The Value of the County Engineer: Strategies To Expand The Shrinking Employment Pool

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The Value of the County Engineer: Strategies To Expand The Shrinking Employment Pool

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"The opinions, findings, and conclusions expressed in this publication are those of the author and not necessarily those of the Highway Division of the Iowa Department of Transportation."
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ABSTRACT

This project report will analyze and integrate data collected from phase one of this research with data collected during phase two. The objective of phase-one research was to examine the factors that allow a better understanding of county engineering as a profession. Only in this way will the profession begin to identify the strategies needed to attract new people into a profession facing serious personnel shortages, particularly in rural counties. Reaching this objective involved examining the responsibilities, goals, and, sometimes, the frustrations experienced by those persons in charge of secondary road systems. Nine states agreed to participate in the study. Seventy county engineers were interviewed in the first phase of the research.

The objective of phase-two research was to address ways to counter problems associated with the exodus of county engineers reaching retirement age. Many questions asked participants to emphasize the advantages and disadvantages of being a county engineer. Those responses were compared and contrasted with advantages and disadvantages offered by private sector career choices. Fifty county engineers were interviewed for phase two of this research. It was hypothesized that state and regional associations for county engineers and the National Association of County Engineers (NACE) present opportunities for professional development for county engineers. It is hypothesized that such opportunities will help in attracting a new generation of county engineers.

The ultimate goal of this research is to offer suggestions to the county engineering profession regarding strategies that might be used to attract and retain a new generation of professionals into careers as county engineers.

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1 There were initially eight states involved in this research, including Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, Ohio, and Washington. After participating in a conference in South Dakota, however, South Dakota asked to be included in the study. Because responses from Missouri were low (only 18 of 66 surveys were returned), the data from Missouri were of limited value. Therefore, Missouri was eliminated from the study, and South Dakota was added.
CHAPTER 1
INTRODUCTION AND BACKGROUND INFORMATION
ON COUNTY ENGINEERING

At the beginning of this research, only one factor seemed clear: Job descriptions for county engineers are somewhat nebulous, varying from state to state. Yet all county engineers focus on providing a quality system of secondary roads and bridges within their jurisdictions. Some county engineers who participated in this research are registered professional engineers (P.E.) with four-year degrees from accredited civil engineering programs. Others are high school graduates with many years of experience to their credit.

The first phase of the study was aimed at more clearly understanding county engineering as a profession. A primary emphasis was on identifying the broad range of skills and responsibilities shared by this diverse group of professionals that is responsible for more than 3 million miles of county roads and bridges that span the nation.

It is important to understand the skills needed for successfully carrying out the responsibilities of a county engineer. This research, in part, provides that understanding. It does so from the points of view of those persons who (1) work in sometimes very different types of county governments and (2) face the challenges of dealing effectively with the public, elected boards of supervisors, county road commissioners, and executive councils on a weekly, sometimes daily, basis.¹

Those county engineers currently in office do not differ significantly from their predecessors of 25 or even 50 years ago. Typically they believe county engineering should be as highly regarded and accepted as any other profession.² County engineers face many obstacles in realizing this aim. One of those obstacles involves the growing complexity and scope of responsibilities associated with the position.

Following World War II, those who chose the county engineer career path provided the impetus and technical/engineering skills needed to bring the nation's county roads into the twentieth century. Today, county engineers continue this critical function with fewer financial and human resources and increasing responsibilities for road and bridge reconstruction, rehabilitation, and maintenance. County engineers are expected to prioritize resource allocations for vital county services, some of which are unrecognized by the public they benefit.

¹ For brevity's sake, the terms "board of supervisors" or "boards" shall also refer to county road commissioners, executive councils, and any other term used to refer to those elected officials to whom the county engineer reports.
The coming generation of county engineers needs to recognize it will need much more than the high level of technical/engineering expertise possessed by its predecessors whose primary efforts were in the “construction phase” of the job.

As the profession moves rapidly toward the twenty-first century, services provided will continue to demand increasingly sophisticated management, administrative, public relations, and even a modicum of legal skills—the latter most notably relating to environmental and tort liability issues.

The tort liability issue has grown increasingly problematic for county engineers and is likely to grow more serious in the coming years. This is a key factor that would discourage many current county engineers from considering the same career choice again. All states participating in this research reported they anticipate an increase in liability exposure as the decade of the 1990s progresses.

Liability issues reported to be of most concern include

- vegetation that reduces sight distance,
- shoulder design, including narrow shoulders and minimum road width,
- roadside obstacles,
- signs and markings, including sign theft and vandalism and inadequate signs,
- low road friction,
- potholes,
- alcohol related accidents,
- bridge functional obsolescence,
- too many attorneys, particularly those who convey the message the county has money and will pay,
- an increase in traffic on county roads,
- narrow bridges,
- dust,
- low visibility and accidents caused by slow snow removal,
- sharp curves—steep river valleys,
- construction areas,
- excessive speed on county roads,
- insufficient guardrail placement,
- bridge overload causing later collapse under normal weight vehicles, and
- old, functionally deficient roads that must accommodate high speed traffic due to inadequate law enforcement.

Because the staffs of many county offices are small, some county engineers have been forced to develop expertise and skills in areas not ordinarily perceived within their realm of responsibilities. It is important to realize these skills will be needed in addition to the broad scope of technical and engineering skills already required for county engineers. Perhaps this is why a county engineer from Minnesota said, “the P.E. should be the minimum requirement for the position.”
When a broad spectrum of job qualifications for county engineering is required, problems associated with projected turnovers and shortages of qualified persons become magnified. At the same time the demands and scope of the position have expanded, many currently well-qualified county engineers currently filling positions are expected to be lost to retirement as early as 1996. (See Table 1 for the age distribution of county engineers nationwide in 1984.) According to a 1985 Transportation Research Board report, 34.2 percent of those serving as county engineers in 1984 would have been expected to retire by 1989.

<table>
<thead>
<tr>
<th>Age Groups</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 26 years old</td>
<td>2</td>
<td>0.3%</td>
</tr>
<tr>
<td>26–35 years old</td>
<td>46</td>
<td>6.5%</td>
</tr>
<tr>
<td>36–45 years old</td>
<td>185</td>
<td>26.1%</td>
</tr>
<tr>
<td>46–55 years old</td>
<td>234</td>
<td>33.0%</td>
</tr>
<tr>
<td>56–60 years old</td>
<td>147</td>
<td>20.7%</td>
</tr>
<tr>
<td>61–65 years old</td>
<td>76</td>
<td>10.7%</td>
</tr>
<tr>
<td>66 years old and older</td>
<td>20</td>
<td>2.8%</td>
</tr>
</tbody>
</table>

Table 1. Age distribution of county engineers nationwide 1984

Retirements have not affected all states equally. Many of the county engineers who participated in phase one of this study in 1992, however, are expected to retire within 5–15 years. (See Table 2.) In 1993 in the state of Iowa alone, of the 99 counties represented it was projected that more than 30 county engineers would begin phasing out of their positions. This projection represents a potentially significant turnover in positions. It is especially disturbing to note that some county engineers are also opting for early retirement. Early retirement of county engineers serves to deepen the void left by the exodus of these skilled professionals.

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3 Turnover is due primarily to retirements and secondarily to attrition for other reasons.

Retirements weigh heavily on county boards,\textsuperscript{5} which must identify replacements. They realize retirees will take with them a lifetime of knowledge and expertise, much of which is not taught, except in the “classroom of experience.” Thus, replacing county engineers presents an extraordinary challenge, particularly for many rural counties expected to fill vacancies with people of comparable depth and scope of expertise and experience.

Table 2. County engineers 46 years of age and older responding in phase one of this research

<table>
<thead>
<tr>
<th>Participating States</th>
<th>Number of County Engineers 46 Years +</th>
<th>Percent of County Engineers 46 Years +</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iowa (46 Responding)</td>
<td>27 (15)</td>
<td>59% (32.6%)</td>
</tr>
<tr>
<td>Kansas (29 Responding)</td>
<td>18 (12)</td>
<td>66% (41.3%)</td>
</tr>
<tr>
<td>Michigan (29 Responding)</td>
<td>19 (12)</td>
<td>66% (27.5%)</td>
</tr>
<tr>
<td>Minnesota (40 Responding)</td>
<td>18 (9)</td>
<td>45% (22.5%)</td>
</tr>
<tr>
<td>Nebraska (27 Responding)</td>
<td>18 (6)</td>
<td>66% (22%)</td>
</tr>
<tr>
<td>Ohio (30 Responding)</td>
<td>22 (6)</td>
<td>73% (30%)</td>
</tr>
<tr>
<td>South Dakota (30 Responding)</td>
<td>12 (2)</td>
<td>63% (9.5%)</td>
</tr>
<tr>
<td>Washington (21 Responding)</td>
<td>11 (2)</td>
<td>56% (9.5%)</td>
</tr>
</tbody>
</table>

(Numbers and percentages in parentheses represent respondents ages 55 years and older.)

As far back as the 1930s, county engineers were developing and implementing strategies to attract people into the profession.\textsuperscript{6} Yet, since the 1950s, many counties nationwide have been forced to confront the difficulties associated with efforts to avert shortages, i.e., gaps that occur between the time one county engineer leaves the position and a replacement is found. Recently, positions in five Iowa counties had not been filled following retirements of county engineers.

Many argue the lack of visibility of the profession coupled with low salaries are the problems. They insist salary remains a key factor discouraging the best qualified from considering county engineering positions. Others maintain that “professionally registered” engineers are typically looking for well paying positions that will provide them with challenges and with the potential for advancement. These two factors

\textsuperscript{5} “County boards” refers to county boards of road commissioners, county boards of supervisors, executive councils, and any other equivalent body of elected officials.

\textsuperscript{6} “Attracting Engineers to County Work.” \textit{Better Roads} Forum, November, 1962.
alone present the state of Iowa with a dilemma. Iowa salaries for county engineers are generally 15–20 percent below those offered by many other states.

One of the primary obstacles to drawing people into county engineering is the four to five years required to qualify for professional registration. Prerequisites to sitting for the professional engineer's test are (1) graduating from an accredited civil engineering program in a college or university, (2) passing the engineer-in-training (E.I.T.) test, and (3) having another four years of experience. These requirements, together with the broad range of knowledge needed to carry out the responsibilities of the job, act as serious disincentives for county engineer aspirants.

Administrative and management skills are also needed to meet the demands of the office. County engineers today are expected to play an active role in public relations. They do so in an environment where the public has a norm of reduced tolerance for roads and bridges in need of repair.

Many currently employed county engineers, regardless of their state affiliation, express growing frustration levels with the low compensation for the valuable contributions they make and the realization their replacements will demand higher salaries. If the profession expects to attract quality applicants, these issues must be address by boards. Two highway superintendents from Nebraska, for example, commented that

> The public perceives county employment as a welfare type of employment where only the uneducated work. They are not treated as equals and instead a prejudice is developed. Until these feelings are changed, the wages will not increase. This results in a less appealing profession.

> Until the pay is raised to decent levels, it would be cruel to try to recruit innocent young people into this dead-end profession. If the pay is raised to decent levels, the young people will find the profession without recruitment.

The person who made the latter statement also said he found it difficult to respond to the survey because, as he comments,

> I have no sympathy with your objective, which is to attract more people into county engineering. I would like to see just the opposite happen. That is, I would like to see large numbers of colleagues leave the profession. Then perhaps several counties would bid against each other for my services and I could earn a decent salary for a change. In my opinion, the counties in my state, at least, already have far more and far better engineers and highway superintendents than they are paying for.

It is noted that concern over low salaries is not restricted to states that do not require the Professional Engineer's license.
A state-aid engineer from Minnesota noted a recent change in the state statute regarding the appointment of county engineers. *Section 163.07, Subdivision 1* of the Minnesota Code states that

"The county board of each county shall appoint and employ, as hereinafter provided, a county highway engineer who may have charge of the highway work of the county and the forces employed thereon, and who shall make and prepare all surveys, estimates, plans, and specifications which are required of the engineer. . . ."

The term "may," highlighted above, formerly read "shall." Implications of this change in Minnesota's statute are disturbing. As the state-aid engineer commented, county boards in Minnesota now have the option of appointing persons who are not registered professional engineers to be in charge of maintenance operations. Currently maintenance comprises approximately 40–50 percent of the county engineer's operations workload.

County engineers are still responsible for making decisions related to design, construction, and anything else related directly to "engineering administration." The rules say county engineers must be in charge before state-aid dollars can be dispersed. The position taken, however, is "we want the county engineer in charge, but some are poor managers."7 This has led some people in Minnesota to work to change the workload distribution formula so that 60 percent of state-aid funds are spent for maintenance while 40 percent are allotted for construction and design. If county engineers would no longer be required to be in charge of maintenance operations, their responsibilities could narrow. The concern is that such a workload distribution will have a negative effect on salaries for subsequent generations of county engineers.

Other county engineers argue local public pressures to reduce taxes, cut costs, and cut back on public employment, compound the problem further by restraining county boards in their efforts to attract qualified people to the profession. This is not a problem unique to the 1990s. More than 50 years ago, an Iowa county engineer commented on the "public pressure" issue and its relationship to county government in his statement that

"Boards are bombarded by insistent agitation [by the public] that taxes be contained or reduced regardless of consequences. In many instances reductions are made beyond all economical justification. Proper and careful studies are not made to determine where economy can be effected without interfering with efficiency."8

Public pressure to reduce costs, and thus taxes, without regard for long-term implications to quality, is an important consideration. There is a need to develop long-range strategies that reflect a commitment to continuity and quality in the

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7 Comment made by a state-aid engineer from Minnesota.
management of the infrastructure. It will become increasingly important for county engineers to work "with" their boards to improve services to the counties. This will mean designing both short and long-range plans that may seem difficult, if not impossible to sell to elected officials who, because of the nature of their positions, are sometimes oriented more toward short-range objectives.

Efforts to educate boards on the need to develop long-range maintenance, rehabilitation, and reconstruction strategies will continue to challenge county engineers. Nearly 80 percent responding to a 1987 Better Roads survey said their elected and appointed officials have only short-term objectives. 9

Yet another problem is raised by low salaries. Some states have fixed, by statute, the maximum salary a county engineer can be paid. A graduated scale is used, based on the population of the county. 10 A 1987 article in Better Roads reported salaries of county engineers in Missouri are limited to no more than $10,000 annually. Such practices may well have the effect of depriving some counties of competent engineering services. In the final analysis, those services may be more expensive than in counties where a full-time county engineer is in the position. County engineers argue this rule was imposed on them and means "work will be done on a part-time or consulting basis, or that engineers must be shared among counties." 11

According to a former president of the National Association of County Engineers (NACE), "consultants do not have a sufficient understanding of the counties' needs to be able to consider the long-range interests of the county from a holistic perspective." Their singular objective is to "bid for a particular job." A county engineer from Washington State agreed, commenting

County engineers must live with and pay for projects. Consultants get paid and walk away from those projects. . . . Private sector opportunities are market driven, county engineers are driven by the needs of the county.

Consulting firms may well be competent to complete the work. Absent a broad-based understanding of a county's needs, however, it may not be in the county's best interests to consider a wide range of external contracting jobs for road and bridge work. One county engineer from Minnesota said he has saved the county as much as 40 percent of costs by completing work in-house. These county engineers are, of course, from states where the professional engineer's license is a requisite for the position. Those county engineers in states where the license is not required have little choice but to contract out for engineering related projects.

At the other end of the continuum, Ohio county engineers are elected and their salaries are set by the state legislature. Salaries for Ohio county engineers are

10 Ibid.
11 Ibid.
perceived as more competitive than those offered by Nebraska, Kansas, South Dakota, or Iowa. The Ohio Association of County Engineers and County Road Commissioners do not share concerns regarding projected shortages expressed by most states. Even though 73 percent of Ohio county engineers currently in office will be retiring within the next 5–15 years, they have little doubt there will be adequate numbers running for office.

Nationwide, county engineers' salaries most often fall within the $41,000 to $50,000 range. In Ohio, however, salaries range from $51,480 to $76,687. As a 1990 Better Roads survey reported, "Nationally, 39.1% of county engineers' salaries fell into brackets lower than those paid in Ohio." The span of salaries is most significant among urban county engineers who are registered Professional Engineers. Their salaries range from $26,000 to more than $70,000. In those counties where there is an urban/rural mix, there is also a fair number earning more than $70,000 per year. Most who do not have the P.E. license are in the $26,000 to $32,000 bracket. County boards must address salary levels to attract qualified people to the job. Unfortunately, a majority of county engineers say, "Increases in salaries are issues to which the Boards are least likely to respond positively."

Some county engineers in Iowa say their boards use the argument that the county engineer is already the highest paid person living within the county. As such, it is unrealistic for this person to expect a salary that is any higher. The issue boards too often do not address is that while the salary of the county engineer may be the highest in the county, it may well be relatively low when compared to the value of this person's contributions to the county's infrastructure. They may well be saving the counties several times the level of their salaries each year. Nonetheless, boards appear to be reluctant to vote for any significant increases.

This "board perspective" indicates that compensation (i.e., salary) is perceived narrowly by some boards solely as a cost to the county and not as an investment in the county's infrastructure. If county boards and the public could be made to realize the worth of the experiences and depth of knowledge needed to adequately fill the position of county engineer, they might shift their collective perspective on this issue. Many county engineers question whether the general public or even their boards understand what the job demands. Some concerns expressed by county engineers are shown in Box 1.

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12 If an Ohio county engineer chooses to continue private practice while in service, $12,500 is deducted from his/her salary [comment made by a retired Ohio county engineer].
Most people don't know what I do, but most perceive us as overpaid employees [Iowa].

Most people do not know what I do. The county engineer's motto is, "We do the impossible with the inadequate, for the ungrateful." When the weather is bad the public wants good roads. When the weather is good, the roads are good, and the people don't care [Minnesota].

We need to work harder to make the community and the public aware as to the complex nature of our jobs. Most people including a lot of commissioners (especially rural) think all there is to the job is grading roads. A lot of rural communities do not even understand a budget and what it takes to maintain roads ($$) let alone the changes in type of and amount of traffic increase on the system each year and competition for federal dollars [South Dakota].

We must let people know more about what we do [Nebraska].

Most people do not know the difference between county paved roads and state roads. They do not realize the engineering design that goes into projects. The state association needs to get the message to the public. The engineer needs to communicate better with the news media. Engineering schools need to understand the responsibility of a county Engineer in our transportation system and explain this to students as a career option [Iowa].

It would help if the Board understood our responsibilities. If it did, the public would as well [South Dakota].

Box 1. Do you find that people just don’t understand what a county engineer is?

Beyond the Salary Debate: Discouraging Factors

The factors that might discourage a new generation of county engineers from considering this career path must be resolved because of the high numbers of current and projected retirements. In addition, factors that must be resolved include the lack of professional visibility of county engineering, and the lack of understanding of what county engineers do. If these issues are not addressed, over time, states — including Iowa — may see a decrease in the quality of their secondary road and bridge networks. States where the professional engineer license is required by statute, particularly rural states, are already concerned about hiring practices and promotions of less qualified and less experienced engineers. In states where the P.E. license is not a statutory requirement for the job, boards often find themselves hiring technicians for the counties' top highway jobs. New persons assuming these positions may be unprepared both technically and administratively for the position.

As the duties of county engineers expand even further to include a higher level of public relations and technical knowledge, there could be a negative impact on some counties. Transportation Research Board Special Report 207 showed that in 1985, as one-third of the current generation prepares to retire,
the quality of county transportation management and engineering could begin to erode. To avoid this negative consequence, compensating training must be given to provide new entrants with the necessary mix of skills. . . . Even with qualified entrants, there is an adjustment process as on-the-job and other special training take place to provide technical, and management and administrative skills. 14

Enhanced levels of training are unlikely to occur as long as budgets are restrained. One question that concerns many county engineers and their boards is whether budget problems are temporary or permanent. Requisite professional development or training opportunities for county engineers remain limited because of their perceived cost to the county. Professional conferences allow county engineers to gain information needed to remain current on issues related to equipment, administrative, management, and personnel issues, as well as sharing information on state and federal regulations which have liability implications for the counties.

Many county engineers interviewed for this research said job qualifications and salaries are also intrinsically tied to the politicization of the office. County engineers tend to express strong concern that sound decision making is sometimes subordinate to political considerations. Many realize the key is to know when to bend to the board's wishes and when to hold their ground when a sound engineering decision is the only viable option. Some, however, find they make such decisions at a high risk. Since a majority of county engineers do not have long-term contracts (either written or oral), they stand in jeopardy of losing their positions with little or no notice.

One county engineer in Iowa whose contract was not renewed commented, "The Board informed me it was disappointed with my lack of activity on bridge repairs within the county." The county engineer responded by saying

I lacked the number of employees to repair many of the county's bridges. The Board froze our manpower . . . if you can't get the manpower you can't get a bridge crew put together. You can't do it if you don't have the crew.

This county engineer felt the board's refusal to renew his contract did not address the issue of his competence. It was an issue of politics. The board itself conceded the termination was not carried out in the "normal sense of the word." Nonetheless, after serving in his position for 12 years, this county engineer was given just 30 days notice of termination. Some say this is not an isolated incident, and that it occurs all too often.

In illustration, a county engineer from Michigan was terminated after 23 years on the job. He said he lost his position because of political pressures. Following his refusal to act on what he believed was an unethical request from a member of his county road commission, his employment was terminated. An even more disturbing issue

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emerged when he told one of his county road commissioners he would be willing to stay on and provide assistance until a replacement could be found. The commissioner’s response was, “Well, that may be okay. Why don’t you tell us exactly what it is you do as a county engineer?” As a result of scenarios such as these, some county engineers argue, “We especially find ourselves at the mercy of political strategies—more often than our city or state peers.” More than half say their success is dependent upon good gamesmanship. This isn’t surprising since most county engineers report directly to a group of elected officials. 15

Maintaining an untarnished image for their departments involves proficiency in intricate political conflict resolution. Many county engineers find themselves taking responsibility for any problems, while granting elected officials credit for agency accomplishments. As a county engineer commented in a Better Roads survey, “When tempers flare, it is important the county engineer has the skills needed to meet, discuss, and resolve the problem as quickly as possible.” 16

Summary of Introductory Remarks and Background Information

More than 85 county engineers from eight states were interviewed over the two years of this research. Another 503 responded to the two surveys that were distributed. An overwhelming majority express a fierce sense of pride in the policy decisions they have accepted, sometimes with limited funds and inflexible boards. The consensus is that entry-level salaries will be a key determinant of the level of qualifications of those applying for available positions.

Currently employed county engineers consistently and invariably express concern for the legacy they will leave to their successors. Nearly all agreed, despite the job title or scope of responsibility of the position, the coming generation will need qualifications coming into the job that the current engineers learned over a lifetime of service, sometimes via their individual and collective mistakes. They worry their successors will have a much narrower margin for error in the learning process.

County engineers also agree that in-depth knowledge of road and bridge design, drainage, material property characteristics, and, to a lesser extent, vehicle operations and traffic control skills such as signing and signaling skills will be required. Administrative experience related to the management of labor relations and personnel matters will also be required. Both technical and staff management components of the position are expected to become more difficult to coordinate as county engineers organize their work forces with a sensitivity to disadvantaged classes, gender relations in work force participation, and alcohol and drug use in the work place. 17

16 Ibid at 42.
17 “Local, Regional, and Federal Agencies.” In Transportation Professionals: Future Needs and Opportunities. Transportation Research Board, National Research Council,
Unforeseen contingencies may disrupt one-year and five-year budget plans required by state statutes. Such disruptions will require extraordinary engineering and administrative skills that encourage responsible decision making and knowledgeable prioritizing of expenditures for services to the public (e.g., catastrophes such as the widespread flooding of 1993 in the Midwest).

The following chapter of this report outlines the rationale for the research methodology and the process followed in developing strategies to improve the perception of county engineering as a profession. Each section is designed to identify issues and insights that can be used by the county engineering community to encourage qualified people to consider this career path.
CHAPTER 2
RESEARCH METHODOLOGY

This research includes a random sample of county engineers from eight states. The
Iowa Department of Transportation technical monitor for the project assisted in the
identification of participating states, each of which has a different system of county
government. Some also have different statutory or professionally designated
requirements for the position. Without implying that existing county road supervisors
are not doing a good job, the technical monitor hypothesized that states with
registered P.E.s have higher quality county roads than states without P.E.s.

Non-P.E.s often compensate for their lack of engineering expertise by hiring
consultants and seeking advice from state-aid engineers (and their equivalents) and/or
their state departments of transportation.

Many of the nonprofessional engineers interviewed for this research have been in
their positions for more than a decade (some for as long as 35 years). They have been
presented with innumerable on-the-job training opportunities to gain needed expertise
in many areas of their jobs. The concern is not that these persons are unqualified for
the jobs they are doing. It is that their successors must have educational preparation,
skills, and experience that exceed those of the current county engineer. This concern
is heightened when the high numbers of retirements anticipated over the next five to
fifteen years are factored in.

This research further defines the skills needed by future county engineers as
expressed by experienced professionals in the field who, despite differences in
county governments, face similar challenges daily in dealing effectively with the
public and with their elected officials.

Phase One: Expert Advisory Groups

A five-person expert advisory group was established to work with the researchers in
identifying issues most relevant to the profession. They included the Iowa DOT
technical monitor for the project and four county engineers from Iowa. This group
assisted in designing interviews that would be used to develop a questionnaire sent to
a random sample of county engineers in the eight participating states.

Because the issues confronting county engineers differ among states, it was necessary
to expand the number of expert advisory groups to eight—one five-person group for
each state. In this way, persons from each of the participating states were assured
their ideas on critical issues relevant to their states would be included in the survey
instrument. Enlarging the number of groups also permitted researchers to expand the
points of view offered solely by the Iowa experience. The objectives were (1) to
become more sensitive to the similarities and distinctions among county engineers in different states; and (2) to better understand the challenges facing county engineers.

A questionnaire aimed at diverse groups needed to be relevant to all who participated in the study. It was also important to include a set of common questions that would elicit as many insights as possible into the profession in general. With assistance from a former president of NACE, contacts were made with key persons in each of the remaining seven states.

Phase Two: Expert Advisory Groups

County engineers from each of the eight participating states were involved in the expert groups set up for phase two of this research. South Dakota was added to the research. Missouri was dropped from the study because of its extremely low response rate (only 27 percent—18 questionnaires out of 66 returned—for the first phase of the research, and only 18 percent—12 questionnaires out of 66 returned—for phase two. Missouri has a system of county government that differs so significantly from the other states included that more than 10 people from that state wrote letters explaining why they did not complete the questionnaire).

At the 1993 annual meeting of the National Association of County Engineers, the researcher met with at least six county engineers from each participating state in one-to two-hour sessions. During this time, questions were asked that aimed at a better understanding of (1) the issues confronting those counties trying to make the profession more attractive to qualified professionals interested in public sector employment and (2) the advantages and disadvantages of choosing a public sector career path. Those issues are discussed in the section describing the phase two collection of field data.

Description of State Requirements for Position of County Engineer in Each Participating State

The discussion in the following section of this report is valid for both phase one and phase two of the research.

Description of Sample by State

Researchers involved in this project have sought to understand the differences as well as the similarities in county engineering in the eight states participating in this study. Those states include—Iowa, Kansas, Michigan, Minnesota, Nebraska, South Dakota, Ohio, and Washington. Because of differences in statutory requirements, the responsibilities assumed by county engineers depend upon a number of factors, determined by the needs of the counties. The important issue to note is that requirements for the position of county engineer differ, sometimes significantly,
among states. When this project was initiated, the objective was to gain a representative sample of states, encompassing these differences.

Advisory group members from Iowa arbitrarily decided to include four states in the study where the P.E. is required by state statute and four where it is not. Initially, this seemed to be the ideal sample for purposes of analysis. Later, researchers learned only about 20 percent of county engineers nationwide are registered Professional Engineers. As such, the sample is not representative of all county engineers nationwide. This is one reason the research must be considered exploratory. Nonetheless, the sample provided many useful insights into county engineering.

State Requirements for Position of County Engineer
The following is a listing of the requirements for the position of county engineer for the states participating in this research:

Nebraska. Road and highway superintendents are required to sit for a written exam to qualify for the job, except for counties with populations greater than 50,000, in which case the county engineer is elected and required by state statute to be a registered Professional Engineer. One highway superintendent commented that the certification test is difficult, with an average pass rate of only 30–35 percent.

Kansas. The state of Kansas requires the registered P. E. license for its county engineers, but the statute is not enforced. One county engineer from Kansas noted the decision to hire a P.E. is "up to the Commissioners and some choose not to, perhaps to save dollars on compensation." Some who hold the title of county engineer in Kansas were hired prior to the change in the statutory requirements. These persons were permitted to keep their job titles as "county engineers" even though they are not registered P.E.s. Kansas is in the process of reexamining its system of county engineering. The state has identified issues relating to the enforcement of the statute requiring the P.E. for all its county engineers.

South Dakota. At the time this study began, this state had no certification process or statutorily defined requirements for its road and highway superintendents. In 1993 procedures were established that included a test for certification. Many respondents from South Dakota commented that while certification has met with some resistance, once set in place, it will help to increase the pay scale and attract more qualified people.

Michigan. The trend in this state is toward the use of managers, engineering managers, and consultants. The registered Professional Engineer's license is not a statutory requirement for the position.

Iowa, Minnesota, and Washington. Each of these states requires county engineers to be registered P.E.s by statute and each enforces this requirement.
Ohio. The system of county government in Ohio provides for the election of its county engineers to four-year terms. Salaries are set by the state legislature and are among the highest in the nation. Ohio has the most stringent requirements for the job nationwide. Both the professional engineer's license and the professional land surveying (P.S.) license are required.\textsuperscript{1} Many Ohio county engineers say dual registration is a prerequisite to carry out the demands of the office. Yet they also express their concern that requiring both the P.E. and P.S. licenses may serve as a disincentive because of the time involved in earning the credentials to run for office.

Conferences Attended/Collections of Field Data—Phase One

Between October of 1991 and February of 1992, data were collected at the following county engineering conferences:

- Missouri, Iowa, Nebraska, Kansas (MINK) regional meeting of county engineers;
- Minnesota's Association of County Engineers' annual conference;
- Kansas Association of Counties' annual conference;
- Ohio County Engineers Association's annual conference; and
- The National Association of County Engineers' (NACE) 1992 annual conference.

During these visits and other special trips made within Iowa and to Nebraska, researchers conducted in-depth, open-ended interviews with expert advisory group members. Chairs of the advisory groups in each of the states selected the group members. The total number of official advisory group members expanded to forty county engineers. Each of these persons provided valuable information for the project. An additional thirty county engineers served as \textit{ex officio} advisory group members. They participated in more than 45 hours of interview sessions at the 1992 NACE meetings.

It was important to use open-ended interviews in order to encourage these individuals to talk about issues important to them. In this way it was possible to develop a questionnaire that reflected their concerns. This forced researchers to eliminate their own, possibly biased or inaccurate, assumptions about the nature of the profession. Questions were probing, yet not in a way that would lead to predetermined responses.

Questions Included in Interviews with County Engineers—Phase One

Some of the questions used in interviews included the following:

\textsuperscript{1} The professional surveyor's license is granted only if the county engineer fulfills a state requirement. In addition to the civil engineering degree, Ohio county engineers must earn 24 credits from an accredited university survey engineering program.
How would you describe your responsibilities, your job, and just generally what you do on a daily basis?

In an ideal setting, what do you think a county engineer's responsibilities should be? Picture yourself accomplishing the ideal objectives of a county engineer, including long-range planning.

What are some of the qualities that make a Professionally Registered Engineer irreplaceable as a road supervisor?

Could a professional administrator do the job you currently are doing?

If you are not a registered Professionally Registered Engineer, do you find this acts as an obstacle in your job? Why or why not?

How would you classify, categorize, assess percentages to your responsibilities, i.e., technical, engineering, managerial, administrative, political (e.g., public relations and meetings with your board)?

How do decisions made by road or highway superintendents differ from those made by a professionally registered engineer?

It could be assumed that experience is very important in your profession, but is there a limit between what one can learn through on the job experience and professional preparation, i.e., the college experience?

What is your relationship with the public? Does this demand take an excessive amount of your time?

What should an engineer's program of study include to prepare for a future position as a county engineer?

How important are human relations, administration, management, and planning? Will it be necessary for future county engineers to be college graduates, i.e., to major in accredited civil engineering programs in colleges and universities?

If you are not a Professionally Registered Engineer, how do you deal with the engineering decisions that you make in your job? Do you use consultants? Do you contact your state-aid engineer or this person's equivalent? Do you use your state DOT/Department of Roads as a consultant? Other?

How do you deal with calls from the public? Is there any standard procedure to take care of complaints or requests from the public?
Have budget problems affected your ability to respond to public requests, e.g., to fix potholes, seal coat roads, take care of paving needs?

When preparing your budget each year, do you have an analytical strategy/plan to help you select projects with the highest benefit-cost ratio for a given budget constraint, or do you use a pavement management system?

Do you or does your office use management, design, or accounting computer software to help deal effectively with jobs? (e.g., preventive maintenance management programs for equipment, scheduling programs for construction job planning, and/or Auto-Cad?)

Could you briefly describe your road network, e.g., miles of dirt roads, gravel, treated, and paved, and any other infrastructures for which you are responsible?

How many people work in your office in the winter? summer? Do you have an assistant? Is this person a student intern? co-op student? technician? engineer-in-training? a professionally registered engineer? other? If you had your choice, what type of assistant would you want?

What jobs are left to consulting engineers? What percentage of design work is done by consultants? How do you select consultants? What type of procedures do you use in selecting consulting engineers? Sealed bidding? Requests for proposals? Other?

Are you going to be forced to “signalize” some roads with “enter at your own risk” or “minimum maintenance” signs in your county? Is this a political issue? In what way?

Increasing numbers of county engineers are reaching retirement age. A shortage of qualified people appears to be a growing problem. Would you comment on this?

How would you rank your salary with those of county engineers in other counties within your state? How about with other states?

Could you comment on tort liability in your county? Have you ever served as an expert witness in another county? Have you ever been called to testify in a case involving your county? Do you think it matters who is in charge of the county road system regarding liability? Does a Professionally Registered Engineer make the county less vulnerable to liability?
Would it be feasible to encourage hiring engineers-in-training to act as assistants to the county engineer and then groom those persons to fill the position of county engineer when the latter retires?

Interview questions were candid, as were the responses. The interviews served to help in an assessment of the issues identified. Often one question led to others which the researchers had not anticipated. The simple question about what type of contract the county engineer had with the county provided insights, for example, into job security. Responses here ranged from

Yes, my contract is written into the minutes of the Board meeting every year, yet I still serve at the pleasure of the Board which makes me very uneasy in terms of my job security

to

I am elected and do not serve the Board. I am accountable only to the public every four years when I am up for re-election.

Most of the people interviewed talked about what was going right in their counties. They also discussed problem areas and frustrations, particularly those that are of a political nature. In several instances five to ten county engineers were interviewed as a group. This allowed an interplay of dialogue leading to questions that might not have emerged in one-on-one interviews. The interactive effect of the discussions allowed much more depth to be gained from the time spent. At the various conferences attended during the five months of phase one collection of field data, researchers interviewed more than seventy county engineers.

Following the NACE conference in February of 1992, a draft questionnaire was developed and mailed to each member of the five-person advisory groups in each state (see Appendix A for a copy of the draft of the questionnaire for phase one). There were two key advantages to sending out a draft copy of the questionnaire. The first was that it allowed a small pilot study to gain additional insights and feedback from those interviewed—information that might have been overlooked using only the interviews. This information was used to improve on the questionnaire. Second, the draft of the questionnaire was used as a tool used to gain insights into the ways researcher perceptions of interview responses may have influenced the way the questionnaire was designed and/or the way in which the questions were phrased.

From the total of 40 questionnaires sent, 30 were returned, many with extensive comments that brought out new perspectives on issues discussed in the interviews. Researchers also used follow-up telephone discussions with some group members to clarify comments on the questionnaires.

The questionnaire was revised, finalized, and mailed to a random sample of 400 county engineers in the eight participating states. A transportation engineering
graduate student working on the project wrote a computer program that randomly chose who was to receive questionnaires. The factors used in determining the composition of the sample were (1) the number of counties in each state, (2) the population size of counties in each state, and (3) the region within the state. Fifty-three percent of county engineers in Iowa (with 99 counties), for example, received questionnaires, while 64 percent of county engineers in the state of Washington (with 39 counties) received questionnaires.

The numbers and percentages of county engineers who returned questionnaires from each state are listed in Table 3.

<table>
<thead>
<tr>
<th>State</th>
<th>Number and Percent Responding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iowa</td>
<td>46 of 53 responses (87%)</td>
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<tr>
<td>Kansas</td>
<td>29 of 62 responses (47%)</td>
</tr>
<tr>
<td>Michigan</td>
<td>29 of 44 responses (66%)</td>
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<tr>
<td>Minnesota</td>
<td>40 of 48 responses (83%)</td>
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<tr>
<td>Nebraska</td>
<td>27 of 56 responses (48%)</td>
</tr>
<tr>
<td>South Dakota</td>
<td>30 of 66 responses (45%)</td>
</tr>
<tr>
<td>Ohio</td>
<td>30 of 47 responses (64%)</td>
</tr>
<tr>
<td>Washington</td>
<td>21 of 25 responses (84%)</td>
</tr>
</tbody>
</table>

**Table 3. Survey response rate—phase one**

**Types of Data Collected for Phase One**

Information collected and analyzed for this report included the following:

- state,
- job titles,
- age and tenure on the job,
- responsibilities that county engineers assume in their jobs,
- importance of public relations,
- status recognition,
- problem-solving strategies,
- tort liability,
- elected county engineers,
- projections on shortages of county engineers,
- self-perceptions of the county engineers' contributions to their counties,
- importance of salary in continuing to attract new people into the profession, and
- factors that would discourage the current generation of county engineers from making the same career choices again.

Each factor was included in the questionnaire because the expert advisory group members agreed each was important to the profession. Questions asked allowed a focus on issues relevant to all systems of county government.

Data Collected and Conferences Attended—Phase Two

Between May of 1992 and February of 1993, the researcher attended county engineering conferences in Michigan, South Dakota, Ohio, and Iowa. Researchers also attended the annual 1993 NACE meeting and a professional development seminar sponsored by the Washington State Association of County Engineers/Public Works Directors (WSACE/PWD) with the assistance of the County Road Administration Board (CRAB).^2^ Participation in this latter event in May of 1992 provided additional understanding of the professional development activities used in Washington State to encourage county engineers to become active members of their state association. At each conference, researchers interviewed county engineers in preparation for development of the survey for phase two of the research.

Questions Included in Interviews with County Engineers—Phase Two

Again, open-ended interviews were used to maximize the depth of feedback. Some questions probed the advantages and disadvantages of being a county engineer.

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^2^ Comments by a person from the Washington State County Road Administration Board (this person was a former Washington State county engineer). CRAB is a state agency charged with developing and enforcing various 'standards of good practice' that all the counties must follow in their administration of road issues. The Board, which directs the agency staff, is comprised of six county commissioners and three county engineers who are selected by the chief county legislative authority organization, the Washington State Association of Counties (comprised of all county commissioners and council persons, with its own small administrative staff). The CRAB Board is responsible for the hiring of its executive director, and overall setting and acting on issues of a county's noncompliance with a 'standard of good practice' (administrative rules adopted and published as Washington Administrative Code or WAC rule; the process involves advertisement, hearing(s), and official action to adopt). Most of the agency's top management staff (4 of a total of 15 staff) have been county engineers in Washington. A large share of the agency's work involves providing guidance and assistance of county engineers and public works directors on roadway and related issues including specialized computer software development and training. The WSACE/PWD is a self-governing association of all the county engineers/public works directors in Washington. It is a formally recognized affiliate of the Washington State Association of Counties as are similar organizations for planners and public health professionals. The WSACE/PWD is very active in both representing and promoting issues of concern in the broad spectrum of public works in general.
Others examined how state and national associations support continued professional growth. Interview questions used were as follows:

From your experiences, what professional opportunities are offered to county engineers that someone deciding to enter the private sector would not find available?

What is your view of a county engineer leaving your state to take a position in another state, and then coming back to his or her home county as a county engineer? Does that pose a conflict of interest regarding working with people on the board that he or she might know? Are people in the county placing pressure on him or her regarding politics?

How can you begin to attract new people into the profession, particularly in rural counties?

What are some of the specific benefits/rewards of being a county engineer in a rural county? What are some of the costs?

How important is continued professional development for county engineers, and does your state association provide opportunities for such continued growth?

Is county engineering an effective springboard for future advancement for those in the profession? If so, how can this be used to attract new people into county engineering?

How strong is your state association?

What are the benefits of belonging to your state association?

Do you have a central information database in your state association so that all county engineers in your state, even nonmembers, can gain access to information relevant to the counties?

At your state meetings, do you discuss problem areas that county engineers have? How often? Are these meetings formalized or are they informal, e.g., lunches with colleagues?

Do you hold recruitment activities to draw new members into your state association? If so, is this information and its importance made available to the boards within each county? If no, why not?

How might your state association be used to expand public exposure so as to make county engineering more visible? What is the primary purpose of your state association?
Does your state association adequately serve your needs as a county engineer? Does your association serve to evaluate and strengthen the profession?

Do you share legislative and regulatory information across counties? Do you have an executive committee that acts as a mechanism to orient new county engineers into the profession?

Of the total number of county engineers in your state, how many are represented by/belong to your state association? How many counties is that of the total within your state?

Of those county engineers who belong to your state association, how many are active participants, i.e., attend meetings, serve as officers?

How could you or your state association be more successful in strengthening your state association?

What are the benefits of belonging to NACE?

How many county engineers within your state belong to NACE?

How many county engineers in your state are active participants in NACE?

Why is NACE membership as low as it is? How could your state association play a role in improving these numbers?

What does it mean to say that you are active in NACE? What does this organization offer you and your colleagues?

Do NACE and your state association work to groom members for higher positions within the profession?

Do you share your assistant county engineers with other states, that is, do you work with other states in grooming your assistants for county engineer positions?

How important are professional activities (i.e., professional development seminars) in your state and national association?

Are there any mini-support groups actively working in your state associations? What purposes do they or might they serve for the retention of county engineers?
Does your board support your activities in your state/national association and see them as an investment or are these involvements viewed as a cost to the county? Why is this?

How could county engineering as a profession gain more public exposure so that you could better publicize the contributions you make to the counties' infrastructure?

Does your state/national association work to recruit new people into the profession? Why or why not?

Does your state/national association work to retain people in the profession? Why or why not?

Does your state/national association serve as a support network for county engineers who lose their positions as a result of political problems with the boards?

Have current members of your state/national associations been surveyed on a regular basis for problem areas experienced in counties across the state(s)?

Are professional development workshops set up in your state to assist county engineers in becoming more effective managers/supervisors? Or are most of the sessions set up to gain technical information?

Do your state/national associations serve as facilitating mechanisms for new county engineers at annual conferences?

Do your state/national associations serve as technical consultants for county engineers? Is there any forum for such assistance for county engineers in your state?

What is your state/national association doing to encourage expanded participation in activities they sponsor?

Does your state association work to aggressively seek participation from county engineers in all counties within the state?

How does your state association work to recognize members? Is there a mechanism for recognizing/reaching out to non-members even though they may never have attended a state meeting?

Do your state/national associations serve in an advocacy role when problems arise within the count(ies)/state(s)?
Do your state/national associations offer opportunities for developing leadership status for county engineers?

Do your state associations express open interest in staying current on technology issues and on personnel/liability and other important issues and is this reflected in the annual/semiannual meetings held?

Would you be open to speaking to student groups at high schools, technical colleges and universities to talk about your profession to young people?

What types of forums are there in your state that could be used to improve the visibility of county engineering? How could these forums be used to get your message across so that the public better understands the profession?

How well does your board understand the decisions you make and the responsibilities you have for the secondary road network in your county?

Does your board see your salary as an investment in the quality of the road network in your county, or as a cost? If as a cost, how might this be overcome?

During interviews for phase two as well as for phase one, researchers asked many probing questions. Responses were again candid. Following the NACE meeting in February of 1993, a draft questionnaire was developed for phase two of the project. It was mailed to members of the expert advisory groups for each participating state (see Appendix B for a copy of the draft of the questionnaire for phase two).

The response rate again was high. Only minor revisions were needed. Revisions were made and the final draft was mailed to 366 county engineers in the eight states participating. Of those mailed, 248 responses were returned for a response rate of 68.8 percent.

The response rates for each state are given in Table 4:
Table 4. Survey response rate—phase two

<table>
<thead>
<tr>
<th>State</th>
<th>Number and Percent Responding</th>
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</thead>
<tbody>
<tr>
<td>Iowa</td>
<td>41 of 51 returned (80%)</td>
</tr>
<tr>
<td>Kansas</td>
<td>24 of 60 returned (40%)</td>
</tr>
<tr>
<td>Michigan</td>
<td>26 of 44 returned (59%)</td>
</tr>
<tr>
<td>Minnesota</td>
<td>41 of 44 returned (93%)</td>
</tr>
<tr>
<td>Nebraska</td>
<td>27 of 48 returned (56%)</td>
</tr>
<tr>
<td>South Dakota</td>
<td>41 of 49 returned (84%)</td>
</tr>
<tr>
<td>Ohio</td>
<td>30 of 46 returned (65%)</td>
</tr>
<tr>
<td>Washington</td>
<td>18 of 25 returned (72%)</td>
</tr>
</tbody>
</table>

Description of Job Titles for Respondents

Respondents were asked to identify their job titles on the questionnaire for phase one of the research, but not for phase two. Once job titles had been identified for each state it was not necessary to ask the question a second time. The qualifications and responsibilities of those participating in this study were as diverse as their titles, including one whose title is “Weed Control Officer.” A majority of those from Iowa and Washington State hold the title of county engineer. Those from other states, however, note the diversity of their job titles as follows:

**Kansas**
- Road and Bridge Supervisor
- Road and Bridge Superintendent
- Highway Administrator

**Michigan**
- County Road Commissioner Manager
- County Highway Engineer
- County Engineer and Manager
- Secretary Manager
- Managing Director
- Engineering Manager
- Engineering Supervisor

**Minnesota**
- County Engineer/Director of Public Works

**South Dakota**
- Road Superintendent
- Highway Superintendent
Nebraska
Weed Control Officer
Weed Superintendent and Bridge Inspector
County Surveyor
Consultant for Board of Supervisors

Ohio
County Engineer, P.E., P.S. (Professional Land Surveyor)

Assessing the implications of differences in job titles and their accompanying credentials may deserve future consideration. This study, however, focused upon the types of responsibilities and quality of work that all county engineers are doing to maintain their secondary road systems. This study provides an evaluation of each county system within itself. At the same time, it offers insights into comparisons and contrasts among the different systems of county government.
CHAPTER 3
WHY BE A COUNTY ENGINEER?

In a society that tends to award status in proportion to income, the low salaries offered to many county engineers can be a powerful disincetive when choosing a career. It remains a burden to be overcome by many already in the profession. Other factors, however, are more positive. One county engineer commented on the profession nearly 30 years ago, “There is no reason to be anything if what you are trying to be presents no challenge.” The publisher of Better Roads elaborated on Wendler’s, comment on the profession as follows:

County engineers must meet the administrative challenge of the office they hold. They must have new ideas, incorporating the latest methods into his operation. They must meet the challenge of public relations, something not taught engineers in college. They have a duty to state their views not only to the board, but the general public. The third challenge is an eager desire to solve engineering problems confronting them daily. County engineering calls for spur-of-the-moment decisions founded on good, solid engineering judgment. ¹

Another county engineer, quoted in Better Roads magazine, said, “Adequate compensation remains a problem. However, I am able to live where I want to and the work is great.”² This latter comment and some of those listed in Box 2 were provided by those responding in this research. Each provides additional insights into why someone would want to be a county engineer.

The diversity of responses from those participating in this research was as difficult to operationalize as the objectives of these professionals. There is no single, definitive answer. There may, in fact, be as many responses to the question “Why be a county engineer?” as there are county engineers. The paths these professionals take to carry out the responsibilities of the position are not always clear-cut; their reasons for continuing to meet the challenges of their office are not always clearly definable. Nonetheless, county engineers hold firmly to the conviction that there are factors more important than either salary or the politics so often interjected into their daily decisions.

¹ Dannhausen, William O. “Why Be a County Engineer?” Better Roads, Publisher’s Comments, p. 11, September, 1991.
I get the most satisfaction out of my job knowing I am trying to approach problems with a long range outlook. I try to plan for future growth and make decisions based on the long term needs of the county [county engineer from Minnesota].

We took the ignored lowest volume roads and regraded them, saving maintenance expense forever. We have taken advantage of every outside dollar opportunity including bridge grants, extra Federal Highway Administration dollars, Federal Aid System dollars, and demonstration money [county engineer from Minnesota].

I just try to be honest and fair with all people we deal with and treat everyone the same [road superintendent from Nebraska].

My budget is lower now than it was when I took the job eight years ago, yet we operate more efficiently than ever before [county engineer from Iowa].

When a position came up in my hometown community, I saw an opportunity [county engineer from Iowa].

I enjoy the survey work and the county realizes a savings because I do it. Working as a troubleshooter, solving the problems that come up during construction, and seeing the project come out okay [county highway superintendent from Nebraska].

I do the impossible, with the inadequate, for the ungrateful [tongue in cheek comment from a county engineer from Minnesota].

As a county engineer, you can kind of be your own boss. You can set your own priorities on what needs to be done and when. Demands from the Commissioners and others are not that frequent and I can work around them. There is always something that can be looked at and done. You don’t have to worry about the ups and downs in business like in the private sector. You also don’t have to worry how long it takes to design, inspect some project to stay under a “not to exceed amount or proposed budget”. There is also the satisfaction of following a project from start to finish [county engineer from Michigan].

I like the ability I have to stay in one location and to have an area I can call “home”; where I am known and respected for my abilities and accomplishments. It is also nice to be able to help the citizens in my area, even if it is only to give advice or direct them to someone else who can help [county engineer from Minnesota].

I like the wide variety of challenging problems I tackle [county engineer from Iowa].

I have limited resources, but that presents me with challenges.

I like being able to provide a needed improvement. It is very satisfying. I have an opportunity to work directly with the people affected by my projects [county road supervisor from South Dakota].

It makes me feel good to be able to respond to local [public] concerns [county engineer from Iowa].

Box 2. Why be a county engineer?
CHAPTER 4
WHAT IS A COUNTY ENGINEER?

J.W. Mavity, a former county engineer from Kansas, described the position of county engineer and its challenges most articulately. He discussed the number of years the county engineer spends in preparation for the job. He said grooming oneself for the position encourages a person to

keep in touch with the best work elsewhere and to maintain an analytical attitude of mind. Moreover, it makes him qualified to select the most economical design for a road and for all of the structures involved. He is qualified to superintend the construction of the road and assure the public of value spent. He is qualified to furnish the correct and most economical maintenance for every type of road. Because of his qualifications, it follows that the engineer should be in charge of these operations.¹

Fifty years after Mavity made this statement, another county engineer from Kansas wrote in response to this research that

training and experience in management and personnel should be a requirement for the job. On the job experience as an assistant to the County Engineer should also be required. There needs to be a revision in the entire county government system in Kansas. The system set into place over 130 years ago does not efficiently or effectively serve the public today.

Requirements most well-suited to prepare county engineers to meet the challenges of their positions may well be those that the coming generation will find the most discouraging. On the other hand, if the profession increases its visibility and begins to command the same respect as other professional communities, perhaps they will find the position challenging in a positive way.

Ideally, the responsibilities and skills of county engineers should reflect the needs, activities, and objectives of the counties. It is the boards of supervisors that set county policy. They do so, however, only after hearing recommendations from their county engineers as to which decisions would be the most economically feasible, practical, and sound. A majority of those who commented on this issue argued strongly that the registered P.E. license should be a requisite for anyone applying for the position. Educating and keeping their boards informed of needed projects and providing a rationale for prioritizing projects requires professional skills are critical.

Absent adequate credentials from applicants, boards will find themselves attracting less qualified people. This is undesirable under any set of circumstances. Again, this is not to imply that the non-P.E.s currently in office are not doing a good job. It cannot be emphasized strongly enough, however, that their successors will need additional expertise to provide the quality and scope of engineering services required to maintain the counties’ roads, and they may not have the luxury of learning from experience. States not requiring the P.E. may need to reconsider their qualifications criteria for new applicants. Box 3 presents a list of some of the comments made on the need for county engineers to be licensed P.E.s.

Does the certification/licensing requirement imposed by your state make it more or less difficult to attract qualified people to county engineering?

It makes it more difficult, but the fact that these people have licenses means they have been trained to solve problems in a methodical manner. Even some of these individuals have difficulty with the management side. Requiring licensing, however, will in most cases mean that you have a professional and responsible individual heading the department [Iowa].

The requirement of the P.E. is essential to guaranteeing a certain source of qualified people [Iowa].

County engineers must be licensed P.E.s or the system fails. I cannot conceive what would happen with non-engineers in these positions. I have experienced what happens in semi-government agencies and government agencies when non-engineers have jobs and job titles of engineers. A multitude of problems occur which cost the public many dollars [Minnesota].

The licensing requirement should not be made easier. Today's county engineer is expected to perform responsibly and competently in many areas. We need the best people we can get [Minnesota].

There are many engineering technicians who could possibly function as county engineers about 75% of the time. Consultants could be retained to do the remainder of the work. This is not, however, a good situation as the P.E. in most cases can save the county much more than his salary every year [Iowa].

It is important to have a licensed P.E. for a county engineer. Many County Commissioners, however, are not willing to pay a reasonable salary [Kansas].

I would strongly oppose any change in the P.E. requirement [Iowa].

Licensing attracts committed engineers [Iowa].

The P.E. should be the minimum requirement for a county engineer [Iowa].

I strongly believe that the P.E. license is a valid requirement for public sector engineers. Public agencies are getting their money's worth for additional salary requirements of engineers over non-engineers. Most public engineers are of the same opinion and share a pride of achievement in becoming a registered engineer [Minnesota].

Box 3. Why should a county engineer be a registered professional engineer?
According to most county engineers, particularly those in states where the P.E. license is required by state statute, the county board’s objectives inevitably will include a need for engineering expertise and the methodical analytical thinking they involve. One county engineer from Minnesota commented that even the decisions he makes that are not directly related to engineering per se are “better decisions” because of his engineering background (i.e., his engineering training provided him with the “analytical attitude of mind” that Mavity discussed.).

Lowell Richardson, recently retired Head of the Office of Local Systems at the Iowa DOT, commented in a 1987 address to the Kansas County Engineers Association, “There are many advantages to having a professionally registered engineer in charge of secondary roads in a county.” He points to Iowa, which he says has one of the best and most complete secondary road systems in the United States. Richardson’s perspective parallels Mavity’s. Both would agree that the background needed to meet the demands of the position must be broad in scope because the job requires the county engineers to be qualified to

- select the most economical design for a road and for all of the structures involved;
- determine the detailed cost of the road;
- superintend the construction of the road and assure the public of value received for every dollar spent; and
- furnish the correct and most economical maintenance for every type of road.2

As county boards continue the task of hiring the most qualified person for county engineer in their respective states, they will need to remain sensitive to the complexity of the position and of the demands it entails. “Selling the profession” will become increasingly important as county budgets continue to make it difficult for some boards to offer salaries competitive with the private sector.

The remainder of this report will emphasize responses from phase two of this research, with a particular focus on the perceived advantages of public sector employment and the strength of professional associations.

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CHAPTER 5
PHASE TWO DATA ANALYSIS:
PERCEIVED ADVANTAGES AND DISADVANTAGES OF
PUBLIC SECTOR EMPLOYMENT

The second phase of this research addresses ways to counter problems associated with the increasing number of county engineers retiring from the profession. Many questions asked of participants in this phase of the research emphasized the advantages of being a county engineer. In order to gain some comparison base, respondents were asked to compare the advantages of public sector employment with the advantages offered by the private sector, i.e., whether the public sector offers more or fewer opportunities for professional growth. One reason this approach was taken is because so often students in the universities are courted by private sector interests. As a result, the public sector sometimes has a tendency to lose out on the “best, the brightest, or those who might well be the most committed to the profession.”

Many counties are dealing with predictions of shortages that parallel those confronting state departments of transportation. Positions available are not perceived as exciting or glamorous, particularly in rural areas where job opportunities for spouses are limited. As some county engineers comment, civil engineering is just not viewed as exciting.¹ Recent research on civil engineering majors has yielded evidence that

when interviewed, students are quick to point out that there are more lucrative opportunities in other niches of the job market, notably other branches of engineering, and, of course, business. The situation even has the prospect of becoming a self-fulfilling prophecy; starting civil engineers are underpaid; a lower echelon of talent is attracted into the profession. The result is that status and challenges are reduced concomitantly.²

This finding compounds the difficulties related to the issue of public sector salaries. The perception, actual or not, is that compensation rates for county engineers are set by averages of the recent past. They may even be based on an established scale so applicants for the position, regardless of qualifications, will be offered the same salary. This may serve as a disincentive to those looking for a competitive beginning salary. It may also result in the perceived absence of full competition for the profession. If this is in fact occurring, many of the most capable and well-qualified

¹ The term “civil engineering” is used here because a majority of those county engineers who are required to hold the professionally registered engineer’s license have been required to earn a degree in civil engineering from an accredited college or university program prior to sitting for the P.E. examination.


-35-
candidates in the years ahead may head for the private sector absent an adequate consideration of the challenges presented by county engineering. If such a trend is realized, in the long term, it could have a negative impact on county infrastructure.

Based on interviews with nearly 50 county engineers for phase two of this research, another problem is the nearly unanimous agreement that the fresh college graduate would not survive long with the demands of the job the county engineer performs. This does not, however, mean that university professors and administrators should not be focusing on selling the profession to students. Repeatedly, comments were made regarding ways in which the current generation of county engineers groomed itself for the positions now held. As it was pointed out earlier, some worked at other jobs/positions in both the private and public sectors for as long as 10–20 years before assuming their current positions as county engineers. Young people should be made aware of long-range as well as short-term career opportunities. That is, they should be shown ways in which county engineering can open a window of opportunity.

County engineers themselves suggest that, whenever possible, counties should groom qualified staff to replace those expected to leave. Realistically, however, this does not appear to be an attainable objective. Some say their boards feel because of other pressing budgetary needs of the county, the costs of any type of grooming of an assistant to the county engineer are too high. One Iowa county engineer who will be retiring in 1995 commented that his preference would be to hire an assistant six months prior to his retirement so he would be able to teach this person the way the county works. He will take the knowledge of more than 30 years as a county engineer with him when he retires. His fear is the work he has accomplished over the years may not be maintained. This type of frustration again raises issues that counties view such strategies as costs rather than investments in the county’s infrastructure. This same county engineer said the long-term costs of not considering this option are likely to be much higher than the board’s short-term investment in an assistant.

In Minnesota, several county engineers interviewed during phase one commented that when they hire engineers in training (E.I.T.s) to work as assistants, as soon as these persons complete the P.E. examination, they leave. Then the hiring process and learning curve must begin again. The downside of this experience involves the loss of qualified people who have spent a great deal of time learning the system only to leave. On the other hand, it may also be a positive in that these persons will have gained expertise working at the county level. Following work experiences in other positions, they may one day consider coming back into county engineering, as many have in the current generation.

An assistant deficit notwithstanding, a number of those participating in this research reported that they do have some type of assistance, most often in the form of technicians rather than assistant county engineers. One insight that demonstrates the value in such a position is that many of the current generation of county engineers served as assistants prior to assuming their current positions. In Iowa 89 percent of those responding had been assistant county engineers; in Minnesota, 58 percent; in
Ohio, 57 percent; and in Washington, 48 percent. Most noted the experience was a prerequisite to and an invaluable preparation for the scope of their current responsibilities. One county engineer from Minnesota who served on the expert advisory group said he had purposefully groomed himself over a period of years for his current position.

In Kansas, 41 percent of those responding were assistant county engineers; in Michigan, 38 percent; and in Nebraska, 15 percent. Those in non-P.E. states seemed more likely to rise through the ranks to their current positions as road and highway superintendents than to have served as any kind of technical assistant. Most acknowledged that work experience as an assistant county engineer or its counterpart, however, will be a prerequisite for future generations of county engineers.

Young people need to be aware of and informed about the opportunities and the challenges these opportunities present. At the same time, they need to be aware of the frustrations of the position and the degree to which it has a tendency to become politicized—and ways to overcome these frustrations. The best way for them to prepare themselves to be successful as county engineers is to seek out an understanding of the expertise and experience needed to competently perform the duties so intricately a part of public service.

An overwhelming majority of those interviewed and surveyed for this research said the key reward of the position is in a job well done, sometimes against difficult odds. It was noted, for example, by a highway superintendent from Nebraska, that he had "spent twelve years trying to convince his County Commissioners that roads with average daily traffic volume of 400 or more should be hard surfaced." He said, "We now have one such project under consideration." According to another county engineer, the bottom line for many, if not most, is, "working within budget constraints to provide the best possible road and bridge system and providing technical assistance on all types of local communities and commissions."
CHAPTER 6
WHAT ARE THE REWARDS AND SATISFACTIONS OF COUNTY ENGINEERING?

The primary objective of phase two of this research has been to identify strategies to attract qualified people into county engineering. Equally important is retaining county engineers in their positions once they have made the choice to work in the public sector. The following sections of this report focus on an analysis of responses addressing these issues. A strong emphasis is placed on ways the profession can identify selling points most likely to offer county engineering a competitive advantage with/against the private sector for qualified applicants for positions that become available.

Job Satisfaction Factors Identified by Phase Two Research

Respondents were asked to provide their perceptions on a number of factors related to opportunities for continued professional growth and ways in which those opportunities compare with the private sector. Identifying these factors as strengths or selling points for the profession may well be the first step in working toward attracting a new generation of county engineers.

Questions regarding a comparison of public sector engineering with the private sector were prefaced with the following statement: “In the following areas, from your perspective, do county engineers have more, the same, or fewer opportunities than those with similar skills in the private sector?” A ranking scale from “fewer opportunities” to “about the same level of opportunities” to “more opportunities” was used.

Following is a list of factors deemed important to the county engineering profession. It is by no means all-inclusive or exhaustive. It does, however, identify many factors county engineers can emphasize in their efforts to make themselves more visible and more attractive to the coming generation of county engineers.

- Leadership development
- Professional development
- Diversity of work/projects
- Salary increases
- Professional contacts
- Sense of contribution to the profession
- Recognition of accomplishments
- Problem-solving skills relating to technical issues
- Problem-solving skills relating to personnel issues
- Problem-solving skills relating to management issues
States requiring the P.E. license seem to provide slightly more opportunities for professional development than those not requiring the P.E. license. Professional development opportunities for county engineers include active membership in their state or regional associations and in the National Association of County Engineers. Professional development also includes participation in conferences sponsored by these associations, including workshops and seminars designed to offer current information on (1) equipment, (2) materials, (3) personnel issues, (4) management and administrative strategies, and (5) both state and federal regulatory issues.

Information and enhancement opportunities gained from participation in professional activities is important, particularly for county engineers, because they frequently work without having regular contact with others in similar positions. Some county engineers report, for example, that they rarely find the time or opportunity even to interact with their peers from other counties within their respective states. They have even fewer opportunities to share information with colleagues from other states. Their relative isolation requires them to take special steps to acquaint themselves with improvements in highway maintenance and construction practices or with the most recent interpretation of state and federal regulatory guidelines.

The state of the art in engineering practices is expected to change dramatically over the next decade. Keeping abreast of changes will require continuous retraining and exposure to new information as technologies evolve. This makes it increasingly important to create a mechanism for the exchange of information on administrative, managerial, and engineering techniques within the county engineering community. This will help county engineers to overcome the isolation and lack of exposure to needed information.

Two Illustrations of Professional Enhancement Opportunities

**The Iowa Experience**

In an effort to facilitate communication between the Iowa Department of Transportation and Iowa's county engineers, the Iowa Transportation Center (the ITC), through funding from the Iowa Highway Research Board, has established an electronic bulletin board system (BBS). This system provides a communication and file-sharing tool that encourages Iowa's county engineers to share information and leave messages for their colleagues on a toll-free line. The BBS is perceived as an electronic stepping-stone that will help to computerize and link counties that have been relatively isolated from such communications in the past.

Making county engineers visible to each other and encouraging interactions among them both within their own state boundaries and beyond those boundaries has the potential to encourage (1) the level of professional development needed to relieve the frustrations associated with ongoing problems associated with budget restraints, (2) current knowledge of changes in state and federal regulations, and (3) an under-
standing of the ways in which county engineers can address and resolve ever-present political pressures. The key will be to remember the challenge has been issued not only to the new generation of county engineers as individuals, but to the profession collectively.

For many county engineers, professional development opportunities are presented when the state association of county engineers sponsors its annual meetings and/or when University T² Centers (e.g., the ITC) sponsor workshops and seminars on topics of special interest for county engineers. In Iowa, the technology transfer program through Iowa State University works with the Iowa County Engineer's Association in identifying topics of interest to the county engineering community. Some of the topics of the more than 80 such programs sponsored by the ITC in recent years include the following:

- vehicle fleet management/maintenance,
- pavement maintenance/management systems,
- roadside design,
- supervisory management skills,
- liability and traffic signing,
- supervisory management skills,
- liability and traffic signing,
- garage waste management,
- regulatory issues (for example, meeting federal and state regulations),
- excavation safety, and
- training in bridge inspections.

The ITC is also involved with the Iowa County Engineer's Association Special Schools Committee, one of 13 committees that identifies topics of interest for Iowa's county engineers. Other committees include the following:

- Public Relations Committee,
- Legislative Conference Committee (Engineers and Technicians),
- Nomination and Awards Committees,
- Research Board Committee,
- Design Guide and Management Systems,
- Functional Classification and Highway Needs Committee,
- Computer Program and Information Coordinating Committee,
- Technology Transfer Committee,
- Constitution Bylaws and Auditing,
- Cost-Accounting Committee,
- Iowa Department of Natural Resources Committee, and the
- Contractors Coordination and Specifications Committee.

The ITC develops and sponsors training programs, workshops, and seminars. These are intended to provide informative updates on equipment and materials. Many program ideas are identified by the Iowa county engineers committees.
The BBS is used by county engineers to remain current on state-of-the-art technical, management, and administrative information. It is noted that the BBS and other mechanisms for information can be effective only if

1) the county engineers choose to use the technology,

2) they have a strong state association that makes them aware of the importance of the information available through the use of the BBS and other sources (this means it is also important for the state associations to have an active and supportive membership),

3) the national organization (NACE) continues to serve as a clearinghouse of information for the profession, and, perhaps most important,

4) county boards believe professional development opportunities\(^1\) for county engineers are integrally related to high quality secondary road and bridge networks.

Finally, the ITC employs a former Iowa county engineer as a “safety circuit rider.” This person travels the state of Iowa putting on workshops and programs designed to improve vehicle safety within the counties. In a sense, he notes, “I make house calls.” This person has put on nearly 70 accident analysis workshops since 1989. Each workshop was designed to provide county engineers with assistance in evaluating vehicle accident data. This service offers a mechanism by which counties can learn from each other. County engineers collect accident statistics which are fed into a computer in Des Moines, Iowa. The database is then made available for use by counties as a tool to reduce traffic accident rates.\(^2\) The ITC safety circuit rider serves as a liaison between the university and county engineers.

**The Washington State Experience**

In May of 1992, researchers were invited to attend a professional development seminar sponsored by the Washington State Association of County Engineers/Public

\(^1\) That is, those that provide technical and administrative information important for maintaining the county’s infrastructure.

\(^2\) The ITC safety circuit rider says that one of his areas of focus is to examine the night/day ratio of accidents. In Iowa, three times as much traffic flows during the day as during nighttime hours. It is assumed that 75 percent of accidents should then be occurring during daylight hours. This, however, is not the case. When the number of nighttime accidents appears high, he examines the reasons that night driving conditions cause accidents. He looks at accident rates and compares them with rates on similar types of roads in different parts of the state. He also examines the severity of accidents and, if that rate is higher than it should be, he works with the county engineers to identify ways to lower those rates. This is a complex process. Trends are examined over time to see whether traffic conditions have changed. There is also a sign management program in place wherein the ITC safety circuit rider is able to use the federal highway computer program for counties. The ITC holds a conference annually on the management of county traffic signs. The safety circuit rider’s services are part of the ITC’s technology transfer program.
Works Directors (WSACE/PWD) and the County Road Administration Board [CRAB]. Those in attendance had an opportunity to interact with a management consultant who presented information on conflict management techniques.  

During one session, participants identified how the WSACE/PWD might become more effective. The factors identified by the participants at these sessions are listed in the following paragraphs. Each point provides insights into ways a strong and effective state association works for its members. Opportunities for professional development can be used in marketing strategies for county engineering. (The stars next to each point show the number of people at the Washington State conference identifying the area as an important one for improvement.)

**Incorporation of social and recreational events at conferences.** Informal times allow for the exchange of information that may not be exchanged during formal sessions. This encourages a release of frustrations as well as the positive exchange of information on equipment, materials, administrative, management, and personnel issues.********

**Clarification of WSAC/PWD and CRAB mission goals and action steps.** This will help WSACE/PWD develop a more well-defined sense of purpose to pass on to its members. This fosters a sense of belonging among county engineers.************

**Continued professional development.** This is important so that professional growth can become a normative part of being a county engineer. It also serves to increase the strength of the profession.******

**Orientation for new members.** Orientation is important to make new members feel a part of the county engineering community. This fosters a sense of being a part of a professional community.**************

**Development of a central information data source.** This parallels Iowa's efforts to facilitate communication among county engineers through the Electronic Bulletin Board System.*******

**Better communication about WSACE/PWD activities.** County engineers who are well informed about the activities of the state association are more likely to become involved in its activities.**

**Continuing education.** Many county engineers argue this is the only way to stay current on relevant issues. One Washington county engineer commented

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that eventually a master's degree will be a prerequisite to adequately carry out the responsibilities of the position.****

More information meetings. This parallels a function already working in Kansas where groups of county engineers have lunch together on a weekly or month basis. During that time they raise and discuss issues related to the job. **

Designated greeters at meetings. This may encourage new people to become more involved in CRAB activities. Involvement by all county engineers is one way to strengthen the state association. Then it can act as an advocate for county engineers within the state.*****

Recruitment of new members to the state association. These persons can be drawn from the ranks of county engineers across the state. This is not a high priority for Washington because it already maintains high levels of participation from its members.***

Increased level of public exposure and visibility. This issue is controversial. One county engineer from Washington commented he would as soon remain invisible. When you are visible you may get more complaints from the public. Others say the public needs to become more aware of the broad scope of responsibilities of the county engineer. This is one way salary levels could be addressed.**

Networking at conferences. This will allow Washington's county engineers to interact with one another and also facilitate interactions with county engineers from other states at the annual NACE meeting. ****************

Clear membership criteria in WAACE/PWD. This may not be an important issue for states that require the P.E. One person who responded in this study, however, indicated that he was not eligible to belong to the state association because he is not a registered P.E.**

Involvement of new county engineers in executive committee. This could be construed as an effort aimed at retaining county engineers in their current positions.**

Mentorship. This can be important for new county engineers orienting themselves to the complex demands of the position.**

Association activities that focus on common needs of county engineers. 

******
Sharing of legislative and regulatory information. This is a top priority for a majority of county engineers. They point out new legislation appears to be generated almost on a daily basis.*****

Group discussions of common problems. Working together leads to strategies to assist county engineers in resolving common problems.******

Informal meetings of demographic groups. Certain regions of the state share issues in common. Discussion of those issues can lead to solutions to problems.***

Washington State county engineers have a broad scope of opportunities for professional development. Because of this, they are not having as many problems attracting people into positions as some of the other states involved in this study.
CHAPTER 7
GENERAL DISCUSSION:
PUBLIC SECTOR OPPORTUNITIES

This chapter reviews county engineers’ participation in professional conferences, their contributions to counties, and the most often cited problems within the profession.

Professional Conference Involvement

In states where the P.E. is required and enforced, county engineers ranked professional development opportunities in the public sector somewhat higher than their counterparts in non-P.E. states in this study (see Figure 1). ¹ Those in non-P.E. states, however, say attendance is generally good at their professional conferences. Many who do attend these conferences say some of their colleagues do not have the support of their boards to take time off for such activities. Reasons include the expense involved in conference attendance and time taken away from the job. Some said gaining board support for attendance at the national conference is more of a problem than gaining support for regional/state conferences. This is because of the greater expense and more time taken away from county responsibilities (the NACE conference runs for nearly a week).

![Figure 1. Perceived opportunities for professional development in public sector compared with opportunities in private sector](image)

¹ The scores were summed and a mean was derived. Each response for Figures 1–9 was placed on a 0–7 point scale with a ranking of 0–2 = fewer opportunities than the private sector; 3–5 about the same level of opportunities as the private sector; and 6–7 more opportunities than the private sector.
Nonetheless, a majority of respondents reported their boards were somewhat to very supportive of their participation in professional meetings (see Box 4 for representative answers to the survey question regarding board support for conference attendance). Responses presented in Box 4 may be related to the degree to which board members themselves are able to take advantage of opportunities to attend conferences. If they do, they too are able to share information by coming together with other county board members who face similar pressures.

Professional meetings in some states are combined for board members and county engineers. These meetings do, however, tend to include sessions that appeal either to board members or to county engineers. Some board members do attend county engineer sessions and vice versa. If sessions included topics common to both groups, however, the sharing of information and problem areas common to both would likely increase. This is strategy county engineers and their boards could use as a mechanism to merge their perspectives on county road and bridge issues.

<table>
<thead>
<tr>
<th>Very supportive</th>
<th>The Board provides funding each year so that I can attend the meetings because this is one way in which I can stay current on both technical issues and nontechnical issues.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Somewhat supportive</td>
<td>They sometimes provide funding, but only for about one meeting per year.</td>
</tr>
<tr>
<td>Somewhat unsupportive</td>
<td>The Board feels the cost is too high because it is taxpayer money that would go to provide funding for such trips.</td>
</tr>
<tr>
<td>Very unsupportive</td>
<td>The Board has rarely agreed to provide funding for attending conferences because budgets are such a problem in my county.</td>
</tr>
</tbody>
</table>

Box 4. Is your board of supervisors supportive of your need to attend meetings and conferences?

It was reported that a majority of county engineers do not belong to NACE. Some report the cost of membership is prohibitive. Others note they would be unable to attend meetings, or that their state or regional associations provide them with adequate levels of information for their needs. Those who do belong to NACE say the national organization provides them with opportunities to stay current on

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2 This is not to imply that no board members currently attend meetings for county engineers, only that a majority do not appear to do so.
• federal legislation affecting counties,
• state-of-the-art technology,
• new equipment, and
• ideas from county engineers from other states.

They also say NACE serves as

• an information clearinghouse for county engineers and
• an advocate for county engineers (occasionally).

County engineers able to attend state and national conferences say their exposure to new ideas learned from conference attendance often results in direct dollar savings to the counties (see Figures 9–16 for responses by state). These savings were in the following areas:

• equipment
• materials
• liability prevention
• legislation compliance
• personnel
• budget management
• hiring consultants
• project funding

For one non-P.E. state (Michigan), the average ranking for professional development opportunities was somewhat higher than from one of the P.E. states (Minnesota). The trend in Michigan, toward engineering "managers," may account in part for this ranking. That is, managerial skills held by these persons when they enter the profession may have prepared them better to address the wide range of administrative responsibilities of county engineers. Some county engineers argue that managerial skills are as important as engineering skills as prerequisites for the job. These skills may have an effect on the types of topics offered at state and regional conferences and on the types of workshops attended.

Professional development opportunities seem to be related to the county engineer's opportunities for developing leadership skills (see Figure 2). They may also be related to opportunities for improving technical, personnel, and management problem solving skills (see Figures 3–5). The P.E. states, again with the exception of Michigan, consistently rank these opportunities—against those offered by the private sector—higher than non-P.E. states.

Opportunities for continued professional growth through contacts with colleagues and recognition for accomplishments (see Figures 6–7) appear to be related to (1) the strength of the state associations of county engineers and (2) the level of the county engineer's involvement within those associations. These affiliations, coupled with the challenges and diversity of work projects (see Figure 8), led many respondents to report
the public sector presents more development opportunities than the private sector. If county engineers have their board's support to pursue professional development opportunities they are more likely to have a high level of job satisfaction.

![Figure 2. Leadership development compared with private sector](image)

![Figure 3. Types of savings realized—IOWA](image)
Figure 4. Types of savings realized—MINNESOTA

Figure 5. Types of savings realized—OHIO
Figure 6. Types of savings realized—WASHINGTON

Figure 7. Types of savings realized—KANSAS
Figure 8. Types of savings realized—MICHIGAN

Figure 9. Types of savings realized—NEBRASKA
Figure 10. Types of savings realized—SOUTH DAKOTA

Figure 11. Technical problem solving skills compared with private sector
Figure 12. Personnel problem solving skills compared with private sector

Figure 13. Management skills compared with private sector
Figure 14. Professional contacts compared with private sector

Figure 15. Sense of contribution to the profession compared with private sector
The County Engineer's Contribution to Counties

One question asked of respondents was how they would describe their most significant contributions to their counties. Responses to this question are reported in Box 5. Contributions could be described in terms of dollars saved or public relations, or any other contributions that respondents felt made the job challenging, exciting, and satisfying.

A significant number of respondents reported a high degree of satisfaction in being able to see a project develop from inception, through design, to construction and utilization/maintenance. This satisfaction may have influenced their perception that on-the-job benefits are greater than those in the private sector.

Responses may also be a function of the county engineer's understanding of the county's needs as a whole. That is, when external consultants are hired, each "job" is presented as an "obligation" that ends with completion of the project. County engineers, on the other hand, realize they must live with the results of their projects. They cannot and do not walk away upon completion. Many reported, "that makes the job special." One person said, "And takes a special person to do this job." There is a continuing vested interest in the county as a whole.
I provide safe roads and bridges [Minnesota].

For years I have managed the system and have brought credibility to the public works department and to the Board of Commissioners. I have an ability to work with state and federal agencies and with big business interests [Washington State].

I feel the most satisfaction in my job knowing I am trying to approach problems with a long range outlook. I try to plan for future growth and make decisions based on the long term needs of the county [Minnesota].

I aggressively seek out grants and upgrade staff education levels. I have also helped to computerize much of our operation [Ohio].

Public relations, staff efficiency (e.g., properly trained, motivated, and rewarded); and increased levels of professional ethics [Michigan].

At the time I was employed, each Board member was running a section of the county road department. Now we operate a unit which results in more competitive purchasing of supplies and an organized road department [Nebraska].

I work to find innovative ways to stay within my budget [Kansas].

By using a P.E., my county has decreased its exposure to liability, increased management and professionalism, and qualified services [Nebraska].

We took the ignored lowest volume roads and regraded them, saving maintenance expenses forever. We have taken advantage of every outside dollar opportunity including bridge grants, extra FHWA dollars and Federal Aid System and demonstration money [Minnesota].

Providing engineering expertise on a day-to-day basis. Providing professional management to the department and to the county. Areas involved are finance, budgets, legal issues, management, and organization [Iowa].

Just to be honest and fair with all people we deal with and treat everyone the same [Nebraska].

Strive to keep bridges and roads in good condition. Advise county commissioners on many varied issues. Utilize federal aid money on roads and bridges. Coordinate various programs within the county [Michigan].

Long-term planning and service to the public when problems are identified [Ohio].

Box 5. How would you describe your most significant contributions to your county?
In the Best of All Possible Worlds, What is the Problem?

Salary levels and political issues provide fuel for an ongoing controversy for county boards. These factors are also inherent obstacles to attracting qualified people into county engineering. This report has focused primarily on the strengths of the county engineering community, not on its limitations. If county engineers and their boards begin to work more closely together to minimize these limitations and identify ways to enhance the profession's many strengths, shortages of qualified county engineers need not become a critical issue, i.e., adequate numbers of qualified applicants will apply for positions. This, however, is going to take a level of energy and commitment that county engineers, their boards, and state/national associations have not seen a need for in the past.
CHAPTER 8
STRATEGIES TO ATTRACT NEW COUNTY ENGINEERS

This chapter addresses the unique perspective of Ohio compared to the perspective of the remaining states regarding strategies for attracting new county engineers.

Scholarships: The Ohio Perspective

One strategy currently used to attract engineers and their counterparts to county engineering is scholarships for technical school and university students. Ohio, however, does not offer student scholarships, because Ohio has not had difficulty attracting people to fill its positions. Ohio's county engineers are elected. Their salaries are high compared with those of county engineers in other states. Their length of tenure on the job is also comparable to states where county engineers are appointed by boards.

Most county engineers from Ohio agree, "Continuity is likely if the engineer is doing a good job." 1 In some instances, county engineers' length of tenure is longer than tenures of their appointed colleagues (i.e., the average tenure is three terms, or twelve years). Ohio county engineers do not share the political problems their board appointed counterparts say are inherent in the position.

The elected county engineer is perhaps the most misunderstood of those in all states participating in this study. Box 6 presents a list of comments on elected county engineers reported by county engineers who are not from Ohio. While many respondents criticize the elected county engineer, others appear to favor this type of appointment (see Box 7).

In 1989, Better Roads conducted a study on elected county engineers. At that time, 24.8 percent of those responding agreed election to the office is a "good idea." This may be because "most engineers favor the system they know best." 2 One county engineer from Ohio suggests it is "easier for an elected engineer to sell a project to the public than to a board of commissioners." 3

In the current study, when compared with their appointed counterparts, Ohio's county engineers said the issue of politics was less time consuming and frustrating. They also have a strong state association that is as active, if not more active, than any associations in the other states involved in this study. For these reasons, it is likely Ohio's association of county engineers sees no need to offer scholarships to students.

1 "Should All County Engineers Be Elected?" Better Roads, p. 41, June, 1989.
2 Ibid at 39.
3 Ibid.
Scholarships: The Perspective of the Remaining States

Minnesota and Michigan lead the states in the number of scholarships offered. This is an admirable gesture on the part of the county engineering community. If, however, the objective is to attract young people into county engineering, scholarships may not be a sound use of association dollars. While county engineers comment there are benefits to offering scholarships (see Box 8), overwhelmingly they said scholarships do not encourage young people to seek out assistant county engineer positions upon graduation (see Box 9).

The elected County Engineer is on the same level as elected officials. The pressures to do or not to do certain things because of political pressures or friendships would be extremely high. The time to campaign is not available.

The election of County Engineers is a decision not based on merit, but on deep pockets and greased palms. It is like the fox guarding the chicken house.

Competency cannot be determined in an election.

Too much time would be wasted on politics that could be better spent on technical issues. Changes in personnel every four years would be likely to hurt the county.

An elected position would reduce engineering considerations and increase political considerations.

Political promises result in unwarranted projects. We have enough of those with the board being elected.

Box 6. Evaluations of elected county engineers
by county engineers who are not from Ohio

While an engineer could be tempted to do certain projects to be reelected to his job, a Board member can also try to force out an appointed County Engineer who doesn’t “go along” [Minnesota].

The elected County Engineer can determine road and bridge programs based on engineering decisions—not be special interest commissioners [Ohio].

Being elected makes our positions less political because we make the engineering decisions. If we were appointed by a Board—an elected entity—the office would be much more political due to interference of the appointing agent [Ohio].

I am an elected County Surveyor. I would hope that is because I am doing a good job and that it is not a political issue [Nebraska].

Box 7. Comments supporting elected county engineers
It has given us a chance to publicize the county engineering profession and explain to students what the job is all about [Iowa].

We recently hired a technical school student. Their curriculum is almost tailor-made for our type of work [Iowa].

We are just starting to get involved in a scholarship program. We feel it will be a benefit in the future [Minnesota].

We hire full and part-time employees from colleges and they work very well with us [Minnesota].

The state colleges and technical schools bring students to the annual County Engineer’s conference. This gives the engineers an opportunity to meet students. We have hired one student as a result of this type of contact [Iowa].

Any contact with the universities presents a recruiting “possibility” [Washington].

If nothing else, it is important to note the colleges are active in providing the scholarship opportunity [Minnesota].

Box 8. Benefits of offering scholarships to university and technical school students

To date, our work with universities both through the grant fund and lecture groups like the ASCE Student Chapter has yielded no candidates for County Engineering positions [Iowa].

I do not feel that scholarships necessarily benefit as a recruitment strategy, but that our active involvement with technical schools is most important [Iowa].

Scholarship recipients do not get into County Engineering [Iowa].

Our scholarship program is fairly new and low-key. The information about the program is not well-distributed or promoted [Michigan].

We keep a good idea of class sizes and fields of interest. Technical schools have been a great source of recruiting opportunities for staff. The scholarships to the four-year universities, however, have only been “earmarked” for Civil Engineering. This could possibly be helped by County Engineering interest requirements for scholarship [Iowa].

Our association offers scholarships, but does not specify it definitely has to go only to those individuals interested in County Engineering.

We need a lot of work in this area [Washington].

Box 9. Costs of offering scholarships
A county engineer from Iowa said he has been trying to identify ways to steer young engineering pre-professionals into this career path. He says, however,

Scholarships have not been successful. The best way to get these kids into this field is to make the job more attractive. You can lead a horse to water [with scholarships] but you can’t make him drink it [i.e., consider county engineering as a career].

Respondents from most states involved in this study (other than Ohio) are experiencing some degree of difficulty in attracting qualified people. As such, they were asked to identify ways the profession can begin to attract more people. Box 10 shows suggestions made by county engineers.

We could try forgivable loans in lieu of scholarships. Also some sort of co-op program is being considered in our state, but funding remains a problem. We need to start speaking at schools. We need to start with the youth of the state [Iowa].

Many county highway departments hire students in the summer to give them a taste of the profession [Minnesota].

We need to participate in college job fairs and in high school career days [Washington].

The pay scale in the state for Highway Superintendents as a whole is not attractive to young people. We need to get the pay scale up. Fund some special school for the job [South Dakota].

We need someone to urge legislators to increase incentive payments to counties for having full-time Highway Superintendents [Nebraska].

We need to lobby for increased financial subsidies from the state. As it stands now, accountants, administrators, and managers, with no engineering licenses, have more authority and higher salaries than County Engineers [Michigan].

Maybe revolving forgivable loans to students in return for working for the county would help [Iowa].

We need new brochures and promotional materials (This would make County Engineering more visible) [Iowa].

Get information out to the schools on what County Engineers do, what the challenges are, and what opportunities are available [Michigan].

Box 10. What are some of the activities your state association could or should be considering to make county engineering an attractive career option to the new generation?
Comments in Box 10, and throughout this report, show that recommendations made by county engineers are numerous and varied. Most say the profession needs to be more visible. They say if it were, prospective applicants for county engineering position, the public, and the boards would more clearly understand the value of contributions made by county engineers.
CHAPTER 9
RECOMMENDATIONS

As pointed out at the beginning of the report, the current study is exploratory. Therefore, it would be inappropriate to suggest that researchers have learned all there is to know about what it will take to solve the current and projected shortages of county engineers. Nonetheless, many insights have been gained from this research. These insights can be used to provide the motivation for dialogue among county engineers, their boards, and their associations. Only through a proactive approach to projected shortages will the profession be able to successfully attract a sufficient number of engineers into the profession.

The following is a discussion of issues raised most often by county engineers. They are issues that county engineers find the most challenging and the most frustrating. Each provides some clarification of issues important to attracting new people into county engineering.

Salaries

In this study, many reported salaries are too low to satisfy the coming generation of county engineers. This finding holds for all participating states except Ohio. Ohio county engineers say this is because the Ohio County Engineers’ Association has a strong lobby, and their salaries are set by the state legislature, not by the boards. It is, however, noted that delegating decisions on salary structures to the legislature could further politicize the position. It may also be a way the profession can enhance its recognition level. Until low salary levels are addressed as a primary factor discouraging public sector service, a majority of county engineers agree it will be difficult to continue to attract highly qualified people.

County engineers are in unanimous agreement that adequate qualifications to perform the job must be seen as an investment in the infrastructure, not solely as a cost to county taxpayers. It was beyond the scope of this research to develop a mechanism by which to more clearly articulate and empirically measure the valued contributions made by county engineers. This may, however, be the only way the boards that hire and set compensation levels will become sensitive to those contributions.

Salary is not, of course, the only factor important in attracting qualified persons to the profession. It is, however, more important than for some currently in the profession. As a highway superintendent from Nebraska commented,

We tend to get too involved with ourselves and our everyday job situations and to overlook and neglect our successors. We need to take a more active role in promoting our profession, but we struggle with trying to promote it by just stating the
personal growth and development obtained in county engineering. Until we can offer appealing salaries, I think we are going to have a hard time competing with the private sector.

Many who currently report that salary is not a problem are satisfied with their own level of earnings because they have been on the job for a long time or are in urban counties where compensation levels are higher.

Dissatisfied county engineers may be those who were hired at a disproportionately low and unrealistic salary considering the value of the contributions they bring to the position. One county engineer quoted in a Better Roads article said, “Even though salary increases during their tenure were modest, the salaries of some of us have not been high enough to compensate for low starting rates.”1 This person further commented, “If the engineer never complained, or never showed proof of what his peers made elsewhere, the low pay scale became exaggerated over time.”2

Low salaries will likely remain a problem for small rural counties. Low budget allocations will continue to make it difficult for boards to raise salaries to acceptable levels. This is likely to be a barrier to positive comparisons with the private sector or with the urban public sector.

Rural Counties

County engineers agree that smaller, rural counties are not perceived as attractive to the new generation of professionals. They say it is rural counties that will continue to experience the most significant problems in recruitment and retention of county engineers. The generally high quality of life offered by rural counties may serve to overcome part of the problem, including that associated with low salaries. One county engineer, however, said coming back to one's home county could raise ethical considerations in terms of politics. That is, it may at times be difficult to generate decisions that could negatively affect family, friends, and business associates.

Nonetheless, rural living conditions could be used to effectively sell the profession. This would be most likely to work if it is aimed at younger engineers who have already experienced the unattractive elements of big city living. As one engineer from the Iowa Department of Transportation noted, these factors could be used in advertisements of openings for county engineers. Comments such as those in Box 10 lead to the conclusion rural living may be a critical selling point for the profession.

1 "Ibid at 27.
2 Ibid.
I chose to raise my family in a rural environment. This job is one that is “fun” and allows me to practice my profession outside a large city area.

I like working in my hometown and like small towns. The work is interesting. Clean air, no noise, and I like the country.

Small community life, better for my children, and close to family.

This is my home town.

I like living in a small community.

When the position came up in my hometown community, I saw an opportunity.

I like the rural community I live in.

Family, community roots.

I enjoy a rural area and think it is a better place to raise children. I worked in Chicago for 5 years after graduation and did not like the competitive atmosphere.

Moved back to home area and family.

I am serving in a community where my family has lived for five generations. I had an opportunity to raise my family in a good community.

The position was available in my home community.

Box 11. Selling the advantages of living in a rural area

Drawing younger people into the profession could well revitalize the ranks of county engineers. At the same time, however, as a former state-aid engineer from Minnesota comments,

Youth is wonderful but it does bring less experience to the position. Individually, they are doing well, but the reservoir of experienced County Engineers is continually reduced. Only a few have the opportunity to work as an assistant county engineer prior to talking over the primary position. The wealth of county engineering knowledge and experience is at minimum an insurance policy on our future transportation system, we cannot afford to lose.

The Politicization of the Position

In one Midwestern state, a county commissioner promised his constituents, “If I am reelected, you will get that new bridge.” As a county engineer reported in Better Roads, however,
The commissioner was re-elected, and the voters passed the bond issue needed to fund the work. The bridge was never built, since the two other commissioners on the board wanted the available money spent for more urgent work in other parts of the county. Today, 16 years later, the failure to keep that promise still haunts the board. The public remembers and obstinately refuses to vote for new and needed projects. A commissioner currently serving says that as new commissioners are elected, they don't even know what happened and why the people are so uncooperative.  

This county engineer's comment on politics seems to introduce a difficult scenario that might serve to discourage county engineer aspirants. There are, however, ways of overcoming politics. The following advice offered by a former Director of Transportation in Minnesota, could be used by universities and technical schools as they incorporate information about public sector opportunities into their curricula.

This person suggests county engineers should apply the following strategies in dealing with the political aspects of the job:

**Don't be partisan.** Your board has veto power over any construction project completed on your county roads. Sooner or later you know you will appear before the board to sell a needed construction project.

**Know your political bosses.** That is, find out everything you can about your board members, including what their political affiliation is, what their political aspirations are, who their friends are, and most importantly, who their relatives are. The more you know about them, the better able you will be to work with them.

**Keep a low profile.** There is no compelling reason for a county engineer to maintain a high profile at the local level. High visibility just makes you a better target. Save your visibility for work within professional organizations, such as NACE.

**Procrastination is your friend.** Most politically sensitive issues come to you as a crisis, but they seldom are, Klosser says. You are always given only one side of a politically sensitive issue. Time is the best ally you have. If you can procrastinate until both sides of the issue have been investigated, it can usually be solved. A straightforward, honest appraisal of the issue, with several alternative actions you can live with, will be appreciated by nearly any politician.

Generally, county engineers involved in this research agree with the above advice, except perhaps for the comment about espousing a low profile. Increasing visibility

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may well be critical to a profession so poorly understood and under-recognized. A majority of those responding agreed that absence of visibility is a problem integrally related to salary, recognition, and respect. Box 12 presents recommendations intended to increase the "visibility" of the profession.

We need more visibility in the local media.

We need press releases and publicity and more public contact.

Visibility is important. It would help if the Board understood our responsibilities and not think of our position as just another employee. If the commissioners understood our job, then the public would as well.

We need to lobby the legislature to make the County Engineer's wages at least as much as a school district superintendent's.

We need to get more positive publicity. Most of the time only negative things appear in the press.

We need a public relations effort to market our profession.

We need to get motivated to work together and conduct some marketing, both to target students and the general public.

We must become more visible through the media by bragging about our accomplishments.

The County Engineer may be one of only 2 or 3 professional people in most rural counties. This person is expected to be an expert on many problems. We need to provide this information to the public.

Box 12. Why should county engineering become more visible?

One county engineer from Washington State argued that keeping a low profile is prudent. Perhaps the issue has become a trade-off. That is, the choices become whether county engineers should increase their visibility—also increasing their risk of increased requests from the public for county responses to problems—or, conversely, whether they should maintain a low profile and face continued problems with recognition from their boards and the public they serve.

In addition to recommendations for increasing the visibility of the profession offered in Box 12, it might be in county engineers' best interests to follow the lead of the county engineer from Minnesota who holds public information meetings at least once a year to inform the public about what is going on in his county. He says this way residents of the county feel they have input into county road and bridge policies and the county engineer has an opportunity to explain the way he ranks county road and bridge projects.
Tort Liability

County engineers are concerned that projected increases in liability risks for counties will make it difficult to sell the profession. Most county engineers report that liability is currently a problem for them. It is also a problem that is projected to increase over the coming decade. Fear of county tort liability is a factor that would discourage many county engineers in the current generation from considering the same career choice again. Some say it is also an issue that could be a discouraging factor for those considering public sector service. One person commented that county engineers perhaps lean on the negatives of the liability issue to an extreme. He noted that with firmer design standards, tort liability should not be a key frustration for county engineers.

The fact remains, however, that county engineers say liability issues are persistent and will increase over time. They point out that liability is not limited to design standards. Liability risks include the effects of

- traffic sign theft and vandalism,
- roads that have been “posted” because of budget constraints,
- environmental regulations that have grown more complex, and
- management and labor relations that are becoming more difficult to coordinate as county engineers organize their work forces with a sensitivity to disadvantaged classes, gender relations, and alcohol and drug use in the work place.

Selling a new generation on the challenges of these aspects of the job will require close relationships with the technical schools, colleges, and universities which prepare students for county engineering (and which offer continuing education seminars and workshops).

Both state and national conferences sponsored for county engineers serve as clearinghouses of information on state and federal regulations. Still, many respondents report it is difficult to remain current. They say it seems the rules change almost weekly and they feel they sometimes suffer from information overload. At the same time, however, active state/national associations that offer information on liability and safety issues make the job of the county engineer more manageable.

The Strength of State Associations

State organizations present invaluable opportunities for professional development for county engineers. Such opportunities should be well publicized and strengthened as selling points for the profession. Researchers involved in this study have attended conferences in each of the eight participating states. In each state, sessions are held that are specifically designed for professional development (e.g., Washington State's WSACE/PWD meeting/retreat held in May of each year). As long as these
opportunities are offered, prospective county engineers can be informed they will not be entering a profession that has a proverbial “glass ceiling” regarding professional development opportunities.

What Can be Done to Attract People to County Engineering?

County engineers may not be earning six-figure salaries, but they say there are more important factors determining job satisfaction than salary alone (see Box 2 in Chapter 3: Why be a county engineer? and Box 5 in Chapter 7: Significant contributions to the county). These positive aspects of the job must be relayed to students learning about the profession and to applicants applying for positions. In some areas of the nation, particularly small rural counties, there will always be problems surrounding levels of compensation and opportunities for spouses. At the same time, the target population for county engineer positions should not necessarily be aimed exclusively at young graduate engineers. Persons who have already amassed 15–20 years of experience in other positions, including managerial jobs within the private sector or with a state department of transportation should be included.

Boards need to become more sensitive to the importance of county engineers' attendance at professional meetings. County engineers themselves must assume responsibility for pointing out to their boards the savings counties can realize when the former attend state and national conferences (see Figures 9–16 in chapter 7 for savings by state). County engineers can enhance their boards' awareness of the investment that flows from professional activities (e.g., remaining current on safety issues, state and federal regulations, and sharing ideas with county engineers from other counties and other states).

The profession is expected to change dramatically over the next few years. Even so, county engineers say not all of their departments will have the staff or the money to establish and conduct training programs. Such programs are needed to upgrade skills and provide other information relevant to the position. When opportunities arise where they and their staff can attend association-sponsored conferences, boards must be made to realize the benefits of such activities.

County Budget Constraints

Some county engineers say budget constraints are so restrictive it is difficult to meet the demands of county roads and bridges in need of repair. Others say meeting a budget is the most challenging aspect of the job. It is frustrating to realize that many county engineers are forced to work using short-range planning strategies because of a patch-and-go philosophy held by their boards. Yet, many view this as just a part of the job.
More important than budget constraints, county engineers say boards must be informed on what the county engineer does. This is the only way salary levels will be addressed. The issue then becomes “Who should educate the boards?” County engineers say they engage in this process at each meeting held with their boards. Another way to educate the boards is to involve both groups in single sessions at professional conferences. In addition to sessions held separately for the two groups, coordinated sessions could examine strategies to improve services to the counties so each group is likely to perceive this positively.

Job Security

A majority of county engineers do not have long-term written contracts. Therefore, they have little job security and serve at the pleasure of the board. Most county engineers have been on the job between one and ten years. Yet, they report they are somewhat secure to very secure in their perceptions of job security. A small number said they had little job security. Nonetheless, this would not have discouraged them from seeking the same career choice again. Perhaps job security in part stems from the level of effort they devote to the job. Many average 49 hours to a maximum of 60 hours per week on the job. Reasons given are varied and include

- early morning and evening meetings,
- quiet time to get caught up on quality work,
- administrative tasks,
- general county obligations, and
- the realization that the profession demands more than a 40-hour a week job.

Though many county engineers serve at the pleasure of their boards and can be released with no more than 30–60 days notice, perceptions of job security were not significantly affected. For others, a yearly contract placed them in a somewhat tenuous position, particularly when they made recommendations to their board to which the board was, for some reason, resistant. In a small number of instances, county engineers reported they had lost their jobs because they had fallen out of favor with their boards. Yet a majority said they shared a good to excellent relationship with their boards and that the boards recognize their contributions to the county.

Again, however, the new generation entering the profession may demand a more secure offer of job security than its predecessors. One Michigan county engineer said it would be prudent for his commissioners to offer at least a four- to five-year contract for new people coming in, as evidence of greater job security.

Requirements for the Job Are Too Rigid

Many county engineers in states where the P.E. license is required are concerned that if shortages become the norm, boards will move toward redefining state statutes.
specifying job requirements (see chapter 1 for a discussion of Minnesota's code relating to job requirements). As reported earlier in this analysis, a majority of county engineers argue the P.E., or at the very least, certification criteria, must be required to attract qualified persons. (This is the argument whether the state requires the registered P.E. license or not.)

In conclusion, factors likely to keep the current generation in this career path and those likely to draw in a new generation remain as follows:

- the diversity of the position,
- being your own boss,
- county engineers can hold to high ethical standards,
- great personal rewards and even greater professional rewards,
- working on a project from inception, through design, to construction, and maintenance,
- the public-service aspect of the position,
- the opportunity to apply investment in training and or education to the job, and
- providing a safe road network. (One Minnesota county engineer pointed out that the concept “safe road” is oxymoronic. Nonetheless, it is an issue many county engineers have raised.)

If county engineering is to avert serious shortages of qualified persons, both the state associations and NACE must become more involved in increasing the visibility of the profession (see Box 12 earlier in this chapter for some suggestions on increasing the visibility of the profession). Those who know the profession best are the most well situated to relate its advantages, benefits, and challenges to the coming generation. Each state’s involvement in the perpetuation and integrity of the profession is an investment in the future of the profession.

A majority of county engineers say scholarships do not encourage students to consider becoming E.I.T.s in a county engineer's office (see Boxes 8 and 9 in Chapter 8 for a review of the costs and benefits of scholarships). Nor are scholarships necessarily reserved for students who express an interest in county engineering. County engineers say

Scholarships to four-year universities have only been “earmarked” for Civil Engineering. No interest in county engineering is required for applicants.

An Iowa county engineer reported, “To date, our work with universities both through the grant fund and lecture groups like the ASCE Student Chapter has yielded no candidates for county engineering position.”

Rather than offering scholarships, state associations could offer research paper competitions for engineering and technical school students to examine issues of concern to the county engineering community. This would challenge students to
participate in a competition on topics reflecting real-world issues relevant to particular states. Students from each region within a state could engage in competition. One student from each region could be selected to attend the association's annual regional or state conference to present the results of research conducted. A committee of county engineers could review papers to determine regional winners. Five regional winners (one each from the Southwest, Southeast, Northwest, Northeast, and the Midwest) could be chosen to present their papers at a special session at the NACE conference.

At each level, the award should include travel and expenses to attend the conference and an honorarium paid by the state association. NACE could assume responsibility for bringing students to its conference, including money for travel and expenses. This would (1) provide an opportunity for young people to interact with professional county engineers from across the nation, giving exposure to the profession, and (2) expose students at both technical schools and universities to the issues confronting county engineers.

This type of hands-on contact with county engineers would inform students about the profession of county engineering. It would serve a much more positive function than a lecture from the county engineer who comes into the classroom to talk about the merits of the profession during the student's sophomore year in college. It should be viewed as a long-term investment in the counties' infrastructure, not a cost. While the benefits of conference papers might not be immediately realized, in the long term, the visibility of the profession would increase.

Paper competitions, coupled with the profession's involvement in job fairs, career days, and continued efforts to hire E.I.T.'s and assistants would be a positive proactive remedy to avert projected shortages of county engineers.

Conclusion

This research has served to clarify the role and value of the contributions made by the county engineering community. Understanding the responsibilities of county engineers and the challenges inherent in the profession will be important factors in drawing new people into the profession. It will be incumbent upon county engineers themselves to document and publicize the value of their contributions to the counties' infrastructure.
APPENDIX A
PHASE ONE QUESTIONNAIRE

The Value of County Engineers and Their Counterparts
Strategies to Expand the Shrinking Employment Pool

THIS RESEARCH HAS BEEN ENDORSED BY
NACE
[NATIONAL ASSOCIATION OF COUNTY ENGINEERS]

Please respond to the following questions as accurately as you can. Circle the letter of each response where requested. Where comments are requested, you may use as much room as you need. Feel free to add typed or handwritten additions if you need more space. Each of the questions was designed from comments provided by your colleagues. If you feel additional comments are necessary, please feel free to use the blank sheet at the end of the questionnaire.

GENERAL

1. What is your state?
   a. Iowa
   b. Minnesota
   c. Nebraska
   d. Missouri
   e. Washington
   f. Ohio
   g. Michigan
   h. Kansas

2. What is your job title?
   a. Road Superintendent
   b. Highway Superintendent
   c. County Engineer
   d. County Engineer, P.E.
   e. Public Works Director
   f. Engineering Manager
   g. Other [Please Specify] ____________________________

3. What are the statutory requirements/qualifications needed for the job you do?
   a. Sit for written examination [e.g., Highway Superintendent License].
   b. B.S. degree in Civil Engineering/Engineering Science and registered professional engineer's license [e.g., P.E.]
   c. There are no statutory requirements
   d. Other [Please specify] ____________________________

4. What are the educational requirements/qualifications that would be needed by someone assuming responsibility for the job you do?
   a. high school degree
   b. 2 year technical school or junior college degree
   c. 4 year college/university B.S. degree in Civil Engineering/Engineering Science
   d. Other [Please specify]
5. How long have you been in charge of the secondary road system for your county? 

6. What is your age range?
   a. 25-35 years
   b. 36-45 years
   c. 46-55 years
   d. 56-60 years
   e. reaching retirement quickly

ABOUT YOUR COUNTY

7. What is the population of your county? __________________________

8. Do you have intergovernmental agreements to help maintain roads for the special districts or townships [e.g. special districts, townships, small cities]? Circle all that apply.
   a. townships
   b. small cities
   c. special districts

ABOUT YOUR RESPONSIBILITIES - CURRENT AND PROJECTED

9. Break down by percentages the amount of time spent on each of the following responsibilities.
   a. Engineering Administrative tasks __________
   b. Other Administrative tasks ______________
   c. Personnel matters ______________________
   d. Legal/statutory updates to control tort liability in the county.
   e. Salesman/Educator for the Board and the public __________
   f. Public works including sanitary landfill, wetlands issues, natural preservation. __________
   g. Financial/Budget issues/Planning __________
   h. Working with local units of government __________
   i. Other [Please specify] ______________________

10. What positions did you hold prior to assuming responsibilities as the person in charge of county roads? Please circle all that apply.
    a. assistant county engineer/county engineer in another county
    b. public works position/worked for state Department of Transportation
    c. private sector [Please specify] ______________________
    d. Other [Please specify] ______________________

11. What is the highest level of education you have attained?
    a. High school
    b. 2 year technical school
    c. 4 year degree in civil engineering
    d. 4 year degree in engineering science
    e. Other [Please Specify] ______________________

12. Do you have a written contract with the county?
    a. yes
    b. no
13. If your contract with the county is written, how would you classify it? If your response is some combination of the following, please circle all that apply.
   a. I serve at the pleasure of the Board/Commission
   b. The Board/Commission can terminate me with 30/60 days notice.
   c. I have a yearly contract
   d. I have a 3/4 year contract
   e. I am elected for a 2/3/4 year term.
   f. Other [Please specify] ____________________________________________

14. If you do not have a written contract with the county, how would you classify your contract? If your response is some combination of the following, please circle all that apply.
   a. My agreement with the Board/Commission is oral.
   b. My agreement with the Board/Commission is written into the minutes of the meeting once a year.
   c. The Board/Commission can terminate me with 30/60 days notice.
   d. I have an oral contract that runs 1/2/3/4 years.
   e. I am elected for a 2/3/4 year term. My contract/agreement is to serve the public, not the Board/Commission/Council.
   f. Other [Please Specify] ____________________________________________

15. On an average, how many hours per week do you work? ____________

16. If you work more than 40 hours per week, what drives the additional time spent on the job? If your response is some combination of the following, please circle all that apply.
   a. Meetings with the Board/Commission held in the evenings.
   b. Early morning meetings with my maintenance superintendent/road crew.
   c. Other county obligations, including development plans, meetings with advisory groups or community organizations such as Rotary Club, Lions, Jaycees, or other community based organizations.
   d. It is more than a 40 hour per week job.
   e. Quiet time I spend to get caught up.
   f. Keeping up with administrative tasks.
   g. Other [Please Specify] ____________________________________________

17. As the person in charge of county roads, do you have hiring/firing power?
   a. yes
   b. no

18. For how many counties are you responsible? ________________

YOUR ROAD SYSTEM, ITS CONDITION, AND THE BUDGET

19. What are the total dollar amounts annually allocated to each of the following?

<table>
<thead>
<tr>
<th>ROADS</th>
<th>MAINTENANCE</th>
<th>CONSTRUCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>BRIDGES</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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20. How many miles of each of the following types of roads do you maintain for your county? Please rank the average range of the quality of the roads in your county using the following scale:

Excellent = 11-9  Good = 8-6  Fair = 5-3  Poor = 2-1

<table>
<thead>
<tr>
<th>Type of Road</th>
<th>Number of Miles</th>
<th>Ranking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dirt [minimum maintenance]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gravel</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Treated [e.g., seal coat]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asphalt</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Concrete</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Please enter number of miles and ranking for each type of road in your county.

21. **Using the ranking scale in question 20**, overall, how would you rate the condition of the roads in your county? __________

22. How many bridges [legal structures] are there in your county? __________

23. **Using the ranking scale in question 20**, how would you rate the general condition of bridges [legal structures] in your county? __________

BOARD OF SUPERVISORS/COUNTY ROAD COMMISSION/EXECUTIVE COUNCIL/EQUIVALENT

24. How does your contract with your Board/Commission affect your perception of job security?
   a. I feel very secure
   b. I feel somewhat secure
   c. I feel somewhat insecure
   d. I feel very insecure

25. How many times per month do you meet with your Board/Commission/Council? ______________

26. How many people serve on your Board/Commission? __________

27. Are your Board/Commission/Council members elected or appointed?
   a. elected
   b. appointed

28. If your Board/Commission Council members are elected, what is their term of office?
   a. 2 years
   b. 3 years
   c. 4 years
   d. more than 4 years

29. If your Board/Commission/Council members are elected, are they elected by district or at large?
   a. by district
   b. at large
30. If your Board/Commission/Council members are elected, is there a turnover in persons who sit on your Board/Commission?
   a. every election
   b. every other election
   c. there is a lot of stability in my Board/Commission/Council because elections are staggered.

31. Are there times when the Board/Commission/Council has not taken your recommendations in setting policy?
   a. The Board/Commission nearly always takes my recommendations
   b. The Board/Commission frequently takes my recommendations
   c. The Board/Commission sometimes takes my recommendations
   d. It seems as if the Board/Commission rarely takes my recommendations.

32. For which of the following reasons has the Board/Commission declined to take your recommendations?
   a. Political reasons
   b. My recommendation was inadequately supported with technical data
   c. To satisfy a friend's request.
   d. The Board/Commission did not understand the technical importance of the recommendation.

33. Using a scale of Excellent = 4, Good = 3, Fair = 2, and Poor = 1, how would you rate your relationship with your Board/Commission? _____________

PUBLIC RELATIONS

34. When members of the public want something done or want to provide information about the roads/bridges in the county, they are most likely to contact one of the following. Rank order those to whom the public will most likely contact first. Use the scale: 1 = most likely to 8 = least likely
   ______ a. Come directly to me because I am the one who is responsible to get the job done.
   ______ b. Go directly to the Board/Commission and bypass me.
   ______ c. Talk to one of my employees
   ______ d. Talk to the County Attorney
   ______ e. Leave a message with my secretary
   ______ g. Talk to one of my technicians
   ______ h. Talk to my foreman
   ______ i. Other [Please Specify] _____________________________

35. What types of calls are most commonly received from the public? Rank order the following in terms of which is the most common type of call received from the public. 1 = most common to 7 = least common
   ______ a. pot holes
   ______ b. road needs paving, resurfacing
   ______ c. haven't plowed snow fast enough to suit them
   ______ d. ditch cleaning [summer]
   ______ e. gravel road problems, e.g., roughness and dust
   ______ f. culvert repair
   ______ e. Other [Please Specify] _____________________________
36. How much of your time is spent in public relations?
   a. less than 5%
   b. 5-10%
   c. 15-25%
   d. 25-50%
   e. A majority of my time is spent in public relations. My job is one of selling.

OFFICE-STAFF NEEDS

37. What are the size and composition of your staff? Feel free to alter category names to fit the titles given to your staff members. These differ by state.

<table>
<thead>
<tr>
<th>Office Staff</th>
<th>Normal Size Staff</th>
<th>Additional Summer Staff</th>
</tr>
</thead>
<tbody>
<tr>
<td>Secretarial</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clerc</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Technician</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Co-op/Intern Student</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engineer in Training</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Professional Engineer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Professional Land Surveyor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Department Head</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shop/Field Staff</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mechanics</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maintenance Superintendent</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Foreman</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operators</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Labor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Please enter the number of staff persons for each category listed above.

38. Do you have an assistant?
   a. yes
   b. no

39. Answer this question only if you have an assistant. Is this person
   a. An Engineer in Training
   b. a technician
   c. a student intern
   d. a co-op student
   e. Other [Please Specify] ________________

40. Answer this question only if you do not have an assistant. Why do you not have an assistant?
   a. My budget does not allow for an assistant.
   b. I don't need an assistant
   c. There are no people in the area whom I could hire.
   d. Other [Please Specify]

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41. Whether you do or do not have an assistant, if you had your choice, what type of assistant would you want/require? Rank order your preferences using the following scale: 1 = highest preference, 10 = lowest preference
   ______ a. An Engineer in Training with a B.S. in Civil Engineering
   ______ b. An Assistant County Engineer with a P.E.
   ______ c. A technician with a 2 year degree in Engineering Science
   ______ d. An Engineering Manager
   ______ e. A student intern from the university
   ______ f. A student intern from a junior college
   ______ g. A student intern from the local high school
   ______ h. A co-op student from the university
   ______ i. A co-op student from the junior college
   ______ j. I neither want nor need an assistant

Describe your reason[s] for wanting/needing the type of assistance you have described above.

STATUS RECOGNITION - EDUCATION - PROBLEM SOLVING

42. In your opinion, do you receive the status recognition you deserve for someone with so many diverse and critical responsibilities? Please circle all those that apply.
   a. The Board/Commission recognizes the contributions I make.
   b. My employees recognize the contributions I make.
   c. The public recognizes the contributions I make.
   d. It seems to be a rare occasion that someone recognizes the contributions I make.
   e. Please make any additional comments needed


43. What kind of educational experiences will successors to retiring persons in your position need to successfully take care of the secondary road system in your county? Please circle all that apply.
   a. A high school education is sufficient so long as these persons rise through the ranks. That is the only way they can get the experience needed to do this job.
   b. Sit for the written examination the state requires for the job.
   c. An engineering science degree from a technical school or junior college.
   d. B.S. degree in Civil Engineering
   e. B.S. degree in Civil Engineering and a registered professional engineer's license.
   f. Other [Please Specify]
44. What kinds of work experiences will someone need in order to consider doing the type of job you currently have? **Please circle all that apply.**
   a. assistant to the public works director/county engineer/road/highway superintendent.
   b. private sector work in engineering
   c. private sector work in management
   d. private sector work in engineering management
   e. work in the public sector such as State Department of Transportation
   f. a position as an Engineer in Training
   g. a person must rise through the ranks in order to one day assume the responsibilities I currently have.
   h. internship/co-op experiences
   i. Other [Please Specify] ____________________________

45. What can you do to encourage young people to consider jobs similar to yours? **Please circle all that apply.**
   a. Offer summer job experience
   b. Offer internship experience
   c. Offer co-op experience
   d. Demonstrate the county is going to grow in the future.
   e. Encourage students to complete college to prepare for this type of position.
   f. There is nothing I can do. It is out of my hands.
   g. Participate in job fairs/career days in high schools/colleges/universities.

**CONSULTANTS**

46. Does your office use the services of consultants?
   a. yes
   b. no

47. Answer this question **only if you hire consultants**. When do you hire the services of consultants?
   a. when there is no time to complete the work in-house
   b. when needed expertise is unavailable in-house.
   c. Other [Please Specify] ____________________________

48. Answer this question **only if you hire consultants**. For which of the following reasons are consultants used? **Please circle as many answers as apply.**
   a. Bridge design
   b. Bridge inspection
   c. Road design
   d. Road construction
   e. Environmental assessments
   f. Surveying
   g. Public works related projects such as sanitary landfills
   h. For professional development seminars
   i. Other [Please Specify] ____________________________
49. **Answer this question only if you hire consultants.** When you use consulting services, do you
   a. use competitive bidding where the lowest bidder is awarded the contract.
   b. use requests for proposals and negotiate the final price on the contract.
   c. call those with whom you are already familiar.

50. **Answer this question only if you do not use consultants.** If you do not hire consultants, is it because
   a. my office has all the engineering design staff needed to complete work in-house.
   b. my budget will not allow for hiring consultants.
   c. Other [Please Specify] ____________________________

---

**DECISION MAKING**

51. Which of the following do you consider in carrying out your responsibilities? **Please circle as many as apply.**
   a. Look for additional funds to improve the economic situation in the county.
   b. Patch and go [short term damage control; little if any room for creativity because of budget constraints].
   c. Patch and go because the Board/Commission is so political.
   d. Patch and go because I am resigned to dealing with a Board/Commission that is not progressive.
   e. Use public opinion and advisory groups because of need to stay in touch with the public.
   f. Explain and present projects to the public.
   g. Encourage county growth by promoting new road construction to Board/Commission.
   h. Present long range plans [10-20 year plan] looking at future change and growth of the county.
   i. Collaboration with other agencies and intergovernmental units such as small cities, townships, and special districts.
   j. Educating/updating the Board/Commission is a continuing process.
   k. A lot of my job involves dealing with the political nature of my Board/Commission.
   l. The Board/Commission and I negotiate prior to making decisions so that each of us clearly understands the reasons for projects and the way in which they are ranked.
   m. Other [Please Specify]

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52. What types of analytical tools do you use in managing your road network?  
   **Please circle all that apply.**  
   a. pavement management system  
   b. bridge prioritization program  
   c. sign management system  
   d. equipment management program  
   e. electronic bulletin board  
   f. computer aids including  
      i. AUTOCAD/ROADCALC/CAD  
      ii. spreadsheets  
      iii. word processors  
      iv. data bases  
   v. Other [Please Specify] ________________________________

TORT LIABILITY

53. Is tort liability currently a problem in your county?  
   a. yes  
   b. no  

54. Do you project that tort liability issues will become a problem in your county in the future?  
   a. yes  
   b. no  

55. What are some of the causes and concerns you have regarding current and projected tort liability issues in your county? **Circle all that apply.**  
   a. vegetation that reduces sight distance  
   b. shoulder drops  
   c. narrow shoulders  
   d. roadside obstacles  
   e. signs and markings [sign vandalism is a problem in my county]  
   f. signs and markings [the cost of replacing aging and damaged signs makes it difficult to maintain them in the safest way possible]  
   g. low road friction [skid problems in wet and icy weather]  
   h. low maintenance on pot holes  
   i. alcohol related accidents  
   j. Other [Please Specify] ________________________________

56. How many times during an average year do you act as a witness for your county in court in tort liability lawsuits? ____________

57. How many times during an average year do you act as an expert witness or another county in tort liability lawsuits? ____________

YOUR RELATIONSHIP WITH YOUR STATE DEPARTMENT OF TRANSPORTATION

58. How would you **rate your relationship** with your state Department of Transportation?  
   a. Excellent  
   b. Good  
   c. Fair  
   d. Poor
59. How would you rate your relationship with your state-aid-engineers or their equivalents?
   a. Excellent
   b. Good
   c. Fair
   d. Poor

60. How would you define your relationship with your state DOT?
   a. The DOT is a partner providing engineering/technical consulting and assistance
   b. The DOT is a partner providing legal consulting and assistance
   c. Other [Please Specify] ________________________________

__________________________
DUAL COUNTY RESPONSIBILITIES

61. What is your opinion on one person being in charge of two or more counties?
   a. I am indifferent
   b. I don't like the idea
   c. I like the idea
   d. Other [Please specify] ________________________________

62. Answer this question only if you like the idea of one person in charge of two or more counties. Which of the following expresses your reasons? Circle all that apply.
   a. It would increase the salary of the position
   b. It would increase the status of the position
   c. It would be similar to a promotion
   d. Counties that cannot pay competitive salaries would benefit because they share the expenses.
   e. It would help to coordinate resources between counties.
   f. Other [Please Specify] ________________________________

63. Answer this question only if you do not like the idea of one person in charge of two or more counties. Which of the following expresses your reasons?
   Circle all that apply:
   a. It would double the number of problems [e.g., two offices, two motor graders, two staffs, two Boards/Commissions]
   b. It would increase responsibilities too much for one person.
   c. It would reduce the effectiveness of operation in each county because the person's time would be split between two or more counties.
   d. It would increase competition for the services of the person.
   e. If the Boards/Commissions are political, the problems would be compounded.

__________________________
ON ELECTED COUNTY ENGINEERS

64. What is your opinion on the elected county engineer?
   a. I like the idea
   b. I don't like the idea
   c. I am indifferent
   d. Other [Please specify] ________________________________
Regardless of your opinion on elections of county engineers, please comment on your response.

MAINTAINING AN ADEQUATE SUPPLY OF QUALIFIED PERSONNEL

65. Are there currently shortages in your state of qualified persons to fill spots left by those retiring from positions such as the one you hold in your county?
   a. yes
   b. no

66. Are there projected shortages in your state of qualified persons to fill spots left by those retiring from positions such as the one you hold in your county?
   a. yes
   b. no

67. If there are current or projected shortages, how do you anticipate they will be addressed?

68. If there are no current shortages of people to fill positions left open by retirees in your state, to what do you attribute your success?
   a. Salaries are competitive
   b. Job offers challenges
   c. Other [Please Specify]

69. How would you describe your most significant contributions to the county? These may be described in terms of dollars saved or public relations, or any other contributions you feel have made the job challenging, exciting, and satisfying.

70. How important is salary as a factor drawing new people into positions like the one you now hold?
   a. Very important
   b. Somewhat important
   c. Somewhat unimportant
   d. Very unimportant
71. What are some of the factors other than salary that drew you to the position you hold? Please be specific. Our analysis of your responses to this question would be incomplete without your input on this issue.

72. If you had your career choice to make all over again, what are some of the factors that would discourage you from doing the job you are currently doing?
   a. Salary
   b. Public complaints
   c. The political hassles
   d. Environmental regulations
   e. Tort liability issues
   f. I would make the same choice.
   g. Other [Please specify] ____________________________

THANK YOU FOR YOUR PARTICIPATION IN THIS RESEARCH. The time you have taken to respond to these many and varied questions is much appreciated. IF YOU WOULD BE INTERESTED IN RECEIVING A SUMMARY ANALYSIS OF THIS RESEARCH, PLEASE INCLUDE YOUR NAME AND ADDRESS. If you will be attending the NACE meeting in 1993, I will be presenting the results of the research there. Again, if you have additional comments you wish to make, please use the blank sheet of paper attached.
APPENDIX B
PHASE TWO QUESTIONNAIRE

The Value of County Engineers and Their Counterparts
Strategies to Expand the Shrinking Employment Pool

THIS RESEARCH HAS BEEN ENDORSED BY
NACE
[NATIONAL ASSOCIATION OF COUNTY ENGINEERS]

Please respond to the following questions as honestly and candidly as you can. In
order to save space and reading time for you, whenever the term county engineer is
used it should be interpreted as county engineer/road, highway superintendent/director
of public works/other job title counterpart to the county engineer.

1. What is your state?
   a. Iowa
   b. Kansas
   c. Michigan
   d. Minnesota
   e. Missouri
   f. Nebraska
   g. Ohio
   h. South Dakota
   i. Washington

In the following areas, from your perspective, do county engineers have more, the
same, or fewer opportunities than those with similar skills in the private sector. Use
the following ranking scale --

Fewer opportunities [0-2]
About the same level of opportunities [3-5]
More opportunities [6-7]

2. Leadership development
   0 -- 1 -- 2 -- 3 -- 4 -- 5 -- 6 -- 7
   Fewer Opportunities  The Same  More Opportunities

3. Professional development
   0 -- 1 -- 2 -- 3 -- 4 -- 5 -- 6 -- 7
   Fewer Opportunities  The Same  More Opportunities

4. Diversity of work/projects
   0 -- 1 -- 2 -- 3 -- 4 -- 5 -- 6 -- 7
   Fewer Opportunities  The Same  More Opportunities

5. Salary increases
   0 -- 1 -- 2 -- 3 -- 4 -- 5 -- 6 -- 7
   Fewer Opportunities  The Same  More Opportunities

6. Professional contacts
   0 -- 1 -- 2 -- 3 -- 4 -- 5 -- 6 -- 7
   Fewer Opportunities  The Same  More Opportunities

7. Sense of contribution to the
   profession
   0 -- 1 -- 2 -- 3 -- 4 -- 5 -- 6 -- 7
   Fewer Opportunities  The Same  More Opportunities

8. Recognition of accomplishments
   0 -- 1 -- 2 -- 3 -- 4 -- 5 -- 6 -- 7

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9. Problem solving skills relating to technical issues
   Fewer Opportunities  The Same  More Opportunities
   0 -- 1 -- 2 -- 3 -- 4 -- 5 -- 6 -- 7

10. Problem solving skills relating to personnel issues
    Fewer Opportunities  The Same  More Opportunities
    0 -- 1 -- 2 -- 3 -- 4 -- 5 -- 6 -- 7

11. Problem solving skills relating to management issues
    Fewer Opportunities  The Same  More Opportunities
    0 -- 1 -- 2 -- 3 -- 4 -- 5 -- 6 -- 7

In the following areas, from your perspective, do county engineers gain more or less than engineers in the private sector?

12. On the job Benefits
    0 -- 1 -- 2 -- 3 -- 4 -- 5 -- 6 -- 7
    More  Less

13. Salary Increases
    0 -- 1 -- 2 -- 3 -- 4 -- 5 -- 6 -- 7
    More  Less

14. From your perspective, please list any other advantages that county engineering provides that the private sector might not.

Please indicate to what degree you have had opportunities to broaden your knowledge or skills in the following areas. Use the ranking scale provided --

Fewer opportunities [0-1]
About the same level of opportunities [3-5]
More opportunities [6-7]

15. Personnel management
    0 -- 1 -- 2 -- 3 -- 4 -- 5 -- 6 -- 7
    Fewer Opportunities  The Same  More Opportunities

16. Technical/Engineering skills
    0 -- 1 -- 2 -- 3 -- 4 -- 5 -- 6 -- 7
    Fewer Opportunities  The Same  More Opportunities

17. Financial management skills
    0 -- 1 -- 2 -- 3 -- 4 -- 5 -- 6 -- 7
    Fewer Opportunities  The Same  More Opportunities

18. Public relations skills
    0 -- 1 -- 2 -- 3 -- 4 -- 5 -- 6 -- 7
    Fewer Opportunities  The Same  More Opportunities

19. Does your state have an active association for its county engineers?
   a. Yes
   b. No

20. If you answered yes to question 18, do you belong to your state
association of county engineers?

a. Yes
b. No

21. Is there a regional association for county engineers in your state?

a. Yes
b. No

22. If you answered yes to question 21, do you belong to the regional association in your state?

a. Yes
b. No

23. Do the state/regional associations of county engineers design conferences to include opportunities to share information with the Road Commissioners Boards of Supervisors/Executive Councils/Other across the state/region?

a. Yes
b. No

24. How active are you in your state association of county road superintendents/highway superintendents/county engineers/Other?

a. Extremely active. I participate in a majority of the activities sponsored by the state association.
b. Somewhat active. I participate at a minimum in the annual meetings.
c. Somewhat inactive. I rarely attend meetings/conferences.
d. No active at all. I do not belong to any state associations for people in my profession.

25. Does your state/regional association offer scholarships to technical school/college/university students to interest them in county engineering?

a. Yes
b. No

26. If your response to question 25 was yes, how many scholarships does your state association offer each year? 

27. If your response to question 25 was yes, have you found this type of involvement with technical schools, colleges, and universities to be a benefit as a recruitment strategy?

a. Yes
b. No

Please comment on your response to question 27.

28. Which of the following is your state association doing to recruit a new generation of county engineers? Please circle all that apply.

a. scholarships for college/university students
b. internships
c. participating in co-op programs with technical schools/colleges/universities
d. county engineers are speaking at high schools to make young people aware of the opportunities in county engineering.
e. county engineers are speaking at technical schools to make young people aware of the opportunities in county engineering.
f. county engineers are speaking at colleges/universities to make young people aware of the opportunities in county engineering.
g. Other [Please specify] ____________________________

29. What are some of the other types of activities that your state association could or should be considering to make county engineering an attractive career option to the new generation?

30. What other suggestions do you have for recruiting?

31. Is your Board of Supervisors supportive of your need to attend meetings and conferences?
   a. Very supportive. They provide funding each year so that I can attend the meetings because this is one way I can stay current on both technical issues and nontechnical issues.
   b. Somewhat supportive. They sometimes provide funding, but only for about one meeting per year.
   c. Somewhat unsupportive. The Board feels that the cost is too high because it is taxpayer money that would go to provide funding for such trips.
   d. Very unsupportive. The Board has rarely agreed to provide funding for attending conferences because budgets are such a problem in my county.
   e. Other [Please specify] ____________________________

32. Can you recall instances where attending professional conferences has led to a savings for your county?
   a. Yes
   b. No
33. What types of savings have you realized for your county as a result of your involvement in regional, state, and/or national conferences?
   a. equipment savings
   b. materials savings
   c. learned about liability issues that allowed preventive measures that save the county dollars.
   d. alerted to legislative changes that saved the county money
   e. gained understanding of personnel issues
   f. gained better understanding of working with restricted budgets [give county most for its dollar]
   g. made contacts with consultants that saved the county dollars
   h. made contacts that resulted in matching funds for projects for the county
   g. Other [Please specify]

34. How would you rank your state association of county engineers, in terms of the degree to which it provides you with opportunities for professional development?
   a. Outstanding
   b. Excellent
   c. Good
   d. Fair
   e. Poor

35. What are the advantages of belonging to your state association of county engineers?
   Please circle all that apply.
   a. Opportunities to stay current on state legislation affecting counties
   b. Opportunities to learn state of the art technology
   c. Opportunities to learn of new equipment
   d. Opportunities to meet with county engineers from other counties to share ideas.
   e. Opportunities to meet with county engineers from other counties to share problem areas.
   f. My state association acts as an information clearing house for county engineers
   g. My state association acts as an advocate for the county engineering community.
   h. Other [Please specify]

36. Do you belong to the National Association of County Engineers?
   a. Yes
   b. No
37. If your response to question 36 was no, what is your reason for not belonging to the national organization?
   a. cost is too high
   b. could not attend meetings anyway
   c. the state/regional association provides me with all the information I need
   d. Other [Please specify] ____________________________

38. If you do belong to NACE, what are the benefits of being a part of this organization?
   a. Opportunities to stay current on federal legislation affecting counties
   b. Opportunities to learn state of the art technology
   c. Opportunities to learn of new equipment
   d. Opportunities to meet with county engineers from other states to share ideas.
   e. Opportunities to meet with county engineers from other states to share problem areas.
   f. NACE acts as an information clearing house for county engineers
   g. NACE acts as an advocate for the county engineering community.
   h. Other [Please specify] ____________________________

Using the scale listed below, please rank your responses to the following questions.

0-2 No problems
3-5 Somewhat Difficult
6-7 Very Difficult

39. How difficult has it been to attract qualified people to county engineering in your state? 0 -- 1 -- 2 -- 3 -- 4 -- 5 -- 6 -- 7
   No problems Somewhat Difficult Very Difficult

   Please comment on your response to question 39.

40. Is your state projecting problems in attracting qualified county engineers? 0 -- 1 -- 2 -- 3 -- 4 -- 5 -- 6 -- 7
   No problems somewhat Difficult Very Difficult

41. How serious would you rank the problem of attracting qualified county engineers? 0 -- 1 -- 2 -- 3 -- 4 -- 5 -- 6 -- 7
   Not very serious at all Extremely serious

Answer the following question only if your state requires the P.E. license or certification for county engineers.
42. Does the certification/licensing requirement imposed by your state statute make it more or less difficult to attract qualified people to county engineering in your state?  

0 -- 1 -- 2 -- 3 -- 4 -- 5 -- 6 -- 7  

Less difficult  More difficult

If you answered question 42, please comment on your response.

43. If your state is experiencing current shortages in qualified county engineers or is anticipating shortages in qualified county engineers, for example, to what do you attribute these shortages? Please circle all that apply.

a. salaries are too low
b. political issues are becoming more problematic
c. liability issues are a problem
d. environmental issues are a problem
e. rural counties are not attractive to the new generation of professionals
f. budgets are so restrictive that it is difficult to meet the challenges of the job
g. the Board offers no contract, and thus, no job security. The county engineer serves at the pleasure of the Board.
h. fringe benefits are lacking, i.e., vacation, sick leave, insurance benefits
i. requirements are too strict [e.g., P.E. license/certification is required]
j. Other [Please specify]

44. If you were to list the most important factors in selling future generations on why they should consider county engineering as a profession, what would those factors include? Please circle all that apply.

a. diversity of the job
b. being my own boss
c. working on a project from start to finish
d. public service
e. public relations between the public and the county
f. providing a safe road network for the county
g. opportunity to apply investment in training and/or education to the job
h. Other [Please specify]  

45. Do you find that people just don't understand what a county engineer is?

a. Yes
b. No

46. If your response to question 45 was yes, how can you, your state association, and the schools work together to make the profession more visible?
Thank you very much for your participation in this research. If you would like to have a copy of the interim report or the final report, please check the selection of your choice and place your name and address on this page, or if you wish, send me a separate letter with your request.

___ Would like a copy of the interim report on this project.

___ Would like a copy of the final report on this project.

___ Would like copies of both the interim and the final report for this project.

Name

Address