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**ABSTRACT**

**Priority Technique for [General Aviation Airport](#) Investments in Tennessee**

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One issue state departments of transportation must address is the allocation of funds among competing general aviation airport projects. For example, the Tennessee Aeronautics Division administers an annual program for funding projects at airports throughout the state. Although the annual funding available from state and federal funds for the program is currently almost \$12 million, the demand for projects far exceeds the available monies. Further, continued reductions in the [Federal Airport Improvement Program](#) (AIP) funding for small airports has increased the competition for funding. For many years, general aviation airport projects in Tennessee were awarded on a first requested, first funded basis. With the increase in requests and the reductions in funding, a rational system for project selection was needed. Accordingly, the Division developed a scoring system to rank and prioritize projects. The system considers a variety of factors for each project, including safety, economic impact of the airport, and usage.

The State Transportation Equity Fund, created in 1986 by act of the General Assembly, is the principal source of state funding for airport improvement. Taxes on the sale of aviation fuel are collected by the fund and allocated to the Department of Transportation for use in the airport program. The program received about \$11.1 million from the Equity Fund during 1997. Using these funds, the Department makes statewide grants to Tennessee air carrier and general aviation airports to support safety, airport improvements, and landside improvements. The Department will cover up to 75 percent of the total cost, depending upon the type of project.

The Aeronautics Division also serves as the administrator in Tennessee for grant applications to the Federal Aviation Administration's (FAA) AIP for all airports except primary commercial service. Since over 90 percent of the state's 78 general aviation airports are located in small or medium sized communities, the [prioritization](#) technique has extensive implications on the economic development associated with airport investments for these communities.

The paper describes the prioritization technique developed for the Tennessee Aeronautics Division. Point scores are awarded in relation to project objectives, type of improvement, airside versus landside functions, airport usage, and sponsor responsibility. Discussed are the advantages and disadvantages of using a formal prioritization technique and how the benefits and costs of projects were considered along with issues of providing equity among airports of different sizes and economic development potential.

## Priority Technique for General Aviation Airport Investments in Tennessee

### Overview

General aviation (GA) facilities comprise the vast majority of the nation's civilian airports. In contrast, commercial service airports having regularly scheduled passenger service are a relatively small percentage of the airport population; these primarily serve large and medium sized population centers. GA airports vary widely in terms of intended function, services, aircraft rating, intensity of usage, and support facilities. However, in common they exist to serve the non-commercial segment of the aviation industry. This includes a diversity of users, among them recreational aircraft owners, agricultural pesticide applicators, cargo and passenger charter operators, and corporate aircraft. Some airports cater to a single market segment, while others serve elements of several of these groups. Typically, GA airports are limited by runway characteristics to the smaller propeller driven and jet aircraft, although a few have the capability to handle the largest jets used in passenger and cargo service.

General aviation airports are frequently associated with specific communities. While common, by no means is municipal ownership or control the norm. Ownership by county governments or independent airport authorities also occurs frequently, with state government and private sector GA airport ownership less common. Regardless of ownership, however, the primary markets for most GA airports are the urban areas within reasonable proximity, typically as measured in driving time.

Most small and medium sized communities view their associated GA airports as important assets in the quest for economic development. This is especially true when the community either has no commercial service airport or is poorly served by one. Industrial recruiters consider the lack of a suitable GA airport to be a major detriment in enticing industries to locate in an area without commercial service. Many corporations use business aircraft to transport executives to remote plant sites. In addition, they may use charter air cargo operators or corporate business aircraft to bring high priority shipments of critical components or raw materials to a factory site or to make emergency deliveries from plants to key customers. Such companies are felt not to be likely to locate in areas without a suitable GA airport. Besides business uses, GA airports may also provide economic benefits from usage by the recreational aircraft community, including both based aircraft and itinerant operations. In some cases, tourism is an important segment of such usage.

Many states have an agency charged with promoting aviation, setting aviation policy, ensuring coordination with federal funding agencies, and providing grants for airport construction and maintenance. Typically, the state department of transportation (DOT) performs these roles. One important issue state DOTs must address is the allocation of funds among competing GA airport projects. For example, the Tennessee Department of Transportation (TDOT) Aeronautics Division administers an annual program for funding projects at airports throughout the state. Although the annual funding available from state and federal funds for the program is currently almost \$9 million, the demand for projects exceeds the available monies. Further, continued reductions in the Federal Aviation Administration (FAA) Airport Improvement Program (AIP) funding for small airports have increased the competition for funding. Many other states grapple

with similar problems. To address airport funding distribution, Tennessee and other states have developed project priority ranking systems which attempt to score projects based up a specified formula and set of criteria. A major issue with such systems is the balance between the state perspective and the interests of the local community served by the airport. As a state agency, a DOT must, of necessity, balance the statewide role of the airport system against the local issues associated with each individual facility.

This paper describes the prioritization approach developed for the TDOT Aeronautics Division. For many years, GA airport projects in Tennessee were awarded on a first requested, first funded basis. With the increase in requests and the reductions in funding, a more formal system for project selection was needed. Accordingly, the Division developed a scoring system to rank and prioritize projects. The system considers a variety of factors for each project, including safety, economic impact of the airport, and usage. Point scores are awarded in relation to project objectives, type of improvement, airside versus landside functions, airport usage, and sponsor responsibility. Discussed are the advantages and disadvantages of using a formal prioritization technique, how the benefits and costs of projects were considered, and issues of providing equity among airports of different sizes and economic development potential. Also discussed is how the prioritization technique is an element integrated with long-range planning and the capital improvement program.

### **Background**

The State of Tennessee has a long history of involvement in aviation. Tennessee's policy is that every community of 2,500 or more in population will be no farther than 30 minutes driving time from an airport. With minor exceptions, this goal has been fulfilled. The state's approach has been to encourage the development of GA facilities by local interests, with state and federal grant monies made available to aid construction. Only one of the 78 GA airports in Tennessee is state owned—a rural facility serving Reelfoot Lake in the northwest corner of the state. Most of the remainder of the airports are owned by county or municipal governments, although eight are privately owned, public use facilities. Fixed base operators run the publicly owned airports.

The Tennessee State Transportation Equity Fund, created in 1986 by act of the General Assembly, is the principal source of state funding for airport improvement. Vendors of aviation fuel in Tennessee report annual sales to TDOT, which then requests an appropriate share of the collected taxes from the state's Department of Revenue. The Fund generated about \$11.1 million during 1997. The annual total fluctuates because of variations in amount of aviation activity, though in general it has been on an upward trend.

Because fuel tax revenues are generated by both commercial and GA aircraft operations, the Equity Fund is not devoted strictly to the GA airport system. The current disbursement program allocates 50% of the Fund revenues to commercial service airports for use as the required local match on FAA funded projects. Forty percent of the revenues are then earmarked for the GA airport program, with the remaining 10 percent available for discretionary purposes. In 1997, the Fund provided slightly in excess of \$4.4 million for GA airport improvements in Tennessee.

Using Equity Fund monies, TDOT makes grants to GA airports statewide to support safety, airport improvements, and landside improvements. The Aeronautics Division is responsible for awarding and administering these grants. Grants will cover up to 75 percent of the total cost, depending upon the type of project. Airports are required to provide a local match for the remainder of the required project funds.

For all except primary commercial service airports, the Aeronautics Division also serves as the state administrator for grant applications to the federal AIP. This program is awarded by the FAA to TDOT on a block grant basis. In 1997, \$4.5 million was available, with no local match required. The AIP does have eligibility requirements, however, which must be met by applicants.

In summary, Tennessee has available some \$9 million annually for investment in the GA airport system. These monies provide the major funding base for all capital improvements to the publicly owned GA airports in Tennessee. Few of the cities and towns served by GA facilities would be able to bear the complete cost of such improvements. Thus, the state provided funding is essential to the system. However, the demand for funding greatly exceeds the available money. Since only a portion of the requested projects can be funded, the issue of equitable distribution of funds to meet both state and local goals has been of great concern.

## **Planning Framework**

The TDOT Aeronautics Division plays an active role in helping to promote and maintain the GA system. As a state agency, TDOT must approach its activities with a statewide perspective. This introduces the potential for conflict between local interests and state interests, which of necessity are much broader. To minimize such problems, and to promote objectivity, the concept of prioritization has been firmly integrated into TDOT's aviation planning process. Prioritization is supported by long range planning, functional classification, capital improvement planning, and by a formal project priority ranking procedure. Figure 1 shows the overall relationships of these elements.

## **Policy and Oversight**

The Tennessee Aeronautics Commission consists of members appointed by the Governor to represent aviation interests across the state. Theoretically, the Commission ensures that the state's aviation activities do reflect local issues and concerns. Commission members provide policy guidance to Division staff reviewing grant applications. The Commission also votes to approve all major grant applications, thus imposing an implicit prioritization on projects. However, Commission decisions are actually advisory recommendations to the TDOT Commissioner. Since the Commissioner is free to make the binding decision, ultimate approval resides within the DOT. In practice, the Commission is rarely overruled, but the possibility exists.

## **Long Range Planning**

The Aeronautics Division performs the statewide planning process for aviation, with one product of this being the long range Tennessee Airport System Plan. Elements of the planning process are

done on a regional level within the state. Note that while these regions focus upon areas of the state, they do overlap the state's boundaries to reflect actual aviation markets. For each region, planners consider regional economic forecasts, aircraft activity forecasts, the existing airport infrastructure, and the economic impacts of airports. In assembling the regional evaluations into a comprehensive plan, TDOT considers statewide goals for service availability, development strategies, growth expectations, and economic activity forecasts. A statewide systems analysis is performed to develop recommendations for improvement and funding programs to meet state goals and objectives. The final system plan is the result of an iterative process that, when complete, provides a budget, maintenance, and developmental programs to guide state aviation activities for a multi-year period. The plan is the first step in an overall prioritization process for aviation improvements.

As part of the overall planning process, the Aeronautics Division has developed a functional classification system for GA airports. Each such airport in the state has been assigned to one of the following classes: GA Business Service; GA Community Service; GA Limited Service; GA Local Service; or Private, Public-use. The functional classification of each airport, updated as part of the long-range plan, defines the role of that airport and thus the state's interest in its infrastructure investment. Higher functional classifications represent airports with greater levels of activity, potential for growth, and regional economic significance. Typically, higher classed airports have infrastructure to support larger aircraft and to handle higher volumes of operations. This is not always the case, however, because some airports have deficiencies to be remedied by capital investment.

### **Short Range Planning**

The second level in the TDOT's planning process is the airport Capital Improvement Plan (CIP). The purpose of the CIP is to help the Aeronautics Division budget for future needs while allowing owners to plan for airport maintenance and development. Owners are charged with evaluating pavements, facilities, and standards issues and annually submitting a list of potential projects to TDOT. Aeronautics Division staff select projects for inclusion in the CIP based upon goals in the long-range plan, budget projections, and scores generated by the priority ranking system described below. While the CIP is updated annually, it contains a three-year horizon of potential projects. Thus, the CIP is oriented towards the short term.

A key aspect of the CIP process is that it requires airport owners to submit project proposals, other than for emergency repairs, on a periodic basis, rather than the ad hoc fashion of previous years. Thus, all project proposals arrive at the same time and can be evaluated together. If a project falls in a CIP out-year, a project grant proposal must be submitted during that year and the project re-evaluated. Note that projects not on the CIP can be requested, but they will receive a lower priority for consideration.

The initial call for candidate projects to be considered in the CIP resulted in 540 projects, with a total value of \$170 million. The difference between the requested amount and the \$9 million available per year underscores the need for a prioritization process.

### **Project Scoring and Ranking**

The third level in the planning process is the Airport Project Ranking System (APRS), TDOT's procedure for ranking proposed projects at GA airports. APRS is both a procedure for ranking airport projects and a computer software package which implements the procedure and allows groups of projects to be ranked. By evaluating the relative scores of projects, TDOT planners can determine which projects should receive priority in funding. Projects that do not score in the upper portion of the range for the current CIP cycle are unlikely to be selected. Since over 90 percent of the state's GA airports are located in small or medium sized communities, the prioritization technique has extensive implications on the economic development associated with airport investments for these communities. The role of APRS in the project selection process is a focus of the next section of the paper.

### **Project Ranking Procedure**

This section describes the implementation and structure of APRS.

In APRS, projects are categorized by their location within the airport, e.g. runway, taxiway, terminal, etc. There is an implicit hierarchy of locations with airside locations (runway, taxiway) having an overall higher priority than landside locations (terminal, hangar, etc.). Each location has one or more project types that might be performed to improve the airport. Project types, for example, might include runway lengthening, navigational aid installation, hangar construction, or paving an access road. In general, the project types represent generic activities performed commonly among the airports within the system.

The APRS software implementation is a Windows application for Intel-based personal computers. Like most Windows programs, APRS employs a graphic user interface employing menus and forms to control program execution. Using the computerized ranking procedure, a complete set of projects can be viewed or printed in order of descending score.

APRS creates and/or maintains information in a number of databases. The main working data set is the project database, which contains a list of projects for which a ranking is to be established. Users may create one or more project databases, depending upon needs, project categories, etc. Project information includes airport, project type and location, estimated cost, request date, and disposition. The project rank is determined according to a set of criteria described further below. APRS interfaces with the Aeronautics Division's Airport Information Management System (AIMS) to obtain necessary information on facility characteristics and operations levels.

## Scoring Formula

Project scores in APRS are computed according to the following formula:

$$S_t = S_{pt} + S_{aa} + S_{sr}$$

Where:

$S_t$  = Total project score

$S_{pt}$  = Project type score (max. 50 pts.)

$S_{aa}$  = Airport activity score (max. 30 pts.)

$S_{sr}$  = Sponsor score (max. 20 pts.)

The scoring formula permits a maximum project score of 100 points.

### *Project Type*

The project type score is assigned based upon the nature and location of the project within the airport. In general, project types having a pure safety function score highest, with maintenance next highest, then upgrading followed by capacity. For example, the system assigns 49 points to a project that corrects unsafe runway surface failures, but only 19 to a project to increase runway dimensions or strengthen pavement to handle larger critical aircraft.

### *Airport Activity*

The airport activity score accounts for various factors relating to the amount of activity at the airport. Busier airports should receive a higher score than lightly used ones. All other things being equal, the scoring formula allots slightly higher scores to airports having high levels of activity. Airports with a higher functional classification also receive slightly higher scores to reflect their importance to the system.

The composite score for airport activity is:

$$S_{aa} = S_{io} + S_{ba} + S_{fc}$$

Where:

$S_{aa}$  = Total airport activity score

$S_{io}$  = Annual itinerant operations score (max. 15 pts.)

$S_{ba}$  = Airport based aircraft score (max. 10 pts.)

$S_{fc}$  = Airport functional class score (max. 5 pts.)

The formula allocates 30 total points for airport activity. APRS obtains data on the airport class and operational levels from files in AIMS. Current values are always used in scoring.



### ***Sponsor Responsibility***

This scoring category reflects the degree to which the sponsor takes proactive measures to operate and maintain the facility in a highly professional manner and in compliance with applicable guidelines and licensing criteria. These categories include:

- publication of an airport operations manual,
- overall maintenance of facility,
- implementation of a pavement management system,
- implementation of hazard restriction zoning around the airport,
- implementation of land use zoning around the airport,
- compliance with state licensing requirements, and
- participation in the capital improvement planning process.

Compliance with all categories reflects a well-managed airport and gains increased points for projects for that airport. The CIP process gains airports points for participation and for submitting a request for a project in the current CIP. To help equitably distribute projects, however, airports with several ongoing projects may have points deducted from a project score.

The composite score for sponsor compliance is:

$$S_{sr} = S_{lc} + S_{mt} + S_{oo} + S_{om} + S_{hz} + S_{lz} + S_{cp} + S_{pm}$$

Where:

$S_{sr}$  = Total sponsor responsibility score

$S_{lc}$  = Licensing compliance score (max. 5 pts.)

$S_{mt}$  = Maintenance quality (max. 4 pts.)

$S_{oo}$  = Outstanding obligations score (max. 0 pts., min. -5 pts.)

$S_{om}$  = Operations manual score (max. 2 pts.)

$S_{hz}$  = Hazard zoning score (max. 2 pts.)

$S_{lz}$  = Land use control score (max. 2 pts.)

$S_{cp}$  = Capital improvement plan score (max. 3 pts.)

$S_{pm}$  = Pavement management system score (max. 2 pts.)

The total number of points available for the composite score is 20.

### **Implications of the Priority Ranking Approach**

The ranking procedure insures that all projects are put on a competitive basis. Objectivity is provided for by the allocation of scarce resources among communities. Projects are placed on a uniform funding cycle so that comparisons can be easily made.

An essential aspect of APRS is the functional classification plan. The smallest airports with little use will have investment limited to essential safety improvements. Other facilities in the lower functional classes will not be likely to have capacity or upgrade projects selected. This may make the owners of these facilities uncomfortable, but from a statewide perspective, it makes sense

when resources are scarce. However, with the emergence of specific development proposals, functional classification can be altered.

Despite the impact of functional classification on the score, airport owners have a chance to gain some offsetting points in the sponsor responsibility category. This rewards owners who protect their investment by complying with state guidelines and best industry practices. It also provides some equity in project distribution by deducting several points from the score of airports with multiple ongoing projects.

The priority ranking score reflects existing conditions and provides no direct recognition for development. This was deliberate. GA airports can stimulate economic development and serve as a catalyst to attract industry. There are specific examples where airport improvements were necessary to attract a specific industry. However, this is not predictable and a good GA facility is a necessary, but not sufficient condition for industrial recruitment. Rather than projecting or predicting development, the priority ranking system focuses on existing goals—enhancing safety, emphasizing projects of regional or statewide significance, and providing a good return on investment by ensuring utilization. Certainly, however, a proposal related to a firm development opportunity will receive special considerations and may have the priority altered. Rather than considering economic development explicitly in the priority ranking system, TDOT considers economic development potential for an airport in the long-range planning process and the functional classification.

Project scores do not consider the magnitude of funding required. The ranking process is strictly to determine the relative importance of projects according to benefit. Explicit tradeoffs between budget and project costs are made in the CIP. Project cost is really impractical to include in the formula because many projects are still in the conceptual state when submitted and lack detailed cost estimates.

The ranking process does not mean that a project will never be funded. It is simply a means for prioritizing a current year's proposed projects to determine which should receive limited funds. Projects with high scores will be placed in the CIP, for programming either in the current year or in an out year. Non-qualifying projects may always be revised and resubmitted in a later year. It should be noted that the ranking system is a tool, and, under extraordinary circumstances, a project may always be selected regardless of rank.

A review of the prioritization formula used for 1998 projects indicates that critical (safety, maintenance) projects in airports with high utilization rank highest. However, good projects in airports with lower usage levels will be in the upper tier. The scoring formula has been calibrated to provide reasonable tradeoffs. The same is true for lower tier projects. Non-critical projects in high utilization airports do fall into the lower tier and are unlikely to be selected. Thus, the system seems to be performing as intended. It is fully expected that, as more experience is gained or circumstances change, the formula weights will need to be adjusted or new factors added. However, initial indications are that the ranking process is meeting state goals.

An additional indication that the system is working is its acceptance by the airport owners. The priority ranking system provides a "level playing field" for airports seeking grants. An owner

clearly knows how projects are ranked, and what the chance for a particular project's funding is. The feeling that politics are involved in the selection process—formerly a major concern—is largely alleviated. If a project can be demonstrated to have economic development implications, it may be approved regardless of the score, but such cases are expected to be extraordinary.

## Conclusions

GA airports in Tennessee, while owned at the local level, depend upon federal and state grant money for needed capital improvements. Tennessee annually has about \$9 million available to support such projects—an amount far less than that required. Accordingly, some method is required to prioritize projects so that the most critical ones receive funding.

An issue with GA airport funding is the conflict between local and state interests. These airports are frequently viewed by their owners as critical assets for industrial recruitment. At the local level, frequently all projects are considered to be critical, since each owner sees its facility as the universe. The DOT, however, must consider regional or statewide interests, and the state perception of an airport project's criticality may be far different than the local owner's.

The development of a statewide planning process which is sensitive to the role of GA airports in promoting and sustaining economic development is essential to meeting both local and state goals. TDOT has implemented a comprehensive planning process that seems in spirit to meet these goals. This process involves the following elements:

- An Aeronautics Commission representing local interests to provide policy guidance and approve projects;
- Implementation of a long-range planning process which assembles regional analyses including aviation activity, economic forecasts, and economic impacts of airports into a plan that specifies budget, maintenance, and developmental programs to meet state goals and objectives;
- Development of a functional classification system in which GA airports are classified according to their role in the statewide system;
- Implementation of a short-term capital improvement planning process which, in compliance with the long-range plan, identifies specific high priority capital and maintenance projects and allocates budget resources to them; and
- Development of a system for objectively scoring projects according to a specified set of criteria and ranking them by score.

Prioritization is inherent in each step of this overall process. The prioritization process, which considers both state and local interests, brings objectivity to the programming of airport improvements. With a clearly defined set of priorities, TDOT can maximize the effectiveness of the airport grant program by funding those projects that make the greatest contribution to the system.

Functional classification is an important element of prioritization. By functionally classifying an airport, TDOT implicitly ranks that airport in terms of its importance to the state system. Classification is determined through the long-range planning process; the CIP and project ranking process explicitly consider the functional classification in ranking projects by importance and in programming them for implementation.

To perform the initial ranking of candidate projects, TDOT uses APRS. Projects receive an objective score based upon project type, airport activity, and sponsor responsibility, with the airport and sponsor categories being composite totals that consider a number of factors. Airport owners have the opportunity to earn project points by complying with a set of best practices and state guidelines. The set of ranked projects can then be evaluated for inclusion in the capital program for the current or subsequent years. Thus far, APRS has been well received by both state and local aviation officials.

The rational approach to investing in GA airports in Tennessee has put economic development on an objective basis. Rather than relying on vague references to economic development in the programming process, reliance will be placed on long-range planning and functional classification to adequately assess the economic development potential of an airport.