Part A: Current Airport Community Value

A New Method for Valuation of the Importance of General Aviation Airports to their Communities

March 2011

AIRPORT COMMUNITY VALUE

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EXHIBITS

A. GLOSSARY

This section defines acronyms and abbreviations used throughout the document.

Term	Description
5010	FAA Airport Master Record
ACV	Airport Community Value
ARV	Airport Replacement Value
BEA	Bureau of Economic Analysis
BUI	Business Use Index
CCF	Community Commitment Factor
EAV	Existing Airport Value
EIFS	Economic Impact Forecasting System
FAA	Federal Aviation Administration
GA	General Aviation
GIS	Geographic Information System
NCTCOG	North Central Texas Council of Governments
RARF	Regional Airport Resource Factor
REMI	Regional Economic Modeling, Inc.
RIMS II	Regional Input-Output Modeling System
RPZ	Runway Protection Zone
RSA	Runway Safety Areas
System Plan	Regional General Aviation and Heliport System Plan
TSZ	Traffic Survey Zone
TxDOT	Texas Department of Transportation
U.S.	United States
ULR	Useful Life Reductions
VFCV	Vertical Flight Community Value
VMF	Value Modifying Factors

B. INTRODUCTION

As budget shortfalls increase in municipal governments, the value of airports continues to come under scrutiny from officials and the public. It is important, therefore, that the community as a whole, and its elected representatives, understand the economic significance of local airports so that support for airport projects is generated. In particular, an airport's economic contribution to the community and to area businesses should be identified. The challenge for policymakers is to weigh the value of an airport against the resources necessary for it to operate at its maximum benefit to the community. Environmental concerns and budget constraints may impede achieving airport development and associated economic benefit. General aviation (GA) airports support new jobs and industry, which bring a higher standard of living for area residents.

As part of the North Central Texas General Aviation and Heliport System Plan (System Plan), a new metric, Airport Community Value (ACV), has been created to address the challenges described above. ACV allows a community to better understand the potential return on capital investment that can be realized from airport development and to emphasize the need to protect this community asset from degradation or loss. ACV also provides the airport sponsor with a new metric to be used to compare the airport's value to other community assets as well as its importance to the regional or state aviation system as a whole. Vertical Flight Community Values (VFCV) are calculated in a separate document for the System Plan.

The ACV analysis demonstrates the economic effects of airport and aviation use within North Central Texas by tracking the potential changes in ACV from the existing system through the airport's recommended plan. These changes are representative of the economic impacts resulting from implementing the plan's recommendations and investing in the regional airport system. For example, the development of a runway extension at an airport may mean increased corporate and business aviation use. Thus, the capital investment results in economic activity in addition to construction spending. New based jets, corporate pilots and crew, fuel sales, hangar fees, and improved business access complement the value of the airport and positively impact the local economy.

The following six sections discuss the ACV principle:

- Traditional Methods of Economic Analysis
- The Need for New Metrics
- Proposed ACV Method for North Central Texas
- Method for Evaluation of ACV Scoring
- ACV Scoring and Results
- ACV Metric Results

C. TRADITIONAL METHODS OF ECONOMIC ANALYSIS

Many airports and aviation systems rely on traditional methods of economic analysis. These methods may vary in the type of input-output model that is used, but most apply the same measures of economic activity; jobs, income, and total output. Most studies seek to quantify the economic significance of the aviation transportation mode and attempt to provide local stakeholders with evidence that airport expenditures are creating and sustaining jobs.

Typically, economic impact models are used to describe the flow of money from one economic sector to another. In the past, models such as the Regional Input-Output Modeling System (RIMS II) and the United States (U.S.) Corps of Engineers Economic Impact Forecasting System (EIFS) were used to measure the impacts of direct spending on an area. In recent years, more complex models have been developed, including the Minnesota IMPLAN and Regional Economic Modeling, Inc. (REMI), which have social accounting capabilities. In all of these models, the inputs of direct jobs and direct spending are critical to the economic impact measurement process. These models trace sector-to-sector impacts and estimate the proportion of any change that is likely to circulate within the economy and the percentage that can be expected to expand out to other geographic regions.

The models (IMPLAN/REMI) are based on input-output tables produced by the U.S. Department of Commerce, Bureau of Economic Analysis (BEA). Input-output modeling takes into account the dependency of each economic sector on every other sector (there are 500 sectors recorded in the BEA input-output tables). Using these models, the BEA input-output tables are adjusted to take into account the structure of the local economy under study. For example, in calculating a manufacturing multiplier for one county, over 300 sectors can be involved. Each of their contributions to the multiplier is weighted by the size of the sector in terms of output.

THE MULTIPLIER OR RIPPLE EFFECT

Numerous studies have been conducted to establish respending multipliers for various geographic areas and segments of the economy. These studies indicate that multipliers ranging from one to three are appropriate for airport economic estimates. Sector-specific, input-output multipliers are usually developed to estimate the respending impacts of airport-related wages and salaries and other aviation-related expenditures. For impacts relating to airport employment, construction, and local business use, multipliers from a number of different sectors are used.

Previous studies show the multiplied effect of spending money on an enterprise. As an example, if a new firm comes into an area and employs 50 people and also purchases some local goods and services, the economic impact is attributable to the company's direct outlays plus the respending of these outlays by firms supplying the goods and services to the new firm. There are generally two types of ripple effects: (1) those associated with firm-to-firm transactions, and (2) those derived from the wages and salaries allocated to employees in these firms. The wages and salaries paid to the 50 new employees are spent and respent several times within the community. Retail establishments that have nothing to do with the nature of the new firm's business are affected by its presence as the new employees spend their income on housing, clothing, automobiles, groceries, restaurant meals and so forth. Thus, for every dollar of new wages and salaries, an additional 25 to 75 cents of income might be generated elsewhere in the area. As supplier companies provide input to the new firm they expand their own production and allocate more resources to wages and salaries, a further consumer-generated ripple effect occurs.

When all the effects are taken in the aggregate, a new job often generates the equivalent of another full-time job (summed up over many partial jobs in different parts of the area's economy) if the community is large and has a sophisticated consumer retail base. In smaller communities, a new job can generate between one-third and two-thirds of one additional job. Ripple or multiplier effects work in both a positive way (when a new airport enters or an existing airport expands) and in a negative manner (when an enterprise goes out of business or an airport closes). For example, the closure of a military base has a much greater economic impact than simply the loss of direct employment or expenditures at the facility.

STUDY OUTPUTS

Most economic impact studies rely on surveys of jobs and spending to ascertain the direct labor and expenditure input to the economic models. This will determine the multiplier effects of direct inputs. These studies attempt to measure the economic activity created by employment or the expenditure of resources at an airport. The goal is to track the movement of expenditures through the various economic sectors until the money, exported incrementally from a region through purchases of outside goods and services, is completely exported from the region. This type of analysis is helpful in accomplishing the following:

- Estimating economic outputs at airports from a given set of inputs or investments.
- Quantifying the “hidden” value associated with airport activity (induced economic impacts).
- Identifying the beneficiaries of public investment in aviation (tracing the movement of money through different economic sectors).

In traditional economic impact analyses, standard outputs include:

- **Direct Spending:** On-airport spending, including employment, operations, and capital projects as well as off-airport spending by air travelers for rental cars, hotels, restaurants, etc., by both airport service users and providers.
- **Induced Benefits:** Impacts created by successive rounds of spending in a local economy until the original direct or indirect impact is incrementally exported from the locale.
- **Jobs and Income:** Quantification of income generated by aviation and the number of jobs supported by the airport itself.
- **Total Output in Dollars:** The combined impacts of direct and induced spending.

- **Taxes:** Contributions in tax revenues by the aviation industry to local and state jurisdictions.

Many economic impact studies attempt to provide information about the economic value of aviation and the importance of airport operations and capital expenditures. Unfortunately, shortcomings in current methodologies prevent the desired goals from being realized. These are discussed in the following sections.

D. THE NEED FOR NEW METRICS

The following shortcomings raise questions about current methods for measuring the economic impact of airports:

- **Not Comparable to Other Enterprises:** In many cases, economic impacts for airports are described in terms of jobs, income, and output where there are no comparable enterprises on which to gauge the significance of the impact. For example, what is the economic impact of an 80,000 square-foot airline terminal relative to an 80,000 square-foot, big-box store? Does a GA airport generate as much economic benefit as a school, public library, or road project, all of which are competing for scarce municipal funding? Without comparable statistics, decisions are difficult to make about the optimum expenditure of public money.

- **Not Meaningful to Communities:** Often, economic impact studies are not published in a manner that is meaningful to citizens within the community due to the generalized nature of the results. Results should speak to the issues of concern to the public such as how much the enterprise is paying in taxes or how many persons are or will be employed in the future.

- **Not Used for Evaluation of Investment Purposes:** Most economic impact analyses are not used for the evaluation of capital investments. Unlike cost/benefit studies, economic impact analyses do not determine returns on investments. In fact, most traditional methodology is precluded from being incorporated into the Federal Aviation Administration's (FAA) current cost-benefit analysis process. New metrics are needed that can be incorporated into an evaluation of capital investment decision-making.

- **Does Not Measure Recommended Plan Impacts:** Most traditional economic analyses measure the current or existing economic impacts of an airport but do not consider the impacts of the recommended plan once implemented. To make informed decisions concerning capital investments needed for implementation of a recommended plan, economic impacts should be considered. In this regard, the change in economic impacts between existing conditions and the effect of a recommended plan represents the difference that provides the most help to decision-makers and stakeholders in the funding process.

- **Does Not Include Existing Property or Facility Value:** Traditional economic impact methodology does not usually place an economic value on the existing property or facilities at an airport. While the economic impacts of airport operation can be compared to the income statement of a financial report, there is no corresponding method for showing "balance sheet" assets and their value exists.

For an economic impact assessment to be considered meaningful, it must address financial issues beyond the traditional outputs described above. This could include impacts such as local taxes, return on capital investment, and opportunity costs associated with not investing in the airport system. In addition, a better method of measuring airport community value must be developed. Some inclusion of the existing value of airport facilities should be in the baseline definition of an airport's economic impact. This could take the form of an estimate of replacement costs or existing facility worth (including useful life depreciated values of facilities). With a baseline value such as this, it is more productive to measure actual return on capital investment or changes in total value over the planning period.

E. PROPOSED ACV METHOD FOR NORTH CENTRAL TEXAS

In establishing new metrics such as ACV, a broader view of economic impact should be instituted. Employed in this study are both the estimate of existing economic impact (total output) combined with estimates of the existing value of the airport. This method is comparable to examining both an income statement and a balance sheet when looking at the financial health of a business. These baseline values are then subjected to a number of sustainability assessment factors called Value Modifying Factors (VMF) in reaching a future estimate of an overall ACV.

Both traditional and new methods of economic impact analysis are used in this process. This ACV method incorporates familiar measures of job, income, and total output figures along with new metrics for estimating the value of an airport to a community. The process adds the existing value components and establishes a base year VMF score for each airport. For the future, the operational economic activity plus any capital investment is multiplied by the change in future VMF to yield the actual value of the future airport investments. This total is then added to the future (depreciated or appreciated) value of the airport to arrive at a future ACV. Thus, there are "before" and "after" ACV sets showing existing and future projected values. These measures include the following factors:

Existing Value Components

- Economic Impacts From Activity
- Airport Property and Facility Value
  - Replacement Value
  - Current Costs of Facilities Based on Useful Life Estimates

VMF (Sustainability Assessment)

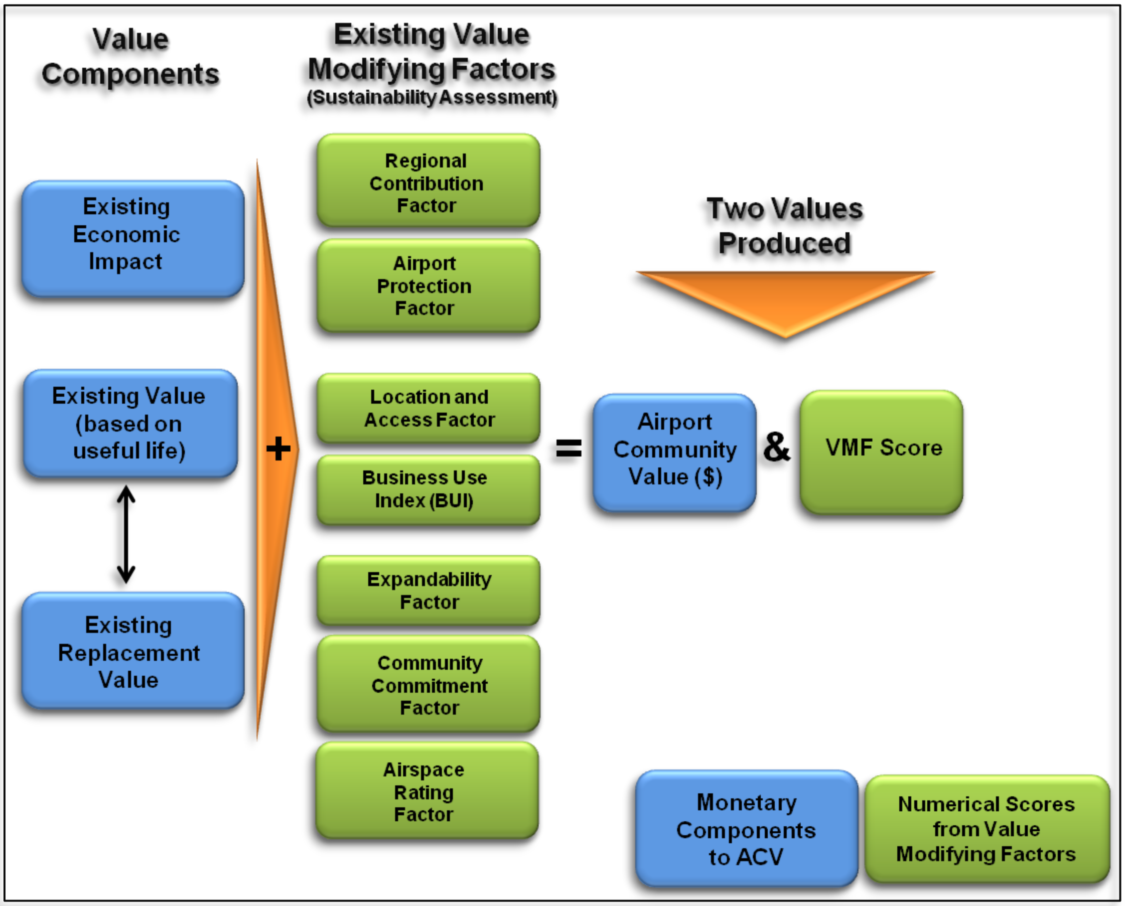
- Regional Airport Resource Factor
  - Geographic Coverage
- Airport Protection Factor
  - Land Use and Zoning Controls around Airport
- Location/Access
- Business Use Index
  - Multi-engine Propeller
  - Business Jet
- Expandability Factor
  - Airside, Landside
- Community Commitment Factor (CCF)
  - Past and Future Funding Availability
- Airspace Rating Factor

A community can change its future ACV at any time by undertaking actions impacting the VMF. For example, by lengthening a runway, an airport may increase its accommodation of business aviation, raising its Business Use Index (BUI). If the community is willing to commit dollars to capital improvements, this can increase the Community Commitment Factor (CCF) and so on. Taken together, these and other proactive measures can increase the value of an airport to a community. Local and regional planners as well as decision-makers can use this tool to measure their airport's ACV and to estimate return on capital investment from future capital contributions. Exhibit 1 presents a graphic illustration of the ACV estimation process. Methods for collecting or developing these measures are described in the following subsections.

EXISTING VALUE COMPONENTS

Existing value components to be compiled or estimated through the system planning process include the development or use of existing economic impact assessment numbers. This includes the number of existing jobs, the amount of income produced, and the total output for each system airport. The level of state and local taxes produced by the economic activity at the airport is important. In addition, an estimate of the current value of the system airport should be developed, using a replacement cost basis or replacement value minus useful life estimates of existing facilities.

Exhibit 1: ACV Estimation Process



Source: CHA Aviation Development Team

Existing Economic Impacts

The existing economic impacts involving jobs, income, total output, and state and local tax generation is measured by using economic models such as the IMPLAN methodology. This information is taken from a previous recent study where available. For those airports for which this information is not readily available, it is estimated by using other known correlation factors.

Existing Property and Facility Values for Airports

Two estimates of Existing Airport Value (EAV) are helpful in describing the overall ACV. The first value of an existing airport is the replacement cost of the facility. While not the current value of the facility due to depreciation of assets, this cost gives an idea of the utility value of the facilities at the local airport. Estimating replacement value is done by multiplying unit costs of construction times the existing quantities of facilities to derive an approximate infrastructure investment total. If land values can be determined, they should be added to the facility development costs, yielding a total replacement value. Not included in this method are the potential difficulties of actually replacing the airport due to environmental and land use constraints.

A second important descriptor in the ACV involves the depreciated value of the existing airport facilities. Rather than use actual depreciation schedules, which vary according to accounting methods, a simplified method could employ "useful life" estimates of facilities at system airports on a systematic basis across North Central Texas. In this regard, the approximate age of the various facilities is needed. Pavement Management System indices can be used for runway and taxiway system values. If straight-line methods are used, the useful life of a facility can be simplified for various types of buildings and infrastructure. For example, pavement life could be estimated to be 20 years. The useful life of buildings could be estimated at 40 years and so forth. Construction dates for the various facilities should be determined as the model is being set up. To approximate EAV, the useful life fraction (e.g., 10-year-old pavement has a fraction of 10/20 or 0.5) is then multiplied by the replacement value costs at system airports.

VALUE MODIFYING FACTORS (SUSTAINABILITY ASSESSMENT)

The existing values for economic impact and airport replacement costs offer a baseline estimate of overall economic value. However, this value is a static snapshot of a constantly fluctuating economic flow. The six primary factors that modify these values are discussed below. Numeric scores for each factor are discussed in Section F of this report.

Regional Airport Resource Factors

Airports are regional resources that serve areas beyond their sponsors' immediate political boundaries. As entry points to the nation's airspace system, airports can be considered "on-ramps" to the national air transportation system. A loss of such a facility reduces the overall service level of the national and regional system to a certain degree. The regional system plan should place a value on the on-going operations or expansion of each airport as a resource worthy of protection. Although it can be argued that all airports contribute to their local communities, this value differs on a case-by-case basis. This value can be estimated on a system level using geographic coverage as one parameter.

Using normal system planning guidelines of geographic coverage, a rating system should include:

- The classification/category of airports, see Exhibit 5 in the System Plan Inventory Report, categorizes airports by their design, based aircraft, etc. From these categories a quantitative value is achieved as an input for the ACV model.
  - Airport Category Values: F,G= 4, E= 3, D= 2, A,B,C= 1
- The population served by the airport as measured within a 30 minute travel time or 20 mile radius.

Loss of an airport in any category should be scored negatively using a point system defined in Section F of this report.

Airport Protection Factor

Communities that take actions to protect their airports are increasing the value of their investments. Protection of airport facilities includes any action that increases land use and zoning controls to ensure compatible uses near the site. This also includes appropriate height hazard zoning. Scoring this factor involves the following primary components:

- Control of Runway Protection Zone
- Runway Safety Areas in Place
- Land Use Compatibility
- Height Hazard Zoning for airport

Location/Access Factor

When addressing location or access, the convenience factor is being measured. One of the primary reasons for using air transportation is to save travel time. In this regard, access to an airport by ground is critical. The relative ease by which an airport can be accessed increases its value to the local community and to the regional system of airports. Similarly, the location of the airport relative to the community it serves is a factor that increases convenience for users. Scoring items include the following:

- Surface access rating is based on proximity to an interstate, limited access to state roads, regional arterials and local arterials.
- Location of the airport relative to major economic centers

Business Use Index

Similar to geographic coverage, airports should be scored relative to their accommodation of business aviation. As described in this system plan, business aviation has a significant economic value to an airport. Therefore, if an airport is able to accommodate business jets, it should receive a higher score in this category than airports with factors such as a short runways and/or low-load limit pavements. In addition, the number of jets or multi-engine propeller aircraft based at the airport should be used as a factor in the rating process. Scoring items include the following:

- The ability to accommodate business aviation as measured by airport classification designated by the System Plan.
- The number of business type aircraft (jet, multi-engine propeller) based at the airport as well as the number of itinerant operations.

Expandability Factor

The ability of an airport to expand is a significant factor in its future value to the community it serves. If an airport cannot expand, there is limited return on additional capital investment in the facility, since the population of aircraft it serves will not be significantly altered. For this factor, two primary criteria are used as a gauge. The first involves the ability to expand within existing airport property. Both airside and landside are included in this scoring. The second gauge is the potential ability of the airport to expand outside of its existing property boundaries. This measure should be qualitatively assessed, though non-park or wetland open space can exist outside airport boundaries, primarily off existing runway ends. Scoring items include the following:

- On-airport expandability, airside and landside.
- Off-airport expandability, primarily off existing runway ends.

Community Commitment Factor

The level of community commitment to a local airport is an important factor in assessing its existing and future value. Communities that have developed current airport master plans and capital improvement programs on file with funding agencies can be considered proactive in this area. In addition, past and future funding availability for the local airport is a good measure of community support. Airports that are under-funded or that have to forego grants because there is no matching local share, are by default, not considered supported by their communities. Scoring items include the following:

- Current plans on file with funding agencies such as airport master plans, airport capital improvement programs, airport zoning plans, Part 150 studies, and airport business plans.
- Past funding history for airport improvements including any airport operating subsidies and the frequency of past capital improvement funding from the airport sponsor.

Airspace Rating Factor

In GA airport systems, the airspace conditions in place at major airline airports can be a limiting factor for future aviation activity at smaller GA airports. This is the case in terms of overall levels of congestion and air traffic control in the system and restrictions within Class B airspace. Therefore, airspace can affect a facility's existing and future value to its sponsor and community. A qualitative assessment of airspace should regard the impacts as less intensive for GA facilities that are farther from major airline airports, and more intensive when located more closely.

F. METHOD FOR EVALUATION OF ACV SCORING

This section presents the method for evaluation of ACV scoring for airports included in the system plan modeling process. All of the factors shown in Section E are assigned evaluation values, based upon the criteria described above. All of the factors except BUI have the potential of scoring between zero and four points in the matrix. Because of its overall importance in an airport's future, the BUI scoring ranges from one to eight, essentially giving it double the weight of other evaluation factors.

No airport has to remain at its current ACV level. By implementing any of the actions listed as factors in the process, the ACV can be altered. With changing economic conditions, the ACV is a fluid number, fluctuating with supply and demand, investment capital, and policy changes designed to protect local airports.

MATRIX SCORING SYSTEM

A Microsoft Excel matrix scoring system was used to estimate existing ACV for each forecast system airport in this study effort. These values include the various inputs described in the preceding sections of this report. Exhibit 2 presents a screenshot of the Excel model, which includes instructions for each input value. Most of these values are quantitative and will be reproducible by different technicians. Some scoring items have qualitative aspects that require judgment and knowledge of airports, such as the determination of airport expandability.

Exhibit 2: Airport Community Value Scoring Matrix

Airport Community Value Scoring Matrix

Airport Name				
		Direct	**Indirect**	**Total**
Existing IMPLAN Values	Derived from existing TxDOT 2005 study or new effort			
Airport Jobs	Show Direct, Indirect, and Total			0
Total Output	Show Direct, Indirect, and Total			$0
Tax Contribution	Derived from existing 2005 study or new effort			$0
Existing Airport Replacement Value	See Input Sheet "Airport Replacement Value" for Details			$0
Existing Airport Value w/Depreciation	See Input Sheet "Existing/Depreciated Airport Value" for Details			$0
		Subtotal Existing ACV		$0

Value Modifying Factors

		Input Value		**Factor Score**
Regional Airport Resource Factor		Maximum Factor Score = 4		-
Airport Classification	Use Classes 1 - 4 (Not Military or Airline)			
Average Population in Service Area	Use NCTCOG Data for Each System Airport			
Airport Protection Factor		Maximum Factor Score = 4		0
Control of Runway Protection Zone	1=Yes, 0=No			
Runway Safety Areas in Place	1=Yes, 0=No			
Land Use Compatibility	1 Point for Each Quadrant			
Height Hazard Zoning for Airport	1=Yes, 0=No			
Location/Access		Maximum Factor Score = 4		0
Surface Access Infrastructure	.25=Local Arterial, .5=Regional Arterial, .75=Limited Access State Road, 1=Interstate			
Location Relative to Economic Centers	1 to 3 Miles=4, 4 to 6 Miles=3, 7 to 9 Miles=2, over 9=1			
Business Use Index		Maximum Factor Score = 8		0
Airport Classification	Use Classes 1 - 4 (Not Military or Airline)			
Business Aviation Activity	# Based Business Jets			
	# Itinerant Operations			
Expandability Factor		Maximum Factor Score = 4		0
On-Airport Expandability	Airside 1 to 4 using 4 pts. for 100%, 2 pts for 50%, etc.			
	Landside 1 to 4 using 1 pt. for each 5 acres			
Off-Airport Expandability	1 to 4 using 4 pts. for 100%, 2 pts. for 50% etc.			
Community Commitment Factor		Maximum Factor Score = 4		0
Current Plans on File	1 pt. for each - ACIP, Master Plan, Airport Zoning, Business Plan			
Funding History and Frequency	Airport Operating Subsidy=2 pts., Annual Capital Funding=2 pts., Less Than Annual Capital Funding, 1 pt.			
Airspace Rating Factor		Maximum Factor Score = 4		-
	1 pts. for 0-10NM from DFW, 2 pts for 11-15NM 3 pts. for 16-20NM, and 4 pt. for 21+ NM			
		Total VMF Scoring		-
		Maximum Factor Score = 32		

Source: The CHA Aviation Development Team and NCTCOG Staff

Exhibit 2 shows a screenshot of the Excel model input areas for the ACV input sheet. The top portion allows existing economic impact values from a selected study to be entered or new values from a separate analysis to be used. The Airport Replacement Value (ARV) and the EAV with Useful Life Reductions (ULR) is automatically generated from a different input sheet, Exhibit 3. The subtotal of the existing ACV is simply the existing total economic output combined with the EAV with ULR. This dollar amount is accompanied by a VMF.

VMFs are useful for all future actions and investments in the airport. The VMF calculation requires input in the blue boxes. These input factors are described for each item and do not need substantial explanations. Each VMF with the exception of the BUI has a maximum point total of four; the BUI has a maximum point total of eight. These input totals are then interpreted by the program and automatically adjusted and entered into the far right column. At the bottom of the table, the scores are totaled for each airport. The maximum point total is 32. The ranking of airports with regard to their existing VMF score does not imply a best-to-worst rank order. Instead, the ranking shows the leeway for each airport to adjust its future ACV. Those with lower VMF scores have more potential to improve their future ACV than those with higher scores. This improvement potential implies that future investments in the airport can have a high rate of return, relative to an airport that doesn't change its future VMF.

Prior to filling out the input sheet, information must be gathered on the highest number of based jets and itinerant operations at any system airport, the highest population service area, and the square footage for pavements and buildings.

AIRPORT REPLACEMENT VALUE AND EXISTING VALUE ESTIMATION

Key indicators of value involve the physical assets associated with airports and their infrastructure. By including the Airport Replacement Value (ARV) and the existing value estimation, a larger picture concerning the actual worth of the airport to the community is presented. Also, by introducing asset valuation, a mechanism for better measuring return on capital investment can be developed. Exhibit 3 presents the input sheet needed to develop estimates of replacement values and EAV, which incorporate ULR.

As shown in Exhibit 3, inputs needed for ARV estimates include the following:

- Total airport acreage and the most recent estimate of price per acre.
- Runway area in square feet (length multiplied by width) and cost per square foot.
- Taxiway values are estimated automatically.
- Apron Area (in square feet) requires estimates either from airport management or from aerial photography, along with cost per square foot.
- Conventional hangar square footage. Costs are estimated automatically at $120 per square foot but these cost factors can be changed.
- Number of T-hangar units. Costs are estimated automatically at $75,000 per unit but can be changed in the blue input box.
- The fuel system replacement value is based on the size of the facility. Three options are possible; $0, $250,000, and $500,000. Some fuel facilities cost more or less than these amounts, but on average, these replacement values are practical.
- The instrument approach capability places a value on these facilities or services, with non-precision valued at $500,000 and precision valued at $1,500,000.
- An air traffic control tower is valued at $2 million.
- Non-hangar buildings on the airport are valued at $230 per square foot, but the values can be changed.

The screenshot presented in Exhibit 3 produces both the ARV and the EAV.

Exhibit 3: Airport Replacement Value Input Sheet

Airport Replacement Value Input Sheet

	Description	Units		Cost/Number	Amount
Land Value	Acreage from 5010		Cost/Acre		$ -
Pavement					
Runway	Length x Width		Cost/SF	$ 16.00	$ -
Taxiway	1=Full, 2=Partial, 3=None				0
Apron Area	Area from Aerial		Cost/SF	$ 16.00	$ -
Hangars					
Conventional Hangars	Total Square Footage		Cost/SF	$ 120	$ -
T-Hangars	Total Units		Cost/Unit	$ 75,000	$ -
Fuel System	0=None, 1=AvGas Only 2=AvGas & Jet A				$ -
Instrument Approaches	0=None, 1=Nonprecision 2=Precision				$ -
Air Traffic Control Tower	0=No, 1=Yes				$ -
Non-Hangar Buildings	Total Square Feet from Aerial		Cost/SF	$ 230	$ -
				Total Replacement Value	$ -

Existing/Depreciated Airport Value Input Sheet

	Age of Existing Facilities				
Land Value	N/A				$ -
Pavement (Square Feet)	0-5 Years Old	6-10Y	11-20Y	Over 20Y	
Runway					$ -
Taxiway	N/A				$ -
Apron Area	-	-			$ -
Hangars					
Conventional Hangars (SF)					$ -
T-Hangars (# of Units)					$ -
Fuel System	N/A				$ -
Instrument Approaches	N/A				$ -
Air Traffic Control Tower	N/A				$ -
Non-Hangar Buildings					$ -
				Existing Facility Value	$ -

Source: CHA Aviation Development Team

EAV with ULR are estimated for each airport using the replacement value estimates combined with knowledge of the age of the various facilities. Inputs to the process include:

- Area in square feet and age of runway and apron areas.
- For hangars and non-hangar buildings, a 40-year life is assumed.
- Other facilities were not reduced in value, since their replacement costs are assumed to increase at the same rate as their depreciation.

For the two commercial airports, Dallas/Fort Worth International (DFW) and Dallas Love Field (DAL), some of these values were increased over and above the assumptions noted to account for these airports significant infrastructure. For example, these airports have extensive roadway, bridge, fencing/security, auto parking structures, and other high value facilities. Additionally, their fuel systems and instrument approach equipment is much more sophisticated than other GA facilities in North Central Texas. The EAV and ARV for these airports include the consideration of these infrastructure values.

G. ACV SCORING

The ACV metric described in the preceding sections was calculated for the 41 airports considered in the forecast for the System Plan. The product of the exercise is an estimate of the following three values for each airport and for the system as a whole: the economic impact value; the existing (depreciated) airport asset value; and, the airport facility replacement value. The methodology for performing the assessment of the ACV metric and the results of the task are described in the following sections.

To complete the ACV metric and to estimate the value of each airport to its community and the airport system in total, more than 20 discrete data values for each airport were researched and assembled into a database. This data corresponds to those described in preceding sections. The source of this data and any additional information regarding its use in the ACV metric calculations are described below.

Existing Value Components

Existing value components include the existing economic impact assessment data, the current value of the airport, and the replacement value of the airport. Existing value components are compiled or estimated for use in calculating each system airport as follows.

- **Economic Impacts:** Economic impacts include the number of existing jobs, the amount of income produced, and the total output for each system airport. For this calculation, the data was retrieved from the Texas Department of Transportation (TxDOT) 2005 Economic Impact Study. Estimates are made for airports not included in this TxDOT study using aviation activity spending estimates, average capital expenditure rates, and visitor spending totals. Because these are rough estimates, they only cover aviation activity. Other on-airport economic activity is not included due to the limitations of the scope of this project. However, for individual airport planning efforts, it is recommended that full economic impact assessments be performed if not completed within the TxDOT Study.

- **Airport Property and Facility Value**: Two estimates of EAV are used:

    - **Replacement Value:** The estimate of replacement values is calculated by multiplying unit costs of construction by the existing quantities of facilities to derive an approximate infrastructure investment need. Not included are the potential unknown costs or time delays related to environmental and land use constraints.

    - **Existing/Depreciated Value:** Estimates of an existing/depreciated facility value employ "useful life" estimates of facilities at system airports on a systematic basis across North Central Texas. For instance, pavement life is reasonably assumed to be 20 years, and the useful life of buildings is assumed to be 40 years. Some estimates are made of the age of facilities if that data was not available for this study. These useful life estimates will then then multiplied by the replacement value costs.

Replacement Values

The ACV metric estimates replacement values by scoring individual facility assets as follows. Unit cost estimates were provided by a licensed engineer.

- **Total Airport Acreage:** The land area for each facility is collected from current the FAA Airport Master Record (5010). Land values are estimated based on research of local real estate listings (described below).

- **Total Paved Areas by Type:** The paved runway and apron area are determined in square feet (length x width) and cost per square foot is applied. For this calculation, $16 per square foot is assumed. Taxiway values are estimated by assuming that a full-length parallel taxiway would be approximately 50 percent of the runway cost, and a partial parallel taxiway would be 25 percent of the runway cost. The square footage of paved areas was retrieved from 2007 aerials.

- **Conventional Hangar Value:** Total square footage of conventional hangar space is multiplied by the unit cost of such space. In this instance, unit costs are estimated to be $120 per square foot. The square footage of conventional hangars was retrieved from 2007 aerials.

- **T-hangar Building Value:** Total square footage of T-hangar space is divided by average unit size (1,000 square feet), to determine the number of T-hangar units. The number of units is then multiplied by the unit cost of such space. Unit costs are estimated at $75,000 per T-hangar. The square footage of T-hangars was retrieved from 2007 aerials.

- **Fuel System Value:** The fuel system replacement value is based on the size of the facility. In this instance, the ACV metric includes three options: no fuel system; AvGas only; and, a fuel system with both AvGas and Jet A fuels. While fuel system prices vary, an AvGas system is reasonably estimated at $250,000, and a dual-fuel system at $500,000. This data was retrieved from the 5010.

- **Instrument Approach Value:** While prices for approach equipment varies, the ACV metric values a non-precision system at $500,000 and precision approach at $1,500,000. This data was retrieved from the 5010.

- **Air Traffic Control Tower:** While these costs also vary, the minimum estimate for an air traffic control tower is $2 million. This data was retrieved from the 5010.

- **Non-hangar Buildings Value:** Total square footage of non-hangar buildings is estimated, and multiplied by the unit cost for finished space of this sort. The ACV metric estimates an average of $230 per square foot for non-hangar building costs. The square footage of non-hangar buildings was retrieved from 2007 aerials.

Existing/Depreciated Values

The ACV metric adjusts the existing/depreciated value of facilities by reducing the replacement value of each facility asset based on knowledge of the age of the various system airports. The ACV metric includes the following assumptions:

- **Paved Area Value Reductions:** The replacement cost of runway, taxiway, and apron areas are reduced by applying the following percentages based on estimated facility age. These percentages were provided by a licensed engineer.

    - Good (0-5 years): 12.5%
    - Fair (6-10 years): 37.5%
    - Poor (11-20 years): 75.0%
    - Over 20 years: 100.0%

  For the ACV metric, each airport’s runway pavement condition is available from the 5010. This data is used as the baseline for all pavement condition/age at each respective airport.

- **Hangars and Non-Hangar Building Value Reductions:** Using a 40-year life as a reasonable benchmark, the following percentages are applied to estimated replacement values for each facility: These percentages were provided by a licensed engineer.

    - 0-5 years: 6.25%.
    - 6-10 years: 18.75%
    - 11-20 years: 37.50%
    - Over 20 years: 67.00%

- **Other Facilities:** Other facilities such as fuel systems, air traffic control towers, and instrument approaches are not reduced in value, since their replacement costs are assumed to increase at the same rate as their depreciation.

- **Land Value:** Land values in North Central Texas vary widely and depend upon a range of market variables. Such variables include: location, zoning, utilities and infrastructure, and tract size. For the purpose of the ACV metric, both the existing and replacement land values are the same since land does not depreciate in value.

  To estimate land value, four unique land prices per acre were determined and utilized based on the location of the facility (rural, suburban/transitional, urban small, and urban large). The rural and suburban/transitional land prices were set based on two research publications[1] released by The Real Estate Center at Texas A&M University. Price per acre for urban land was based upon research from current property listings[2], and categorized as either small (0-149 acres) or large (150 or more acres). This threshold, 150 acres, was determined by the size of the airport facilities in this system plan and availability of land for sale that could accommodate them. Using this method, the land values assigned to each airport reflect both the size of the facility and the amount of land required to replace it. For example, the ACV metric assumes that land required to replace Ennis Municipal (30 acres, rural site) will be significantly less than Dallas Airpark (62 acres, urban small site), or Dallas Executive (1,070 acres, urban large site).

Value Modifying Factors

The existing values for economic impact and airport replacement costs discussed above offer a baseline estimate of facility values. However, these values are a snapshot of a constantly moving economic target. The VMFs discussed in Section F of this report address the market impacts of these values and offer insight into certain strategies that individual airport sponsors might consider to improve airport values and economic impacts.

Regional Airport Resource Factor (RARF): This factor is determined using two inputs, as follows:

- **Airport Design Classification:** The classification/category of airports, see Exhibit 5 in the System Plan Inventory Report, categorizes airports by their design, based aircraft, etc. From these categories a quantitative value is achieved as an input for the ACV model.

  - Airport Category Values: F,G= 4, E= 3, D= 2, A,B,C= 1

- **Service Area Population: The** population served by an airport is determined utilizing Geographic Information System (GIS) software. The estimate first requires the identification of a geographic area around each airport that could reasonably represent an airport's service area. In airport system planning, use of a 20-mile radius or 30-minute drive time areas is typical. Once the service area is defined, a simple GIS spatial analysis function is used to query the population within each airport's service area. The query utilizes population data provided by NCTCOG's 2030 Demographic Forecast, which is categorized by Traffic Survey Zone (TSZ) for use with the NCTCOG's calibrated travel demand model.

Airport Protection Factor: Communities that take measures to protect their airports are increasing the value of their future airport investments. However, assigning a quantifiable data score to such a qualitative factor is subjective. Therefore, the following assumptions are made in order to assign discrete scores to these factors for the ACV metric:

- **Land Use/Height Hazard Zoning Controls Around Airports:** The existence of protective zoning and/or land use controls around system airports is assessed via online research; specifically, independent searches are conducted to identify airports whose sponsor and/or other surrounding community has adopted zoning or other land use controls to protect the airport and surrounding property owners from noise issues and/or encroachment by incompatible land uses. One point is awarded for airports where such controls are identified and zero points are awarded otherwise. In some cases, the research found that some communities are in the process of adopting such zoning or controls for local airports. In these instances, one point is awarded in anticipation of the adoption of these controls.

- **Control of Runway Protection Zone (RPZ):** This assessment considers the extent to which an airport controls land beneath the RPZ and a score is assigned based on a review of airport property lines, 2007 aerials, and other sources available for individual airports. For example, an airport with control of the RPZ at each runway end (and all four RPZs at facilities with crosswind runways) receives two points. A facility with one of two RPZs under control receives one point. A facility with no RPZs under control receives zero points. Scoring for facilities with multiple runways awards a fraction of points depending on the number of runway ends, with the maximum point total for any airport being two points.

- **Runway Safety Areas (RSA) in Place:** The scoring for this factor is performed in the same manner as the RPZ factor scoring described above. In this way, points are awarded (0, 1, or 2) for facilities with a single runway, and a fraction of these points are awarded, based on the assessment, for facilities with multiple runways.

- **Land Use Compatibility:** The compatibility of land uses around each airport is assessed by first categorizing the surrounding areas into quadrants. Then, types of uses occurring on land in each quadrant are observed via 2007 aerials. One point is awarded for each quadrant where abutting land uses were compatible. Residential uses that are part of agricultural lands where the primary purpose is for agricultural use are considered agricultural in nature. Residential, retail, and office/commercial uses are considered non-compatible.

  Land uses considered compatible are, in descending order:
    - Natural/undeveloped areas
    - Agricultural lands
    - Low-rise/low density industrial areas.

- **Airport Classification:** The classification/category of airports, see Exhibit 5 in the System Plan Inventory Report, categorizes airports by their design, based aircraft, etc. From these categories a quantitative value is achieved as an input for the ACV model.
    - Airport Category Values: F,G= 4, E= 3, D= 2, A,B,C= 1

Location/Access: The ACV metric includes an assessment of the location and ground access qualities of an airport. ACV scoring for this factor includes the following two primary criteria:

- **Surface Access:** For this criterion a gradient score is used, where one point is assigned to a facility located on a local arterial, two points are assigned to a regional arterial, and three and four points are assigned to facilities adjacent to limited-access state roads and interstate highways, respectively. A three-mile radius of the airport is used to assess proximity to surface access facilities. In this manner, facilities with ground access via higher capacity roadways are awarded a higher score. This data was retrieved by utilizing GIS software to review various NCTCOG's surface transportation shapefiles.

- **Location Relative to Economic Center:** Utilizing the same gradient scoring system as described for surface access, four points are assigned to airports less than three miles from a center of economic activity, and three points are assigned to airports between four and six miles from such a center. Two points and one point are assigned to those airports between seven and nine miles and over nine miles from an economic center, respectively. This data was retrieved by utilizing GIS software to review the NCTCOG's Major Employer database and geographic location and density.

Business Use Index: Similar to geographic coverage, airports are assigned a score relative to their ability to accommodate business aviation use. The BUI score includes the following primary criteria:

- Airport Design Classification: The same classification used under the RARF is utilized. The airport design classification score is based on a point scale of one to four, with four being the most accommodating to corporate aviation.

- Based Business Aircraft and Itinerant Operations: The number of business type aircraft (jet) currently based at the airport as well as the number of itinerant operations are used as direct inputs into the model. The formula first assigns two points to the facility with the highest number of based jets and the facility with the highest number of itinerant operations. From this point, the model assigns fractional percentages of these highest scores for the other system airports, based upon their comparative percentage of the highest business activity of all airports being studied. In this way, the model establishes the benchmark for the highest performing business airport in the system, and determines all airports BUI scores based on their performance against this benchmark. This data was retrieved from the 5010.

Expandability Factor: The ability of each airport to expand, both on-airport (airside and landside) and off-airport, is assessed in a similar manner to the land use compatibility assessment. In this regard, an inverse scale is used to reflect the potential for growth. That is, airports with expansion capability are scored lower than those that had none. Thus, for future investment, the airport gains VMF points from expansion that in turn, increases the value of the investment. For example, if an airport expands in all directions it is awarded 100 percent expandability, which is valued at one point (inverse scoring). Similarly, facilities that could only expand in two quadrants are awarded 50 percent expandability, which is valued at three points. Both on-airport and off-airport expandability points are incorporated into an overall score that assigns lower values to those facilities with greater expansion potential than those with less. This data was retrieved using 2007 aerials.

Community Commitment Factor: Airports that have published plans for the future, and have been funded on a regular basis have a higher value than those that are neglected by their sponsors and funding agencies. Therefore, the following criteria are used in ranking community commitment for each system airport:

- **Current Plans on File:** Plans such as airport master plans, capital improvement plans, airport zoning, Part 150 studies, and airport business plans. An airport is awarded one point for each plan in place. This data was retrieved through internet searches and contact with airport sponsors within the region.

- **Three-year State Funding History:** Past funding history for airport improvements including any airport operating subsidies and the frequency of past capital improvement funding from the airport sponsor. Airports are awarded two points for having received TxDOT funding for each of the last three years. One point is awarded for airports with some level of funding for one or two years, but appeared to have a break in funding. Zero points are awarded to airports with no funding over the three-year period. This data was retrieved from the 2008–2010 and 2009–2011 Aviation Capital Improvement Program.

Airspace Rating Factor: In North Central Texas, DFW and DAL have Class B airspace that both restricts GA activities and contributes to congestion that GA operators must consider. The impact of Class B airspace is less significant for facilities that are farther away than for those that are close to these airports. To account for this, points are assigned to airports based on their distance from DFW Airport, as follows: 1 point for 0-10 miles; 2 points for 10-15 miles; 3 points for 15-20 miles; and, 4 points for 21+ miles. This data was retrieved from the DFW Terminal Area Chart.

H. SUBREGIONAL ACV METRIC RESULTS

An analysis of the existing ACV metric was conducted on a subregional level to coincide with other forecasting and recommendation phases of the System Plan. This assessment will provide a baseline of the current system by airports in a given subregion. The results of the ACV analysis (see Exhibit 4) reports aggregated subregional values to include:

- Total Airport Community Values
- VMF Scores
- Total Economic Outputs
- Existing Values
- Replacement Values
- Weighted VMFs

The values for monetary metrics (e.g. Total ACV, Economic Output) have been aggregated for each subregion based on the individual airport score for that subregion. Value Modifying Factors have been weighted based on an airport's total monetary Airport Community Value score. This allows for proper average scoring by subregion given the differences in total economic output and replacement value by facility type. The methodology used to obtain the total ACV and weighted VMF is outlined as follows:

Step 1: Aggregate Total Airport Community Value by Subregion

- Total ACV Formula – (Total Economic Output) + (Existing Value) = *Total ACV

*A sum of all airport Total ACVs yield a subregion's ACV score.

Step 2a: Aggregate Airport Weight by Subregion

- Airport Weight Formula – (Total ACV) x (VMF Score) = Airport Weight

Step 2b: Weight the Average VMF Values by Subregion

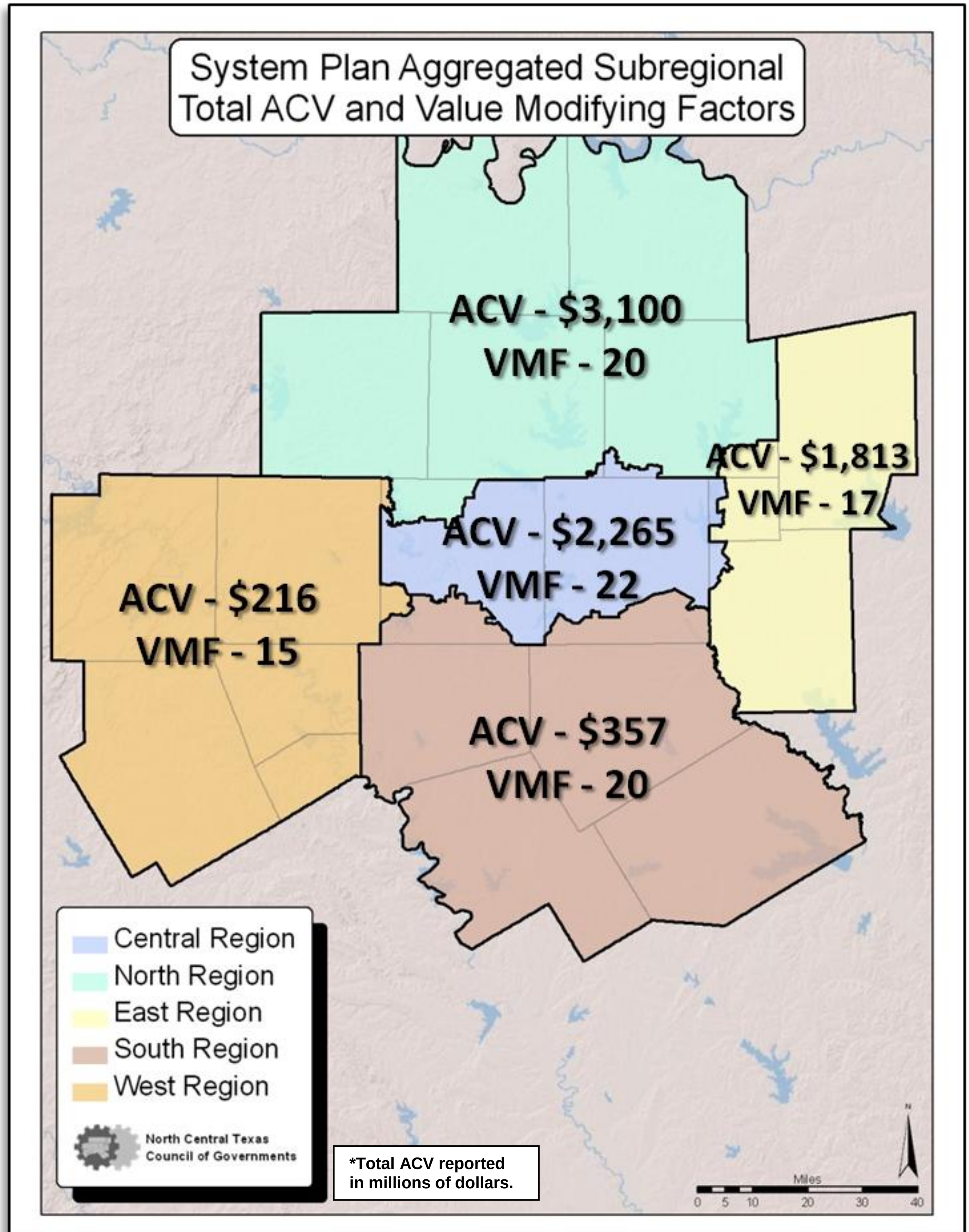
- Weighted VMF Formula – (Airport Weight) / (Total ACV) = **Weighted VMF

**A sum of all airports' weighted VMF yield a subregion's weighted VMF score.

Exhibit 4: Subregional Results of Part A: Current ACV

Sub Regional Results of Part A: Current ACV							
	(Value Totals in Millions)					Airport Weight	Weighted VMF
	Total Airport Community Value	VMF Score	Total Economic Output	Existing Value	Replacement Value		
North (12 airports)	$3,113	197	$1,883	$1,230	$1,708	63021	20
West (6 airports)	$216	77	$98	$119	$152	3154	15
South (8 airports)	$357	136	$63	$294	$383	57093	20
Central (7 airports)	$2,265	145	$1,413	$852	$1,111	49632	22
East (6 airports)	$1,813	88	$1,311	$502	$753	30670	17
Combined Totals	$7,764	643	$4,767	$2,997	$4,106	8,057,240	94

Exhibit 5: Aggregated Total ACV ($) and Weighted VMFs by Subregion



I. POTENTIAL USES OF THE ACV METRIC

The Current ACV metric was developed to assess and evaluate the present state of North Central Texas' general aviation system. A companion piece is being constructed to formulate the future ACV of general aviation airports by evaluating and prioritizing future airport improvement projects.

Ultimately projects will be grouped by System Plan airport designation and weighted to assist in determining the most effective airport improvement projects that bring the highest value to the general aviation airport system.

Source: Unless otherwise noted, Total Economic Output data was provided by ***Economic Impact of General Aviation in Texas**,* prepared by Wilbur Smith Associates for TxDOT, 2005.
** Source: CHA Aviation Development Team

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[1] The rural land price per acre came from *Texas Land Market Developments, Third Quarter 2008*, and suburban/transitional land price per acre was from *Texas Rural Land Value Trends 2007*, and based upon discussion with primary author and chief economist of both publications.
[2] Existing property listings used in ACV metric scoring were drawn from DFW Urban Realty, www.buyandselldallas.com.