percent of all employees retired by the time their age and years of service equaled 109. Since the median (or 50th percentile) value in the graph is 98.2 years, if these data were used for predictions, we could state that there is a 50 percent chance that retirement will occur in less than 98 years of combined age and service. Naturally, there is a 50 percent chance that it will occur later. The information presented in Figure 1 can be used to develop a slightly more mathematical model for predicting future attrition, however. The retirement data in Figure 1 can be mathematically represented by dividing the overall probability range into 10 equally likely subranges—each interval representing a 0.10 probability range. The subranges would be from 0 to 0.10, 0.10 to 0.20, etc. For each bracket, there is a 0.10 probability that the retirement outcome will occur in that bracket. A combined age and length-of-service value is selected at the mid-point of the bracket. The total of all of these mid-point values is 957.2. Since each value of age and years of service occur with a probability of 0.10, the expected value for VDOT employees is 0.10 times 957.2 years or 95.72.

This value can be utilized to predict retirement dates by determining through the use of the Personnel Management Information System the date that employees will reach an average combined age and service level of 95.72 years. An example of how this works can be illustrated as follows: Mr. Jones, a grade 14 VDOT employee, is 46 years old in 1993 and has 10 years of service. At what age and year will he likely retire? Using the probability model, we can say that Mr. Jones' age (46) plus his length of service (10 years) now totals 56. If 56 is subtracted from 95.72, the result is 39.72. For each additional year he works for VDOT, he will accumulate 2 years of age and service, so 39.72 divided by 2 comes to 19.86 years of added work with VDOT. Since Mr. Jones was 46 years old in 1993, he will be 65.86 years old (46 plus 19.86) when he retires. The year of retirement is 2013 (1993 plus 19.86).

Forecasts can be made for individual employees and summarized at various levels according to job classification, location, etc. to allow contingency planning in advance of expected retirement dates. Admittedly, since the model was based on data from a specific classification of employees (grades 12 and

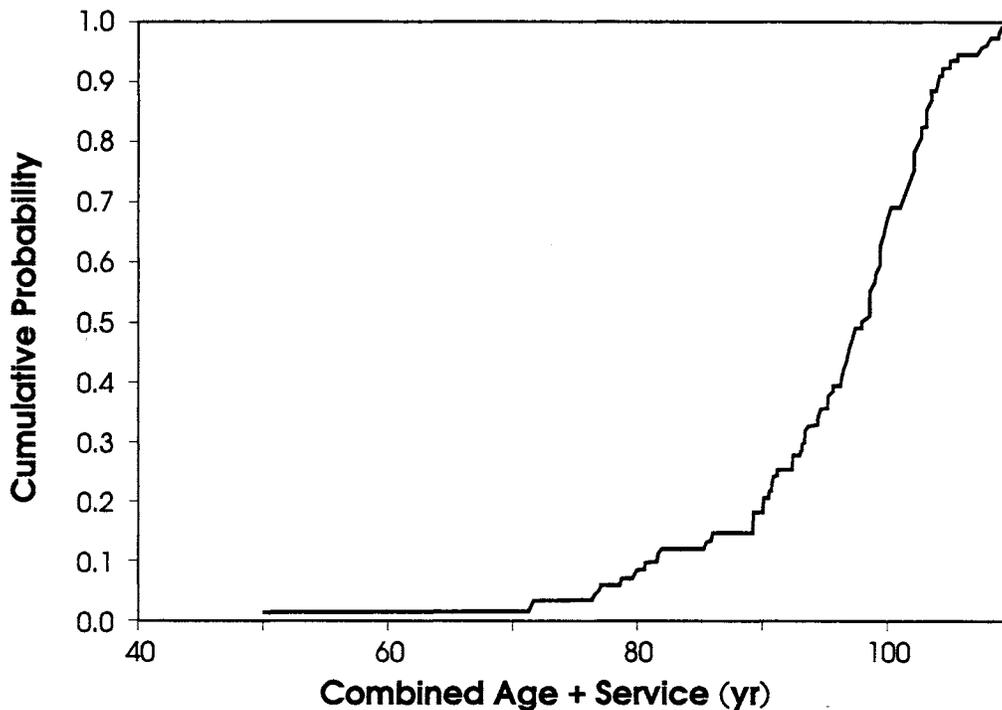


Figure 1. Cumulative distribution of retiring VDOT professionals 1984-1990.

above) who retired during a specified period (1984-1990), it reflects the state of mind and circumstances, both personal and professional, of that group. The methodology, however, can be replicated for any generally homogeneous group of employees, and a new predictive level of age and service can be determined as a means of forecasting attrition. How VDOT should implement the methodology and develop specific demand forecasts for the replacement of professionals were not within the scope of this study.

VDOT's Management's Views Regarding Future Staffing

The current managers at VDOT constitute a vital source of information and perspectives regarding the future of the agency, including its organizational staffing. Accordingly, a series of focus group meetings were held between October 30, 1990, and December 10, 1990, with 31 division and district administrators. The agendas for the meetings were identical, and they lasted approximately two hours. Each individual was requested to provide his or her views regarding what VDOT will be undertaking in 10 years and how it will respond to those activities in terms of staffing. These sessions produced a variety of observations and opinions about VDOT of the future. A brief summary of the four focus group discussions is included here. The individual comments, appearing exactly as transcribed from the original minutes, can be found in the Appendix.

The participants in the focus groups provided some interesting insights into what VDOT might be doing during the next 10 years and the likely composition of its workforce. The key issue that emerged was that although VDOT will continue to perform its traditional activities of designing, building, maintaining, redesigning, and rebuilding roads, local governments will be more involved in the decision-making process and perhaps even in the business of actually building infrastructure. Significant changes in the workforce are foreseen. There will be an increase in the percentage of women, minorities, and foreign nationals in VDOT's workforce, and VDOT's managers will need additional training and skills to deal with a more diverse workforce. Most managers feel that VDOT will continue to be an engineering-oriented organization, and its employees will continue to be required to possess certain basic technical and engineering skills. However, there is also the feeling that communications, financial, and "people" skills will be required of managers (and the general workforce for that matter) to a greater extent than is currently the case. All agreed that computer skills will ultimately be a requirement for nearly all employees.

Another theme that emerged from these sessions was the changing nature of career ladders in VDOT. Many managers feel that there will be a lessening of the tendency for employees to remain with VDOT for their entire career. This will be the result in part of the changing demography of working professionals (e.g., dual-earner families and different attitudes and expectations among young workers). It will also be the result of disincentives found in VDOT's career ladders, e.g., in a lack of economic incentives for promotion and in relocation opportunities provided by VDOT coupled with the Commonwealth's policies with respect to relocation costs. They cite the fact that since there is a tendency for fewer and fewer moves from the field to the central office, this results in an underutilization of valuable experience.

Regarding recruitment procedures and practices, VDOT's managers feel that VDOT is attracting a diverse applicant pool but is experiencing strong competition from the private sector especially with respect to attracting female and minority engineers to VDOT careers. They say this can be blamed in part on the state's somewhat uncompetitive pay scales as well as on certain state and VDOT policies that slow the hiring process.

Finally, the group of managers spent a fair amount of time addressing VDOT's training needs. Most felt that training should play a stronger role in the organization than it does now and that training programs should be developed to address nontraditional as well as traditional areas of expertise. There was the feeling that training should seek to expand employee's skills rather than merely teach them how to do their current jobs better and that training opportunities may be very important for recruitment efforts in the future.

CONCLUSIONS

1. *The composition of the workforce recruited in the near future will be significantly different from that which VDOT has previously recruited. Among changes expected are the following:*

- The workforce will grow more slowly than at any time since the 1930s.
- The average age of the population will rise, and the pool of younger workers entering the labor market will shrink. Traditionally, VDOT has recruited its career employees from the pool of younger workers below 25 years of age.
- Almost two-thirds of the new entrants into the workforce by the year 2000 will be women. Currently, females make up only 11 percent of VDOT's professional workforce, and VDOT continues to experience difficulties in attracting female engineers.
- Nonwhites will make up 29 percent of new entrants into the labor force by the year 2000. These employees currently hold 7 percent of the upper management positions at VDOT, a figure that will no doubt climb during the decade of the 1990s.
- Immigrants will account for approximately 600,000 new entrants into the U.S. labor force year during the 1990s. Currently, only 1 percent of VDOT's professional workforce is filled by non-U.S. citizens or foreign nationals, a number that will no doubt grow during the 1990s.
- More than 80 percent of the net additions to the workforce nationally will be nonwhites, women, and immigrants. Presently, this group accounts for about 50 percent of the nation's workforce. In VDOT, this group currently accounts for 17 percent of the professional workforce.

2. *In every demographic category that is expanding or expected to expand in the next decade, the percentage of resignations between 1984 and 1990 exceeded their representation in the VDOT workforce as a whole. Females left VDOT at a rate almost three times their representation in the agency. Twice as many nonwhite workers on average left VDOT (as would be expected from the overall workforce composition), whereas four times as many resident aliens and foreign nationals resigned than would have been expected based on overall workforce demographics.*

3. *Most national studies predict that greater-than-average turnover among senior transportation professionals will occur during the 1990s. Demographics confirm that most of those in upper management positions in VDOT will be eli-*

gible to retire by the end of this decade. However, if past experience is repeated, many of its senior staff can be expected to remain with VDOT an additional 5 years beyond retirement eligibility dates, which is slightly longer than national studies predict.

4. *A large portion of employees entering VDOT will likely have different career expectations than those who joined the organization 30 years ago. A significant portion of the workforce now anticipates a multiple career path during their lifetime.*

5. *VDOT will continue to require technical and/or engineering skills. However, the changing nature of the workforce and greater pressure from the public and local governments will place a greater emphasis on the need for employees to possess managerial, communication, and "people" skills. VDOT managers especially will need to possess the training and skills necessary to deal with a more diverse workforce and an enlightened public.*

RECOMMENDATIONS

These recommendations are grouped under four basic objectives.

1. *To increase the quantity and quality of new transportation professionals within VDOT.*

- VDOT should continue to provide fellowships for college and university students for post graduate training that link support with guaranteed employment. Special emphasis should be placed on recruiting minorities and women.
- An individual within VDOT should be charged with keeping abreast of national developments regarding recruiting, particularly within AASHTO, and with informing appropriate management within the agency of new developments.
- Training curricula should be established for all classes of employees. Each employee, upon entering employment, should be presented with a training plan in an effort to foster retention and job growth.

2. *To improve the retention rate among transportation professionals, especially women and minorities.*

- There is a need for programs to be conducted in-house on managing diversity in the workforce. The programs should (1) identify the benefits of a diverse workforce, (2) define the manager's responsibilities to maintain an environment that provides equal opportunities to all employees, and (3) develop the improved communication and "people" skills necessary to manage effectively in a new environment.
 - VDOT should consider developing a mentor program that links new employees in VDOT with an individual who has been with the organization for five or more years. These mentors would greatly aid in the adjustment of new arrivals and serve as counselors during the early part of their careers. Such relationships should help in the career development of new employees and serve to ensure that their expectations are understood and met.
 - Incentives are needed that will increase the likelihood that employees will remain with VDOT beyond the critical period (two to six years) when most resignations tend to occur. Such incentives might include more in the way of tuition refunds, co-op training, full-time graduate study, and training curricula.
 - The staff of Human Resources should conduct a series of focus groups with transportation professionals hired within the past five years. The focus groups would be used (1) to determine employee's expectations upon arrival, (2) to monitor how well these are being met, and (3) to encourage the sharing of common concerns.
 - The staff of Human Resources should consider conducting either interviews or focus groups with individuals who have recently resigned to find out more about why employees leave VDOT.
3. *To improve career opportunities for employees who have remained with VDOT.*
- An aggressive program for encouraging career advancement by technicians and other employees through job rotation, attendance at short courses, and professional society meetings should be established.
 - A committee should be established to examine VDOT's and the state's policies and practices regarding relocation. The committee's findings should include (1) an assessment of existing incentives and the extent to which they foster employee development and (2) a determination of how VDOT's and the state's policies

regarding relocation could be altered to benefit employees and encourage upward mobility within the agency.

4. *To determine the nature and extent of near-term employee shortages.*

- The Human Resources Division should test the predictive model discussed in this report to determine whether it is a reliable tool for predicting retirements. The model should be tested in various divisions and over a cross section of classes and employee demographic categories. If proven reliable, this model should be used to estimate when the next retirement bubble will occur.
- If shortages in specific groups of employees or areas of expertise are anticipated (perhaps as a result of using the predictive model), programs should be developed to compensate for them before they actually occur.

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APPENDIX

FOCUS GROUP RESPONSES

***What will VDOT be doing in 10 years, compared to what it is doing now?
What will the most significant changes be?***

- The focus of VDOT activities will always be on building roads or at least maintaining them.
- VDOT will continue in 10 years as a construction and maintenance organization as it is now.
- In the next 10 years, VDOT will design, construct, and reconstruct highways, maintain existing highways, and participate to a greater extent with local groups.
- Existing roads were begun in the late 1950s and are wearing out. Rebuilding these roads will be a major effort. There will be plenty of highway work in the next 20 years.
- Looking to the future, even if VDOT rebuilds existing roads it will be done as a construction activity not maintenance; therefore, VDOT will still have a significant construction program. The current work level will continue for the next 10 years.
- In 10 years, some managers feel that VDOT needs to be building more bridges. However, others believe that environmental and wetlands issues will restrict new location work; therefore, VDOT will be maintaining or enhancing existing facilities. There may be a push nationwide to repair many types of infrastructure. It will probably need to reach a crisis before something will be done.
- Major new road construction will be reduced, but there will be work adding lanes to and rehabilitating existing roadways, which may require an even greater level of skill than that required for building new roads. Maintenance requires a higher level of engineering skill than new road work, which is straight forward and by the book. In maintenance, each situation is different.
- In urban areas, VDOT cannot keep up with increased transportation needs. More mass transit will be required. In rural areas, there will be little change. Because of the cost of land in urban areas, VDOT will have to use what it already owns. This could include expanding existing roads or building elevated roadways. We can't afford to continue to buy land to build roads. The cost of right-of-way exceeds the cost of construction in some areas.
- In 10 to 15 years, we will be in a high-tech society and will not be building highways, but rather finding ways to maintain existing high-

ways. The traffic management area will be vital. Others feel that with the inevitable population growth, the need for VDOT's activities will continue.

- In the past, we had always assumed that after the interstate system was completed, VDOT would focus heavily on maintenance; however, we have never run out of the need to expand and build. VDOT's mission in 10 years will be a mixture of these elements. Engineers shouldn't leave VDOT because they think there won't be any more transportation work.
- Forecasts of the future should consider the past. Previous expectations that dramatic change would occur in the transportation industry have not been realized. Accordingly, it can be assumed that VDOT will generally be performing the same activities in the next 10 years.
- In the next 10 years, localities such as Fairfax County, Chesterfield County, and Richmond, i.e., those in more urban areas, will take over more responsibility for maintaining and planning facilities. VDOT will continue to handle the same for the rural areas. VDOT is faced with a constituency in urban areas that wants more active participation in the planning and development of facilities. We can expect VDOT's staff to shrink as a result. VDOT may serve as an advisor to the localities until they gain expertise in the area.
- There is a perception that the general public is dissatisfied with the transportation system in general; they expect a lot out of transportation today. There is more traffic now than ever anticipated. Yet, because VDOT cannot control zoning, its ability to construct an efficient transportation system is limited. Control of zoning is an important factor in being able to properly plan for the future. VDOT is still oriented toward the rural highway system and has been unable to cope with the complex urban highway system. This is causing some counties to consider taking over control of their local highways.
- Local communities in urban areas may take over more of the work currently done by VDOT, but rural areas probably don't want to do this.
- Another view is that counties won't be taking over maintenance but will instead determine what needs to be done and dictate needs to VDOT. In this scenario, liability must be addressed since it is hard to share. With increased responsibilities comes the need to think about liability—if the state is not making the decisions, they should not bear the liability. This makes it hard to see where things will go. Governors

and assemblies will determine much of the future of VDOT. This will be very politically charged.

- Increased demands on the current roads will lead to lots of redesign work. This may result in a public/private operation. If separate roads were created for trucks, highways for cars might drop to 10-ft lanes instead of 12-ft. Some believe that in the next 10 years more functions will be taken over by local government; counties may take the secondary roads back. There has been some movement already in that direction. Others see the counties getting more involved but feel that turning over all responsibilities to localities won't happen in the next 10 years to any great degree. All of this does increase the need for communication on different levels. If more work is turned over to the private sector, it could reduce the VDOT workforce. However, public/private partnerships may be limited because of the need for a toll structure to pay for the private enterprise aspect—we can't indiscriminately put tolls just anywhere. There may not be the volume of people to make money on a toll. In addition, VDOT may play a greater role in economic development by planning the roads in concert with planned industrial relocation.
- Divesting of county roads has been discussed for years, but there are very few counties that would actually be willing to accept responsibility for the local roadwork. In addition, a statewide agency will be needed to determine the best overall approach and to mediate between adjacent communities.
- A cost study and examination of redundancy has led some counties to reject localization. Other counties would come to a similar conclusion. Citizens would be displeased with the outcome if the highway program were left to the local communities.
- VDOT is successful and local citizens acknowledge that.
- Maintenance activities will continue to be contracted out to private companies; in fact, the level may increase due to the public perception that such an approach is more cost-effective. This is a political decision, but it has the advantage that layoffs can be minimized in economic downturns.
- VDOT uses outside consultants for 20 to 25 percent of the work. The size of VDOT could be affected by the amount of work given to outside contractors. This is a much bigger and more likely scenario than giving the entire effort over to local communities.

- The federal government may limit their involvement to research and development and get out of the highway program.
- In the next 10 years, VDOT will need to be more involved in multi-modal and mass transportation. It will be a different agency—a true DOT—that will be part of a group that collects taxes, and also deals with the ports (sea and air), as well as rail. It will include DMV, aviation, rail, etc.
- In 10 years, expect to see a greater focus on other modes of transportation, HOV lanes, rail corridors for highway or other transit uses, or a light rail transit system.
- The U.S. may move away from petroleum-fueled vehicles in the next decade.
- The 4-year political cycle is having a greater effect than ever before. A consistent long-term direction is not present.
- Decentralization, which has already occurred, will stay in place. The budget will only get tighter.

What kind of workforce will VDOT need in future years? What effects will advances in technology have? What kinds of knowledge and skills will be needed most?

- VDOT of the future will employ many generalists, i.e., people without transportation backgrounds. However, it is important that people with transportation backgrounds be recruited to fill positions related to the technical side. The Department cannot be run totally by people without such a background. The management of companies in general is moving more toward generalists who can respond to external and internal demands. There needs to be a good mix of new blood and internally developed people for a balance.
- People in the agency will be more managers than engineers in 10 years. VDOT will still need engineers to design the roads, but in a lot of positions, it will be as good or better for them not to be engineers. This includes resident engineers and district administrators. VDOT will require individuals who are more manager oriented and have a diversified background; it will not be as heavily engineer oriented.
- There is much talk in VDOT lately focusing on the need for “managers” as opposed to engineers. Such discussions are viewed as an affront to the engineers, who, it is implied, are incapable of also being managers. Engineers can manage as well as “managers,” perhaps

even better in a technical discipline. Fifteen years ago Kentucky rid itself of engineers and replaced them with “managers.” Now they are reversing that decision believing it was a mistake.

- VDOT’s policy does not exclude an engineer from becoming a manager. However, there is a shift in the Department away from the selection and progression of people based solely on their technical engineering skills. VDOT will seek a background in managerial skills while continuing to recognize the importance of technical skills.
- The current discussions on the need for “managers” is not intended to downplay the need for technical expertise but rather to recognize that there is additional expertise that needs to be infused into the organization. The engineer has to have not only technical talent, but administrative skills also; these should both be stressed in the training program.
- The new focus on managerial skills over engineering skills comes from a recognition that people in these positions have always had to be managers not just engineers. In addition, VDOT is changing, and more is expected of it. We have to justify administratively what we are doing now more than ever, such as, with County Boards of Supervisors, etc. Also, the workforce has changed, and grievances, disciplinary action, and EEOC suits are a greater factor than ever. The workers expect more of VDOT and put more demands on managers.
- A district administrator can be more of an administrator than a resident engineer. They are in a much broader role than a resident engineer, who has day-to-day engineering responsibilities.
- The district administrator does not have to be an engineer, but he/she must have the ability to deal technically with engineers below him/her as well as to address complaints from the public, who are quite educated and knowledgeable. If they had to refer the problem to someone else, they would lose credibility with the public. In general, it is easier to adapt an engineer to deal with the managerial aspects of the job than to make an engineer out of someone who is an otherwise good manager.
- The DA job will still be held primarily by engineers in 10 years; 20 years from now may be different. The resident engineer position has moved more towards graduate engineers over the past 5 to 10 years. This follows the general trend in VDOT.
- If the district administrator or resident engineer does not have an engineering background, the need increases for better engineering

skills at subordinate levels, such as inspectors. VDOT may have to upgrade this staff with engineers if such skills do not exist at the top.

- VDOT has many positions that have an engineering title but which are not, and do not need to be, filled by graduate engineers. Many positions which VDOT calls “engineer” are more accurately called “technician” by others. The cause of this problem is VDOT's inability to clearly define position requirements with regard to the need for an engineering education versus a strong technical background. This causes confusion when dealing with outside agencies as well as in determining the types of skills necessary for VDOT in the future. Other states seem to have a better handle on identifying their actual “engineering” requirements.
- The time is soon coming when those persons within VDOT who are doing engineering work will have to be professionally registered (PE license). Future recruits will have to have the educational background that will allow them to obtain their license.
- It is expected that all engineers in certain responsible positions will have to be licensed unless they fall under the grandfather clause. Persons currently in the position are exempt from being licensed; but, if they move to another position, VDOT would try to fill the vacated position with a licensed individual. VDOT would have 20 years to accomplish full licensure in responsible positions.
- Beyond the need for technical expertise, VDOT managers need better people management skills. This need to better interact and relate to people with different backgrounds and attitudes exists today, and it will only increase 10 years down the road as the diversity of the workforce increases. In addition, VDOT will need more expertise in urban planning, mass transit management, economic forecasting, environmental issues, and strategic planning.
- If the General Assembly decides that maintenance should be contracted out, that will have a greater impact on how things are done than anything else that might be predicted today. The types of people who would be required if VDOT embarked on a program to rehabilitate the infrastructure would be similar to those currently employed. In 10 years, the major mode of transportation will still be private vehicles. Rehabilitation is just a different form of construction. The main change in personnel will be in the environmental and social science areas to satisfy public concerns, not to increase productivity.
- Future changes may have an equalizing effect on VDOT staffing. If counties pick up more work, it may reduce the need for maintenance

or administrative and design staff. The bureaucracy is hard to reduce. This will increase the need for people with skills to deal with localities, industries, and client groups, not just internal communication.

- As we have grown with additional divisions within VDOT (and as the state has similarly grown), our ability to respond to information requests from all sources is severely strained. We may need information specialists or better databases in the future.
- VDOT is becoming more service oriented. Responsiveness has become critical. Ten years ago VDOT was a hard science organization; changes forced the creation of new divisions. In 10 years, VDOT will still need people to build, design, construct, and perform maintenance. However, the next line of supervision below the manager level (middle managers) will have to have additional skills to talk to the area superintendent, the bridge designer, etc. to communicate money matters. People must have fiscal skills.
- In the next 10 years, VDOT will need beefing up in the financial areas, particularly in analytical skills if it is to meet the challenges ahead. These people need to be well trained, and VDOT must be in a position to retain them.
- In the past, management positions in the Central Office were filled by people from the districts who brought field experience with them. That is no longer the case; there are many divisions with no field experience—this will be a significant change in the next 10 years as people retire and there is nobody coming in from the field. Communications between the Central Office and the field will get worse.
- VDOT requires a different level of skills today than it did 5 years ago and will require different skills in 10 years. Today, skills in operating a computer are required. The new employees come in with this skill. Hiring requirements have increased to require a 2-year degree in order to obtain this higher level of skills.
- VDOT may not need as many technicians in the future because of the expanded use of CADD; however, it will need at least as many engineers. The highway program is not going away.
- In the next 5 years, there will be an even greater use of computer technology, such as CADD, which will expedite work. Most new employees come into VDOT with computer skills. In the future, CADD skills may have to be taught by VDOT, but drafting will be phased out. This will reduce the number of people needed on the technical side.

Nontechnical groups will also be heavily computer-oriented. As a result, VDOT will be a more sophisticated organization.

- Streamlining, automation, better training, and the expanded use of computers have allowed the workforce in some areas to be cut in half since 1978 (i.e., right-of-way) while maintaining the same or greater workload.
- In some groups, the clerical staff is so restricted that managers look to new hires for computer skills so that they can do their own clerical work. Expectations are that we will use computers, software, and training to eliminate the need for more clerical support. Computers have made deadlines shorter and compressed the time required to make decisions.
- Technology will change the requirements for the professional staff as they have to understand and implement programs such as “smart highways” and computer technology. Highways still have to be built and maintained, landscaping installed, etc. The need for the physical worker will still be there.

Will the composition of VDOT's workforce in 10 years be significantly different from what it is now? For example, will VDOT's future workforce include more women or more minorities? Will changes in the composition of the workforce lead to changes in VDOT's management?

- The workforce of the future will be comprised of more women and minorities. The workforce of VDOT has been predominantly white males because of the applicant pool 30 years ago, but it is changing. Our workforce will be like the norm: whatever is out there in the applicant pool is what will be hired. The workforce will reflect the population as a whole. Those positions at VDOT that are most attractive to the new workforce and which meet their expectations will obviously draw applicants faster.
- We are seeing an increase in the number of Asians in the design sections. This has been the experience in both the districts and the Central Office.
- VDOT may rely heavily in the future on foreign nationals to do the technical/engineering work, whereas people without engineering degrees will be the managers. This highlights the need to provide a competitive salary structure (dual ladders) for the engineers who do not go into management.

- VDOT will continue to be an engineering organization in a decade, but it may have to turn more work over to nonengineers who are supervised by a professional engineer if that is what is available in the workforce.
- Managers feel they do not have the skills to deal well with recruiting women and minorities and retain them. They are working at it, but they could benefit from additional training. Managers believe that those women and minorities who leave do so to take better jobs not because of any problem in VDOT.
- Tomorrow's manager has to be able to deal with human problems. Human needs and problems, including counseling employees on personal problems that are affecting work, have become a big part of the job, and the managers feel they are not that well equipped to handle them.
- In the year 2000, the organization will be younger. The new people will be less experienced but better educated and more flexible.
- In the past, people were hired only in entry level jobs. Now VDOT is hiring people who may have retired from another career or who are at a more senior level. These people will stay a shorter period of time, but only because they cannot get any more years in before they retire.

In the next 10 years, what impact will retirements have on VDOT's workforce? What kinds of knowledge and skills will "go out the door?" How necessary will it be to replace the retirees?

- The top three levels of management in one division could leave within 2 years. Statewide, half could leave in 10 years, and though some people are in line to move up, they are not necessarily qualified to do the higher job. Training programs to pull people up are lacking.
- Some groups are facing 100 percent eligibility for retirement in the next few years. There are not enough backup personnel qualified to fill these positions. The Department has been unable to devote time to cross-training.
- Retirement will occur sooner than in the past as a result of people being fully vested in retirement plans (often including both husband and wife). This will reduce the number of people staying with the agency for 35 years. But long-time employees will continue because of the stability and security offered by VDOT, which is still attractive.

- There are many people at VDOT who are close to a secure retirement; they probably will not consider leaving the agency. However, if they were not so close, many would leave for the private sector or self-employment. The organization is not as attractive to the workforce as it was in the 1960s. It remains a good training ground, but the long-term rewards are not as attractive as they once were.
- In the accounting area, the normal progression is to move on to a better position after several years. There has also been a significant turnover for younger more aggressive employees, such as those with MBA degrees. This has not been the case, however, in civil engineering.
- In engineering, it takes about 5 years to get someone up to speed. There is currently a gap in the 4-to-8-years-of-experience range. In other ranges, the expertise is evenly distributed. This differs from nonengineering departments where there may not be anyone with more than 5 years of experience. In some divisions, the applicant pool is getting smaller, and it is harder to recruit the same level of talent as in the past. The outside market is attracting them faster than we can. More potential recruits end up in an internship in the private sector, which offers more challenges and bigger rewards at a faster rate.
- The most damaging action to succession planning has been previous hiring freezes. As a result of a hiring freeze in the early 1980s, VDOT has a 3-year gap in the ranks of expertise. There is a gap that can't be filled internally with qualified people. This will only be solved over time with new people coming on to take up the slack.
- There are gaps in the organization due to past hiring freezes and the use of consultants that will show up in a few years particularly in the Location and Design Division.
- A 10-year gap exists in the engineering ranks. We (VDOT) got trainees in the last 3 years, but we can't get younger engineers.
- Many of the organizations have a 6-year gap due to a hiring freeze between 1979 and 1984. Others have people with more than 20 years and less than 7 years, but nothing in between.
- In the Lynchburg district, with a MEL of 880, 231 (across all areas) will be eligible to retire within the next 5 years.
- Other districts are concerned with the assistant section head level (grade 11 and 12), where they do not have adequate depth for replacements. The existing people in line do not aspire to move up. A similar problem is noted with resident engineers not desiring promotions.

- For the Northern Virginia district, succession planning for the lower positions (including maintenance and inspector levels) is a higher priority due to a workforce which is closer to retirement than in the professional ranks. Future staffing in the professional ranks is not a major concern, since a more varied group, with respect to age, currently exists.

What kinds of knowledge and skills may go “out the door” as a result of resignations? Among VDOT’s current employees, who are the “short-timers” most likely to be? How necessary will it be to replace those who resign?

- In the future, there will be few engineers that stay 35 years in any industry, not just transportation. This was not the outlook 10 years ago.
- Historically, VDOT has retained 50 percent of its engineers over the years. Generally, if they stay over 5 years, they stay for a long time. Some of these people have a goal to go elsewhere when they are hired on; they are waiting for a better job.
- In the past, it was generally true that after an employee had been with VDOT for 5 years, they were there for a lifetime career. Professionals hired today may only be here for about 4 years. VDOT needs to be aware of this, and take steps to deal with it rather than be surprised by this lower retention. (Note: these observations confirm data presented earlier in this report.)
- Engineers who leave VDOT go to consulting firms, cities, counties, or contractors. There is a demand, and they do have a place to go.
- There is a large exodus of environmental engineers who only stay a year or two and then take a better job elsewhere. Most of them are below age 40.
- The state of the economy plays a part in whether engineers stay or not. When it's good they jump ship.
- Loyalty exists with engineers but not the managers since the managers have skills which are more easily transferable.
- Nonengineers see a greater variety of opportunities elsewhere. They do not see as many opportunities to learn and grow professionally at VDOT.

- In the accounting division, employees average 4 years and then move on. In a public accounting firm, the system is geared for people to move around every few years.

In the next 10 years, how many of the vacancies created by retirements and resignations can be filled by promoting current VDOT employees? Which of the jobs left vacant are most likely to be filled by promotions? Which are most likely to be filled by outside recruits?

- VDOT has historically been able to develop its people in-house and has not had to hire at high levels from the outside. However, the ranks within VDOT are getting very thin particularly in the maintenance section.
- The Department is human resource constrained. It's a major problem getting people to accept internal transfers/promotions such as assistant resident engineer to resident engineer due to the economics involved. VDOT needs to do something about these economic obstacles. Industry has addressed and dealt with this. The economic obstacles are a key problem now; but they were not a problem in years past.
- The current organizational structure (resident engineer is the same level as assistant division head) impedes movement from the field to the Central Office. Field people stay in the field, Central Office people look at both field and office promotions. There is no interest to come back to the Central Office unless at the division head level.
- It is a lateral move for a resident engineer to come to the Central Office. It is a one grade increase to go to the assistant district engineer position. Nobody will take these positions.
- VDOT must make it possible for resident engineers to bid on Central Office positions irrespective of a differential in pay. The cost of moving is staggering and is keeping people from coming from the field to the Central Office and vice-versa. As a result, we are losing a developed resource out there.
- There is insufficient pay incentive between assistant resident engineer and resident engineer, between resident engineer and assistant district engineer (1 pay grade), and assistant district engineer and district engineer. An employee may not recover the costs of moving during their career. VDOT needs to address the mortgage differential.
- VDOT's failure to adequately reimburse employees for relocation expenses is impeding the voluntary movement of employees within the

state. People are not willing to lose money (perhaps \$10,000-\$15,000 by moving) to gain a one-grade promotion. Managers still remember losing \$15,000 to take a promotion and move years ago. Such stories have kept people from bidding on jobs in another district.

- The family considerations have changed in the last 25 years. Today, many families have two incomes and two careers. VDOT must provide an incentive if these employees are going to move for the betterment of the Department. Private industry has addressed these concerns by buying the employee's house, paying closing costs or mortgage differentials, or providing cash incentives. Although VDOT covers the cost of moving personal goods, it does not buy the employee's house at fair market value or pay a mortgage interest differential. Managers believe that VDOT wouldn't lose money on such ventures. It has been suggested that the right-of-way department could handle the home purchase and resale. Although it appears that the agency is way behind private industry in this regard, it is common policy among all state agencies and consistent with the federal government's policies for their employees.
- Managers no longer have the means to assign people where their talents will be best utilized. Working spouses were an exception, not the rule. Now it is the opposite. Two-career families may turn down a promotion rather than move. In many cases, especially at the lower levels of the Department, such as operators and foremen, the employee who works for VDOT is paid less than his/her spouse. A family can't afford to move since they are dependent on two salaries; this can affect attracting new hires as well as internal transfers.
- VDOT needs to look at dual career ladders. At this time, the only option for advancement is to promote engineers into management positions. As a result, we lose their technical expertise.
- VDOT currently has two ladders in the training program: generalist and specialist. After 3 years, those in the generalist program start out one salary grade higher than their counterparts in the specialist program. Engineers in the specialist program figure out pretty soon that if they want to get ahead, they need to become a generalist.
- Providing adequate incentive is an issue in designing the proper organization. If people can't move up, the opportunity for a person to grow is cut off. The current compensation package and career challenges are enough to attract people, but changes are necessary to keep them here. For example, engineers in the generalist program are way out ahead of those in the specialist program. These career paths need to be made more even. Attracting qualified applicants is not a concern.

- VDOT needs to be more flexible as an organization. Why have only one or two people at the same pay level? Pay what the individual is worth to do the job. One division administrator could have people under him doing a specialized job and being paid a higher salary.
- The downside of people not willing to relocate is that you don't get to take advantage of the talent that you have in the Department as a whole. Resident engineers will not consider an assistant district engineer position; they won't even apply if it involves a move.
- The benefit of expertise gained in the field is lost because these employees will not consider transferring to the Central Office - this results in the Peter Principle. People have been in positions and are logical for promotion but they can't move due to financial constraints. Qualified people will go to private industry.
- These disincentives may also deter people from entering the Department, since they do not see the policies in place that will allow them to advance their career through transfers without incurring great personal expense.

Will VDOT need to make changes in its training programs to prepare current employees for their future promotions?

- In the future, on-the-job training and job rotational training and enrichment will need to be stepped up.
- The generalist training program has to better prepare people for the positions of assistant resident engineer, division head, etc. The training needs to address the importance of paperwork, dealing with Boards of Supervisors, inventory control, and environmental impact. Managers in the past were taught to emphasize the technical requirements. VDOT needs to emphasize that other things are important also.
- The discussion of "managers" versus "engineers" originates with a recognition that VDOT must train engineers in other nontechnical issues (i.e. legal, personnel, fiscal, etc.). In the past, it was expected that people would learn these issues in the progression of their job. However, many have not.
- In the past, VDOT had many manual processes, now, we need people to analyze the output of automated processes. This requires that people learn different skills.

- Training will be even more important as the level of technology in-house increases. In the past, technology has been brought on board before training took place (CADD) due to a belief that the purchase might be canceled if not made quickly.
- In the accounting department, some employees are required to have 40 hours of continuing education to maintain their license. VDOT does not offer any courses to deal with this requirement. Employees must take self-study courses or may seek an employer that addresses this need.
- The training program is directed at the field. There is just as much need to train people for higher positions in the home office as in the field.
- In order to retain employees, VDOT needs to develop a sense of loyalty. This can be accomplished by offering training and developing managerial skills so that they feel that they are contributing to the organization. One reason people leave VDOT is that they don't like doing the same things for years. They are self motivated and willing to seek further education. They want to progress, to do more, to do better. VDOT's career ladder is not quick enough. They can make it to grade 15, and then they stall.
- Somehow, VDOT has to provide a means for recognizing the technical areas that are necessary in the Department and provide equal incentives. The current training program is slanted toward the generalist and does not accomplish this. As an example, it takes 5 to 10 years to train an engineer in bridge design, yet in 5 to 6 years, they get restless and want to move on. This leaves VDOT to rely on consultants to fill in, but they don't have the background on the projects to manage them or to answer questions for younger engineers.
- There is no backup for many employees, and the ability to hire a person today to train for the future is limited. VDOT needs a strategy to anticipate the need for and to develop replacements for today's positions. Although there may always be someone to replace a person leaving, it might take many years to get them up to speed.
- Future needs may be met by encouraging current employees who are not engineers to pursue an engineering program sponsored by VDOT.

What kinds of training will VDOT need to provide to outside hires without transportation backgrounds? Will VDOT need to modify its current training programs?

- High schools are not developing the type of skills required by VDOT; therefore, it needs to have a training program to develop these skills after the employees are hired. First, we have to get them into our system and then train them. Going to high schools can be beneficial in attracting people at the technician level and then considering them for additional training and education.
- VDOT is getting technicians today who will advance more rapidly and help close the engineering gap. Once we get them in, we can do things for them. They are bright, energetic people who we can bring along. If we can't draw them as college graduates, bring them in as technicians and take them through an education process. We should count on them as part of the answer to this gap. VDOT should give them a taste of the transportation field and push them to further their education.
- VDOT must continue to attract qualified applicants in the generalists and specialist training programs, and it should be enlarged significantly. The program is considered very attractive to potential applicants.
- Training programs for interns and co-ops may be cut due to the current budget shortfall. This would be a bad decision since VDOT already lacks a sufficient reservoir of talent either in the working ranks or in the training programs to fill future needs.

What changes, if any, will VDOT need to make in its recruitment practices to attract the kinds of people it will need in 10 years? Are VDOT's current recruitment procedures providing your division with a quality applicant pool?

- In the last 5 years, VDOT has been drawing better qualified applicants in general. This is due in part to an improved external image for the Department. While this has helped attract people, VDOT has not always been able to retain these people. This ability to attract people should continue as the need to have more and better skills for jobs grows. The compensation package must be competitive.
- VDOT will compete with other state agencies in the future to attract talented people. Some managers see the competition and turnover getting worse but think it is not necessarily bad. Some divisions have high turnover already; however, they also have good pools of applicants, which are often comprised of 90 percent graduate students.

Although there are external factors they can't control, such as state personnel mandates, they foresee a continued strong applicant pool.

- There has not been a problem finding qualified applicants when VDOT is in a position to hire. The most damaging action to succession planning has been previous hiring freezes.
- VDOT is getting quality people in grade 12 and above, but quality problems exist in the lower ranks. There is a lot of turnover, however, because many are overqualified.
- The number of applicants has generally been quite high for positions like Right-of-way Technician (56 applications), Operator A Truck Driver (>100 applications), Assistant Resident Engineer (6), and Public Information Officer (lots). The District Right-of-way Engineer position received only one applicant from outside the district. People don't want to move, or they consider the competition from people in the district to be too strong.
- The demographics of applicants to VDOT are changing. There are more women, particularly black females, but not many male minority applicants. The accounting department has seen a strong trend toward female applicants, which didn't exist in the past. This has provided many more options for hiring good candidates. Some of these people don't want to work in CPA firms anymore; they complete their internship and want to move on to something else. These applicants are also more qualified than in the past.
- Managers are seeing more women in the applicant pool; about a 50 percent increase has occurred over the last 4 to 5 years. Although the number of women for professional positions has increased, there has been very little increase in the number of minorities (male or female) in these positions. According to industry journals, the accounting professional has seen a significant trend change from males to females in the colleges. In terms of VDOT's recruitment efforts, it is hard to judge the trends, since it is believed that the population we're drawing from is not representative of college graduates on the whole.
- The hiring of minority engineers has been difficult due to the low percentage of minority representation in the graduating civil engineering classes and the demand for these graduates by other companies.
- The recruitment of female and black engineers and—to some extent—technicians has been hampered by the lower salary levels within VDOT when compared with other companies recruiting the same peo-

ple. Even when VDOT has been successful in hiring from these groups, many have left shortly for a better paying job.

- Minority engineers can write their own ticket in industry. To be competitive, VDOT must improve the salary structure to narrow the gap. An estimate is that VDOT has always trailed industry pay scales by 7 to 12 percent. Even when economic times are good, VDOT does not strive to remain competitive.
- The bureaucracy to hire someone requires so much paperwork that good prospects have been lost when an offer could not be formally extended in time.
- Private industry is doing a much better job when it comes to employee relocation. They have programs to cover the relocation of spouses as well as the purchase of an employee's residence. Even when VDOT is successful recruiting, the lower relocation assistance often causes turmoil until the new employee gets settled.
- In some divisions, recruiting qualified people is not a problem, but retaining them is. Salaries have been competitive, but the relocation package is severely lacking. Employees recognize that it costs them too much money to transfer, or they have family or dual income concerns, both of which have cut down on rotation within the Department.
- [The political environment] is negatively impacting recruiting efforts. People are not accepting the jobs being offered. Some jobs have been advertised three times before they were filled. People ask up-front when they will get a raise and don't like dealing with the uncertainty of state employment. The increased effect on VDOT of political decision-making is adding to this uncertainty. This may increase attrition rates as it did in 1981. VDOT still hasn't recovered from the 1981 attrition rates. This could be further aggravated by recent retirement incentives.
- VDOT will have to expand the scholarship programs if it is to remain competitive in the future, since its pay scales have always lagged behind industry.
- The state may need to offer scholarships as a way of attracting future employees (service commitment in return for the scholarship). VDOT has a program called "Adopt A High School." Students are interested in the high-tech aspects of VDOT, such as computer aided drafting and design, and (at the other extreme) equipment operation. This program has attracted students. The programs are successful in that

they demonstrate the variety of opportunities available at VDOT and are also good for the image of VDOT. Many students are looking for a vocational opportunity, not college.

- It may be beneficial to look to the Japanese who pick a person out of high school and target him/her for a position in the organization. VDOT had a similar system in the past that worked.
- In the future, VDOT will lose more people because we're locked into a certain structured work environment without the high technology, such as lasers or ergonomics, which attracts people. People come here for training and to become more marketable, then they move on to get better experience elsewhere. We will see more of this in the future in certain divisions.
- This generation of employees is different from past generations. Loyalty has dropped, employees are always looking for something better. In the past, engineers started at the bottom and worked their way up. They realized that was the path coming into the job. Today's graduate wants to start at the top. Expectations are different. They come to work at grade 11 and want to be grade 16 two years from now. They are not happy if they don't get there. VDOT can't offer that.
- New employees won't be coming in looking to retire from VDOT. After 4 or 5 years, they are interested in exploring some new challenges and will leave. That is the makeup of those entering the workforce now. VDOT can look for high attrition, but that is not all bad and won't cause any problems that we are not already experiencing.
- Employees today aren't committed to VDOT for 30 years. People with financial and data processing skills have been very mobile in the past.
- Engineers are more conservative; that's why VDOT has people with 35 years service. In addition, they found the job interesting and challenging. Engineers in the future will not be career engineers as they are today. Coupled with the move toward business managers, who may quit every 5 years, turnover will be greater.

