

Continuing Quality Improvements in Pennsylvania Highway Maintenance

Gary L. Hoffman

The Pennsylvania Department of Transportation (PennDOT) continues to be on a quality improvement journey that began more than 20 years ago. PennDOT is responsible for maintaining and operating the fifth-largest state transportation system in the nation, with 64 000 centerline-km or 161 000 lane-km (40,000 centerline-mi or 100,000 lane-mi) of pavement and 25,000 bridges. This system carries about 16 percent commercial truck traffic, the highest of any state in the northeastern United States. PennDOT is using the seven Baldrige precepts to improve many of its operations: leadership, strategic planning, customer and market focus, information and analysis, human resource development and management, process management, and business results. In 1998 PennDOT entered the pilot phase of the Baldrige journey. The traditional process included the preparation of a 50-page organization review package (ORP) providing an examiner with a detailed description of the organization and its processes. Each PennDOT bureau and engineering district began preparing ORPs in the fall of 1998, and each was scored by about 15 of the 125 trained and certified internal Baldrige examiners. PennDOT's "Agility" Program follows a strategy designed to enable organizations to adapt and thrive in an era of continuous change, an immediate challenge for the department. The self-assessment gap analysis and Agility initiatives, along with the other Baldrige approaches, are driving positive change in the maintenance area. Internal indicators like lower system pavement roughness, better line striping, equipment fleet optimization, and dollars saved attest to the success of these changes.

Pennsylvania Department of Transportation, 7th Floor Forum Place, 555 Walnut Street, Harrisburg, PA 17101-1900.

The Pennsylvania Department of Transportation (PennDOT) continues on a quality improvement journey that began more than 20 years ago when, in 1978, Governor Dick Thornburgh named Thomas Larson State Secretary of Transportation and charged him with revitalizing the agency.

The PennDOT quality journey has included numerous initiatives, most of which have had significant impact in the maintenance community, which is the largest organization in the department (see Figure 1).

Starting with quality circles in the early 1980s, moving to quality teams in the mid-1980s, through maintenance benchmarking in the mid-1990s, to the Baldrige efforts of today, PennDOT has positively changed how maintenance and operations activities are accomplished—and PennDOT customers are noticing the improvements.

Today, under the leadership of Pennsylvania Secretary of Transportation Bradley L. Mallory and with the support of Governor Tom Ridge, PennDOT espouses the Baldrige criteria and is using them to change the corporate culture.

ORGANIZATION STATISTICS AND STRUCTURE

PennDOT is responsible for maintaining and operating the fifth-largest state transportation system in the nation. Overall, PennDOT is responsible for 64 000 centerline-km or 161 000 lane-km (40,000 centerline-mi or 100,000 lane-mi) of pavement and 25,000 bridges. This state system carries about 16 percent commercial truck traffic, the highest of any state in the northeastern United States.

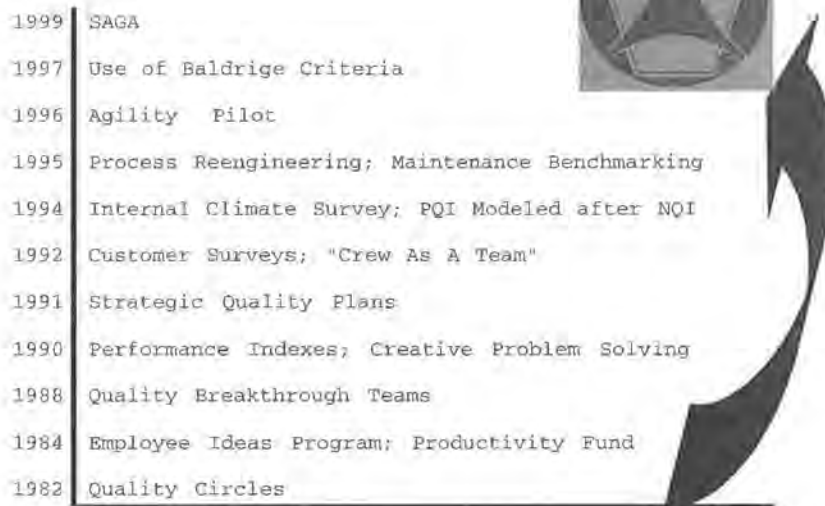


FIGURE 1 PennDOT quality journey.

Because of its age and diversity of design, the highway system in Pennsylvania is very fragile and requires constant managed care. The administration and the secretary of transportation recognize the importance of maintaining this infrastructure and have given maintenance ample support. PennDOT has invested about \$1 billion into maintenance in each of the last 3 years. In fact, a recent report (1) lists PennDOT as the highest-ranked state department of transportation when the percentage (37 percent) of the total budget that is spent on maintaining existing facilities is compared.

To meet the challenge of maintaining and preserving this large and diverse infrastructure, PennDOT is organized into a central office and 11 fairly autonomous engineering district offices. Each district office has an assistant district engineer for maintenance who is responsible for three to eight county maintenance organizations.

PennDOT's county maintenance forces vary from 20 to 220 employees. Statewide, 7,000 of PennDOT's 12,300 employees work in maintenance-related functions, and 6,500 of these are at the county level.

BALDRIGE INITIATIVE

PennDOT uses Baldrige criteria to improve many of its operations. The Baldrige initiative is a general set of principles that may be applied to improve any business or business group. The seven Baldrige precepts are leadership, strategic planning, customer and market focus, information and analysis, human resource development and management, process management, and business results. Each precept is important and necessary to the good management of any organization.

The Baldrige initiative takes these seven principles and puts them into a continuous or closed loop. Leadership sets direction based on customer input; processes are defined; and business result measures are established and monitored. Feedback mechanisms are established to tell leaders where and how to make changes for continuous improvement based on these defined processes and business results.

These concepts were used to establish eight strategic focus areas (SFAs) or business groups. These are

- Maintenance first,
- Quality of life,
- Mobility and access,
- Customer focus,
- Innovation (technology),
- Safety,
- Leadership, and
- Relationship building.

The SFAs were established through numerous focus groups that included partners, stakeholders, customers, and employees. Subsequently, 21 strategic objectives, each supporting one of the SFAs and each having specific appropriate metrics, were established. These strategic objectives and metrics were determined with much input from employees, who were champions and were responsible for implementing the objectives.

It is important to note the prominence of the "maintenance first" and "mobility and access" SFAs, both of which deal primarily with the preservation and operations of the existing infrastructure. The department uses a broad definition of maintenance to include structural improvements on existing alignment.

A number of the Baldrige initiatives are under way in the maintenance area. These maintenance initiatives include foreman training and certification, the maintenance management benchmarking system, the maintenance quality assurance-quality control process, the self-assessment gap analysis (SAGA), and the Agility (recasting) process.

SAGA

In 1998, PennDOT entered the pilot phase of the Baldrige journey. The traditional Baldrige process included the preparation of a 50-page organization review package (ORP), which provides an examiner with a detailed description of the organization and its processes.

Each PennDOT bureau and engineering district began preparing an ORP in the fall of 1998, and each was scored by about 15 of the 125 trained and certified internal Baldrige examiners. (PennDOT's entire executive staff and top managers are certified Baldrige examiners.)

At the same time the department was implementing this traditional ORP process, it learned of the SAGA process from AMP, Inc., an international electrical connector company based in Harrisburg, Pennsylvania. The SAGA process is an intense 3-day workshop in which an organization's employees, partners, suppliers, and customers take a close look at organization operations. They assess organizational strengths and opportunities relative to the Baldrige criteria. Essentially, the SAGA workshop provides the organization the means to verbally "write" a less formal ORP in 3 days, to determine three to seven gaps, and to form gap closure teams.

After several county maintenance organizations piloted the SAGA process, it was determined that the SAGA workshop was a more appropriate tool for the county organization than was the more traditional ORP process. The written ORP process is extremely labor intensive and time-consuming to prepare. Another disadvantage of the ORP preparation process is that it involves a relatively small percentage of the workforce in an organization. The ORP approach may also require more discipline and technical expertise than is generally found in the county maintenance organizations.

Conversely, the SAGA process can involve 50 to 75 percent of the personnel in an organization in a facilitated, structured, concise group-dynamics effort that is done verbally. Technographers are used to record strengths and opportunities, which are subsequently prioritized.

The Bureau of Maintenance and Operations dedicated two full-time employees to coordinate and implement the SAGA process in 58 county organizations in a 30-month period beginning in August 1998. About 55 employees are trained and certified SAGA examiners. A few exam-

iners and trained facilitators guide and standardize the process in each county workshop.

Before the 3-day workshop, all of the proposed participants complete a 1-day training session. These training sessions are designed to familiarize the attendees with the SAGA process, the Baldrige criteria, and the gap closure concepts. Additionally, training exercises are conducted to increase the participants' familiarity and comfort with the process.

PennDOT completed 20 county SAGA workshops in 1999, and at the time of this writing in 2000, 12 more workshops have been completed. By the end of 2000, 45 workshops will have been completed. Typically, about 180 opportunities and 120 strengths are identified in these workshops. The long list of opportunities is prioritized at the end of the workshop, and the top three to seven opportunities (the "vital few") are each slated for action by select teams.

This shortlisting process does not discard the rest of the 180 opportunities. "Quick kills" are identified and addressed so early accomplishments can energize the group toward success in some of the more difficult, longer-term actions. About 70 vital few opportunities or gaps have been identified so far. Some of these are as follows:

- Implement fleet management process with operator input.
- Improve work plan process with employee input.
- Formalize training and certification programs for trades employees.
- Streamline the purchasing process, particularly for materials.
- Implement aggressive communications efforts internally and externally on work zone locations.
- Develop a comprehensive electronic data processing and telecommunications plan at the county level.
- Segment internal and external customers and request their input.
- Communicate strategic plan and objectives to all department employees.
- Provide more flexibility in work schedule and hours.

The process does not stop once the workshop is over. Action plans with milestones are established by the gap closure teams addressing the vital few opportunities. The full-time central office coordinators then assess gap closure team progress at 6-month intervals. Resources are provided as necessary to ensure successful gap closures.

The overall assessment of the SAGAs conducted to date indicates that they are meeting the goals of improving organizational performance and capabilities and of delivering ever-improving value to customers. Another key benefit of the SAGA process is the open communica-

tion among the stakeholders, including management, employees, and external partners. The team spirit that evolves and the focus on improvement are remarkable.

AGILITY

PennDOT's "Agility" program began after Secretary Mallory visited the Iacocca Institute at Lehigh University in Bethlehem, Pennsylvania. Agility is a strategy designed to enable organizations to quickly adapt and thrive in an era of continuous change, and this became an immediate challenge for PennDOT.

The Iacocca Institute was contracted by PennDOT to help launch the Agility pilot by emphasizing the principles of Agility and their application to the department's maintenance organization.

The basic tenets of the Agility process are (a) to empower the employees at all levels to take advantage of opportunities to improve efficiency and effectiveness; (b) to provide the opportunity for customers to communicate, and then to react quickly to their needs; (c) to develop new partnerships with local governments and community groups; (d) to foster improved cooperation between management and the American Federation of State, County and Municipal Employees (AFSCME); and (e) to create an adaptive organization and culture.

One of the most important benefits of the Agility process is that it has allowed foremen to actually manage their crews. About 500 people make up PennDOT's team of foremen, who are all first-line maintenance supervisors and are members of AFSCME, the primary labor union representing the department.

Before Agility, assistant county managers had very tight control over the daily activities of the crews, so much so that many foremen were not expected or given the opportunity to supervise their crews. With the implementation of Agility, foremen were empowered to help plan their weekly activities, take personnel actions to ensure sufficient crew makeups, order materials, and coordinate with vendors and contractors on a day-to-day basis to accomplish the work plan.

The assistant county managers, who transferred these activities to the foremen, now are in a coaching, quality assurance, and training position for the foremen and crews. This delegation of authority also provided the assistant county managers with more time to spend developing partnerships with local governments and responding to customer needs.

Another important change that occurred through Agility was the ability to trade maintenance services with local governments and community groups to effect overall efficiency gains. PennDOT now can enter into very short and simple agreements to exchange services where the customer and PennDOT both benefit. By Pennsylva-

nia law, the department cannot divert dedicated motor license funds to the local governments in a way that will cause an inequality in their distribution, which is done according to statute.

Costs borne by the department for maintenance activities or services provided must be reciprocated with services or activities equal in value. Some examples of these agreements are as follows:

- The department paints traffic lines in exchange for roadside mowing.
- The department provides surplus snowplow equipment or winter materials to a local government in exchange for snowplowing services on state-maintained routes within the local government boundaries.
- The department provides parking lot sealing for a volunteer fire company in exchange for bridge washing services.

Some organizations with which agreements have already been executed are local governments, the federal government, other state departments, state universities, volunteer fire companies, municipal authorities, and school districts.

More than 1,080 agreements are in place in the state's 67 counties, and the savings are more than \$4.7 million from 289 work plans. The department now has agreements with about 30 percent of the local governments in the state. New or enriched partnerships are being developed every week.

A third benefit of the Agility initiative is the recognition of and reaching out to customers, ensuring that the department establishes objectives to meet their needs and expectations. Customers are involved through routine communication mechanisms in every county. Standing customer advisory boards have been established in many counties, allowing customers to become familiar with department businesses and to actively participate in decisions regarding projects and other parts of the operations.

Public surveys, media spots, presentations at public meetings and civic groups, and computerized complaint-tracking systems have become effective ways to communicate information in both directions. The sense and the reality at the local level is that PennDOT is accessible and that PennDOT is listening.

Still another outcome of the Agility changes is the improved cooperation and shared goals with AFSCME. The department has made substantial organizational changes and placed an emphasis on the efficient performance of employees by providing tools and training and by removing policies and procedures that inhibit flexibility and success. The union and management both recognize that the overarching goal is to meet customer needs as efficiently as possible. An example of a changed

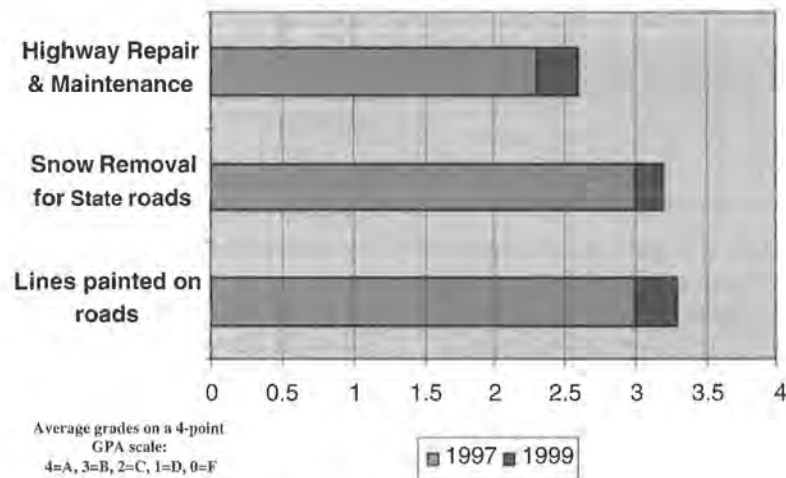


FIGURE 2 Quality grades for PennDOT services.

rule is the ability for work crews to cross county lines where it makes logistical sense to do so. Employees are compensated accordingly for travel time and expenses.

RESULTS

The SAGA and Agility initiatives, along with the other Baldrige approaches in maintenance, are driving positive change in the maintenance business. Internal indicators like significantly lower system pavement roughness, better line striping, equipment fleet optimization, and dollars saved attest to the success of these changes.

Also, customers are telling PennDOT that they see the improvements. The biannual QUIK surveys are telephone surveys to 1,300 randomly selected customers. A comparison of the results of the 1999 survey with those of the 1997 survey indicates that PennDOT has made improvement in 18 of 24 categories.

The most improved category was pavement maintenance (Figure 2). The most telling statistic (Figure 3) is that in 1997, 55 percent of the surveyed customers said they thought PennDOT was doing a significantly better job than it was 5 years earlier. In 1999, about 67 percent of the respondents to the same questions indicated that PennDOT was doing significantly better. This shift in the

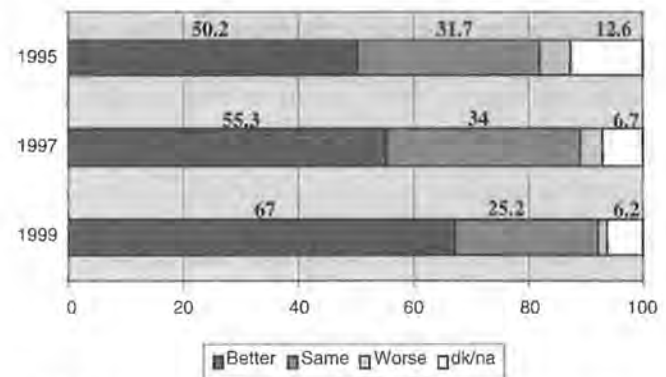


FIGURE 3 PennDOT quality compared with 5 years ago.

public's perception is significant by any statistical test and is due in large part to these quality initiatives.

REFERENCE

- Hartgen, D. T., and N. J. Lindeman. *TEA-21's Promise: Comparative Performance of State Highway Systems, 1984-1998*. Transportation Report 195. University of North Carolina, Charlotte, 2000.