

Succession Planning at the State DOT Level

LESTER A. HOEL AND MICHAEL A. PERFATER

In this paper the development of a program of succession planning for the Virginia Department of Transportation (VDOT) is addressed. 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 paper contains reviews of prior transportation professional needs studies, with an examination of the demographic makeup of VDOT's existing work force, including those who resigned or retired. A profile of resignees, developed from historical data, is used to develop a model to help predict future attrition patterns. VDOT's mission and goals in the future and how it will respond to staffing needs were addressed by a series of focus group meetings held with division and district administrators. Study results suggest that the replacement work force will be recruited from a pool of applicants significantly different from that which VDOT has traditionally used. VDOT will require new recruitment programs to attract professionals with a new set of skills if it is to be successful in replacing its work force in the decades ahead. Recommendations that can assist VDOT and other state DOTs in addressing changes in the makeup of its future work force are grouped under four basic objectives: (a) increase the quantity and quality of new transportation professionals, (b) improve the retention rate, (c) improve career opportunities, and (d) determine the extent of near-term employee shortages.

During the 1990s, many state DOTs, including the Virginia Department of Transportation (VDOT), will lose many senior engineers and managers to retirement. For example, between 1990 and the year 2000, one third of VDOT's professional work force is expected to become eligible to retire, partly because of an early retirement incentive program implemented in 1991.

Many factors can affect a state DOT's ability to replenish its professional staff. Among these factors are: (a) a slower-growing work force, (b) the changing composition of the working population, and (c) shortages of technically trained replacements. Demographers forecast that during this decade, the number of people in the work force will grow more slowly than in the recent past, and the composition of the work force will change as the proportion of women, immigrants, and minorities increases. Finally, statistics also indicate that the number of graduating civil engineers has been declining. Since this area of specialization comprises such a large percentage of transportation professionals in the nation's federal and state transportation agencies, this shortage will also affect the makeup of the future DOT workforce.

A number of recent studies have addressed these issues from a national perspective. Although these efforts have provided useful

information for decision-makers in their efforts to respond to severe problems of professional shortages, the studies do not address the specific conditions and changes within each state transportation agency. In this paper is a report on a research study identifying work force trends within VDOT and suggesting how the agency can position itself to develop a professional work force that will be responsive to the challenges of the 21st century.

First, published studies of needs for transportation professionals are reviewed. Next, the demographic profiles of current and former VDOT professionals are examined, coupled with an investigation of historical trends with respect to attrition, especially retirement. Using a sample of individuals who occupied VDOT positions in professional grades between 1984 and 1991, demographic and attrition data are presented regarding the characteristics of individuals who left VDOT and why they did so. A trend model to forecast future attrition is described that can be used to project retirement dates for current professional employees, and a series of focus group sessions held with key VDOT managers and administrators is used to solicit their views about the agency's future and the skills that will be required of the professional staff. Finally, a set of recommendations is offered for succession planning, involving recruitment and retention of state DOT professional staff.

PRIOR TRANSPORTATION PROFESSIONAL NEEDS STUDIES

In 1985, the first comprehensive assessment of the nation's needs for transportation professionals was published by the Transportation Research Board (TRB) (1). The TRB report predicted a greater-than-average turnover among senior transportation 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.

The TRB study addressed the problem of a waning transportation work force from a national perspective and provided an overall strategy for its resolution. At the state level, however, DOTs were also faced with the reality of a work force that would radically change from past patterns. A study completed in 1987 by the Hudson Institute for the U. S. Department of Labor (2) identified five demographic trends that will affect the workplace of the future:

1. The population and work force will grow more slowly than at any time since the 1930s.
2. The average age of the population will rise, and the pool of younger workers entering the labor market will shrink.
3. More women will enter the work force.
4. Minorities will occupy a larger share of new entrants into the work force.

5. Immigrants will represent the largest share of the increase in the population and work force since World War I.

In 1990, the American Association of State Highway and Transportation Officials (AASHTO) published a guide that sought to define and develop a recruitment and retention program as well as a national "marketing" program to expand interest in civil engineering as a career (3). The purpose of the guide was to create a joint effort among AASHTO member departments to support recruitment and retention and foster interest in civil engineering. This guide contains practical ideas and suggestions for recruiting qualified applicants, and is directed at recruiters in state DOTs. That same year, TRB published a study to synthesize recruitment, training, and management-development practices found to result in long-term success (4). Personnel directors of the state DOTs and Canadian Provinces who were surveyed reported that in their agencies, training and development is focused primarily on improving current job skills rather than on meeting future needs. The study found that agencies rely heavily on training assistance provided by professional associations, universities, community colleges, and private contractors.

Two reports address methods for attracting students to careers in transportation engineering. The first, published in January 1990 by the Institute of Transportation Engineers (ITE) (5), directs the transportation industry to:

1. Develop written and audiovisual materials for students in elementary school, high school, and college that present a positive image of transportation engineering as a career.
2. 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. Develop activities within the profession and with employers that promote recognition of the value of high quality professional transportation engineering.
4. Encourage and promote adoption of policies that provide effective competition for the best professionals, especially salaries and the work environment.

In May 1992, a report on civil engineering careers was published by the National Cooperative Highway Research Program (NCHRP) (6). This document confirmed demographic trends noted in other reports that point to an increasingly diverse population in the future. The report notes that both ethnic minorities and women are underrepresented in civil engineering and have poor retention rates in engineering programs. The study also found that the market is demanding three strategies targeted at the different developmental stages of future civil engineers. The strategies are to:

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

WHO WORKS FOR VDOT AND WHY DO THEY LEAVE?

To understand the nature of the problem of recruitment and retention of transportation professionals, the demographic makeup of VDOT's existing work force was examined based on information obtained from historical monthly records of the agency's Personnel Management Information System (PMIS). This profile serves as a basis for identifying the recruitment and retention challenges that will likely be faced by many state DOTs and furnishes insight as to how they might be addressed.

Profile of the VDOT Professional Work Force

Table 1 presents a statistical summary of VDOT's professional work force (grade 12 and above) as of 1990. The data in this table indicate that the typical VDOT professional 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 nonengineering professional is

TABLE 1 Profile of Existing VDOT Professional Work Force (1990)

	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		
Citizenship									
U.S.	99.0								
Other	1.0								
Age (yr)	45.7			46.1			44.7		
Length of Service (yr)	20.0			21.6			16.4		

TABLE 2 Profile of Professional Work Force that Resigned or Retired Between 1984 and 1990 (Grade 12 and Above)

	All	M	F	Engrs.	Nonengrs.	White	Nonwhite
Retirements (N=82)							
Age (yr)	60.4			60.8	59.1		
Service (yr)	34.9			36.7	27.7		
Resignations (N=75)							
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

also a white male U.S. citizen, in his mid-40s, with 16 years of service. There is a higher proportional representation of females in this group than in the engineering group. Because 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 earlier than was the tendency in the past, say at age 55 or less.

Profile of the Professional Work Force Recently Resigned or Retired

The data in Tables 2 and 3 indicate that the typical retiree who left VDOT between 1984 and 1991 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 also tend to have worked for VDOT longer. The number of professional VDOT employees who retire each year has been fairly constant. The number of retiring engineers tends to be much greater than the number of retiring nonengineers. Historically, engineers have made up a much greater proportion of the professional work force and tend to have longer VDOT careers than nonengineers. The average number of engineers who resigned each year was lower than the average number who

retired. The percentage of all resignations from the engineers' group reflects the fact that engineering positions comprise 70 percent of the work force. The number of resignations among professional nonengineering VDOT employees each year has been fairly constant and is almost the same as the average number who retired. The reasons employees gave for resigning varied but could, to some extent, be categorized. Of the 75 professional employees who left the agency between 1984 and 1990, 68 percent did so to accept a better job, 13 percent moved from the area, 4 percent cited home responsibilities, 3 percent said they were dissatisfied, and the remaining 12 percent listed a variety of reasons. Eighty-four percent of the resigning employees were white and 16 percent were minorities. These percentages are slightly less than the ones for the white employee population as a whole, and slightly more than those of the minority VDOT professional work force, respectively. Females comprised 11.2 percent of the VDOT work force during the study period, but they represented 29 percent of those who resigned. Unfortunately, employees who left VDOT during this period could not be interviewed individually during this study, so more extensive data about the reasons for their resignations are unavailable.

Employees who leave VDOT are likely to do so within about 5 to 7 years after they enter the agency. Those who remain beyond 5 to 7 years tend to remain until retirement. Those who resign tend to

TABLE 3 Number of Engineers and Nonengineers Who Retired or Resigned, by Year (Grade 12 and Above)

Year	Retired			Resigned		
	Engineers	Nonengineers	Total	Engineers	Nonengineers	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

be in their early 30s, which may be a critical age for those in transportation careers. Beyond that, other factors, such as family considerations, spousal employment, etc., definitely tend to affect employment stability. Furthermore, 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 remain with the agency. Engineers do tend to resign from VDOT at a younger age than do nonengineers. One could surmise that this happens because upward mobility for engineers seeking better jobs is easier than it is for nonengineers, thus resulting in the latter group staying at VDOT longer. Again, the details given for resigning are not specific but "obtaining a better position" is often entered on the separation form.

Both the average age and average length of service of minorities who resign are less than those of whites who resign. The data do not divulge why nonwhites who resign do so much sooner during their term of employment with VDOT than do whites. Again, better job opportunities elsewhere or the small percentage of minorities in the work force may be factors in accelerating the decision to leave the agency. Whatever the reason, these data seem to indicate that efforts 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 was used to develop a trend model for making predictions about future retirement patterns at VDOT. In developing this model, which can be applied to forecast general trends in the VDOT work force, probabilities were used to represent the timing of retirements.

Figure 1 shows the cumulative distribution of the combined age at retirement 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. The median (or 50th percentile) value in the graph is 98.2 years. If these data were used for predictions, we could state that 50 percent of retirements occur when combined age and years of ser-

vice are less than 98 years. Another 50 percent of retirements occur later. The information presented in Figure 1 can be used to develop a mathematical model for predicting future attrition. The retirement data in Figure 1 can be mathematically represented by dividing the overall probability range into 10 equally likely categories, each interval representing a 0.10 probability range. The categories would be from 0 to 0.10, 0.10 to 0.20, etc. For each category, there is a 0.10 probability that the retirement outcome will occur in that category based on the historical data. A combined age and length-of-service value is selected at the midpoint of the category. The total of all of these midpoint values is 957.2. Because each value of age and years of service occurs with a probability of 0.10, the overall expected value for all professional VDOT employees is 0.10 times 957.2 years or a combined 95.72 years of age and length of service. The date that employees will reach an average combined age and service level of 95.72 years can be used to predict retirement. For example, if 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 (46 plus 19.86) when he retires. The year of retirement is then predicted to be 2013 (1993 plus 19.86). The reader should bear in mind that this proposed formula is not intended to furnish estimates of individual retirement dates but to develop a likelihood of the event taking place when summed over all the employees in the organization.

VDOT MANAGEMENT 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. A series of focus group meetings were held with 31 of the 36 division and district administrators who manage the agency's daily central office and field operations. Each individual was asked for his or her views about what VDOT will be doing in 10 years and how the agency will staff those activities. These sessions produced a variety of observations and opinions about the VDOT of the future.

The key prognostication was that although VDOT will continue its traditional activities (designing, building, maintaining, redesigning, and rebuilding roads), local governments will be more involved in decision-making, perhaps to the point of actually building infrastructure (VDOT is one of only 5 state DOTs that build and maintain county roads).

Significant changes in the composition of the work force are also foreseen. Managers foresee an increase in the percentage of women, minorities, and foreign nationals in VDOT's work force. The managers need the appropriate training and skills to deal with such a diverse work force.

The managers feel that VDOT will continue to be an engineering-oriented organization, and its employees will continue to require certain basic technical and engineering skills. There is also the feeling, however, that a higher level of communications, financial, and "people" skills will be required of managers (and the general work force). All agreed that computer skills will ultimately be a requirement for nearly all employees.

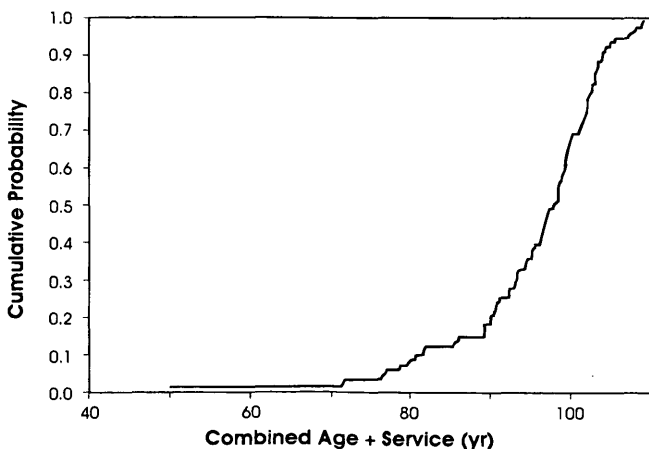


FIGURE 1 Cumulative distribution of retiring VDOT professionals 1984 to 1990.

Many managers feel that there will be less of a tendency for employees to remain with VDOT for their entire career. This will result, in part, from the changing demography of working professionals (dual-earner families and different attitudes and expectations among young workers) as well as certain disincentives in VDOT's career ladders. They cite a lack of economic incentives for promotion, the absence of relocation incentives provided by VDOT, and the Commonwealth's very conservative approach to providing reimbursement for relocation costs as major career-ladder impediments. The result of these disincentives, they say, is a tendency for fewer and fewer moves from the field divisions to the central office, which will lead to the underuse of valuable experience. For instance, if a resident engineer in the field accepts a central office position at the assistant division head level, he or she will (a) receive only a one-pay-grade increase, (b) move from being chief administrator of a unit to a position of less authority and thus experience a loss of autonomy, and (c) likely have to relocate. Thus, the managers say, the only incentive is monetary, which in this instance is probably not enough to offset the cost of the move.

Regarding recruitment procedures and practices, VDOT's managers feel that VDOT attracts 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. 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 employees' skills rather than merely teach them how to do their current jobs better and that the existence of established training opportunities for employees may be very important to the agency's recruitment efforts in the future.

A RECOMMENDED PROGRAM FOR RECRUITMENT AND RETENTION OF TRANSPORTATION PROFESSIONALS

Based on the findings, conclusions, and general observations of this study, a set of recommendations is offered, grouped under four basic objectives:

1. To increase the quantity and improve the quality of new transportation professionals within its ranks.
 - VDOT should continue to provide fellowships for college and university students for postgraduate training that link support with guaranteed employment. Special emphasis should be placed on recruiting minorities and women into these programs;
 - Someone within VDOT should be charged with keeping abreast of national developments in recruitment practices in the transportation profession, particularly within AASHTO, and with informing agency management of new or promising developments in this field.
2. To improve the retention rate among transportation professionals, especially women and minorities within the agency.
 - There is a need for in-house training programs on managing diversity in the work force. The programs should be designed to: (a) identify the benefits of a diverse work force, (b) define and set forth the managers' responsibilities for maintaining an environment that provides equal opportunities for all employees, and (c) provide the improved communication and "people" skills that

will enable employees, especially managers, to work effectively in a dynamic work environment.

- VDOT should consider developing a mentor program that links newer employees with individuals who have been with the organization for 5 or more years. Mentors could have a positive effect on the adjustment of new arrivals, enhance their early career development, and ensure that their expectations during this critical period in their employment are understood and met.

- Incentives are needed that will increase the likelihood that employees will remain with VDOT beyond the critical period (2 to 6 years) when most resignations tend to occur. Such incentives might include more tuition refunds, co-op training, full-time graduate study, and other training opportunities.

- VDOT's human resources staff should periodically conduct a series of focus groups with a sample of transportation professionals hired within the past 5 years. The purpose of these focus groups would be to: (a) determine employees' expectations upon arrival in their new job, (b) monitor how well these expectations are being met, and (c) encourage the sharing of common concerns.

- Human resources staff should consider conducting either interviews or focus groups with recent resignees to learn more about why employees leave VDOT.

3. To improve career opportunities for employees who have remained with the agency beyond the so-called critical period (2 to 6 years).

- An aggressive program should be instituted that encourages career advancement for technicians and other employees through job rotation, attendance at short courses, and professional society memberships and designations.

- A committee should be established to examine both VDOT's and the Commonwealth's policies and practices regarding employee relocation. The committee's efforts should include: (a) an assessment of existing incentives and the extent to which they foster employee development and upward mobility and, (b) a determination of how current relocation policies and practices could be altered to provide greater assistance to employees and incentives that encourage career mobility within the agency.

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

- The Human Resources Division of VDOT should test the predictive model presented in this paper to determine its reliability for predicting retirements.

- The model should be tested in a variety of central office and field units, over a cross-section of classes and employee demographic categories. If the model provides a reasonably accurate prediction of when employees retire in terms of their age and years of employment with the agency, it could fairly accurately predict when large cohorts of the agency's staff will likely retire.

SUMMARY

Managing a changing work force of transportation professionals has been addressed at the national level in studies conducted over the past decade. The potential for newly reconfigured and revitalized state DOTs is, indeed, great as highly trained, computer-literate young professionals enter the work force. In this paper, it was described how one state has examined demographic changes and the implications of these changes for a succession of new talent into the 21st century. The composition of the work force recruited in the

near future will differ significantly from the current profile. Since professional resignations from the state DOT disproportionately include many minorities, women, and recent hires, special programs will be needed to mitigate this exodus. Further, the career expectations of newly hired employees will differ from the career-minded professional of the past. These trends call for a more aggressive program of career development and retention than has been required in the past.

REFERENCES

1. Transportation Research Board. *Transportation Professionals: Future Needs and Opportunities*. Special Report 207, 1985.
2. Hudson Institute. *Workforce 2000: Work and Workers for the Twenty-First Century*. Indianapolis, Indiana, 1987.
3. American Association of State Highway and Transportation Officials. *The AASHTO Guide to Recruitment and Retention of Civil Engineers*, 1990.
4. Transportation Research Board. *Innovative Strategies for Upgrading Personnel in State Transportation Departments*. NCHRP Synthesis of Highway Practices, 163, 1990.
5. ITE Technical Council Committee 2-32. Attracting students to a professional career in transportation engineering. *ITE Journal*, pp. 42-48, January 1990.
6. Transportation Research Board. *Civil Engineering Careers: Awareness, Retention and Curriculum*. Report 347, NCHRP, 1992.

Publication of this paper sponsored by Committee on Management and Productivity.