Business Plan for Engineering Districts: The Pennsylvania Experience

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ABSTRACT

During 1984 the Pennsylvania Department of Transportation embarked on a key initiative designed to improve the overall planning process. To facilitate a businesslike approach to operating Pennsylvania's 11 engineering districts, individual 4-year business plans were developed. Although Pennsylvania's capital improvement projects are coordinated through a 12-year transportation improvement program that is reviewed, revised, and adjusted every 2 years and maintenance projects are developed for each county through an annual work plan, the 4-year business plans for the first time combine these two program elements into a multiyear strategic management document. The 4-year business plans are intended to assist the district engineers in working toward the common objectives of the department. Business plans encompass manpower needs, physical plant, equipment, and materials requirements associated with district and county activities. The business planning process also provides each county manager with the opportunity to examine the anticipated multiprogram effects on the transportation system.

The Pennsylvania Department of Transportation (PennDOT) is "big business." It is expected that the total revenues in 1984-1985 will be around $2.0 billion. This will include $1.4 billion from Pennsylvania's Motor License Fund and $550.5 million from federal sources; $870.7 million in Motor License Fund monies will support departmental highway and bridge programs; the balance, $534.1 million, will be used to fund local government transportation programs and debt services. This magnitude of revenue places PennDOT among the top 250 corporations in America.

The department's responsibilities are very diverse. It serves all motorists with a variety of driver and vehicle transactions, 25 million each year. The department spent $460 million underwriting local transportation systems in FY 1982-1983. This included over $180 million in municipal assistance and over $144 million for public transit operating assistance. PennDOT maintains almost 45,000 mi of roadways, more than the combined state highway mileage in the six New England states plus New York and New Jersey. Percentagewise, PennDOT controls 40 percent of all roadway miles in the commonwealth, compared with an average of 20 percent in other states.

The network of roads and bridges in Pennsylvania today is the fourth largest in the nation and represents an investment by taxpayers of more than $50 billion.

Not only is the department big business, but the environment in which the department operates is becoming more and more complex and demanding. The areas of uncertainty are increasing, and change is all around; it appears, in fact, that the rate of change is accelerating.

What does this mean for management? It means that
there must be better leadership, planning, direction, control, and response than ever before. It means that there must be effective organization and management concepts. There must be the ability to understand the environment and anticipate change. There must be flexibility; flexibility is needed toward missions and in functions and actions. Finally, objectives must be known in order to shape and redirect program-level activities. PennDOT utilizes a strategic management process to effectively provide products and services. The key to this strategic management process is the selection and achievement of departmental major objectives. These major objectives set the tone and guide the department's activities.

The department is organized with several departmentwide functions at the central office level and 11 engineering district offices delivering products and services to Pennsylvania’s citizens. A map of Pennsylvania’s counties and engineering districts is shown in Figure 1.

The 4-year business plans are an integrated part of PennDOT’s overall planning network. The planning network communicates the manner in which the department operates, from the broad organizational level of planning to the more specific project-level planning. The 4-year district plans provide an important communication link between the county and district offices and central office management.

PLAN DEVELOPMENT

Plan Guidelines

Guidelines were provided to the district engineers covering overall plan development, content, time frame, and necessary supportive detail. The guidelines focused on procedures, products, and budget.

A number of points or considerations are particularly noteworthy with respect to the Pennsylvania business planning initiative. The following are examples of how certain facets of operation were emphasized in the business planning guidelines:

- PennDOT will continue to be a maintenance-first organization.
- Multiyear surface improvement mileage targets are to be a principal output of this year’s efforts.
- Resources are limited. Districts will need to give appropriate attention to the commonwealth’s Interstate system, the priority commercial network, and selected roadway segments from the other state-owned system consistent with current program and budget guidance.
- Districts should identify criteria employed for making choices that meet district requirements. District requirements and environments differ; however, the need to identify selection criteria as the basis for decision making is a pervasive requirement.
- The $1.4 billion bridge program will be the major thrust of the department’s bridge efforts. All available federal critical bridge funds will be utilized during this period. Each district has an established responsibility for bridge projects, and this needs to be particularly addressed in the 4-year business plan effort.
- Two areas of construction are part of the department’s major objectives: Interstate completions (all remaining work needed to initiate construction of Pennsylvania’s Interstate system will have been completed by the end of 1986) and the completion of critical missing links in the state’s highway system.

District Variations

The 4-year district business plan guidelines provided the basis for general uniformity in plan de-
development. However, the commonwealth of Pennsylvania consists of 45,000 mi² of land area with a population of 11.8 million residents. With the reality of distinctions in Pennsylvania's physical features, socioeconomics, and climate, there are extreme differences among the priorities and operating requirements of the 11 engineering districts.

Sharp variations in topography create natural boundaries throughout the commonwealth. Pennsylvania is generally composed of mountain ranges and large plateaus with a coastal plain in the southeast corner of the commonwealth. Three major river systems and other waterways pose obstacles that must be traversed by the transportation system.

Pennsylvania has two large metropolitan areas—Philadelphia and Pittsburgh; they are leading centers of industrial production and advanced technology. These two areas account for approximately half of the commonwealth's population.

Despite the numerous cities and towns, large sections of the commonwealth are still rural. In fact, Pennsylvania has the largest rural population of any state in the nation. An extensive agricultural industry along with the mining of vast deposits of coal and the lumbering of 15 million acres of forest land pose unique demands on even the most rural of districts. This is especially true concerning the increased size and weight of trucks hauling these natural resources on Pennsylvania's secondary highway system—highways that were not designed or built for these demands.

The considerable variations in population, topography, and socioeconomics create distinct differences among engineering districts. This influences the type of transportation system necessary for each area. It also relates to the unique problems imposed on that system or the district's ability to provide a proper level of service.

Throughout the planning process, the uniqueness of each engineering district was acknowledged. Business plan guidelines were purposely kept general to recognize district variations and not inhibit the planning process in any way.

Planning Organization

The components of the 4-year business plans were developed based on the present and future demands of the engineering districts. The business plans were organized into the following major components:

• Maintenance
• Highway transfers
• Integrated bridge program
• Capital improvements
• District capabilities (organization/management)
• District concerns (emerging issues)

The first four components are the major appropriations to the annual district operating budget (Figure 2). These appropriations result in the major maintenance and capital improvement programs in each district. The final two components of the plans (district capabilities and district concerns) were designed to give each district the latitude to express their abilities and shortfalls in accomplishing the major objectives of the department.

The district capabilities component provides the forum for discussing the ability to accomplish design, construction, inspection, and maintenance activities as well as the current policy for providing services through department versus contracted personnel.

A component was left open to items of district concern that may affect district or county operations or productivity. For example, this component was used to describe difficulties in retaining construction or materials inspectors, need for specific areas of manpower training, and so forth. This component existed in order to provide an opportunity for the district to elaborate on any district or state concerns that had not been previously discussed.

Planning Time Frame

District business plans covered the 4-year period from FY 1983-1984 through FY 1986-1987. The district planning period began in FY 1983-1984 because this year provides the most known data. Districts had a 4-month period in which to prepare the plans. The schedule was aimed at completion for a May 1984 presentation of the plans to the Secretary of Transportation and the Strategic Management Committee. A review of progress was conducted periodically throughout the planning period.

Budget Assumptions

Districtwide and programmatical budgets were developed as part of the planning guidelines. These budget assumptions were developed as the most probable for the 4-year planning period. Funding levels were provided for each category of district program activity.
Tabulations

Each district engineer was provided with a set of preprinted forms for tabulation purposes. A copy of a maintenance activity form is shown in Figure 3. Both production units and costs are documented for each programmatic activity. Departmental recommended cycle lengths are shown where applicable. The preprinted forms facilitated uniformity wherever possible.

BUSINESS PLANNING RESULTS

The preparation of business plans for each engineering district in Pennsylvania was an unequivocal success. It was successful not only in the documents produced, but in the institution of a multiyear planning process in each of the district offices. It began the evolution of planning as a generic function of district office management.

Results of the 4-year business plans were presented to the Secretary of Transportation by each of the respective district engineers. The plans focused on achieving the department's major objectives and certain other strategic activities in the following areas:

* Roadways
* Bridges
* Highway transfers
* Equipment
* Buildings and grounds

Within each area, the district engineer evaluated the district's key assets, services, and products.

Personnel were evaluated from an overall complement level as well as individually within each service or product area. Material requirements to accomplish goals were an inherent part of plan development.

The results of the plans indicate that general statewide objectives can be met. However, during the presentations, it became apparent that minimum requirements for an adequate level of service could not be fulfilled in all counties with present and projected revenues. A number of issues and concerns were also raised that involve department policies and programs. Addressing these concerns at the top level of management will improve the overall operational framework of the department.

Some highlights of the business plans follow.

Roadway Program

In the roadway program the district 4-year business plans included routine highway maintenance, highway restoration, resurfacing, and capital improvements.

PennDOT continues its commitment to being a maintenance-first organization. Maintenance remained the department's top priority throughout the business plans. A continuing effort will be made to preserve the roadways on the state-owned system in order to keep them in an acceptable condition.

PennDOT established the major objectives of restoring and reconciling Pennsylvania's state system of highways and bridges. Integral to meeting these objectives is the resurfacing of 625 mi of non-Interstate highway annually and the application of surface treatment to 5,460 mi of relatively low-volume state highway. Table 1 compares the annual goals (based on the major objectives) with the level

<table>
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<tr>
<th>ITEMS</th>
<th>RECOMMENDED CYCLE</th>
<th>83/84</th>
<th>84/85</th>
<th>85/86</th>
<th>86/87</th>
<th>TOTAL</th>
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<td>$190</td>
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FIGURE 3 Selected routine maintenance activities.
TABLE 1  Surface Improvements

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<tr>
<th>District</th>
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<th>Surface Treatment</th>
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<td>12-0</td>
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<td>41</td>
</tr>
<tr>
<td>Total</td>
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</table>

Note: Improvements are expressed as miles resurfaced or treated annually.

of activity in each district based on the business plans.

District efforts in achieving surface improvement goals are shown schematically in Figures 4 and 5. Although statewide surface improvement goals were met, specific districts could not meet their individual goals for resurfacing or surface treatment. In addition, in several business plans concerns were expressed about the impact of truck traffic, climate, and drainage factors on goal achievement.

Roadway plans also included the completion of the Interstate system and selected economic development highways within the commonwealth. Routine maintenance activities evaluated included manual patching, mechanized patching, liquid bituminous surface treatment, skin patching, crack sealing, scratch coating, joint sealing, shoulder grading, shoulder cutting, ditch cleaning, and pipe replacement. These activities were covered in relation to cycle times. Although most districts were addressing routine maintenance at an acceptable level, several concerns were raised as to the trade-offs between maintenance activities and goals in surface treatment or resurfacing.

All roadway activities were viewed from the perspective of decisions to make or buy, that is, whether the department should contract for services or perform the services with department personnel. It was generally agreed that there is a need to develop general methodologies to decide which activities are most cost-effective when done by consultant and which when done in house.

Integrated Bridge Program

Pennsylvania's bridge problem differs in many respects from its roadway problem. Deficient bridges are a major deterrent to the overall commonwealth goal of economic development. Whereas poor roads affect all vehicles, weakened bridges initially affect just heavier trucks. A deteriorated bridge system hinders development of natural resources such as bituminous and anthracite coal, natural gas, and timber; the shipment of agricultural and manufactured products; as well as economic development opportunities.

Pennsylvania's billion-dollar bridge program has made Pennsylvania a national leader in bridge repair and replacement. However, this extensive program has only scratched the surface of the bridge problem. Much more needs to be accomplished to eliminate the backlog of bridge restrictions on the commonwealth's highways. There was general agreement that although this program is having a major impact, there is a need to find ways to extend the program if Pennsylvania's highways are to be kept open to heavy traffic.

The 4-year business plan developed an integrated bridge program. Plans included not only necessary capital improvements but rehabilitation, corrective and preventive maintenance, and bridge painting. The business planning process provided the first opportunity for PennDOT and each district to examine the total program being applied to bridges. This was particularly evident in the importance placed by each district on evaluating its proper level of preventive and corrective maintenance.

Bridge painting was found to be an area where funding is generally not adequate. Business plans expressed special concern for painting of large...
steel structures. Cost for bridge painting is currently funded from general county maintenance budgets, but the cost of painting such large structures is sometimes beyond the capability of a small county. Several plans requested an examination into gaining federal participation in this program. Although there is no surplus of federal aid, this approach would allow greater flexibility in dealing with county funding limitations.

**Highway Transfer Program**

One of the key elements in moving the department toward a cyclical maintenance approach is the reduction of the overall size of the state highway system. As started earlier, PennDOT is responsible for twice the percentage of mileage that most other states assume. By transferring the functions of local roads to municipalities, the department will be able to concentrate its efforts on those roads that serve a statewide purpose. Legislation in 1983 established funding for highway transfer rehabilitation and annual maintenance. This funding has been very effective in encouraging Pennsylvania's municipalities to assume ownership responsibility. In short, the program is beneficial to the department and to the local governments.

The business plans developed strategies for transferring mileage to local governments as well as strategies for the prerequisite rehabilitation efforts. Over the 4-year planning period approximately 1,700 mi can be transferred out of a total candidate number of nearly 12,000 mi. All districts believed that this program was working well, but additional funding is needed to transfer responsibility for additional mileage.

**Equipment**

Although the equipment budget and requirements appear meager compared with the highway and bridge program requirements, it is vital that an adequate and modern equipment fleet be maintained in order to provide the commonwealth with transportation services.

Business plans evaluated the 4-year projections of the equipment fleet from an age and utility point of view. District equipment considered in the planning process included large equipment such as trucks, loaders, and graders as well as snow plows, crew cabs, spreaders, and pothole-patching equipment.

With only a few exceptions, there was a belief that there exists a backlog in maintenance equipment replacement. Specifically, crew cabs and older trucks are requiring extensive repair and breaking down too frequently. The department's maintenance costs, and in some cases maintenance service, are being adversely affected by equipment age. The department's $16.3 million equipment budget is extremely small in relation to the programs it supports. Larger equipment is also procured on lease-purchase agreements. An increasingly large portion of the equipment budget is being directed along this line, which results in less available dollars for purchase of new equipment.

The majority of districts are requesting specialized equipment for productivity improvements. Of special interest are microcomputers and computer-assisted drafting and design equipment.

**Buildings and Grounds**

As with equipment, a minimum program for buildings and grounds must be sustained in order to productively support the department's other program requirements.

Although the business plans recommended various repairs and improvements to existing district and county office buildings for energy conservation and other purposes, the principal effort was related to the department's program of consolidating and developing its winter services stockpiles. It became evident that the department must accelerate installation of salt storage facilities through a rational process that takes into account the environment of each situation.
Human Resources

Another area addressed in the district plans pertained to personnel. Several points emerged from the plans:

- There is a need to better focus training toward real work activities. One business plan suggested use of field trailers so training could be held near work sites.
- Cross-training is becoming an effective method of achieving better production from the workforce.
- The department's extensive plan to add and update new computer systems creates a considerable need for systems training and orientation. This need must be met if the department is to realize gains in productivity.
- Because the department relies more heavily on consultant design agreements, it is imperative to ensure responsible performance from these consultants.
- A number of districts presented profiles of employee age. Some districts project specific needs in critical work areas or skills. This will greatly assist the Bureau of Personnel in determining where the greatest recruitment and training efforts should be concentrated to avoid lapses in delivering transportation services.

FUTURE DIRECTIONS

One of the greatest benefits of the 4-year business plans, beyond the guidance of the documents themselves, was the initiation of the planning process in the district offices by district management.

An immediate outgrowth of the business planning process was the development of a categorical budget for the department. District evaluations of minimum service levels served as the basis for requirements of both a capital and operational nature at the district level. District business plans will now serve to rebudget resources and to document requirements for future funding initiatives.

Four-year district business plans were initially successful in Pennsylvania and will be continued as overall guidance to district engineering operations. The plan presentations proved to be a valuable communications tool. These presentations provide a unique opportunity for each district engineer to meet with top management to discuss the operations, successes, and shortfalls of the district.

In summary, the 4-year district business planning process is a major initiative of the department. This multiyear planning process at the district level will assist the districts in

- Working toward the department's major objectives,
- Ensuring that individual annual program-level elements are developed and implemented consistent with the department's major objectives, and
- Supporting a businesslike approach to management at the district level.

The business plans integrate individual district planning efforts into a single unified operating document and form the blueprint of district capability, with the intent to develop an annual process that will produce the variety of annual program elements as byproducts of a larger integrated management process.

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