CASSVILLE MUNICIPAL AIRPORT

AIRPORT MASTER PLAN - UPDATE

Prepared for the

City of Cassville, Missouri

Prepared by

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INTRODUCTION

This Airport Master Plan Study Update has been initiated by the City of Cassville to reevaluate the existing and future role of the Cassville Municipal Airport as was outlined in the original Master Plan Study conducted by Bucher Willis & Ratliff in 1992. The reevaluation of the plan is in response to increased aviation demand and changes in FAA minimum standards being placed on the existing airport.

The previous study outlined long-range airport development for the Cassville Municipal Airport, however only limited progress has been made since the original study was done. The goals of the City and airport have not changed significantly since the original study was done, but FAA aviation standards have changed. This update will re-evaluate the current and future aviation demand in the region and provide guidance for the continued, phased development of the Cassville Municipal Airport

MASTER PLAN PROGRAM

The primary objective of the Airport Master Plan program is to evaluate the existing and future aviation needs, to determine the long-range requirements for airport development, to identify and assess development alternatives, and to produce an airport development/ improvement plan which will yield a safe, efficient, economical, and environmentally acceptable public facility. The original Airport Master Plan was funded with a 90 percent grant from the Federal Aviation Administration. The remaining 10 percent match was provided by the City of Cassville. The plan was originally prepared by Bucher, Willis & Ratliff, Consulting Engineers, Planners, and Architects of Kansas City, Missouri. This update is being funded by a grant from the FAA at 95 percent with a 5 percent match from the City of Cassville. The update is being prepared by Sprenkle & Associated, Inc. of Monett, Missouri.

The airport planning study process serves as a medium for assembling community opinion, spirit, and concurrence. When approved by the various local, regional, state, and federal agencies, the Airport Master Plan represents the long-term intentions of all agencies regarding the type and extent of airport improvements. This permits long-range programming and budgeting, reduces lengthy review periods for each project, and provides for orderly and timely development.

The Master Plan program has been designed to provide an objective look at future airport needs and to answer some basic questions about the airport. These include:

1. **Does Cassville need an airport?**
2. **What is the airport's role?**
3. **What is general aviation and who uses the airport?**
4. **What are the existing and future airport facility requirements?**
5. **If necessary, can the existing airport site be expanded?**

6. **How will continued airport development affect the surrounding environment, City access, and area land use?**

7. **What are the development priorities?**

8. **What are the long-term federal, state, local, and private costs associated with future airport development?**

9. **What effect does the airport have on industrial and economic development?**

10. **What financing options are available for continued improvement of airport facilities?**

11. **How can airport revenues be enhanced?**

The completed plan will answer these basic questions and provide a step-by-step phased development program. A general outline of major elements to be included in the Master Planning program is as follows:

1. **PHASE 1 - AIRPORT REQUIREMENTS**
   - a. Inventory
   - b. Business and Pilot Involvement (Survey)
   - c. Forecasts of Aviation Demand
   - d. Demand/Capacity Analysis
   - e. Facility Requirements

2. **PHASE 2 - SITE ANALYSIS AND ENVIRONMENTAL REVIEW**
   - a. Review of Facility Requirements
   - b. Site Analysis
   - c. Affected Environment

3. **PHASE 3 - AIRPORT PLANS**
   - a. Airport Layout Plan
   - b. Airspace Drawing
   - c. Runway Protection Zones and Approaches
   - d. Centerline Profile
   - e. Terminal Area Plan
   - f. Airport and Area Land Use Plan
   - g. Airport Property Map

4. **PHASE 4 - FINANCIAL PLAN**
   a. Assessment of Priorities
   b. Schedule of Proposed Development
   c. Estimates of Development Costs

The Airport Master Plan study is being conducted in four stages to allow for input by the City of Cassville staff, the Airport users and City officials. The planning program is being directed through the City Administrator's office, working in close coordination with the Federal Aviation Administration.

AVIATION GOALS AND OBJECTIVES

The aviation goals and objectives for the Cassville/Barry County area must be considered as basic fundamental guides to further development. In addition, airport development is to be accomplished at minimum cost to user and non-user alike, without detrimental effects on the environment, and in concert with prevailing local, regional, state and federal goals and development plans.

The overall objective of the Airport Master Plan, then, is to provide an airport that is:

- Safe;
- Economically viable;
- In fulfillment of broad national, state and regional goals;
- Environmentally acceptable with respect to surrounding land uses;
- Acceptable to user and non-user alike; and
- Substantially user-supported.

The development of the Airport Master Plan is evidence that the City and the business community recognize the importance of aviation in community planning and the benefits from the maintenance of adequate airport facilities to the user and general public alike. With a sound, objective, and realistic Master Plan, the airport can fulfill its role as an economic asset to the community and a source of pride and satisfaction to the residents of the area.

GENERAL AVIATION TRANSPORTATION

Transportation plays a key role in the development of communities. The quality and availability of alternative modes between places directly affect their accessibility, and accessibility is one of the single most important variables affecting community growth and economic vitality. Aviation is an important element in the overall transportation network.

The Federal Aviation Administration (FAA) currently defines three broad categories of aviation activity: general aviation, certificated air carrier, and military. Because the Cassville Airport is used primarily by general aviation aircraft, in addressing the question of whether-or-not the Cassville region needs an airport and what role the airport serves, it is first necessary to define general aviation.

General aviation includes every type of civil flying other than the certificated air carriers, and, as such, the system is characterized by a relatively low profile. Most of the general public enjoy the benefits of the system while many remain unaware of its existence. Businessmen flying to meetings, plant visits or new site inspections; travelers using commuter airlines to make connections with major airlines; emergencies such as a doctor rushing a badly burned child to a distant hospital; intercity passengers flying between communities not served by major airlines; a restaurant owner bringing in fresh seafood; a contractor shipping a needed part for a stalled earthmover; a farmer spraying or seeding his crops; a rancher receiving cattle serum; and private pilots avoiding fuel and traffic problems by minimizing travel time while on vacation -- this is general aviation. General aviation flying or usage falls into four major categories:

Business: The use of an aircraft for executive or business transportation. This includes (1) aircraft used by an organization and operated by professional pilots to transport its employees and property (not for compensation or hire); and (2) aircraft used by an individual for transportation required by a business in which he is engaged.

Commercial: The use of an aircraft for commercial purposes (other than the commuter and air carrier) in four types of activity: (1) air taxi involving any use of an aircraft by the holder of an air taxi operating certificate; (2) aerial application, such as crop dusting; (3) special industrial usage, such as pipeline patrol surveys, advertising and photography; and (4) emergency use.

Instructional: The use of an aircraft for flight training under an instructor's supervision.

Personal: The use of an aircraft for a variety of personal reasons.

General aviation is the largest and, in many ways, the most significant element of the national air transportation system. General aviation constitutes 96 percent of all aircraft in use today. As of 2006, the scheduled airlines served only about 500 airports in the United States; however, there are over 19,800 general aviation airports nationwide. Thus, general aviation is definitely a major contributor to the national air transportation system.

General aviation airports provide a variety of public benefits to the surrounding service area. The most substantial of these are the time saved and cost avoided by using air transportation. It is no coincidence that general aviation has contributed to the national trend which has seen industry move away from the larger metropolitan areas to smaller communities. Smaller communities can offer industry lower taxes and labor costs, closer access to raw materials and natural resources, and a superior working environment. General aviation provides this time-saving link for corporative travel that can make the shift to an area such as Cassville very attractive.

CHAPTER ONE

INVENTORY

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INVENTORY

The inventory analysis is a systematic and comprehensive data collection process which is used to provide an understanding of the nature and scale of aviation-related factors. The information that is compiled is analyzed and then forms the basis for developing forecasts of aviation demand and in determining existing and future facility requirements.

The inventory process for the Cassville Airport Master Plan involved several elements, including:

- A physical inventory of existing airport facilities and services and an assessment of current and historic airport activity levels;
- Visits to adjacent area airports to identify airspace requirements, current facilities and activity levels, and their future development objectives;
- The collection of background information pertaining to the Cassville/Barry County area, including population and socio-economic characteristics;
- A comprehensive review of existing regional plans and studies to determine their effect and consistency with future airport development planning;
- A survey of representatives of various firms that currently use or may use the airport facility to determine their air transportation needs; and
- A survey of the airport operators and area pilots to determine their airport requirements and general attitude toward future airport improvements.

An accurate and complete inventory is an essential element to the success of the Master Plan because the findings and assumptions made throughout the report are dependent on the information that is assembled concerning conditions on and around the airport.

1.1 AIRPORT SETTING & ROLE

Cassville Municipal Airport is located approximately two (2) miles west of the City of Cassville. For based aircraft, the airport serves primarily the Barry County area. The airport also serves small portions of McDonald and Newton Counties. The airport location is shown in Figure 1.1. The airport is situated on approximately 101 acres of land. In 1994, approximately 14 acres of land was acquired at the west end of the runway to add the RPZ for runway end 9 of the primary runway. The airport elevation is 1,482 feet above sea level and primary access is provided by Missouri Highway 37. The Federal Aviation Administration classifies the airport as a Basic Utility (B-I) Airport.

1.2 AIRPORT DEVELOPMENT HISTORY

Public aviation activity began in Cassville in 1975 when the City received a federal grant for $250,000 to acquire land for an airport. At that time, the City constructed a 3,000' x 60' runway and made other associated improvements.

Airport improvement projects since the initial development of the airport have included construction of eight T-hangars and two conventional hangars. Fuel facilities have also been installed. In 1979, the City received a grant for $72,000 to install Medium Intensity Runway Lights (M.I.R.L.). Other developments at that time included lighting and an airport beacon. A trailer was purchased in 1990 to become the terminal building.

A new runway extension and overlay was completed in 1992, making Runway 9-27 3,600 feet long and 60 feet wide, with turnarounds on both ends. In 2000 and 2002 and additional 2 hangar buildings, providing a total of 5 rental spaces were built. In 2002, the runway and turn around at end 9 was crack sealed, seal coated and re-marked. With this project it was determined that the runway designation be changed from 8-26 to 9-27. In 2003, the taxiway and apron area was overlaid with 2" of asphalt. One area of the apron was torn out and replaced with 9" of base and 3" of asphalt. A French drain was installed under the area to rid it of water that was accumulating beneath the pavement. New airplane tie down anchors were installed and the areas were re-marked. In 2006, the existing rotating beacon failed and was replaced. In late 2007, the runway and end 9 turn around were let for crack sealing, seal coat and re-marking. This project will be completed in the spring of 2008.

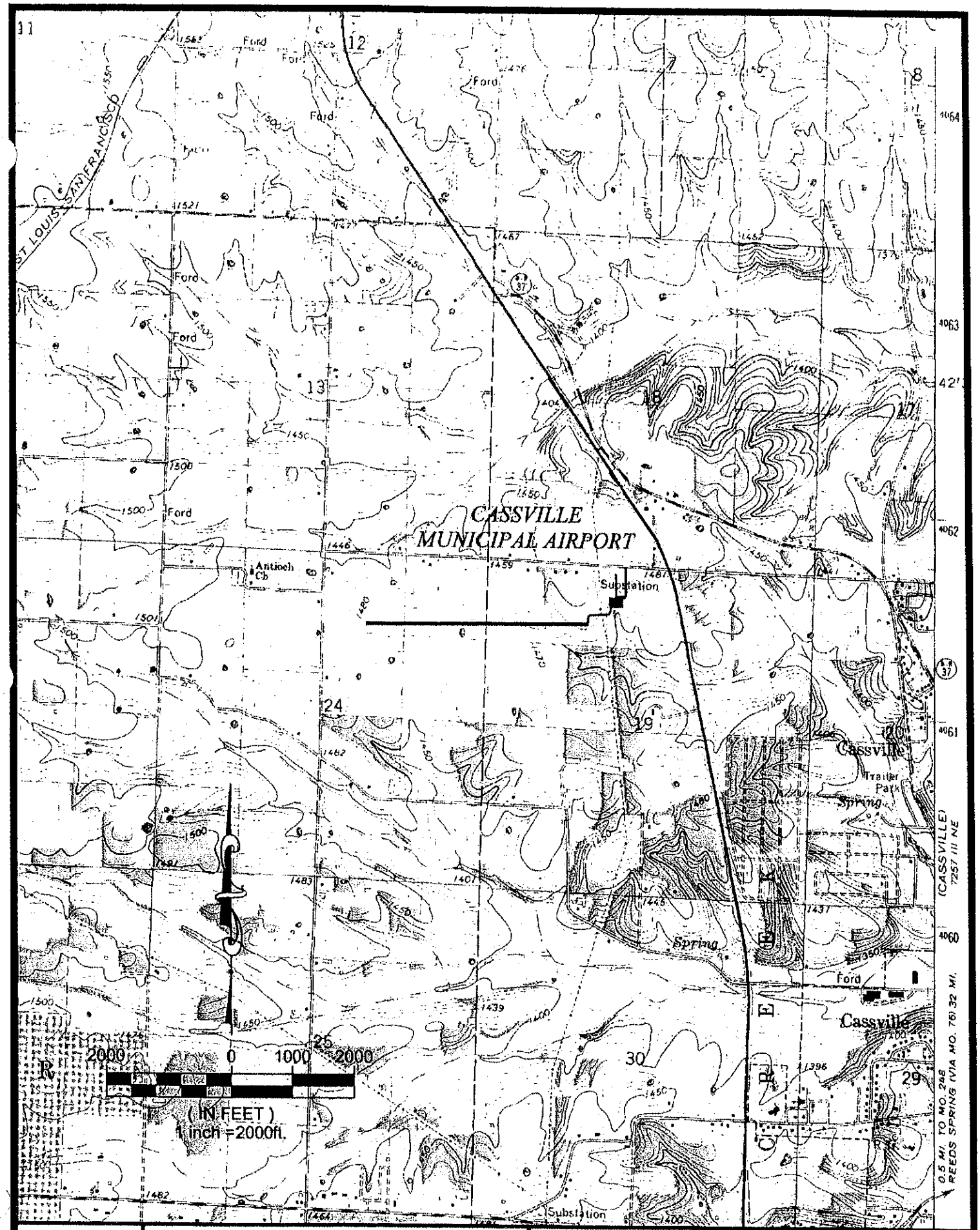
1.3 EXISTING AIRFIELD FACILITIES

The existing airfield facilities at Cassville Municipal Airport are shown in Figure 1.2, "Existing Facilities Drawing". The airport's only current runway is Runway 9-27.

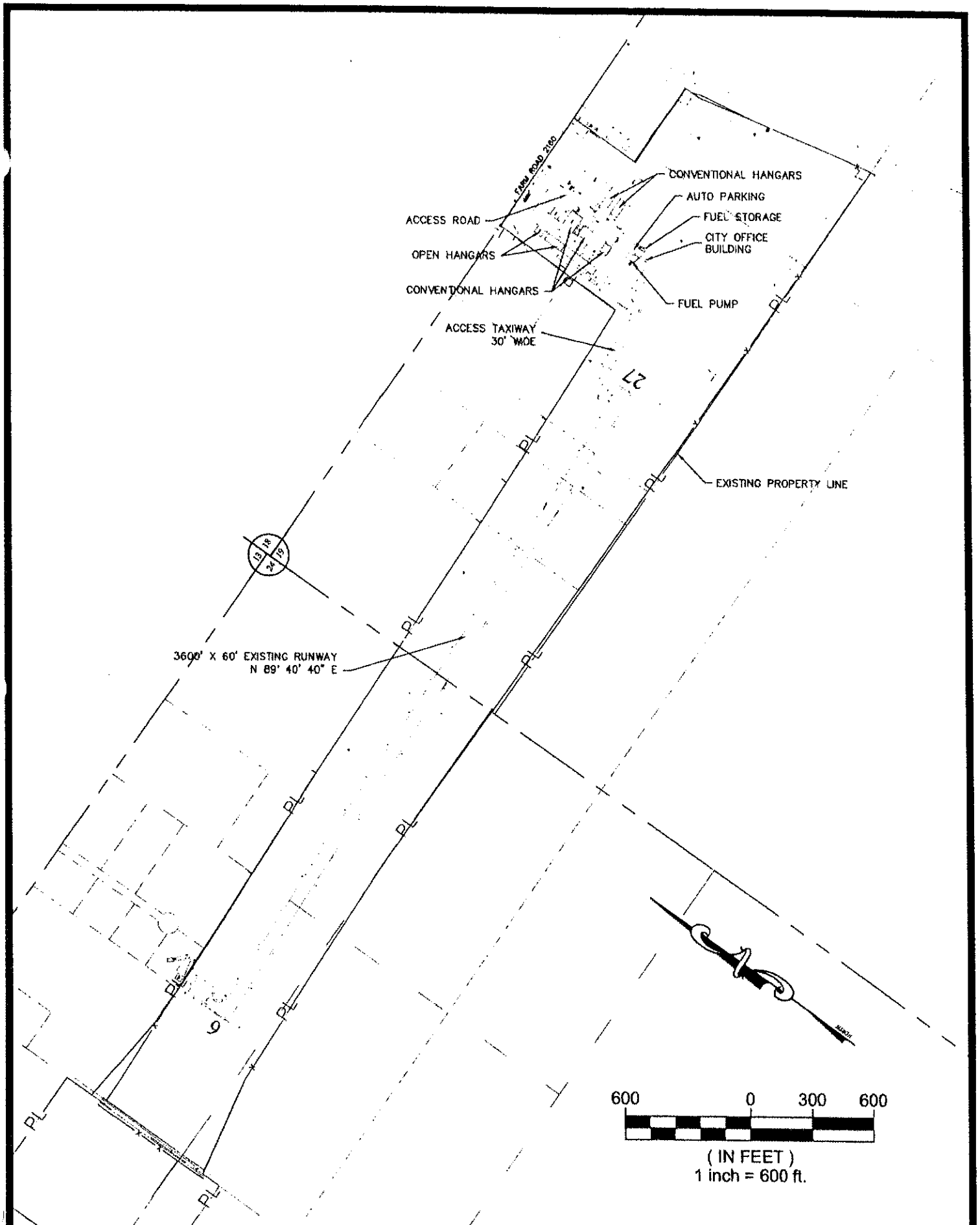
Runway 9-27 is 3,600 feet long and 60 feet wide, with turnarounds on the west end. The pavement material is asphalt with an estimated critical strength rating of 8,000 pounds single-wheel gear (SWG). The runway has non-precision instrument markings and medium intensity runway lights (MIRL) with threshold lights at each end. A winding taxiway connects the east end of the runway with the apron area. With the crack seal and seal coat, the runway surface will be in good condition.

1.4 TERMINAL AREA FACILITIES

The existing airport terminal area consists of the aircraft apron, terminal building, hangars, fixed-base operator (FBO) facilities, auto parking areas, and airport access road.



SAI	Sprenkle & Associates, Inc. *Consulting Engineers & Land Surveyors*	FIGURE 1-1 AIRPORT LOCATION MAP CASSVILLE, MISSOURI



SAI

Sprenkle & Associates, Inc.
Consulting Engineers & Land Surveyors

FIGURE 1-2 – EXISTING FACILITIES
CASSVILLE MUNICIPAL AIRPORT
CASSVILLE, MISSOURI

Aircraft Apron

The aircraft apron was constructed in 1975. In 2003, the apron area was overlaid with 2" of asphalt. One section on the north side was torn out and replaced with 9" of base rock and 3" of asphalt due to damage from water holding under the pavement. A French drain was installed to relieve the water. The ties downs were relocated to provide better clearance of the fuel facility. There are currently six (6) tie-down spaces. The condition of the apron is considered good.

Terminal Building

The 547 square-foot terminal building was constructed in 1990 and is owned by the City. The building has telephone service, restrooms, a small office, fixed base operator counter, and a pilot planning/lounge area with a television and soda machine. The structure is considered to be in good condition.

Hangars & Buildings

All of the hangars are privately owned and located on property leased from the City. Eventually all property on leased ground will revert back to the City. The condition of the small and large conventional hangars is good. The T-hangers are in fair condition.

Fixed Base Operator (F.B.O.)

Currently there is no FBO at Cassville Municipal Airport. A variety of services however, are now available at the airport including:

- Aircraft tie-downs
- Agricultural Spraying
- Flight Training
- Ground School

Fuel Storage

Cassville Municipal Airport currently has two underground fuel storage tanks. They are located adjacent to the northeast portion of the apron and were installed in the mid-to-late 1970's. There is one 2,000 gallon tank that contains 100 LL and one 1,000 gallon tank containing MOGAS. Neither tank is equipped with any type of leak detection or monitoring system. Although the tanks are owned by the City, the pumps are privately owned.

Utilities

The availability and capacity of utilities serving the airport are important in determining the development potential of the airport property, as well as the land immediately adjacent to the facility. Of primary concern in the inventory investigation is the availability of water and sewer systems and power sources.

•Water	Private Well
•Sanitary Sewer	Septic System
•Electric & Gas	Barry Electric CO-OP
•Telephone	GTE
•Fire Protection	Rural County Fire District and City
•Snow Removal	City of Cassville – Department of Public Works

Automobile Parking and Access

Currently, there are 9 paved automobile parking spaces which have been developed in the vicinity of the terminal building. Access to the Cassville Municipal Airport is provided by a county road off Missouri Highway 37. The airport entrance road is asphalt and is in good condition. Highway 37 and the county road are two-lane paved roads in good condition.

1.5 NAVIGATIONAL AIDS AND AIRCRAFT CONTROL

Ground-based electronic navigational aids that are located on or near the airport may be functionally classified as enroute navigational aids, terminal area navigational aids, and landing aids.

Enroute Air Navigation Aids

These location aids are for the purpose of enroute air navigation and permit aircraft in flight to navigate accurately using only instruments. A VHF Omni-Directional Radio Range (VOR) facility, generates directional information and transmits it by ground equipment to the aircraft, providing 360 magnetic courses to or from the VOR station. With distance-measuring equipment (DME) combined with the VOR, it becomes the VORTAC which enables pilots to know their exact geographic position by directly reading their instruments.

At Cassville there are two VORTACs within 30 nautical miles of the airport. The following is a list of the VORTACs, their location relative to the Cassville Municipal Airport, and their frequencies:

•Rogers - 29 miles southwest 116.4 and Ch. 111
•Neosho - 28 miles west, 116.6 and Ch. 113

Both VORTACs provide directional information to pilots in the Cassville area but the Neosho VORTAC is the only one that provides a published instrument approach into the Cassville Airport (VOR DME Rwy 9). Figure 1.3 illustrates the Low Altitude Route Structure in the Cassville Vicinity.

Terminal Area Navigation and Landing Aids

These facilities and equipment are located in the immediate vicinity of or on the airfield itself and are used to assist in landing and takeoff operations.

Lighting Aids

Several different types of lighting aids are available at Cassville Municipal Airport to facilitate the identification, approach, landing, and taxiing operations at night and in adverse weather conditions. The systems now in place at the Airport are described below:

- **Identification Lighting:** At Cassville Municipal Airport the rotating beacon is located just northeast of the primary runway on a 50 foot tall pole. The rotating beacon, which identifies the location and presence of the airport, is equipped with an optical system that projects two beams of light, one green and one white, 180 degrees apart. This light scheme designates the airport as civilian and open to the public.

- **Threshold Lighting:** Threshold lights are located at the immediate ends of the primary Runway 9-27 and are critical in the safe landing of aircraft. The lights are made up of two colors, red/green lens. The green half of the lens faces approaching aircraft and indicates the beginning of the usable runway. The red half of the lens faces the aircraft during takeoff, indicating the end of the usable runway.

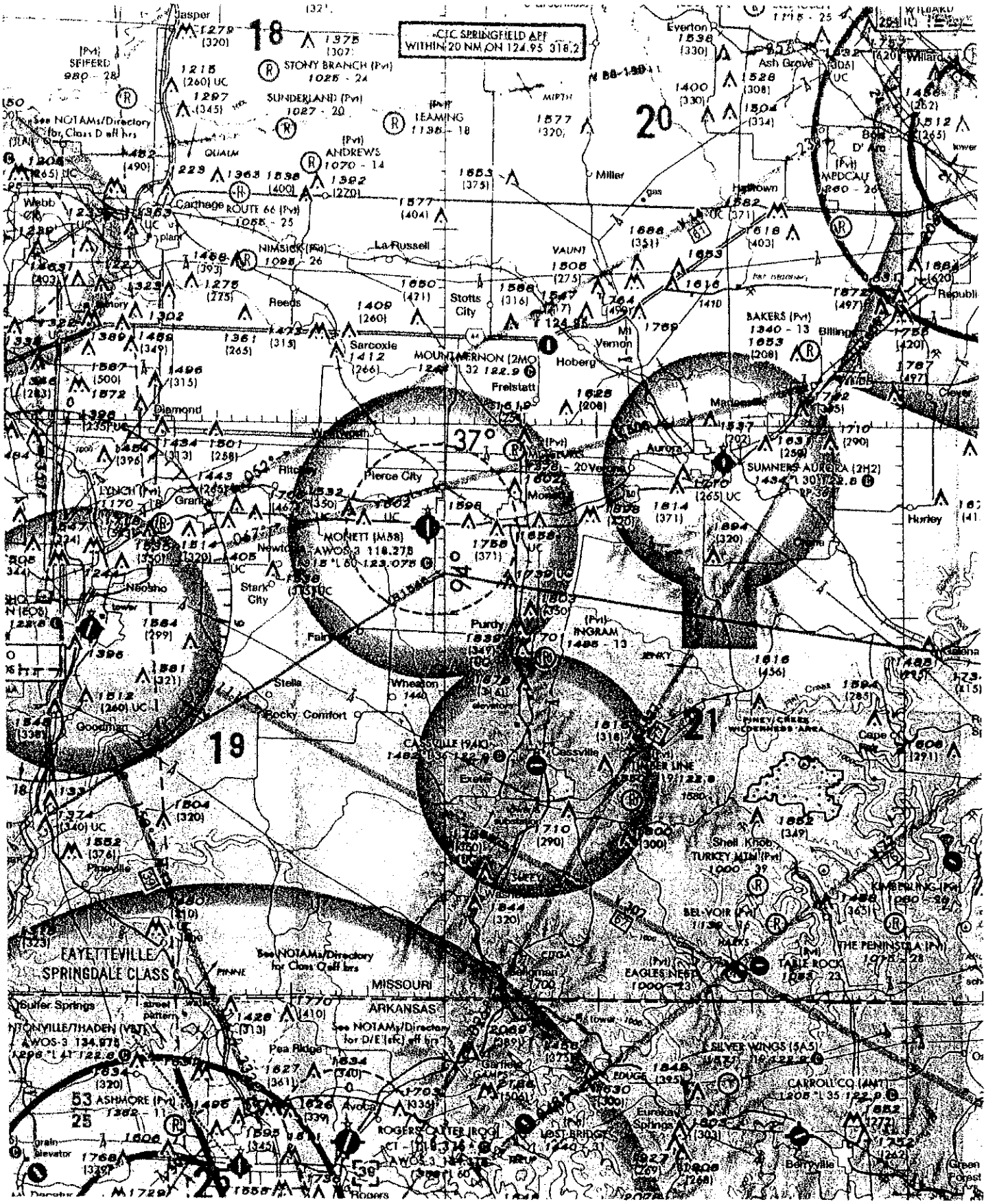
- **Runway Lighting and Taxiway Lighting:** Edge lighting is the standard runway system at the airport. Runway 9-27 is equipped with Medium Intensity Runway Lighting (MIRL). The connecting taxiways at Cassville Municipal Airport are further equipped with a Medium Intensity Taxiway Lighting (MITL) system. These lighting/visual aids are designed to give pilots direction on alignment, lateral distance and maneuvering information around the airport.

Other Facilities

The airport has a lighted wind cone and segmented circle located east of the east end of the runway. The wind cone provides information about wind speed and direction to pilots. The segmented circle provides pilots with traffic pattern information.

Local Operating Procedures

Cassville Municipal Airport is situated at 1,482 feet mean sea level (MSL). The traffic pattern altitude for all aircraft at the airport is 1,000 feet above the airport elevation (2,482 feet MSL). Both Runway 9 and 27 utilize a left-hand traffic pattern. Aircraft approach either runway end and follow a series of left-hand turns for landing. Pilots can also choose to use a straight-in approach, but should not disrupt flow of other arriving and departing traffic.



SAI	*Sprenkle & Associates, Inc.* *Consulting Engineers & Land Surveyors*	FIGURE 1-3 LOW ALTITUDE ROUTE STRUCTURE CASSVILLE, MISSOURI

1.6 AIRSPACE STRUCTURE

The FAA has established an airspace structure that regulates and established procedures for aircraft using the National Airspace System to ensure a safe and efficient airspace environment for all aspects of aviation. The U.S. airspace structure provides six categories of airspace and identifies them as Classes A through G.

Class A airspace is high level controlled airspace and includes all airspace from 18,000 feet MSL to Flight Level 600 (approximately 60,000 feet MSL). Class B airspace is controlled airspace surrounding high activity commercial service airports. Class C airspace is controlled airspace surrounding lower activity commercial service airports and some military airports. Class D airspace is controlled airspace surrounding low activity commercial service and general aviation airports with an air traffic control tower. All aircraft operating within Classes A, B, C and D airspace must be in constant contact with the air traffic control facility responsible for the particular airspace. Class E airspace if controlled airspace that encompasses all instrument approach procedures and low altitude federal airways. Only aircraft conducting instruments flights are required to be in contact with air traffic control when operating in Class E airspace. While aircraft conducting visual flight rules in Class E airspace are not required to be in radio communications with air traffic control facilities, visual flight can only be conducted when minimum visibility and cloud ceilings exist. Class G airspace is uncontrolled airspace that does not require contact with an air traffic control facility or minimum visibility and cloud ceilings.

Airspace in the vicinity of Cassville Municipal Airport is depicted in Figure 1.3. The airspace surrounding Cassville Municipal Airport extending from about 700 feet above the ground level (AGL) to approximately 18,000 feet MSL is Class E airspace. This Class E airspace also encompasses the low altitude Victor Airways in the vicinity of the airport. Victor Airways are corridors of airspace eight miles wide that extend from 1,200 feet AGL to 18,000 feet MSL, and extend between VOR facilities. There are no VOR facilities directly to Cassville Municipal Airport. Figure 1.3 shows the Victor Airways in the vicinity of the airport.

There is no Flight Service Station at the airport and the traffic utilizes the F.S.S. at Columbia. The airspace around the airport does not come under the influence of any existing airway or jet route. Airspace requirements for the existing airports in the vicinity have been reviewed, and no conflicts with regularly scheduled air traffic are anticipated.

1.7 REGIONAL AIRPORTS

A review of the Kansas City Sectional Aeronautical Chart indicated that there are no private airports within five miles of Cassville Municipal Airport; however, there are several public and private airports within thirty miles of the airport. Information for these airports was obtained from FAA Form 5010, Airport Master Records. Table 1.1 summarizes these airports, their location relative to Cassville's airport, and a brief description of their facilities:

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Table 1.1
AREA AIRPORTS

Associated City	Airport	Distance & Direction	Runway Length	Lights
Cassville	Timber Line (Pvt)	6 SE	1,900' Turf	No
Purdy	Ingram (Pvt)	6 N	800 Turf	No
Shell Knob	Turkey Mountain Estates (Pvt)	15 SE	3,950' Turf	No
Monett	Monett Municipal	16 NW	5,000' Paved	Yes
Golden	Bel-Voir Acres (Pvt)	17 SE	1,650' Turf	No
Golden	Eagles Nest (Pvt)	17 SE	3,100 Turf	No
Golden	Table Rock (Pvt)	18 SE	2,300' Paved	No
Freistatt	McClurg (Pvt)	19 N	1,000' Turf	No
Aurora	Aurora Municipal – Jerry Sumners Sr.	19 NE	3,000' Paved	Yes
Garfield, Ark.	Lost Bridge (Pvt)	22 S	3,150 Paved	No
Eureka Springs, Ark.	Silver Wings (Pvt)	22 SE	1,900 Turf	No
Shell Knob	The Peninsula (Pvt)	24 SE	2,800 Turf	No
Mount Vernon	Mount Vernon Municipal	25 N	3,200' Paved	Yes
Pineville	B S Ranch (Pvt)	26 SW	2,250' Turf	No
Rogers, Ark.	Rogers - Carter	26 SW	6,000' Paved	Yes
Granby	Lynch (Pvt)	27 NW	1,800' Turf	No
Berryville, Ark.	Carroll County	27 SE	3,550' Paved	Yes
Kimberling City	Kimberling (Pvt)	28 SE	2,600' Paved	No
Neosho	Neosho – Hugh Robinson	28 NW	5,000' Paved	Yes
Bentonville, Ark.	Bentonville – Louise. M Thaden	26 SW	4,100' Paved	Yes

Note: Airports are located in Missouri unless otherwise noted with the city.

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The area in the vicinity of Cassville's Airport is being analyzed for obstructions that could affect the use of the airspace around the airport and the safety of the foreign/itinerant users who are not familiar with the area. There is also a mobile home located at the west end of the runway that will need to be relocated in the property acquisition phase. Also there are some trees on the north side of the runway near the east end that will need to be addressed in the property acquisition phase. Other obstructions will be noted when the aeronautical survey is completed.

Also, located on the east side of the airport running parallel to Highway 37, are a series of power lines. Although these lines are marked to indicate their location, foreign/itinerant users should be aware of their presence. High power transmission lines continue along the county road that allows access to the airport on the north. The power lines located along the county road on the west and to the east along Highway 37 may have to be modified to accommodate any improvements to the west and east ends of the runway.

There is no Flight Service Station at the airport and the traffic utilizes the F.S.S. at Columbia. The airspace around the airport does not come under the influence of any existing airway or jet route. Airspace requirements for the existing airports in the vicinity have been reviewed, and no conflicts with regularly scheduled air traffic are anticipated.

1.8 AIRPORT AND VICINITY LAND USE

The City of Cassville has been successful in the development of an Industrial Park located within the City. It is believed that an industrial park located adjacent to the airport would be equally successful. Historically, industrial parks have been very compatible with airports and pose no land use conflicts.

The areas to the south and west are primarily a mixture of agricultural/open space. To the east are Highway 37 and one commercial business. Rural residential and wooded areas lie to the north, in addition to a power substation just off the county road.

1.9 CLIMATE

Area weather conditions play an important role in the planning and development of an airport. Temperature characteristics are used in determining runway length, and wind speed and direction determine the number and optimum runway orientation. A major factor in determining the need for navigational aids and lighting is the percent of time instrument flight rules (IFR) weather occurs. IFR weather conditions exist when visibility is impaired due to cloud coverage.

The climate of Cassville is typical of the Midwest, with low humidity, strong winds, cold winters, warm to hot summers and an abundance of sunshine. The average temperatures are 90 degrees for the hottest month and 32 degrees for the coldest months. Annual precipitation averages 41.0 inches. The all-weather wind rose for Cassville Municipal Airport, as shown on the Airport Layout Plan, indicates the predominant wind conditions as well as the wind coverage for the airport's runway configuration. The data was obtained from the Weather Station located at the Springfield Regional Airport.

1.10 HISTORIC AVIATION ACTIVITY

In order to identify past trends in aviation activity at Cassville's Airport, historic data on based aircraft, county-wide registered aircraft and aircraft operations, was assembled from F.A.A. and City records. The three primary sources of information were the F.A.A. Form 5010s, the F.A.A. Census of Civil Aircraft, and the Civil Aircraft Register.

Historic Based Aircraft

The primary factor in the development of aviation activity forecasts at general aviation airports is the number of based aircraft at the facility. To develop these forecasts, the procedure begins with an examination of available historic data and a determination of past trends for based aircraft at Cassville Municipal Airport and County registered aircraft.

The numbers of historic registered aircraft in Barry County since 1990 were obtained from the F.A.A. Census of Civil Aircraft. The summary of historic based and registered aircraft at Cassville Municipal Airport and for Barry County are shown in Tables 1.2 and 1.3. As can be seen from the tables, registered aircraft within the county has remained relatively stable over the past 15 years. Since 1990 there has been a slight decrease in the numbers of based aircraft, but overall they have remained very stable.

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Table 1.2
HISTORIC BASED AIRCRAFT
Cassville Municipal Airport

Year	Single Engine Aircraft	Twin Engine Aircraft	Turbo-Prop	Total Aircraft
1990	13	2	--	15
1992	13	2	0	15
1993	13	2	0	15
1994	13	2	0	15
1995	10	2	0	12
1996	10	2	0	12
1997	10	2	0	12
1998	11	2	0	13
1999	11	2	0	13
2000	11	1	0	12
2001	11	1	0	12
2002	11	1	0	12
2003	12	0	0	12
2004	12	0	0	12
2005	12	0	0	12
2006	12	0	0	12
2007	12	0	0	12
2008	12	0	0	12

Source: F.A.A. Terminal Area Forecasts, FAA Forms 5010.

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Table 1.3
HISTORIC REGISTERED AIRCRAFT
1999-2007

Year	Barry County	McDonald County	Newton County	Lawrence County	Christian County	Missouri State	United States
1999	53	11	26	17	27	5,316	219,464
2000	54	12	25	16	28	5,292	217,215
2001	53	14	28	16	28	4,932	211,446
2002	55	18	34	22	32	5,515	211,244
2003	53	18	43	29	35	5,758	209,241
2004	53	19	47	36	36	5,418	219,107
2005	55	22	52	43	36	5,346	224,352
2006	54	24	68	50	41	5,974	226,422
2007	55	24	74	55	45	6,935	221,943

Source: U.S. Census of Civil Aircraft; General Aviation and Air Taxi Activity Surveys

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Fleet Mix

FAA groups aircraft according to their performance and size. Each airport is assigned a reference code that is made up of an approach category letter based on approach speeds followed by a design group roman numeral based on plane wingspan or tail height. The five airport approach categories range from Category A for planes with approach speeds less than 91 knots up to Category E for planes with approach speeds of 166 knots or more. The six design groups range from Group I for planes with a wingspan of up to, but not including 49 feet up to Group VI for planes with a wingspan between 214 feet and up to but not including 262 feet. For Cassville Municipal Airport the existing critical aircraft is a Beech Baron and the Airport Reference Code is B-I. Table 1.4 shows the historic aircraft mix by classification.

Historic Aircraft Operations

Historic aircraft operations at Cassville Municipal Airport are shown in Table 1.5. Presently, the airport has 12 based aircraft, and an estimated 3,800 annual operations were performed at the facility last year. Aircraft operations are identified as local and itinerant operations. Local operations are performed by those aircraft which take off and land at the same airport and operate within the local vicinity of the airport. Itinerant aircraft operations are those in which the aircraft land or take off at one airport and have a terminus of flight at another airport. It is important to note that both local and itinerant systems can be performed by a based aircraft or a "foreign" aircraft based at another airport. Local operations consisted of approximately 740 which represented about 20% of all traffic. Itinerant traffic made up the balance with about 2,690 annual operations.

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Table 1.4
AIRCRAFT MIX BY CLASSIFICATION*
2007
(Operations)

a. **Aircraft Approach Category**. The aircraft approach category is a grouping of aircraft based on an approach speed. The aircraft approach categories and percentage of activity at Cassville are:

	Percentage of Activity	Estimated Annual Operations
Utility Aircraft:		
1. Category A: Speed less than 91 knots	89%	3,390
2. Category B: Speed 91 knots or more, but less than 121 knots	10%	380
Transport Aircraft:		
3. Category C: Speed 121 knots or more, but less than 141 knots	1.0%	30
4. Category D: Speed 141 knots or more, but less than 166 knots	0%	0
5. Category E: Speed 166 knots or more	0%	0

b. **Airplane Design Group (Physical Characteristics).** The airplane design group subdivides airplanes by wingspan. The airplane design group concept links an airport's dimensional standards to aircraft approach categories or to airplane design groups or to runway instrumentation configurations. The airplane design groups and percentage of activity at Cassville are:

		Percentage of Activity	Estimated Annual Operations
1.	Airplane Design Group I: Wingspan up to but not including 49 feet (15 m)	96%	3,650
2.	Airplane Design Group II: Wingspan 49 feet (15 m) up to but not including 79 feet (24 m)	4%	150
3.	Airplane Design Group III: Wingspan 79 feet (24 m) up to but not including 118 feet (36 m)	0%	0
4.	Airplane Design Group IV: Wingspan 118 feet (36 m) up to but not including 171 feet (52 m)	0%	0
5.	Airplane Design Group V: Wingspan 171 feet (52 m) up to but not including 214 feet (60 m)	0%	0
6.	Airplane Design Group VI: Wingspan 214 feet (60 m) up to but not including 262 feet (80 m)	0%	0

* Per A/C 150/5300-13

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Table 1.5
HISTORIC AIRCRAFT OPERATIONS
Cassville Municipal Airport
1990-2007

Year	Total Based Aircraft	Itinerant Operations	Local Operations	Air Taxi Operations	Military Operations	Total Operations
1990	15	2,000	1,000	200	10	3,210
1991	15	2,000	5,200	100	0	7,300
1992	15	2,000	5,200	100	0	7,300
1993	15	2,000	5,200	100	0	7,300
1994	12	2,000	5,200	100	0	7,300
1995	12	2,000	5,200	100	0	7,300
1996	12	2,000	5,200	100	0	7,300
1997	11	2,000	5,200	100	0	7,300
1998	11	2,000	5,200	100	0	7,300
1999	12	2,000	5,200	100	0	7,300
2000	12	2,000	5,200	100	0	7,300
2001	12	1,950	4,850	100	0	6,900
2002	12	1,950	4,850	100	0	6,900
2003	12	2,500	3,200	100	0	5,800
2004	12	3,000	1,600	100	0	4,700
2005	12	3,000	1,200	100	0	4,300
2006	12	3,000	1,200	100	0	4,300
2007	12	2,960	740	100	0	3,800

Source: F.A.A. 5010 Forms

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Annual Instrument Approaches

Although Cassville Municipal Airport has a published instrument approach off the Neosho VORTAC to Runway 9, there is no record of any completed approaches in the F.A.A Air Traffic Activity Report. However this is not a true representation of I.F.R. approach usage in the Cassville area. An I.F.R. approach is not counted by the F.A.A unless it is completed while under Air Traffic Control (A.T.C.) communication. Pilots often terminate communication with A.T.C. ten miles from the destination airport but continue on and complete the instrument approach. An approach carried out under these conditions is not counted. This is unfortunate because the F.A.A uses the Air Traffic Activity Report to determine the need for additional navigational aids. It is strongly encouraged that pilots continue their IFR flight plans and approaches under A.T.C. communication.

1.11 SOCIO-ECONOMIC CHARACTERISTICS

The historic and future levels of activity at an airport will depend, to a great extent, on the economic vitality and level of development in the airport's area of influence. For this reason, historic and forecast socio-economic information related to the Cassville and Barry County region was assembled for later use in the study. This data provides insight into the trends and character of the community. Specifically, the information is used to determine air transportation service levels as well as for forecasting based aircraft and operations at the airport.

Population

Table 1.6 illustrates the historic population trends for the Cassville/Barry County region. The data shows that the County population has grown fairly steadily as has the City population. This trend locally is expected to increase with the continued influx of manufacturing, service and retail enterprises into the City of Cassville. According to the County population projections listed in the Cassville Comprehensive Plan, County population will increase to about 44,300 for the plan period. City population is expected to show slight increases to about 4,000 people by the end of the planning period.

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Table 1.6
POPULATION TRENDS
City of Cassville and Barry County

Year	City of Cassville	Barry County	State of Missouri
Historic			
1970	1,910	19,597	4,677,000
1980	2,091	24,408	4,917,000
1990	2,371	27,547	5,118,000
2000	2,890	34,010	5,595,211
Forecasts			
2008	3,250	35,327	5,860.326
2010	3,410	37,072	5,922,078
2015	3,586	38,986	6,069,556
2020	3,764	40,917	6,199,882
2025	3,928	42,695	6,315,366
2030	4,075	44,295	6,746,762

Sources: U.S. Census Bureau; Missouri Population Projections, Missouri State Office of Administration.

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Area Income and the Economy

As indicated, an assessment of the economic conditions in Cassville and Barry County is important for the later development of aviation demand forecasts. Historically, the increases in registered and based aircraft in the United States have been closely related to population and income levels and trends in business and industrial growth.

From studies made by the Department of Commerce, it has been found that the likelihood of taking a trip by air increases as family income increases. These findings have been confirmed by several Census of Transportation studies. A parallel finding applies to general aviation market potential. The inclination and ability to own a general aviation aircraft is a direct function of family income; i.e., the larger the family income, the higher the incidence of aircraft ownership.

Historically, Cassville has had a very high percentage of manufacturing jobs compared to the rest of the state, which is the result of past successful industrial development efforts. This factor is important as it relates to airport activity in Cassville because a significant segment of the general aviation community is the corporate and industrial user. In recent years, general aviation has contributed significantly to the American industry trend, which has shown a move away from the larger metropolitan areas to smaller communities. Smaller communities can offer industry lower taxes and labor costs, closer access to raw materials and natural resources, and a superior working environment. General aviation provides the time-saving link for corporate travel that can make the shift to communities such as Cassville very attractive.

Table 1.7 summarizes the relationship of per capita income for Barry County, the State, and the U.S. between 1989 and 2006. Per capita income has historically been slightly lower than that of the State and the U.S. County per capita income levels should stay at about 75 percent of State levels through the planning period.

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Table 1.7
UNADJUSTED PER CAPITA INCOME TRENDS & FORECASTS
Barry County, Missouri U.S. (Current Dollars)

Year	Barry County	State of Missouri	Barry County as Percent of State	United States
Historic				
1989	12,357	16,988	72.7	18,520
1990	12,586	17,627	71.4	19,477
1991	13,624	18,353	74.2	19,892
1992	13,993	19,349	72.3	20,854
1993	14,596	19,862	73.5	21,346
1994	15,027	20,848	72.1	22,172
1995	15,642	21,559	72.6	23,076
1996	16,362	22,548	72.6	24,175
1997	17,182	23,716	72.4	25,334
1998	18,255	24,923	73.2	26,883
1999	18,912	25,697	73.6	27,939
2000	20,534	27,242	75.4	29,845
2001	20,992	27,818	75.5	30,574
2002	21,039	28,382	74.1	30,821
2003	21,157	29,115	74.5	31,504
2004	22,836	30,272	75.4	33,123
2005	23,218	31,426	73.9	34,757
2006	23,925	32,789	73.0	36,714
Forecasts				
2010	27,657	36,876	75.0	40,053
2015	30,836	41,115	75.0	44,657
2020	34,380	45,840	75.0	49,790
2025	38,332	51,109	75.0	55,513
2030	42,738	56,984	75.0	61,894

Source: 1989-2006, U.S. Department of Commerce, Bureau of Economic Analysis, website CA1-3 Data Tables.

Average Growth Rate 2.2 percent annually from The Budget and Economic Outlook, January 2008, Congressional Budget Office.

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1.12 INVENTORY SUMMARY

Based on the inventory analysis, current aircraft activity has been divided by F.A.A. classification relating to aircraft operating characteristics and size and expressed as a percentage of total aircraft operations.

The information provided within the Inventory - Chapter One provides the foundation upon which the remaining elements of the Master Plan are produced. Information on current airport facilities and utilization will serve as a basis for the development of forecasts of aviation activity and for the determination of future airport facility requirements. Further, information from airport users, City officials and airport personnel, will help to identify airport development priorities to meet the goals and objectives of the planning process.

CHAPTER TWO

FORECASTS OF AVIATION DEMAND

CHAPTER TWO
FORECASTS OF AVIATION DEMAND

As indicated in Chapter One, the demand for aviation services has, historically, been closely related to the socio-economic character of its area of influence. As population and relative income grow, there is generally a corresponding growth in the numbers of registered aircraft. Other indirect factors, such as commercial activities, health care requirements, industrial development efforts, and tourism are also important considerations. For Cassville, aviation demand forecasts have been prepared for:

- **Based Aircraft**
- **Aircraft Mix (types)**
- **Aircraft Operations (landings and takeoffs)**
- **Annual Instrument Approaches (AIAs)**

2.1 FORECASTING CONSIDERATIONS

Aviation demand forecasts are formulated in two steps. First, demonstrated past trends in the growth of the various demand elements are examined along with future area-wide development trends that may influence growth in air traffic activity. In addition, related socio-economic trends are also assessed. The aviation activity forecasts are then developed after examining these trends and then projecting them into the future using various mathematical techniques. Finally, a judgment is made about how these projections can be deemed a reasonable forecast for future behavior of aviation demand. The judgment of the various projections culminates in the selection of a particular project as the "preferred" forecast.

A considerable amount of subjective judgment goes into making general aviation forecasts, which rely heavily on national trends and forecasts modified to local conditions. Regardless of what methodology is used, assumptions must be made as to how activities might change in the future. The primary objective of forecasting is then, basically, to develop some measure of change so that preparations can be made to accommodate future needs efficiently and cost-effectively.

When assembling data for forecasting the first items to look for are the current F.A.A. Aerospace Forecast and any state data available to see what the trends are in national and state aviation. The F.A.A. Aerospace Forecast – Fiscal Years 2008-2025 projects that the active general aviation fleet will increase at and average annual rate of 1.3 percent through 2025. The turbine-powered fleet is projected to grow at an average annual rate of 3.7 percent per year and the turbine jet fleet to increase at an average annual rate of 5.6 percent per year. The trend appears to be that business use of general aviation aircraft will be expanding at a greater rate than personal/sport use.

Two important considerations weigh upon finalization of forecasts for facility planning purposes. The first concerns the relative accuracy of the forecasts. Generally, one cannot assume a high level of confidence in forecasts that extend beyond five years. Facility planning, however, often takes up to ten years to complete. The second consideration concerns the level of optimism reflected in the forecasts.

It is, therefore, important to design facilities that will be relatively insensitive to variations from the "preferred" forecast. For instance, it is important to ensure that, should a forecast prove conservative, facilities planned in conjunction with the forecast do not become extremely overcrowded within the planning period. On the other hand, should a forecast prove to be overly optimistic, facilities should not become an economic burden to the City because of anticipated revenues that may not materialize. Therefore, facilities planning should be done with a built-in tolerance for variation in the forecasts.

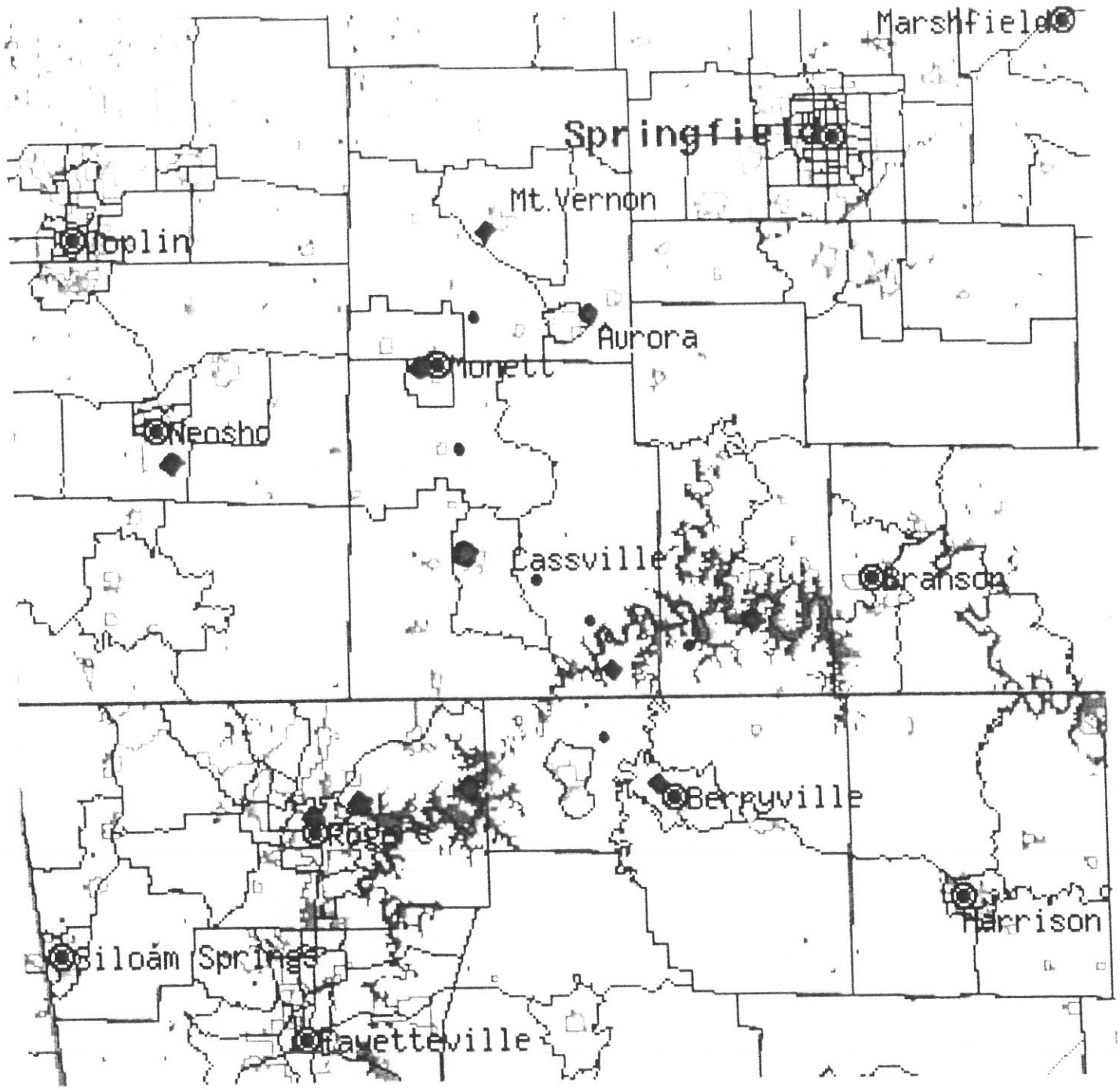
Also, the general business environment can have a distinct impact on the levels of aviation activity, especially in smaller communities. The addition, expansion, or elimination of a single industry can substantially alter the nature of aviation demand. Statistical techniques used to develop forecasts cannot take such deviations into account because it is usually impossible to predict their occurrence from an analysis of past trends. However, a thorough inventory review and the solicitation of input and participation from the business community (as has been done in the study through the mail surveys and personal and phone interviews) can offer significant insight into future conditions.

Finally, it should be noted that activity at general aviation airports is very sensitive to the types of facilities and services provided. Runway lengths, terminal and hangar facilities, fuel prices, general line service, etc. all are very important factors to the general aviation user. Consequently, forecasts based on historical behavior, and presented here in this report, should be used only to develop minimum planning criteria. Development of additional facilities to accommodate forecasts and/or provision of additional services could induce growth in activity considerably above the forecasts presented.

2.2 AIRPORT SERVICE AREA

The initial step in determining future aviation demand at Cassville is to define the generalized service area for the various types of aviation activity the airport can accommodate. The primary airport service area for Cassville Municipal Airport, as shown in Figure 2.1, was determined by considering other air facility choices available to users in the geographical region centered on Cassville. With information on competing airports, their capabilities and services, and their relative attraction or convenience, a determination can be made regarding Cassville Airport's share of the market. In determining the aviation demand for the airport, it was also necessary to identify the airport's role and intended services. The primary role of the airport has been that of a general aviation airport serving primarily ARC A-I, B-I and B-II aircraft.

The location of the airport relative to the region's large population centers and other area airports indicates that the primary general aviation service area for Cassville will include Barry County and small portions of McDonald and Newton Counties.



SAI

Sprenkle & Associates, Inc.
Consulting Engineers & Land Surveyors

FIGURE 2-1
AIRPORT SERVICE AREA
CASSVILLE, MISSOURI

2.3 BASED AIRCRAFT FORECAST

The most important factor in the development of aviation activity forecasts at a general aviation airport is the number of based aircraft. At Cassville, to determine future levels of based aircraft, regression analysis techniques and trend line projections were performed analyzing the socio-economic information previously assembled in Chapter One. In addition, previous forecasts and forecasting techniques were reviewed, compared for accuracy, and utilized where appropriate.

There has been recent interest in hangar space at Cassville Municipal Airport. Currently, there are no available enclosed hangar spaces for those with interest in housing their planes at Cassville; however these interested parties are willing to build the hangars to utilize Cassville Municipal Airport. Also, based on conversations with the airport board members, it is the general consensus that there are users of turbo-prop aircraft that would utilize the airport more if the runway was longer to allow them to land in conditions other than ideal. Both of these factors have affected our assumptions for immediate growth in based aircraft.

The regression analysis that was performed related the based aircraft to the area's population growth, employment characteristics, and per capita income figures. The analysis provided the highest coefficient of correlation and was in general agreement with previous forecasts prepared in the National Plan of Integrated Airport Systems (NPIAS). For the short-term, 15 based aircraft are projected by 2010. Extended to the long-term (2030), 27 aircraft area expected to be based at Cassville Municipal Airport.

The present and projected based aircraft figures are shown in Table 2.1. Based on information assembled during the inventory analysis and from F.A.A. aviation forecast information, the forecasts for based aircraft at Cassville indicate an increasingly higher percentage of multi-engine aircraft through the plan period.

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Table 2.1
BASED AIRCRAFT FORECAST
Cassville Municipal Airport

Year	Single Engine (A-I)	Multi-Engine (B-I)	Turbo-Prop (B-II)	Rotorcraft/ Other	Forecast Total Aircraft
2007*	12	0	0	0	12
2010	13	2	0	0	15
2015	14	3	0	0	17
2020	17	4	1	0	20
2025	18	5	1	0	24
2030	20	6	1	0	27

Note: A-I, B-I, B-II refers to F.A.A. Aircraft Reference Codes (A.R.C.). See Table 1.4 for explanation of terms.
*Actual

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2.4 AIRCRAFT MIX FORECAST

The forecast of operations performed by the various types of aircraft at Cassville Municipal Airport is required to determine the design requirements and current or potential future environmental "spillover" effects associated with airport activity.

Currently, three categories of aircraft extensively utilize the airport -- light single-and twin-engine aircraft and a limited number of turboprop aircraft. (F.A.A. Category A & B Aircraft) The estimated current usage by percentage was previously indicated in Table 1.4. Facilities required to accommodate each category of aircraft are considerably different, particularly with respect to runway length and strength. Runway length, for example, is based on the largest category of aircraft performing a significant number of annual operations, usually about 500 itinerant operations per year.

The general aviation, propeller-driven aircraft are divided into categories and are distinguished by F.A.A. Aircraft Reference Codes. Code A-I and B-I aircraft are primarily single-engine and smaller twin-engine types. Code B-II aircraft are larger twin-engine types and turboprop aircraft. Aircraft within each category are shown in Table 2.2.

At Cassville, approximately 10% of last year's activity was by twin-engine utility aircraft or about 330 annual operations. Of these, about 120 operations were by A.R.C. B-II aircraft. Assuming growth of twin-engine operations parallels that forecasted by the F.A.A. for the United States, Cassville can expect about 1,800 multi-engine operations by 2030. Of these, about 700 operations are expected to be by A.R.C. Code B-II aircraft.

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Table 2.2
EXAMPLES OF GENERAL UTILITY AIRCRAFT
ACCOMMODATED BY AIRPORT TYPE

	Airport Reference Code A-I	Airport Reference Code B-1	Airport Reference Code B-II
Beech	B19 Sport/150	Beech F33A Bonanza	Beech B58P Baron
Beech	B24R Sierra/200	Beech V35B Bonanza	Beech B60 Duke
		Beech A36 Bonanza	Beech B80 Queen Air
		Beech C23 Sundowner	Beech E90 King Air
Bellanca	Citabria Series		
Bellanca	300A Super Viking		
Cessna	150 Series	Cessna 204 Skywagon	Cessna 340A
Cessna	172 Skyhawk	Cessna 337 Skymaster	Cessna402B Businessliner
Cessna	T205 Stationair	Cessna P337 Skymaster	Piper PA-24 Series
		Cessna 310	Piper PA-30-150 Twin Commanche
Grumman	American AA-1B Trainer	Piper PA-32-260 Cherokee Six	Piper PA-31-350 Chieftain
Grumman	American AA-5A Cheetah		Piper PA-31-425 Navajo
Grumman	American AA-5B Tiger	Piper PA-23-250 Aztec	
		Piper PA-34-200 S eneca II	Rockwell Int'l. 500S Shrike
		Ted Smith Aerostar 600	Rockwell Int'l. 685 Commander
Mooney	M20C Ranger	Ted Smith Aerostar 601	Also accommodated are the models listed under Basic Utility Stage I and II.
Mooney	M20E Chapparrel	Also accommodated are the airplane models listed under Basic Utility Stage I.	
Mooney	M20F Executive		
Navion	Rangemaster H		Note: Some of the above models have an option for for a seating configuration of 10 passenger seats or more.
Piper	PA-11 thru PA-22 Series; PA-28		
Piper	PA-32-300 Cherokee Six		
Piper	PA-32-300R Lance		
Rockwell	Int'l. 112A Commander		
Rockwell	Int'l. 112, 114 TC Commander		

*F.A.A. Approach Category B; Airplane Design Group II, See Table 1.4 for reference

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2.5 AIRCRAFT OPERATIONS FORECAST

The aircraft operations forecast is another key factor in scheduling airport development. What improvements are required, when they are required, and the establishment of probable federal funding eligibility for major capital improvement depends generally on the levels of activity realized throughout the planning period.

The forecast of general aviation operations for Cassville Municipal Airport has been developed using the based aircraft forecast and then applying anticipated utilization rates. Total annual operations are expected to increase from about 3,800 per year (2007 data) to about 8,100 by 2030. At Cassville, operations per based aircraft have averaged anywhere from 200 to 400 per year over the last twenty years. At present, there are approximately 317 operations performed per based aircraft. Based on the past and on anticipated trends nationally and in the region, the general aviation operations per based aircraft ratio is expected to be 250 operations per year for the first part of the planning period and increase to 300 operations per year for the rest of the planning period.

Historically, the local percentage of operations has been around 20 percent and itinerant operations made up 80 percent of operations except in 1991 when local/training operations were extensive. Typically, itinerant operations increase with business and industrial usage since business aircraft are used primarily to transport people from one location to another. Because of the large industrial base in Cassville, which includes substantial usage by foreign itinerant aircraft, the itinerant portion of activity is expected to stay close to 80 percent within the plan period.

Table 2.3 summarizes the projected aircraft operations for the planning period. The activity is generated by based aircraft, based aircraft utilized for training, other local aircraft, and "foreign" itinerant aircraft.

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Table 2.3
AIRCRAFT OPERATIONS FORECAST
Cassville Municipal Airport

Year	Based Aircraft	Operations per Base Aircraft	Itinerant Operations			Percent Itinerant Operations	Total Operations
			Local Operations	Air Taxi	Other GA		
2007*	12	317	740	100	2,960	81	3,800
2010	15	250	750	100	2,900	80	3,750
2015	17	250	850	100	3,300	80	4,250
2020	20	300	1,200	200	4,600	80	6,000
2025	24	300	1,400	200	5,600	81	7,200
2030	27	300	1,600	200	6,300	80	8,100

* Actual

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The aircraft operations mix forecast was developed on the basis of information assembled in the inventory analysis and on national trends, aircraft inventories, and anticipated future requirements of the Cassville business community. Although the majority of aircraft activity at Cassville Municipal Airport will continue to be the single- and twin-engine utility aircraft, the forecasts shown in Tables 2.4 and 2.5 reflect the increasing trend toward use of larger, more sophisticated aircraft.

Air Taxi Operations

The aircraft operations associated with current and future air taxi service is a very special element of general aviation demand and should be addressed independently. Only since 1972 have air taxi operations been identified as a separate operational category by F.A.A. activity records, having previously been included in the general aviation element. As indicated previously in Table 1.5, there were 100 air taxi operations reported at Cassville in 2007. The air taxi portion of operations is not expected to increase very rapidly during the planning period. With this in mind, by the year 2030 there is expected to be approximately 200 annual air taxi operations.

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Table 2.4
AIRCRAFT MIX FORECAST (Operations)
Cassville Municipal Airport

Year	Single-Engine Piston (A-I)	Multi-Engine Piston (B-I)	Multi-Engine Turbo-Prop (B-II)	Business Jet 75/60 (C-II)	Rotor-Craft	Total Operations
2007	3,410	240	120	30	0	3,800
2010	2,800	400	250	100	200	3,750
2015	3,100	500	300	150	200	4,250
2020	4,300	700	500	200	300	6,000
2025	5,100	900	600	250	350	7,200
2030	5,600	1,100	700	300	400	8,100

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Table 2.5
AIRCRAFT MIX PERCENTAGES (Operations)
Cassville Municipal Airport

Year	Single-Engine Piston (A-I)	Multi-Engine Piston (B-I)	Turbo-Prop Multi-Engine (B-II)	Business Jet 75/60 (C-II)	Rotor Craft Other
2007	89.7%	6.3%	3.1%	0.9%	0.0%
2010	74.6%	10.7%	6.7%	2.7%	5.3%
2015	72.9%	11.8%	7.1%	3.5%	4.7%
2020	72.9%	11.7%	8.3%	3.3%	5.0%
2025	70.8%	12.5%	8.3%	3.5%	4.9%
2030	69.1%	13.6%	8.6%	3.7%	4.9%

Note: A-I, B-I, B-II, C-II refers to F.A.A. Airport Reference Codes

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2.6 ANNUAL INSTRUMENT APPROACHES

The forecast of Annual Instrument Approaches (AIAs) provides guidance in determining an airport's requirements for additional navigational aid facilities. An instrument approach is defined as "an approach to an airport, with intent to land, by an aircraft in accordance with an Instrument Flight Rule (IFR) flight plan, when the visibility is less than three miles and/or when the ceiling is at or below the minimum initial approach altitude."

The forecasts for AIAs assume 10% IFR weather and a steady increase in instrument-rated pilots from 45% to about 60%. This also takes into account the trend toward a more sophisticated general aviation fleet. Table 2.6 summarizes the forecast of Annual Instrument Approaches through the plan period.

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Table 2.6
ANNUAL INSTRUMENT APPROACH FORECAST
Cassville Municipal Airport

Year	Total Itinerant Operations	Ops. IFR Weather	Percent IFR-Rated Pilots	Annual Operations During IFR Weather Approaches	Annual Instrument Approaches (AIA's)
2007	3,060	10%	45%	138 (4.5%)	70 (2.3%)
2010	3,000	10%	50%	150 (5.0%)	75 (2.5%)
2015	3,400	10%	50%	170 (5.0%)	85 (2.5%)
2020	4,800	10%	50%	264 (5.5%)	120 (2.5%)
2025	5,800	10%	60%	348 (6.0%)	174 (3.0%)
2030	6,500	10%	60%	390 (6.0%)	195 (3.0%)

IFR - (Instrument Flight Rules), Unconstrained Forecast and assumes all IFR flight plans are completed and cancelled only after executing the IFR approach.

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2.7 FORECAST SUMMARY

The purpose of this chapter has been to develop forecasts of future aviation activity that will be used to guide in the continued development of Cassville Municipal Airport. These are summarized in Table 2.7. The next chapter will identify the future facility requirements for the airport.

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Table 2.7
SUMMARY - AVIATION FORECASTS
Cassville Municipal Airport

ACTIVITY		2007 Current	2010 5-Yr.	2015 10-Yr.	2020 15-Yr.	2025 20-Yr.	2030 25-Yr.
A.	**BASED AIRCRAFT**	12	15	17	20	24	27
1.	Single Engine	12	13	14	17	18	20
2.	Twin Engine Helicopter & Turboprop	0	2	3	3	6	7
3.	Helicopter & Other	0	0	0	0	0	0
B.	**AIRCRAFT OPERATIONS (TOTAL)**	3,800	3,750	4,250	6,000	7,200	8,100
1.	Basic Utility (A-I, B-I)	3,650	3,200	3,600	5,000	6,000	6,700
2.	General Utility (B-II)	120	250	300	500	600	700
3.	Business Jet (C-II)	30	100	150	200	250	300
4.	Rotor-Craft/Other	0	200	200	300	350	400
C.	**ANNUAL INSTRUMENT APPROACHES (AIAs)**	70	75	85	120	174	195
D.	**AIRPORT REFERENCE CODE (A.R.C.)**	B-I	B-I	B-I	B-II	B-II	B-II

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where's critical aircraft discussion to justify 500 ops w/ B-II ?

CHAPTER THREE

AIRPORT FACILITY REQUIREMENTS

CHAPTER THREE
AIRPORT FACILITY REQUIREMENTS

This chapter identifies the long-range facility requirements for Cassville Municipal Airport that will be required to satisfy the annual aviation demand through the year 2030. The facility requirements are developed from information assembled in the inventory and forecast analysis and from F.A.A. criteria for design of airport components. The analysis yields estimates of required **"airfield"** improvements, such as runways, taxiways, navigational aids, marking and lighting, and **"terminal area"** improvements, such as hangars, terminal buildings, aircraft parking aprons, fueling facilities, vehicle parking spaces, and airport access requirements.

3.1 AIRFIELD SYSTEM

The primary components of the **"airfield"** are those directly related to the arrival and departure of aircraft. These facilities are comprised of the runways and taxiways, navigational aids, and airport lighting and marking.

The development of airport facilities is based primarily upon the characteristics of the aircraft which are expected to use the airport. The most important characteristics are the approach speed and the size of this "critical" group of aircraft. The "critical" aircraft is defined as the most demanding aircraft with at least 500 annual operations that operates, or is expected to operate, at the airport. The existing "critical aircraft" is the Beech Baron and the ultimate "critical aircraft" for Cassville Municipal airport is expected to be the Beech King Air family of aircraft.

As indicated previously, F.A.A. groups aircraft according to their performance and size. This grouping results in the Airport Reference Code (A.R.C.). For Cassville Municipal Airport the existing A.R.C. is B-I and the ultimate A.R.C. is expected to be B-II.

Cassville Municipal Airport is currently classified in F.A.A.'s National Plan of Integrated Airport System (NPIAS) as a basic utility airport (B-I). The role of the airport is expected to change to that of a general utility (B-II) airport during the final stages of the planning period.

Runway Requirements and Orientation

The condition and adequacy of the existing runway system at Cassville Municipal Airport, including the number of runways, runway orientation, airfield capacity, runway length, and pavement strength, were assessed. From this analysis, future runway requirements were determined.

The runway length requirements were determined using AC 150/5325-4B *Runway Length Requirements for Airport Design*. There are various factors that govern the suitability of runway length. The most notable are airport elevation above mean sea level, temperature, wind velocity, airplane operating weights, takeoff and landing flap settings, runway surface condition (dry or wet) effective runway gradient, and presence of obstructions in the vicinity.

There are 5 steps to determine recommended runway lengths for the airport. The first step is to identify the list of critical design aircraft that will substantially use the runway. "Substantial use" is defined as having at least 500 or more annual itinerant operations at the airport. The next step is to identify the airplanes that will require the longest runway lengths at maximum certified takeoff weight (MOTW). Next, the MTOW determined previously along with the approach speed are used to determine which design guidelines apply. The design will either use tables in the AC or will use airplane manufacturers' airport planning manuals. The next step is to select the recommended runway length from the various lengths generated in step three. The final step is to apply any adjustment to the obtained runway length as recommended by the AC to determine the final recommended runway length.

It was previously established that the Beech Baron is the existing "critical aircraft" for A.R.C. B-I and the Beech King Air is the ultimate "critical aircraft" for A.R.C. B-II. Both of these aircraft have a MTOW less than 12,500 pounds, an approach speed greater than 50 knots and a capacity of less than 10 passengers the AC recommended the design guidelines in Chapter 2 and the use of Figure 2-1. For this procedure, the design is also based on a family grouping "percent of fleet", 95% and 100% of the fleet. Cassville Municipal Airport falls under the 95% of fleet category because the airport is primarily intended to serve low-activity locations and small population communities. Using this information along with a mean maximum daily temperature of 90° F and an airport elevation of 1,482 feet the required runway lengths were determined and are shown in Table 3.1.

****

Table 3.1
RUNWAY REQUIREMENTS
Cassville Municipal Airport

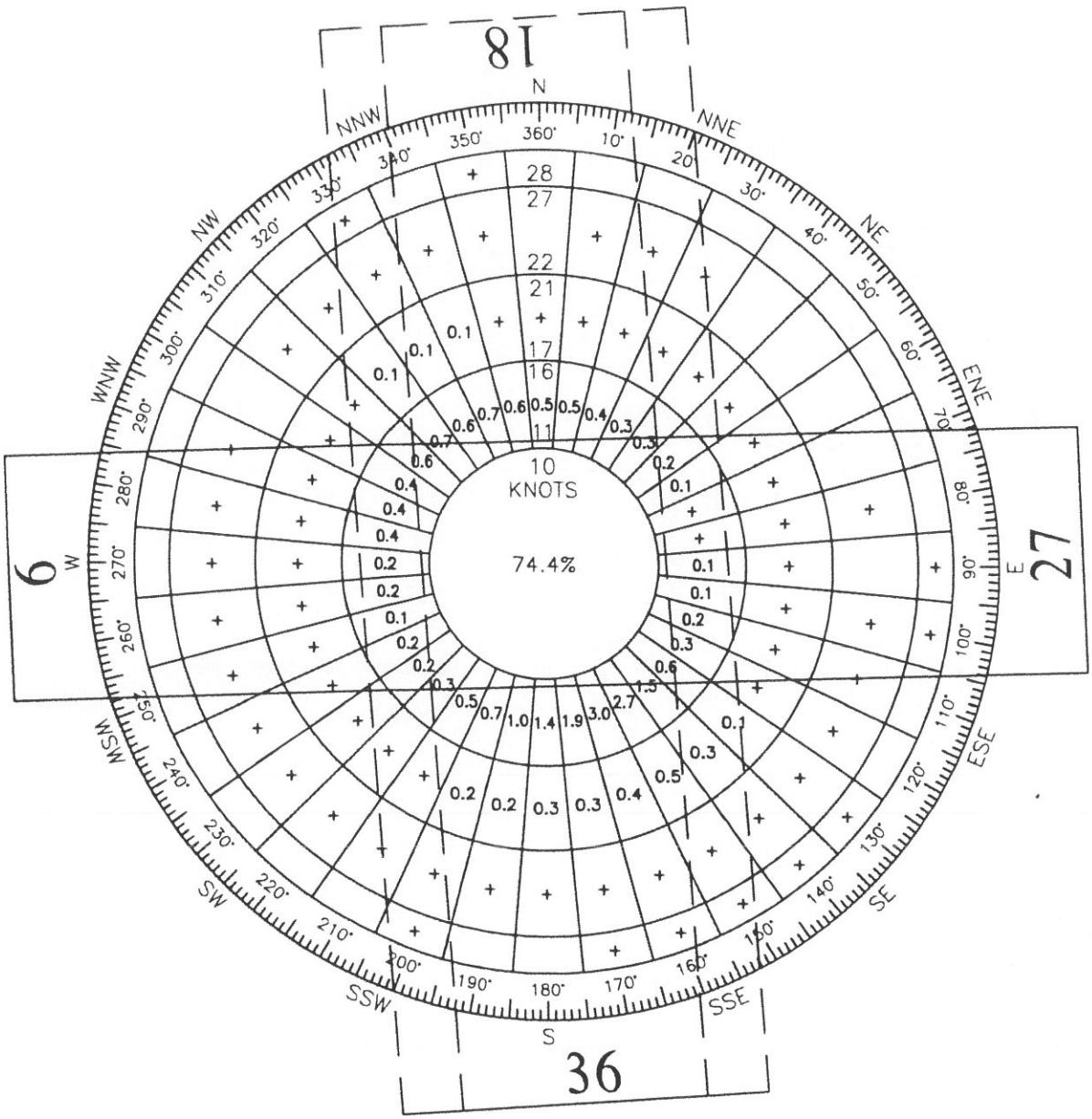
Runway Design Category	Runway Pavement		
	Length	Width	Strength
A.R.C. B-I	3,600	60'	8,000 lbs. (S)
A.R.C. B-II	4,200	75'	12,500 lbs. (S)

(S) = Single-wheel gear
(D) = Dual-wheel gear

Sources: F.A.A. Advisory Circular 150/5300-13, "Airport Design".

****

Area wind characteristics were also assessed and are a major factor in determining the optimum number and alignment of runways. Wind velocity data (speed and direction) has been recorded and assembled from the Weather Station located at the Springfield Regional Airport from 1998-2007 for a total of 81,166 observations. The wind rose, Figure 3.1, was used for calculating the following wind coverage for alternative runway alignments:
Figure 3.1



SOURCE:

NATIONAL CLIMATIC CENTER
SPRINGFIELD REGIONAL AIRPORT
81,166 OBSERVATIONS
1998–2007

COMBINED COVERAGE

0–3 M.P.H. = 14.2%
4–12 M.P.H. = 60.2%

SAI

Sprenkle & Associates, Inc.
Consulting Engineers & Land Surveyors

FIGURE 3–1 – ALL WEATHER WIND ROSE
CASSVILLE MEMORIAL AIRPORT
CASSVILLE, MISSOURI

Figure 3.1, *Continued*

Wind Rose Analysis - Cassville Region

Wind Coverage @ Barry County

Single Runway	Percent Coverage 12 m.p.h. (10.5 Knots)
0°	94.1%
10°	92.8%
20°	90.7%
30°	88.1%
40°	85.6%
50°	83.5%
60°	82.1%
70°	81.6%
80°	81.8%
90°	82.8%
100°	84.6%
110°	87.0%
120°	89.6%
130°	91.8%
140°	93.4%
150°	94.5%
160°	95.0%
170°	94.8%

N/S is predominant wind

Alternative 2-Runway System

R/W 9-27/18-36 ?	98.60%
R/W 9-27 @ 10.5 knots	82.58%
R/W 9-27 @ 13 knots	89.94%
R/W 9-27/18-36 @ 10.50 knots	98.63%
R/W 9-27/18-36 @ 13 knots	99.73%
R/W 18-36 @ 10.50 knots	94.98%
R/W 18-36 @ 13 knots	97.68%

The established goal for wind coverage is 95 percent; that is, a light plane should be able to operate at an airport 95% of a given period without experiencing a crosswind component greater than 12 mph. Fifteen (15) mph winds are applicable to the larger business jet aircraft that are less sensitive to crosswinds. Where a single runway does not provide a 95 percent usability factor, a crosswind runway is required. A crosswind runway is defined as an additional runway built to compensate primary runways that provide less than the recommended 95 percent wind coverage for the airplanes forecasted to use the airport. Since wind coverage for the existing Runway 9-27 at Cassville totals 82.8% at 12 mph, a two-runway system is required and is desirable to provide additional wind coverage.

Airfield Design Standards

The FAA has established several imaginary surfaces to protect aircraft operational areas and keep them free from obstructions that could affect the safe operation of aircraft. These include the runway protection zone (RPZ), runway safety area (RSA) and the object free area (OFA).

The RPZ is defined as "an area off the runway end to enhance the protection of people and property on the ground." The RPZ is a trapezoidal shaped area centered on the extended runway centerline. The dimensions of the RPZ are a function of the runway ARC and approach visibility minimums.

The RSA is defined as "a defined surface surrounding the runway prepared or suitable for reducing the risk of damage to airplanes in the event of an undershoot, overshoot or excursion from the runway."

The OFA is defined as "an area on the ground centered on a runway, taxiway or taxilane centerline provided to enhance the safety of aircraft operations by having the area free of objects, except for objects that need to be located in the OFA for air navigation or aircraft ground maneuvering purposes."

Table 3.2 summarizes the dimensions of these safety areas by ARC. The FAA expects these areas to be under the control of the airport. A review of the current airport drawings indicates that the existing RPZ, RSA and OFA standards for runway 9-18 are fully met on existing airport property. Extending runway 9-18 to the west will require additional property or easement acquisition to meet the RPZ standards.

Primary and Crosswind Runway Length and Strength

To accommodate the "critical" aircraft group expected to operate at the Cassville Municipal Airport, the design length of the primary runway should be 4,200 feet in length and be 75 feet wide. This length is sufficient to meet the take-off requirements for piston and turbo prop-aircraft (B-II) with weights up to and including 12,500 pounds single wheel gear (SWG).

****

Table 3.2
AIRFIELD SAFETY AREA DIMENSIONAL STANDARDS

	B-I	B-II
Runway Protection Zone[1]		
Length	1,000	1,000
Inner Width	250	500
Outer Width	450	700
Runway Safety Area		
Width	120	150
Length Beyond Runway End	240	300
Object Free Area		
Width	400	500
Length Beyond Runway End	240	300

Source: FAA AC150/5300-13 Airport Design
[1] One mile approach visibility minimums

****

There are several things to consider when determining whether-or-not the existing site will accommodate the ultimate aviation needs of the Cassville Region.

-Any extension of the existing runway 9-27 could be accommodated to the west and would require a road location to the west. This runway will become the crosswind runway when runway 18-36 is built.

-Location of the future runway (18-36) would extend to the southeast and northwest. Design standards for a crosswind runway would be 4,200' x 75' and would require road relocation to the north and south. This runway will become the primary runway.

-Commercial development to the south and private property to the north will be factors in dealing with further expansion of the proposed crosswind runway.

Taxiways

Taxiways are one of the most important factors in determining and maintaining the operational safety of an airport. As airport activity increases (take-offs, landings, and touch-and-go maneuvers), faster access from the runways to the taxiway system is required to maintain safety. The taxiway strength for A.R.C. B-II taxiways should be designed to accommodate the heaviest aircraft that will use the pavement. All taxiways should support King Air B200 aircraft, which weighs 12,500 pounds single-wheel gear (SWG). The

recommended taxiway width for Group B-II should be a minimum of 35 feet in width and the runway-to-taxiway separation should be 240 feet.

T-hangar taxiways will also be required during the planning period. Generally these taxiways are 20-feet wide and are built to a "non-critical" strength and are dependent on the types of aircraft housed in the individual hangars. Also, to facilitate access to airport-related industrial areas, additional access taxiways will be required. The locations and required strengths of individual taxiway/taxi lanes are identified in the Terminal Area Plan.

Lighting and Marking

In order to obtain the maximum utilization of the airport, lighting is necessary to accommodate night-time operations. As stated in Chapter One, there are currently several existing lighting aids already in place at the Cassville Municipal Airport. These systems include a rotating beacon, medium intensity runway lighting on Runways 9-27 and 18-36, medium intensity taxiway lighting, and threshold lighting also on both runways.

If the Cassville Municipal Airport is to accommodate forecasted demands, current systems will have to be updated and additional systems will have to be added. Recommended additions to the system include:

- **Threshold Lighting:** Following runway extensions and or relocations, threshold lights would be installed at the immediate ends of each paved runway.

- **Runway Lighting and Taxiway Lighting:** All runways should be equipped with medium intensity runway lights (M.I.R.L.) and the parallel taxiways and connecting taxiways should have reflectors

- **Runway End Identifier Lights (REIL):** REIL is a system of lights installed to provide rapid identification of the approach end of a runway. REIL's are a pair of flashing lights located on each side of the runway threshold. REIL's are recommended for all runway ends.

- **Precision Approach Path Indicators (PAPI):** PAPI is a system of lights located on the side of the runway which provides visual descent guidance information during approach to the runway. These systems are ultimately recommended for all runways.

- **Runway Marking:** Runway markings are dependent upon the types of approaches available to that runway. The Cassville Municipal Airport would require non-precision instrument marking.

Terminal Navigation Aids

Airport navigational aids (NAVAIDS) are facilities and equipment installed on or near the airport for the purpose of providing pilots with electronic guidance and/or visual references to use in executing an approach to land at the airport. The importance of aids to navigation is frequently dismissed by individuals concerned with airport development due to unfamiliarity with various systems.

The purpose of upgrading navigational aids is to increase an airport's reliability. Navigational aids add reliability to air transportation by allowing aircraft to operate during inclement weather. The traditional development process for NAVAID development is as follows: (1) Non-Directional Beacon (NDB), (2) VOR or VORTAC, (3) Localizer, (4) Approach Lighting System, (5) Glide Slope Instrumentation, and (6) Precision Instrument Landing System (ILS/MLS). Each facility in the NAVAID development process added greater reliability but at increasing cost. Each step allowed aircraft to fly during progressively bad weather; i.e., progressively lower ceilings and visibility. However, since 2004 F.A.A. has implemented a new navigational system using GPS. The new system, wide area augmentation system or WAAS, has caused the phasing out of NDB, VOR/VORTAC and VOR/DEM systems.

The WAAS system uses a network of ground-based reference stations located within airports to measure small variations in the GPS satellites' signals. These measurements are received by a master station that sends the corrections to WAAS satellites. The WAAS satellites broadcast the correction messages back to WAAS-enabled GPS receivers to compute its position and thereby give accurate information to pilots for navigational purposes. This system requires extensive survey work to establish the reference stations at each airport. Cassville Municipal Airport is currently undergoing an aeronautical survey to establish these reference stations so that in the future pilots will be able to use the WAAS system to navigate to and from the airport.

3.2 TERMINAL AREA REQUIREMENTS

The terminal area is defined as that portion of the airport other than the landing area. Functions and facilities include the terminal/administration building, aircraft storage hangars, the aircraft parking apron for based aircraft and itinerant aircraft, fixed base operations (aircraft repair and maintenance, flight training, aircraft sales, fuel facilities and sales, etc.), aviation-related service businesses, and auto parking. The terminal facility requirements outlined in the following pages refer to general public needs at the airport.

Terminal/Administration Building

The airport terminal building at a general aviation airport has several functions. Adequate space should be available for the management offices, a quiet pilots' lounge and flight planning area, restrooms, storage rooms, and possibly meeting rooms and food service or snack areas. The space is not necessarily limited to a single terminal building, but space is also needed by the fixed base operators for similar services and functions.

The existing terminal/administration function at Cassville Municipal Airport is located in the terminal building just east of the aircraft apron. The building has about 547 square feet and provides limited space for pilot needs and the passenger waiting area.

Based on the forecasts of general aviation and air taxi activity, additional space is required over the plan period. For terminal building requirements, peaking factors are used to determine future needs. These include peak months, design day and design hour criteria. The analysis revealed that the peak months at Cassville average about 12% of the annual general aviation traffic at the airport. This is about 456 operations. The peak month is typically June or July. The design day is defined as the average day within the peak month. This currently is about 15 operations. The design hour is defined as the peak hour within the design day. This currently is about 20% of design day activity or about 3 operations per hour.

For terminal building requirements, these activity levels are correlated to design hour passengers which refer to the average number of pilots and passengers expected to use the airport's terminal facilities during a given time. In calculating the design hour passengers, an average of 1.9 passengers per general aviation operation (excluding touch-and-go operations) was assumed for existing activity. In the future, this ratio is expected to increase as more sophisticated and larger aircraft make up a higher percentage of activity at Cassville Municipal Airport. Table 3.3 shows the expected design hour passengers over the next 20 years.

****

Table 3.3
DESIGN HOUR PASSENGERS/OPERATIONS
Cassville Municipal Airport

	Existing	2010	2015	2020	2025	2030
Annual Operations	3,800	3,750	4,250	6,000	7,200	8,100
Peak Month Operations	456	450	510	720	864	972
Design Day Operations	15	15	17	24	29	32
Design Hour G.A. Operations	3	3	3	5	6	6
Passengers/Operation	1.9	2.0	2.0	2.1	2.1	2.2
Design Hour Passengers	6	6	6	11	13	13

****

As shown in Table 3.4, additional terminal building space will be required over the plan period. Because of the spatial requirements, construction of a new terminal building during the planning period is recommended.

****

Table 3.4
TERMINAL BUILDING REQUIREMENTS (Sq. Ft.)
Cassville Municipal Airport

	Required Space Per Passenger (Sq. Ft.)	Existing	2010	2015	2020	2025	2030
Design Hour Passengers			6	6	11	13	13
Waiting Area/ Pilots Lounge	15		90	90	165	195	195
Management/ Operations	3		18	18	33	39	39
Restrooms	4		24	24	44	52	52
Concessions	3		18	18	33	39	39
Circulation, Storage Mechanical, Etc.	20		120	120	220	260	260
Meeting Facilities/ Classroom	(optional)		500	500	500	500	500
TOTAL TERMINAL BUILDING REQUIREMENTS (S.F.)		547	770	770	995	1,085	1,085

Auto Parking and Access

The requirement for vehicle parking adjacent to the terminal building and hangar areas is a function of the design hour passengers. The total number of parking spaces was determined as 1.3 spaces per design hour passenger multiplied by 315 feet per space for parking and circulation. Additional parking should be constructed in conjunction with future terminal area expansion. Table 3.4 identifies the auto parking requirements for the terminal area.

****

Table 3.5
AUTOMOBILE PARKING REQUIREMENTS
Cassville Municipal Airport

	Existing	2010	2015	2020	2025	2030
Design Hour Passengers	--	6	6	11	13	13
Auto Parking Positions	5	8	8	14	17	17
Total Parking Area (Sq. Ft.)	600	2,520	2,520	4,410	5,355	5,355

****

Aircraft Hangars

Adequate demand usually exists for 80% of the based aircraft to be stored in hangars. Wide variances to this rule exist, however, due to types of structures provided and different hangar rental rates. Based upon the analysis of current use of hangar buildings at Cassville, future hangar requirements for the various types of general aviation buildings have been calculated.

The analysis indicates that 70% of single-engine aircraft, 90% of light twin-engine aircraft, and 100% of turbine and rotorcraft would desire hangar storage. This increasing percentage reflects the relative sophistication and expense of each type of aircraft. These percentages were then applied to the projected numbers of aircraft expected to be based at Cassville Municipal Airport in 2010, 2015, 2020, 2025 and 2030.

The next step then is to determine the number of conventional hangars versus the number of required T-hangars. The principal uses of conventional hangars are for larger aircraft storage, storage during maintenance, and for housing fixed-base operator activities. Therefore, it is assumed that all turbine and rotorcraft aircraft would be stored in conventional hangars. An additional 20% of the total hangar space should be allocated to maintenance and shop storage. The remaining aircraft requiring hangar space would be housed in T-hangars.

Total hangar space for Cassville Municipal Airport is indicated in Table 3.5. For planning purposes, an average of 900 square feet per based utility aircraft was utilized. For turbine aircraft, 1,500 square feet per aircraft was utilized.

****

Table 3.6
HANGAR REQUIREMENTS
Cassville Municipal Airport

	Existing	2010	2015	2020	2025	2030
Based Aircraft	12	15	17	20	24	27
Number of Aircraft to be Hangared	10	12	14	16	20	21
Conventional Hangar Spaces	2	2	3	3	4	5
T-Hangar Spaces	8	10	11	13	23	25
Conventional Hangar Area (Sq. Ft.)	4,875	3,000	4,500	4,500	6,000	7,500
T-Hangar Area (Sq. Ft.)	9,975	9,000	9,900	11,700	20,700	22,500
Total Hangar Storage (Sq. Ft.)	14,850	12,000	14,400	16,200	26,700	30,000

****

Aircraft Apron

The paved aircraft parking and tie-down areas should be provided for approximately 40% of the peak/design day itinerant aircraft from other airports plus about 20% of the based aircraft. F.A.A. planning criteria calls for approximately 360 square yards per space for itinerant aircraft and about 300 square yards per space for based aircraft. Table 3.6 identifies the required tie-down spaces and total apron requirements for the planning period. Expansion of the aircraft apron and installation of paved tie-down areas will be required but probably not until the final development phase of the plan.

****

Table 3.7
AIRCRAFT APRON AND TIE-DOWN REQUIREMENTS
Cassville Municipal Airport

	Existing	2010	2015	2020	2025	2030
Local Aircraft						
- Tie-Down Spaces	4	3	3	4	4	5
- Apron Area (Square Yards)	--	900	900	1,200	1,200	1,500
Itinerant Aircraft						
- Tie-Down Spaces	7	6	7	8	8	9
- Apron Area (Square Yards)	3,610	2,160	2,520	2,880	2,880	3,240
Maintenance, Fuel Apron	800	1,000	1,000	1,000	1,000	1,000
Total Apron Area (Square Yards)	4,410	4,060	4,420	5,080	5,080	5,740

****

Fuel Storage

Future fuel storage requirements were determined based on historic and similar fuel utilization rates for general aviation airports. Based upon historic data, the average fuel consumed per operation is about 8.9 gallons. This ratio can be expected to increase as the average size of aircraft using the airport increases. On the average, fuel storage should be provided for an average month of airport activity. As can be seen in Table 3.7, the current 3,000 gallons of fuel storage that the airport currently has should be adequate through the first planning period, although the existing system should be brought up to current E.P.A. standards (i.e., leak detection and monitoring systems). Some expansion of fuel storage facilities will likely be required during phases 2 and 3 of the development program.

****

Table 3.8
FUEL STORAGE REQUIREMENTS
Cassville Municipal Airport

	Existing	2010	2015	2020	2025	2030
Annual Operations	3,800	3,750	4,250	6,000	7,200	8,100
Average Monthly Operations	317	313	354	500	600	675
Gallons per Operation	8.9	9.0	9.0	9.5	9.5	10.0
Fuel Storage Needs (Gallons)	3,000	2,817	3,186	4,750	5,700	6,750

****

3.3 SUMMARY

The purpose of this chapter has been to quantify and define the requirements for future airport facilities that will be needed to meet the projected aviation demand for Cassville Municipal Airport. A summary of the airfield and terminal facility requirements is shown in Tables 3.8 and 3.9.

****

Table 3.9
SUMMARY - TERMINAL AREA REQUIREMENTS
Cassville Municipal Airport

Facilities	Existing	Phase I 2008-2015	Phase II 2016-2020	Phase III 2021-2025	
Based Aircraft	12	15	17	24	
Aircraft Parking Apron (Square Yards)	4,410	4,060	4,420	5,080	
Aircraft Tie-Downs					
Based Aircraft	4	3	4	4	
Itinerant Aircraft	7	7	8	8	
Total	11	10	11	12	
Hangar Spaces					
Conventional	2	3	3	4	
T-Hangars	8	11	13	23	
Total	10	14	16	27	
Terminal Building (Square Feet)	547	770	995	1,085	
Auto Parking					
(Spaces)		5	8	14	17
(Square Feet)	600	2,520	4,410	5,355	
Fuel Storage (Gallons)	3,000	3,186	4,750	5,700	

****

****

Table 3.10
SUMMARY - AIRFIELD FACILITY REQUIREMENTS
Cassville Municipal Airport

Facility	Existing	Phase I 2008-2015	Phase II 2016-2020	Phase III 2021-2025
Existing Runway 9-27				
Dimensions	3,600' x 60'	4,300' x 75'	4,300' x 75'	4,300' x 75'
Strength	8,000 lbs. (E) (SWG)	8,000 lbs. (SWG)	12,500 lbs. (SWG)	12,500 lbs.
Lighting MIRL	MIRL	MIRL	MIRL	
Marking Basic	Non-Precision	Non-Precision	Non-Precision	
Visual Aids	None	PAPI	PAPI	PAPI
Lighting Aids	Thres. Lts.	Thres. Lts.	Thres. Lts. REIL (9-27)	Thres. Lts., REIL
NAVAIDS		VOR	VOR, GPS	VOR, GPS VOR, GPS
Taxiways		Turnarounds Parallel	Partial 35' Parallel	Partial 35' Parallel Full 35'
Future Runway 18-36				
Dimensions	-	-		4,200 x 75'
Strength	-	-		turf 12,500 lbs. (SWG)
Lighting -	-		None	MIRL
Marking -	-		None	Non-Precision
Visual Aids	-	-	None	PAPI
Lighting Aids	-	-	None	Thres. Lts., REIL
NAVAIDS	-	-		None GPS
Taxiways	-	-		None Partial 35' Parallel

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CHAPTER FOUR

AIRPORT DEVELOPMENT PLAN

CHAPTER FOUR
AIRPORT DEVELOPMENT PLAN

This chapter of the Master Plan details the airport development program for the Cassville Municipal Airport and identifies the proposed schedule for implementation of the plan recommendations. The airport development program was designed to provide for a logical and cost-effective schedule of improvements, keyed to the development needs as identified in the forecasting and facility requirements section of this report.

The program outlined on the following pages is the result of input from a variety of sources including the Cassville City officials, airport users, and the general public. Cost information was collected from government agencies, contractors, and from similar recent airport construction projects in the area. Estimates for each planning period are based on July, 2008 dollars. A 20% contingency overhead for engineering and administration has been added to each phase of the development program.

The existing site development plan was structured to provide maximum flexibility to meet long-term airport development needs. The improvements outlined on the following pages and recommended by phase (short-range, 2008-2015; intermediate-range, 2016-2020; and long-range, 2021-2025) represent development which will yield a safe, efficient, unconstrained, and attractive public facility. A total cost overview for the 20-year plan period is given in Table 4.1.

****

Table 4.1
Capital Improvements Cost
Overview - 20 Years

		Federal Aviation Administration	Local Cost*	Total Cost
Phase I - (2008-2015)				
- 2009	Property & Easements	$ 476,900	$ 25,100	$ 502,000
- 2010	Runway 9/27 Extension Grading	131,100	6,900	138,000
- 2011	Visual Aids	42,750	2,250	45,000
- 2012	Relocate Power Line	367,650	19,350	387,000
- 2013	Runway 9/27 Extension Paving & Lighting	503,595	26,505	530,100
SUBTOTAL PLUS 20% Contingencies		$ 1,826,394	$ 96,126	$ 1,922,520
Phase II (1998-2003) PLUS 20% Contingencies		$ 1,430,586	$ 323,694*	$ 1,754,280
Phase III (2004-2010) PLUS 20% Contingencies		$ 1,775,949	$ 598,371*	$ 2,374,320
Total Estimated Costs 20 Year Capital Improvements		$ 5,032,929	$ 1,018,191*	$ 6,051,120

*Includes improvement items not eligible for State or Federal Funds; i.e., terminal building expansions, T-hangar construction, conventional hangar construction, fueling facility improvements and parking lot maintenance and expansion. These sums could include city or private development funds. Total costs for capital improvements excluding building costs are estimated at $112,351.

****

4.1 SCHEDULES FOR PROPOSED DEVELOPMENT

An assessment of improvement priorities is an important element of any development plan. Forecasts of future activity and identification of facilities and equipment which affect the safety and reliability of the airport are the factors that determine the timing of needed improvements.

Again, the assessment of improvement priorities has been discussed with airport users, City officials, and the public throughout the planning process. An overview of the major airport improvements, is as follows:

Cassville Municipal Airport
Development Summary
Phase I
(2008-2015)

1. **Property and Easements**

   a. Property acquisition - 114 acres
   b. Easement acquisition - 23 acres
   c. Relocation and severance - two residences

2. **Runways and Taxiways**

   a. Grade area for runway 9/27 extension and widening.
   b. Extend and widen Runway 9/27 to 4,300' x 75'
   c. Extend and relocate medium intensity runway lights (MIRL)

3. **Visual Aids**

   a. Install precision approach path indicators (PAPI) on Runway 9/27.

4. **Relocations**

   a. Relocate county road (west end)

Feb 2009

Estimated Development Costs
Cassville Municipal Airport
– Phase I –

Item Number	Description	Quantity	Unit	Unit Price	City Portion @ 5%	MoDOT Portion @ 95%	Extended Total
1. ACQUIRE PROPERTY AND EASEMENTS							
1	Acquire Property Primary Runway	26	Acres	$ 3,000.00	$ 3,900.00	$ 74,100.00	$ 78,000.00
2	Residence Relocation/Severance	2	LS	$ 50,000.00	$ 5,000.00	$ 95,000.00	$ 100,000.00
3	Acquire Property Terminal Area	11	Acres	$ 3,000.00	$ 1,650.00	$ 31,350.00	$ 33,000.00
4	Acquire Property Crosswind Runway	74	Acres	$ 3,000.00	$ 11,100.00	$ 210,900.00	$ 222,000.00
5	Acquire Avigation Easements	23	Acres	$ 3,000.00	$ 3,450.00	$ 65,550.00	$ 69,000.00
	Subtotal Property & Easements				*$ 25,100.00*	*$ 476,900.00*	*$ 502,000.00*
2. EARTHWORK TO EXTEND RUNWAY 9/27							
1	Clearing and Grubbing	1	LS	$ 10,000.00	$ 500.00	$ 9,500.00	$ 10,000.00
2	Earthwork	12,000	CY	$ 4.00	$ 2,400.00	$ 45,600.00	$ 48,000.00
3	Drainage	1	LS	$ 20,000.00	$ 1,000.00	$ 19,000.00	$ 20,000.00
4	Seeding	40	Acres	$ 1,500.00	$ 3,000.00	$ 57,000.00	$ 60,000.00
	Subtotal - Runway Earthwork				*$ 6,900.00*	*$ 131,100.00*	*$ 138,000.00*
EXTEND AND WIDEN RUNWAY 9/27							
1	Clearing and Grubbing	1	LS	$ 10,000.00	$ 500.00	$ 9,500.00	$ 10,000.00
2	Earthwork	5,000.00	CY	$ 4.00	$ 1,000.00	$ 19,000.00	$ 20,000.00
3	Drainage	1	LS	$ 20,000.00	$ 1,000.00	$ 19,000.00	$ 20,000.00
4	Edge Drains	9,000	LF	$ 10.00	$ 4,500.00	$ 85,500.00	$ 90,000.00
5	Crushed Aggregate Base Course	13,800	SY	$ 7.00	$ 4,830.00	$ 91,770.00	$ 96,600.00
6	Bituminous pavement (3")	13,000	SY	$ 9.50	$ 6,175.00	$ 117,325.00	$ 123,500.00
7	Seeding	40	Acres	$ 1,500.00	$ 3,000.00	$ 57,000.00	$ 60,000.00
8	Pavement Marking	32,000	SF	$ 1.25	$ 2,000.00	$ 38,000.00	$ 40,000.00
	Subtotal - Runway Paving				*$ 23,005.00*	*$ 437,095.00*	*$ 460,100.00*
RUNWAY LIGHTING							
1	Electrical Duct	200	LF	$ 35.00	$ 350.00	$ 6,650.00	$ 7,000.00
2	Runway Edge Lights	10	Each	$ 350.00	$ 175.00	$ 3,325.00	$ 3,500.00
3	Relocate Existing Lights	1	LS	$ 8,500.00	$ 425.00	$ 8,075.00	$ 8,500.00
4	Electrical Cable & Trench	9,000	LF	$ 4.00	$ 1,800.00	$ 34,200.00	$ 36,000.00
5	Regulators and Electrical Controls	1	LS	$ 15,000.00	$ 750.00	$ 14,250.00	$ 15,000.00
	Subtotal - Runway Lighting				*$ 3,500.00*	*$ 66,500.00*	*$ 70,000.00*
3. VISUAL AIDS							
1	Install PAPI's 9/27	2	Each	$ 22,500.00	$ 2,250.00	$ 42,750.00	$ 45,000.00
	Subtotal NAVAIDS				*$ 2,250.00*	*$ 42,750.00*	*$ 45,000.00*
4. OTHER - COUNTY ROAD RELOCATION							
1	Road Relocation	1	Each	$ 100,000.00	$ 5,000.00	$ 95,000.00	$ 100,000.00
	Subtotal - Other				*$ 5,000.00*	*$ 95,000.00*	*$ 100,000.00*
	Subtotal - Phase 1				$ 65,755.00	$ 1,249,345.00	$ 1,315,100.00
	Engineering, Legal & Administration (20%)				$ 13,151.00	$ 249,869.00	$ 263,020.00
	Total - Phase 1				*$ 78,906.00*	*$ 1,499,214.00*	*$ 1,578,120.00*

low

low

low ↖ utilities ?

Cassville Municipal Airport
Development Summary
Phase II
(2016 - 2020)

1. **Runways and Taxiways**

   a. Construct parallel taxiway to Runway 9/27
   b. Construct turf crosswind Runway 18/36 - 4,200' x 100'

2. **Terminal Area**

   a. Construct 4,060 SY apron.
   b. Construct terminal access road.
   c. Construct auto parking area.
   d. Relocate existing terminal trailer building.
   e. Install fuel facility, 5,000 gallons.
   f. Construct one ten-unit T-hangar.

3 **Visual Aids**

   a. Install runway and identification lights (REIL's) for Runway 9/27

4. **Relocations**

   a. Relocate county roads (north & south side)

Estimated Ultimate Development Costs
Cassville Municipal Airport
– Phase 2 –

Item Number	Description	Quantity	Unit	Unit Price	City Portion @ 5%	MoDOT Portion @ 95%	Extended Total
1. PARALLEL TAXIWAY GRADING							
1	Clearing and Grubbing	1	LS	$ 7,500.00	$ 375.00	$ 7,125.00	$ 7,500.00
2	Earthwork	10,000	CY	$ 4.00	$ 2,000.00	$ 38,000.00	$ 40,000.00
3	Drainage	1	LS	$ 15,000.00	$ 750.00	$ 14,250.00	$ 15,000.00
4	Seeding	20	Acres	$ 1,500.00	$ 1,500.00	$ 28,500.00	$ 30,000.00
	Subtotal - Parallel Taxiway Grading				*$ 4,625.00*	*$ 87,875.00*	*$ 92,500.00*
2. NEW TERMINAL AREA							
1	Construct 4060 S.Y. Apron	1	LS	$ 115,000.00	$ 5,750.00	$ 109,250.00	$ 115,000.00
2	Construct Access Road	1	LS	$ 8,000.00	$ 400.00	$ 7,600.00	$ 8,000.00
3	Seeding	5	Acres	$ 1,500.00	$ 375.00	$ 7,125.00	$ 7,500.00
4	Construct 14 auto parking spaces *	1	LS	$ 12,000.00	$ 12,000.00	$ -	$ 12,000.00
5	Relocate City Terminal Trailer*	1	LS	$ 5,000.00	$ 5,000.00	$ -	$ 5,000.00
6	Septic system for Terminal *	1	LS	$ 5,000.00	$ 5,000.00	$ -	$ 5,000.00
7	Well*	1	LS	$ 15,000.00	$ 15,000.00	$ -	$ 15,000.00
8	Fuel facility *	1	LS	$ 20,000.00	$ 20,000.00	$ -	$ 20,000.00
9	Construct 10-unit T-hangar *	10	Each	$ 15,000.00	$ 150,000.00	$ -	$ 150,000.00
	* Items paid by City @ 100%						
	Subtotal - New Terminal Area				*$ 213,525.00*	*$ 123,975.00*	*$ 337,500.00*
3. PARALLEL TAXIWAY PAVING							
1	Edge Drains	9,500	LF	$ 10.00	$ 4,750.00	$ 90,250.00	$ 95,000.00
2	Crushed Aggregate Base Course	17,800	SY	$ 7.50	$ 6,675.00	$ 126,825.00	$ 133,500.00
3	Bituminous Pavement (3")	16,800	SY	$ 9.50	$ 7,980.00	$ 151,620.00	$ 159,600.00
4	Pavement Marking	3,200	SF	$ 1.25	$ 200.00	$ 3,800.00	$ 4,000.00
	Subtotal - Parallel Taxiway Paving				*$ 19,605.00*	*$ 372,495.00*	*$ 392,100.00*
PARALLEL TAXIWAY GUAIDANCE SYSTEM							
1	Retroreflective Markers	60	Each	$ 80.00	$ 240.00	$ 4,560.00	$ 4,800.00
	Subtotal - Parallel Taxiway Guidance System				*$ 240.00*	*$ 4,560.00*	*$ 4,800.00*
4. CROSSWIND RUNWAY 18/36							
1	Clearing & Grubbing	1	LS	$ 15,000.00	$ 750.00	$ 14,250.00	$ 15,000.00
2	Earthwork	40,000	CY	$ 4.00	$ 8,000.00	$ 152,000.00	$ 160,000.00
3	Seeding	20	Acres	$ 1,500.00	$ 1,500.00	$ 28,500.00	$ 30,000.00
	Subtotal Crosswind Runway				*$ 10,250.00*	*$ 194,750.00*	*$ 205,000.00*
5. VISUAL AIDS							
1	REIL's - 9/27	2	Each	$ 15,000.00	$ 1,500.00	$ 28,500.00	$ 30,000.00
	Subtotal - Navigational Aids				*$ 1,500.00*	*$ 28,500.00*	*$ 30,000.00*
6. OTHER - RELOCATE COUNTY ROADS (North & South)							
1	Road Relocation	2	Each	$ 200,000.00	$ 20,000.00	$ 380,000.00	$ 400,000.00
	Subtotal - Other				*$ 20,000.00*	*$ 380,000.00*	*$ 400,000.00*
	Subtotal - Phase 2				*$ 269,745.00*	*$ 1,192,155.00*	*$ 1,461,900.00*
	Engineering, Legal & Administration (20%)				$ 53,949.00	$ 238,431.00	$ 292,380.00
	Total - Phase 2				*$ 323,694.00*	*$ 1,430,586.00*	*$ 1,754,280.00*
	Total - Phase 2 - No Hangars/Terminal				*$ 75,294.00*	*$ 1,430,586.00*	*$ 1,505,880.00*

Cassville Municipal Airport
Development Summary
Phase III
(2021 - 2025)

1. **Runways and Taxiways**

   a. Construct new 4,200' x 75' Runway-18/36.
   b. Install medium intensity runway lights (MIRL) and threshold lights.
   c. Construct 35' wide parallel taxiway to Runway 18/36.

2. **Terminal Area:**

   a. Construct new 1,250 sq. ft. terminal building
   b. Construct one 50 x 50 conventional hangar.
   c. Construct one 12-unit T-hangar.
   d. Expand aircraft apron by 1,000 S.Y.
   e. Expand auto parking lot by 8 spaces.
   f. Expand fuel facility by 2,500 gallons.
   g. Install terminal fencing.

3. **Visual Aids**

   a. Install precision approach path indicators (PAPI's) for Runway 18/36.
   b. Install runway end identification lights (REIL's) for Runway 18/36.

Estimated Ultimate Development Costs
Cassville Municipal Airport
– Phase 3 –

Item Number	Description	Quantity	Unit	Unit Price	City Portion @ 5%	MoDOT Portion @ 95%	Extended Total
1. RUNWAY 18/36 PAVING (4,200' x 75')							
1	Clearing and Grubbing	1	LS	$ 10,000.00	$ 500.00	$ 9,500.00	$ 10,000.00
2	Earthwork	6,000	CY	$ 4.00	$ 1,200.00	$ 22,800.00	$ 24,000.00
3	Drainage	1	LS	$ 15,000.00	$ 750.00	$ 14,250.00	$ 15,000.00
4	Edge Drains	8,200	LF	$ 10.00	$ 4,100.00	$ 77,900.00	$ 82,000.00
5	Crushed Aggregate Base Course	37,200	SY	$ 7.00	$ 13,020.00	$ 247,380.00	$ 260,400.00
6	Bituminous Pavement (3")	35,000	SY	$ 9.50	$ 16,625.00	$ 315,875.00	$ 332,500.00
7	Seeding	10	Acres	$ 1,500.00	$ 750.00	$ 14,250.00	$ 15,000.00
8	Pavement Marking	32,000	SF	$ 1.25	$ 2,000.00	$ 38,000.00	$ 40,000.00
	Subtotal				*$ 38,945.00*	*$ 739,955.00*	*$ 778,900.00*
RUNWAY LIGHTING							
1	Electrical Duct	90	LF	$ 35.00	$ 157.50	$ 2,992.50	$ 3,150.00
2	Runway Edge Lights	58	Each	$ 350.00	$ 1,015.00	$ 19,285.00	$ 20,300.00
3	Runway Threshold Lights	16	Each	$ 400.00	$ 320.00	$ 6,080.00	$ 6,400.00
4	Electrical Cable & Trench	9,800	LF	$ 4.00	$ 1,960.00	$ 37,240.00	$ 39,200.00
5	Regulators and Electrical Controls	1	LS	$ 15,000.00	$ 750.00	$ 14,250.00	$ 15,000.00
	Subtotal - Runway Lighting				*$ 4,202.50*	*$ 79,847.50*	*$ 84,050.00*
2. PARALLEL TAXIWAY PAVING 18/36							
1	Clearing & Grubbing	1	LS	$ 10,000.00	$ 500.00	$ 9,500.00	$ 10,000.00
2	Earthwork	3,600	CY	$ 4.00	$ 720.00	$ 13,680.00	$ 14,400.00
3	Drainage	1	LS	$ 10,000.00	$ 500.00	$ 9,500.00	$ 10,000.00
4	Edge Drains	9,800	LF	$ 10.00	$ 4,900.00	$ 93,100.00	$ 98,000.00
5	Crushed Aggregate Base Course	17,280	SY	$ 7.00	$ 6,048.00	$ 114,912.00	$ 120,960.00
6	Bituminous Pavement (3")	16,320	SY	$ 9.50	$ 7,752.00	$ 147,288.00	$ 155,040.00
7	Seeding	10		$ 1,500.00	$ 750.00	$ 14,250.00	$ 15,000.00
8	Pavement Marking	2,000		$ 1.25	$ 125.00	$ 2,375.00	$ 2,500.00
	Subtotal - Parallel Taxiway Paving 18/36				*$ 21,295.00*	*$ 404,605.00*	*$ 425,900.00*
3. TERMINAL AREA							
1	Expand Apron by 1,000 S.Y.	1	LS	$ 50,000.00	$ 2,500.00	$ 47,500.00	$ 50,000.00
2	Perimeter Fencing	21,500	LF	$ 6.00	$ 6,450.00	$ 122,550.00	$ 129,000.00
3	Terminal Fencing	1,250	LF	$ 12.00	$ 750.00	$ 14,250.00	$ 15,000.00
4	Construct New Terminal Building*	1,250	SF	$ 75.00	$ 93,750.00	$ -	$ 93,750.00
5	Construct Conventional Hangar *	2,500	SF	$ 40.00	$ 100,000.00	$ -	$ 100,000.00
6	Construct 12-unit T-hangar *	12	Each	$ 15,000.00	$ 180,000.00	$ -	$ 180,000.00
7	Expand Auto Parking by 8 Spaces *	1	LS	$ 7,000.00	$ 7,000.00	$ -	$ 7,000.00
8	Expand Fuel Facility by 3,500 gallons*	1	LS	$ 40,000.00	$ 40,000.00	$ -	$ 40,000.00
	* Items paid by City @ 100%						
	Subtotal - Terminal Area				*$ 430,450.00*	*$ 184,300.00*	*$ 614,750.00*
4. VISUAL AIDS							
1	PAPI's	2	Each	$ 22,500.00	$ 2,250.00	$ 42,750.00	$ 45,000.00
2	REIL's - 16/34	2	Each	$ 15,000.00	$ 1,500.00	$ 28,500.00	$ 30,000.00
	Subtotal - Navigational Aids				*$ 3,750.00*	*$ 71,250.00*	*$ 75,000.00*
	Subtotal - Phase 3				*$ 498,642.50*	*$ 1,479,957.50*	*$ 1,978,600.00*
	Engineering, Legal & Administration (20%)				$ 99,728.50	$ 295,991.50	$ 395,720.00
	Total - Phase 3				*$ 598,371.00*	*$ 1,775,949.00*	*$ 2,374,320.00*
	Total - Phase 3 - No Hangars/Terminal				*$ 93,471.00*	*$ 1,775,949.00*	*$ 1,869,420.00*

APPENDIX A

ENVIRONMENTAL OVERVIEW

APPENDIX A
ENVIRONMENTAL OVERVIEW

The analysis of the potential environmental impacts of proposed airport development is an important component of the airport master plan process. The primary purpose of the environmental evaluation is to assess the proposed development program for Cassville Municipal Airport to identify any potential environmental concerns or "red flags" to development.

An important element of environmental evaluation is coordination with appropriate federal, state and local agencies to identify potential environmental concerns that should be considered prior to the design and construction of new facilities at the airport. Agency coordination consists of a letter requesting comments and/or information regarding the potential environmental effects of proposed airport development over the next 20 years.

Any major improvements planned for Cassville Municipal Airport will require compliance with the National Environmental Policy Act of 1969, as amended (NEPA). Compliance with NEPA is generally satisfied by the preparation of an Environmental Assessment (EA) or Environmental Impact Statement (EIS). While this section of the Master Plan is not structured to satisfy NEPA requirements, it is intended to supply a preliminary review of environmental considerations that would need to be analyzed in more detail within the NEPA process.

PROPOSED DEVELOPMENT

As a result of the Master Plan analysis, a number of improvements have been recommended for implementation during the planning period of this Master Plan. The Airport Layout Plan illustrates the proposed development for the Cassville Municipal Airport. This follows is a list of major projects recommended for the Cassville Municipal Airport.

- Establish Global Positioning System (GPS) approaches to each end of runway 9-27.
- Install precision approach path indicators (PAPI's) to each end of runway 9-27.
- Acquire approximately 115 acres of land to protect the airfield safety areas and provide for facility expansion.
- Extend runway 9-27 to the west 700 feet and widen existing runway 9-27 to 75 feet for overall runway dimensions of 4,300 feet x 75 feet.
- Construct new parallel taxiway.
- Construct new apron and terminal area.
- Construct new terminal entrance road.
- Construct new hangars at the new apron and terminal area.
- Construct new runway 18-36 with a parallel taxiway.

ENVIRONMENTAL CONSEQUENCES – SPECIFIC IMPACTS

This environmental overview has been prepared using FAA Order 1050.1E. Policies and Procedures for Considering Environmental Impacts, and FAA Order 5050.4B, National Environmental Policy Act (NEPA) Implementing Instructions for Airport Actions as guidelines. Several factors are considered in a formal environmental document, such as an EA or EIS, which are not including in an environmental overview. These factors include details regarding the project location, historical perspective, existing conditions at the airport, and the purpose and need for the project. This information is available within the Master Plan document. A formal environmental document also includes the resolution of issues/impacts identified as significant during the environmental process. Consequently, this environmental overview only identifies potential environmental issues and does not address mitigation or the resolution of environmental impacts. The following subsections address each of the specific impact categories outlines in FAA Order 5050.4B.

NOISE

Aircraft sound emissions are often the most noticeable environmental effect an airport will produce on the surrounding community. If the sound is sufficiently loud or frequent in occurrence it may interfere with various activities or otherwise be considered objectionable.

To determine the noise related impacts that the proposed development could have on the environment surrounding Cassville Municipal Airport, noise exposure patterns are analyzed for both existing airport activity conditions and projected long-term activity conditions.

Noise Contour Development

The basic methodology used to define aircraft noise levels involves the use of a mathematical model for aircraft noise predication. The Yearly Day-Night Average Sound Level (DNL) is used in this study to assess aircraft noises. DNL is the metric currently accepted by the FAA, Environmental Protection Agency (EPA) and the Department of Housing and Urban Development (HUD) as and appropriate measure of cumulative noise exposure. These three federal agencies have identified the 65 DNL noise contour as the threshold of incompatibility, meaning that noise levels below 65 DNL are considered compatible with underlying land uses.

DNL is defined as the average A-weighted sound level as measured in decibels (dB), during a 24-hour period. A 10 dB penalty is applied to noise events occurring at night (10:00 p.m. to 7:00 a.m.). DNL is a summation metric that allows objective analysis and can describe noise exposure comprehensively over a large area.

Since noise decreases at a constant rate in all directions from a source, points of equal DNL noise levels are routinely indicated by means of a contour line. The various contour lines are then superimposed on a map of the airport and its environs. It is important to recognize that a line drawn on a map does not imply that a particular noise condition exists on one die of the line and not the other. SNL calculations do not precisely define noise impacts. Nevertheless, DNL contours can be used to: (1) highlight existing or potential incompatibilities between the airport and any surrounding development; (2) assess relative exposure levels;

(3) assist in the preparation of airport environs land use plans; and (4) provide guidance in the development of land use control devices, such as zoning ordinances, subdivision regulations and building codes.

The noise contours for Cassville Municipal Airport have been developed by using the Area Equivalent Method (AEM) Version 7.0 as a screening tool for this environmental overview. This screening tool is a quick way to assess the impact of changes in aircraft mix or number of operations. If there is a 17% increase in DNL 65 dB contour area than further analysis is needed by using Integrated Noise Model (INM). AEM is a mathematical procedure that estimates the change in noise contour area for an airport given the types of aircraft and the number of operations for each aircraft. AEM calculations are developed on the basis of a single runway, one-way traffic flow configuration. It produces and estimate of the area impacted (in square miles) and not contours. However, AEM use is limited to changes in fleet mix and number of operations.

Table A-1 is a summary of the Annual Operations by fleet mix. Refer to Chapter 2 for more detailed information of aviation forecasts for Cassville Municipal Airport.

TABLE A.1
Aircraft Forecast Summary

	Annual Operations	
Type of Operation	**Existing (2007)**	**2030**
Itinerant Operations		
Single-Engine Piston	2,730	4,480
Multi-Engine Piston	190	880
Turboprop	120	700
Business Jet	30	300
Rotor-craft	0	400
Total Itinerant Operations	3,070	6,760
Local Operations		
Single-Engine Piston	680	1,120
Multi-Engine Piston	50	220
Total Local Operations	730	1,340
Total Operations	3,800	8,100

Results

The AEM analysis determined that the baseline DNL 65 dB area impacted is 0.1 square miles and that the alternative area impacted was also 0.1 square miles. This correlated to an area increase of more than 17%. Therefore further analysis is needed using the INM model before any major expansion projects proceed.

COMPATIBLE LAND USE

Federal Aviation Regulations (F.A.R.) Part 150 recommends guidelines for planning land use compatibility within various levels of aircraft noise exposure as summarized in Exhibit A. As the name indicates, these are guidelines only; F.A.R. Part 150 explicitly states that determinations of noise compatibility and regulation of land use are purely local responsibilities.

The primary goal of compatible land use planning is to achieve and maintain compatibility between the airport and its surrounding community. Inherent in this goal is the assurance that the airport can maintain or expand its size and level of operations to satisfy existing and future aviation demand. The protection of the investment in a facility such as an airport is of great importance. At the same time, a person who lives, works or owns property near an airport should be able to enjoy the location without infringement by noise or other adverse impacts of the airport. Typically, to handle potential issues with land use, the city would enact land use zoning around the airport. Cassville Municipal Airport is unique in that the areas around the airport are not in the city limits of Cassville. The City of Cassville would have to work with the county to pass some form of zoning to limit the land use.

The impact of noise on land adjacent to the airport can not be fully determined until further noise modeling is completed.

SOCIOECONOMIC IMPACTS

Social impacts known to result from airport improvement projects are often associated with the relocation of residences and businesses of other community disruptions. The proposed development and associated land acquisition are not anticipated to divide or disrupt an established community, interfere with orderly planned development, or create a short-term, appreciable change in employment. However, development of the proposed improvements at Cassville Municipal Airport is expected to result in the relocation or removal of three to five residences. Because acquiring real property and displacing persons is involved with this project, 49 CFR part 24 (implementing the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970), as amended, must be met.

SECONDARY (INDUCED) IMPACTS

Induced socioeconomic impacts address those secondary impacts to surrounding communities resulting from the proposed development, including shifts in patterns of population movement and growth, public service demands, and changed in business and economic activity to the extend influenced by the airport development. According to FAA Order 1050.1E, "Induced impacts will normally not be significant except where there are also significant impacts in other categories, especially noise, land use or direct social impacts."

Significant shifts in patterns of population movement or growth or public service demands are not anticipated as a result of the proposed development. It is expected, however, that the proposed new airport development would potentially induce positive socioeconomic impacts for the community of a period of years. The airport, with expanded facilities and services would be expected to attract additional users. It is expected to encourage tourism, industry and trade and to enhance the future growth and expansion of the community's economic base. Future socioeconomic impacts resulting from the proposed development would be expected to be primarily positive in nature.

FIGURE A.1

Table A-1
LAND USE COMPATIBILITY GUIDELINES - FAR PART 150

LAND USE	YEARLY DAY-NIGHT AVERAGE SOUND LEVEL (DNL) IN DECIBELS					
	BELOW 65	65-70	70-75	75-80	80-85	OVER 85
RESIDENTIAL						
Residential, other than mobile homes and transient lodgings	Y	N[1]	N[1]	N	N	N
Mobile home parks	Y	N	N	N	N	N
Transient lodgings	Y	N[1]	N[1]	N[1]	N	N
PUBLIC USE						
Schools, hospitals, nursing homes	Y	25	30	N	N	N
Churches, auditoriums, and concert halls	Y	25	30	N	N	N
Governmental services	Y	Y	25	30	N	N
Transportation	Y	Y	Y[2]	Y[3]	Y[4]	N[4]
Parking	Y	Y	Y[2]	Y[3]	Y[4]	N
COMMERCIAL USE						
Offices, business and professional	Y	Y	25	30	N	N
Wholesale and retail -- building materials, hardware, and farm equipment	Y	Y	Y[2]	Y[3]	Y[4]	N
Retail trade, general	Y	Y	25	30	N	N
Utilities	Y	Y	Y[2]	Y[3]	Y[4]	N
Communication	Y	Y	25	30	N	N
MANUFACTURING AND PRODUCTION						
Manufacturing, general	Y	Y	Y[2]	Y[3]	Y[4]	N
Photographic and optical	Y	Y	25	30	N	N
Agriculture (except livestock) and forestry	Y	Y[6]	Y[7]	Y[8]	Y[8]	Y[8]
Livestock farming and breeding	Y	Y[6]	Y[7]	N	N	N
Mining and fishing, resource production and extraction	Y	Y	Y	Y	Y	Y
RECREATIONAL						
Outdoor sports arenas and spectator sports	Y	Y	Y[5]	N[5]	N	N
Outdoor music shells, amphitheaters	Y	N	N	N	N	N
Nature exhibits and zoos	Y	Y	N	N	N	N
Amusements, parks, resorts, and camps	Y	Y	Y	N	N	N
Golf courses, riding stables, and water recreation	Y	Y	25	30	N	N

The designations contained in this table do not constitute a Federal determination that any use of land covered by the program is acceptable under Federal, State, or local law. The responsibility for determining the acceptable and permissible land uses and the relationship between specific properties and specific noise contours rests with the local authorities. FAA determinations under Part 150 are not intended to substitute federally determined land uses for those determined to be appropriate by local authorities in response to locally determined needs and values in achieving noise compatible land uses.

FIGURE A.1, *Continued*

Key To Table A-1

Y (Yes)	Land use and related structures compatible without restrictions.
N (No)	Land use and related structures are not compatible and should be prohibited.
NLR	Noise Level Reduction (outdoor to indoor) to be achieved through incorporation of noise attenuation into the design and construction of the structure
25, 30, 35	Land use and related structures generally compatible; measures to achieve a NLR of 25, 30, or 35 dB must be incorporated into design and construction of structure.

Notes for Table A-1

1. Where the community determines that residential or school uses must be allowed, measures to achieve outdoor-to-indoor Noise Level Reduction (NLR) of at least 25 dB and 30 dB should be incorporated into building codes and be considered in individual approvals. Normal residential construction can be expected to provide a NLR of 20 dB, thus, the reduction requirements are often stated as five, 10, or 15 dB over standard construction and normally assume mechanical ventilation and closed windows year round. However, the use of NLR criteria will not eliminate outdoor noise problems.

2. Measures to achieve NLR of 25 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise-sensitive areas, or where the normal noise level is low.

3. Measures to achieve NLR of 30 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise-sensitive areas, or where the normal noise level is low.

4. Measures to achieve NLR of 35 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise-sensitive areas, or where the normal noise level is low.

5. Land use compatible provided special sound reinforcement systems are installed.

6. Residential buildings require a NLR of 25 dB.

7. Residential buildings require a NLR of 30 dB.

8. Residential buildings not permitted.

Source: FAR Part 150 Airport Noise Compatibility Planning, Appendix A, Table 1.

AIR QUALITY

The federal government has established a set of health-based ambient air quality standards (NAAQS) for the following six pollutants: carbon monoxide (CO), nitrogen dioxide (NO2), sulphur dioxide (SO2), ozone, lead and PM10 (particulate matter of 10 microns or smaller). Currently, only airports in nonattainment and maintenance areas must meet the requirements of the General Conformity Rule provided in the Federal Clean Air Act; airports in attainment areas area assumed to conform.

The Missouri Department of Natural Resources (MDNR) determines whether the General Conformity Rule applies. A letter requesting a determination based on the Cassville Municipal Airport ALP will need to be sent prior to any construction activities at the airport.

WATER QUALITY

Airport activities can have a major impact on water quality. The Clean Water Act provides the authority to establish water quality standards, control discharges into surface and subsurface waters, develop waste management treatment plans and issue permits for discharges and for dredged or fill materials.

Construction of the proposed improvements will result in an increase in impermeable surfaces and a resulting increase in surface runoff form both landside and airside facilities. The proposed development might result in short-term impacts on water quality, particularly suspended sediments, during and shortly after precipitation events during the construction phase.

FAA Advisory Circular 150/5370-10 Standards for Specifying Construction of Airports, Item P-156 Temporary Air and Water Pollution, Soil Erosion and Siltation Control established recommendations that should be incorporated into project design specifications to mitigate potential impacts. These standards include temporary measures to control water pollution, soil erosion, and siltation through the use of fiber mats, gravel, mulches, slope drains and other erosion control methods.

The Clean Water Act, Section 402(p), requires a National Pollution Discharge Elimination System (NPDES) General Permit from the Environmental Protection Agency if the project(s) disturb five or more acres of land. In Missouri, NPDES General Permits are issued by MDNR. The City of Cassville and all applicable contractors will need to comply with the requirements and procedures of the NPDES General Permit, in regard to construction activities, including the preparation of the Form E – Application for General Permit, the Form G – Application for Storm Water Permit and a Storm Water Pollution Prevention Plan (SWPPP), prior to the initiation of construction activities.

The construction program, as well as specific characteristics of project design, should incorporate Best Management Practices (BMPs) to reduce erosion, minimize sedimentation, control non-storm water discharges and protect the quality of surface water features potentially affected. BMPs are defined as nonstructural and structural practices that provide the most efficient and practical means of reducing or preventing pollution of storm water. The selection of the practices ad Cassville Municipal Airport should be based on the site's characteristics and focus on those categories of erosion factors within the contractor's control, including (1) construction scheduling, (2) limiting exposed areas, (3) runoff velocity reduction, (4)

sediment trapping, and (5) good housekeeping practices. Inspections of the construction site and associated reporting may be required.

The Department of the Army, Corps of Engineers may require a permit issued under Section 404 of the Clean Water Act for construction activities associated with airport development. The Corps of Engineers would require a 404 permit for the discharge of dredged or fill material into the waters of the United States, including adjacent wetlands. A jurisdictional delineation, completed by the Corps of Engineers, is required to determine if a permit is required. Prior to any construction the City of Cassville should obtain a jurisdictional delineation of wetlands and waters of the U.S. from the Corps of Engineers

Spills, leaks and other releases of hazardous materials into the local environment are often a concern at airports due to fuel storage, fueling activities and maintenance of aircraft. Storm water flowing over impermeable surfaces may pick up petroleum product residues and, if not controlled, transport them off site.

Also of crucial concern would be spills or leaks of substances that could filter through the soils and contaminate groundwater resources. As growth in aviation activity occurs, additional fuel storage facilities will be necessary. Fuel storage facilities must be designed, constructed and maintained in compliance with Federal, State and local regulations and must be registered with MDNR. These regulations include standards for underground storage tank construction materials, the installation of leak or spill detection devices and regulations for storm water discharge. Additionally, waste fluids, particularly oils, coolants and degreasers, require proper management and disposal.

DEPARTMENT OF TRANSPORTATION ACT, SECTION 4(f)

Paragraph 6.1a, FAA Order 1050.1E provides the following.

> *6.1a. "Section 4(f) of the DOT Act, which is codified and renumbered as section 303(c) of 49 U.S.C., provides that the Secretary of Transportation will not approve any program or project that requires the use of any publicly owned land from a public park, recreation area or wildlife and waterfowl refuge of national, state or local significance or land from an historic site of national, state or local significance as determined by the officials having jurisdiction thereof, unless there is no feasible and prudent alternative to the use of such land and such program, and the project includes all possible planning to minimize harm resulting form the use."*

> 6.2e. *"...When there is no physical taking, but there is the possibility of constructive use, the FAA must determine if the impacts would substantially impair the 4(f) resource. If there would be no substantial impairment, the action would not constitute a constructive use and would not therefore invoke section 4(f) of the DOT Act."*

The proposed airport development is not anticipated to impact any Section 4(f) properties. However, the City of Cassville will need to contact the appropriate federal, state and local agencies for final analysis and approval by FAA.

HISTORIC, ARCHETECHTURAL, ARCHAEOLOGICAL AND CULTURAL RESOURCES

The Missouri State Historic Preservation Officer (SHPO) should be contacted regarding the potential presence of cultural or archaeological resources within the area of the proposed development for the Cassville Municipal Airport. The SHPO may recommend that the project area be surveyed by a qualified archeologist to locate any existing cultural or archaeological resources. At this time, it is not know if the existing airport site has been surveyed for cultural resources and may need to also be surveyed.

BIOTIC COMMUNITIES & THREATENED & ENDANGERED SPECIES OF FLORA & FAUNA

The U.S. Department of the Interior, Fish and Wildlife Service (USFWS) and the Missouri Department of Conservation should be contacted to request information regarding potential impacts to threatened or endangered species or species of special concern. Depending on the findings a biological survey may be needed to evaluate the types of native vegetation to be disturbed by the proposed projects and to determine whether any impacts would be anticipated.

COSTAL MANAGEMENT PROGRAM AND COSTAL BARRIERS

The proposed development of Cassville Municipal Airport is not located within the jurisdiction of a State Coastal Management Program. The Costal Zone Barrier resources system consists of undeveloped costal barriers along the Atlantic and Gulf Coasts. These resources are well outside the sphere of influence of the airport and its vicinity and do not apply to the proposed project.

WILD AND SENIC RIVERS

The proposed development of Cassville Municipal Airport is not located within the vicinity of a designated wild and scenic river. No impact to wild and scenic rivers is anticipated as a result of the proposed airport development.

WATERS OF THE U.S., INCLUDING WETLANDS

Prior to any development activities, the City of Cassville should request a jurisdictional delineation from the U.S. Army Corps of Engineers for the development area including future proposed airport property. This delineation would identify any waters of the U.S., including wetlands and intermittent streams, under jurisdiction of this agency. If the proposed construction could directly or indirectly affect any waters of the U.S., the project might require a U.S. Army Corps of Engineers permit per Section 404 of the Clean Water Act.

FLOODPLAINS

The City of Cassville had floodplain mapping for the city, but the airport property is not contiguous to the City of Cassville proper. The area surrounding the airport is not incorporated and lies in Barry County which is not floodplain mapped. The airport is not within any designated floodplain and by looking at the location of the airport on a USGS map, the airport is located on a ridge and is considered a non-risk drainage area.

FARMLAND

Most of the area around the airport is pasture or agricultural. The United States Department of Agriculture determines if the proposed improvement and expansion of the Cassville Municipal Airport are affected by the Farmland Protection Policy Act (FPPA) that excludes land which is already in or is committed to urban development, currently used as water storage, or land that is not prime unique farmland. It is not expected that the airport improvements will be affected by the FPPA, but correspondence is needed with the U.S. Department of Agriculture for a final determination.

ENERGY SUPPLY AND NATURAL RESOURCES

No concern regarding existing energy production facilities or know energy resource supplies is expected by the City of Cassville for this proposed airport development. A slight increase in energy demand will likely occur as a result of the proposed project. Additional electricity will be needed for proposed runway extension, taxiway construction, new navigation lights, terminal building, hangar and parking areas. In addition to this electric demand, expenditures of manpower, fuel, electricity, chemicals, water and other forms of energy will be necessary to construct the improvements and to provide maintenance and operation of the facilities.

LIGHT EMISSIONS

The proposed lighting improvements for the airport include installation of Medium Intensity Runway Lighting (MIRL) on runway 18-36 and the installation of precision approach path indicators (PAPIs) to each end of runway 9-27 and eventually runway 18-36. Outdoor lighting installed within the auto parking areas, aircraft parking apron and surrounding all terminal, FBO and hangar buildings is also anticipated. The distance from the airfield to light-sensitive land uses is expected to be enough such that any new light emissions will not be significant.

SOLID WASTE

Slight increased in the generation of solid waste are anticipated as a result of the proposed development and overall growth in aviation activity. Because landfills can attract birds for feeding, the location of landfills near airports is not desired. Normally, landfills are discouraged within a five mile radius of a runway end or within a 10,000 foot radius of jet airports and a 5,000 foot radius of non-jet airports. The nearest operational landfill near the Cassville Municipal Airport is the Newton-McDonald County Landfill which is approximately 28 miles northwest of the runway. Adverse affects from solid waste is not expected for this airport.

CONSTRUCTION IMPACTS

Construction activities have the potential to create temporary environmental impacts at an airport. These impacts primarily relate to noise resulting from heavy construction equipment, dust emissions resulting from construction activities and potential impacts on water quality from runoff and soil erosion form exposed surfaces.

A temporary increase in particulate emissions and dust may result from construction activities. The use of temporary dirt access roads would increase the generation of particulates. Dust control measures, such as watering exposed soil areas, will need to be implemented to minimize the localized impact.

Any necessary clearing and grubbing of construction areas should be conducted in sections or sequenced to minimize the amount of exposed soil at any one time. All vehicular traffic should be restricted to the construction site and established roadways.

The provisions contained in FAA Advisory Circular 150/5370-10 Standards for Specifying Construction of Airports, Item P-156 Temporary Air and Water Pollution, Soil Erosion and Siltation Control should be incorporated into all project specifications. During construction, temporary dikes, basins and ditches should be utilized to control soil erosion and sedimentation and prevent degradation of off-airport surface water quality. After construction in complete, slopes and cleared areas should be reseeded to aid in the vegetation process.

CONCLUSION

This overview has outlined the steps that the City of Cassville needs to take to determine the potential environmental issues and anticipated considerations that may result from the development of the Cassville Municipal Airport. Figure A.2 summarizes the Environmental Overview and provides the next steps in the NEPA process. As a result of the NEPA process, mitigation measures may be recommended to limit the potential impacts related to a number of these resources including water quality, waters of the U.S, archaeological and cultural resources and biotic communities and threatened and endangered species of flora and fauna. Please note that as more specific information is gathered through a formal EA process, additional issues may arise.

FIGURE A.2 – ENVIRONMENTAL OVERVIEW SUMMARY

CATEGORY	ACTION
Noise	Further analysis using INM model software
Compatible Land Use	Verify after DNL 65 dB contours are determined
Socioeconomic Impacts	Consult with FAA , MoDOT to determine impact; use 49 CFR part 24 guidelines to proceed with real property acquisition and relocation
Secondary (Induced) Impacts	None
Water Quality	For construction, obtain NPDES general permit from MDNR and implement SWPPP with BMPs
Air Quality	Request letter of determination from MDNR
Section 4(f) Lands	Work with FAA, MoDOT to determine appropriate agencies to request determinations of impact
Historical/Cultural Resources	Contact State Historical Preservation Officer for determination
Biotic Communities, Protected Species	Contact U.S. Department of the Interior, Fish and Wildlife Service (USFWS) and the Missouri Department of Conservation for determination of any protected species in the project area
Wetlands	None anticipated, complete a jurisdictional delineation with the U.S. Army Corps of Engineers for the development area
Floodplains	None
Coastal Zone Area, Coastal Barriers	None, not applicable
Wild and Scenic Rivers	None
Farmland	None anticipated; correspond with the U.S. Department of Agriculture for a final determination
Energy Supply/Natural Resources	Not significant; additional energy use as a result of additional facility development
Light Emissions	Not significant
Solid Waste Impacts	None
Construction	Not significant; incorporate BMPs in construction programs