DRAFT

AIRPORT MASTER PLAN

Springfield – Branson National Airport

August 1, 2012

As required by Paragraph 425.B (4) of FAA Order 5100.38C, *Airport Improvement Program (AIP) Handbook:*

The preparation of this document may have been supported, in part, through the Airport Improvement Program financial assistance from the Federal Aviation Administration as provided under Title 49 U.S.C., Section 47104. The contents do not necessarily reflect the official views or policy of the FAA. Acceptance of this report by the FAA does not in any way constitute a commitment on the part of the United States to participate in any development depicted therein nor does it indicate that the proposed development is environmentally acceptable or would have justification in accordance with appropriate public laws.

JVIATION®

900 S. BROADWAY ● SUITE 350 ● DENVER, COLORADO 80209

PHONE: 303-524-3030 ● FAX: 303-524-3031

● WWW.JVIATION.COM ●

Table of Contents

1.0 INTRODUCTION 1-1

2.0 INVENTORY 2-1
2.1 AIRPORT REFERENCE CODE 2-2
2.2 AIRFIELD/AIRSPACE 2-4
2.2.1 Runways 2-4
2.2.2 Taxiways 2-5
2.2.3 Apron 2-7
2.2.4 Pavement Condition 2-8
2.2.5 Lighting, Marking, and Signage of Runways and Taxiways 2-9
2.2.6 Visual and Navigational Airport Aids 2-9
2.2.7 Instrument Approach Equipment and Procedures 2-10
2.2.8 Airport Airspace Usage 2-12
2.2.9 Air Traffic Control 2-13
2.2.10 Noise Abatement Procedures 2-15
2.2.11 Obstructions to Air Navigation 2-15
2.3 COMMERCIAL PASSENGER FACILITIES 2-16
2.3.1 Terminal Building Overview 2-16
2.3.2 Ticket Counters 2-16
2.3.3 Outgoing Baggage Make-Up 2-17
2.3.4 Airline Ticket Offices 2-17
2.3.5 TSA Facilities 2-18
2.3.6 Gates 2-18
2.3.7 Hold Rooms 2-18
2.3.8 Circulation 2-18
2.3.9 Concessions 2-19
2.3.10 Rental Car Facilities 2-19
2.4 CURB FRONT 2-21
2.5 GA FACILITIES 2-21
2.5.1 Based Aircraft 2-21
2.5.2 Fixed Base Operator 2-22
2.5.3 Airport Hangars 2-22
2.5.4 Based and Transient Aircraft Parking Aprons & Tie downs 2-23
2.6 AIR CARGO FACILITIES 2-24
2.7 SUPPORT FACILITIES 2-24
2.7.1 Aircraft Rescue and Fire Fighting Building 2-24
2.7.2 Snow Removal Equipment/Maintenance Storage Facilities 2-25
2.7.3 Aircraft Fuel Storage 2-25
2.7.4 Parking 2-26
2.8 SURFACE TRANSPORTATION 2-27
2.8.1 Airport Access Road Network 2-27
2.8.2 Circulation Roads 2-27
2.8.3 Railroads 2-27
2.9 UTILITIES 2-27
2.9.1 Water 2-27
2.9.2 Sanitary Sewer 2-28
2.9.3 Communications 2-28
2.9.4 Natural Gas 2-28

2.9.5 Electricity 2-28
2.9.6 Stormwater 2-28
2.10 METEOROLOGICAL DATA 2-30
2.10.1 Weather Observation Equipment 2-30
2.10.2 Wind Coverage 2-30
2.10.3 Temperature 2-34
2.10.4 Precipitation 2-34
2.10.5 Instrument Meteorological Conditions (IMC) 2-34
2.11 AIRPORT EQUIPMENT 2-34
2.11.1 ARFF Equipment 2-34
2.11.2 Snow Removal Equipment (SRE) 2-35
2.11.3 Aircraft Fueling Equipment 2-35
2.11.4 Airport Certification 2-36
2.11.5 Security 2-36
2.12 AIRPORT PROPERTY 2-37
2.13 REGIONAL SETTING AND LAND USE 2-38
2.14 COMMUNITY PLANNING INITIATIVES 2-40
2.15 COMMUNITY SOCIOECONOMIC ANALYSIS 2-41
2.15.1 Population 2-41
2.15.2 Employment 2-41
2.15.3 Income and cost of living 2-42
2.16 ENVIRONMENTAL OVERVIEW 2-43
2.16.1 Air Quality 2-43
2.16.2 Department of Transportation Act: Section 4(f) 2-44
2.16.3 Farmlands 2-44
2.16.4 Fish, Wildlife, and Plants 2-45
2.16.5 Floodplains 2-45
2.16.6 Hazardous Materials, Pollution Prevention, and Solid Waste 2-47
2.16.7 Historical, Architectural, Archaeological, and Cultural Resources 2-48
2.16.8 Light Emissions and Visual Impacts 2-48
2.16.9 Noise 2-49
2.16.10 Water Quality 2-49
2.16.11 Wetlands 2-50
2.16.12 Wild and Scenic Rivers 2-51
2.17 CURRENT AVIATION ACTIVITY 2-52
2.17.1 Aircraft Operations 2-52
2.17.2 Commercial Activity 2-52
2.18 SURVEY RESULTS AND ANALYSIS 2-53
2.18.1 Based Aircraft Owners 2-53
2.18.2 Local Businesses 2-54
2.18.3 Business Aircraft 2-55
2.18.4 Tenants 2-56

3.0 AVIATION ACTIVITY FORECASTS 3-1
3.1 INTRODUCTION 3-1
3.1.1 Purpose 3-1
3.1.2 Data Sources 3-1
3.2 FORECAST SUMMARY 3-3
3.3 SGF MARKET PROFILE 3-3
3.3.1 Service Area 3-4
3.4 FORECAST DETAIL 3-8

3.4.1 Methodology ... 3-8
3.5 GENERAL AVIATION FLEETS ... 3-9
3.5.1 General Aviation Outlook – The Macro Picture ... 3-9
3.5.2 Based Aircraft ... 3-14
3.5.3 Fleet Mix ... 3-15
3.5.4 Local and Itinerant Operations ... 3-16
3.6 SCHEDULED AIRLINE SERVICE ... 3-21
3.6.1 Historical Capacity and Service ... 3-21
3.6.2 Airline Fleet Applications At SGF ... 3-25
3.6.3 Current Commercial Air Service At SGF ... 3-28
3.6.4 Competing Airports ... 3-29
3.6.5 Passenger Origin and Destination Demand Patterns ... 3-29
3.6.6 Historical Passenger Demand ... 3-32
3.6.7 Airline Historical Frequency and Capacity at SGF ... 3-33
3.6.8 Airline Load Factors ... 3-34
3.6.9 Key Economic Metrics and Annual Growth ... 3-35
3.6.10 Regional Growth in Personal Income ... 3-36
3.6.11 Passenger Enplanements – Forecast Approach ... 3-36
3.6.12 Factors Impacting Passenger Enplanements Forecasts ... 3-36
3.6.13 Forecast Uncertainties Specific To SGF ... 3-37
3.6.14 Methodology ... 3-38
3.6.15 Regional Market Changes ... 3-38
3.6.16 Airline Enplanement Forecast Projection ... 3-39
3.6.17 Peak Period Demand ... 3-41
3.6.18 Future Peak Hour Operations ... 3-43
3.6.19 Current Design Aircraft ... 3-43
3.6.20 Future Design Aircraft ... 3-44
3.7 FORECAST COMPARISONS ... 3-45
3.7.1 Comparison Summary to Terminal Area Forecast (TAF) ... 3-45
3.7.2 Airport Forecast/TAF Comparison of Forecasted Enplanements ... 3-48

4.0 FACILITY REQUIREMENTS ... 4-1
4.1 SUMMARY ... 4-1
4.2 AIRSIDE REQUIREMENTS ... 4-2
4.2.1 Runways ... 4-2
4.2.2 Taxiways ... 4-9
4.2.3 FAA Safety Standards ... 4-12
4.2.4 Navigational and Landing Aids ... 4-17
4.2.5 Airspace Requirements ... 4-20
4.2.6 Obstructions ... 4-21
4.3 LANDSIDE REQUIREMENTS ... 4-22
4.3.1 Regional Transportation Network ... 4-22
4.3.2 On-airport Circulation Roadways ... 4-22
4.3.3 Parking ... 4-22
4.3.4 Land Use ... 4-23
4.4 TERMINAL REQUIREMENTS ... 4-23
4.4.1 Level of Service ... 4-24
4.4.2 Building Systems / Code Compliance Analysis ... 4-28
4.4.3 Apron Level ... 4-29
4.4.4 Main Level ... 4-31
4.4.5 Airline Functions ... 4-31

4.4.6 Concessions 4-35
4.4.7 Non-secure Public Areas 4-36
4.4.8 Secure Public Areas 4-36
4.4.9 Building Service Areas 4-38
4.4.10 Future Terminal Expansion 4-39
4.5 GENERAL AVIATION 4-41
4.5.1 Transient Aircraft Apron 4-41
4.5.2 Aircraft Parking Aprons 4-42
4.5.3 Aircraft Storage Requirements 4-43
4.5.4 FBO Facility Needs 4-44
4.6 AVIATION SUPPORT FACILITIES 4-44
4.6.1 Airport Cargo Apron Expansion 4-44
4.6.2 Air Cargo Facilities 4-45
4.6.3 Aircraft Maintenance Facilities 4-45
4.7 AIRPORT SUPPORT FACILITIES 4-45
4.7.1 Aircraft Rescue and Fire Fighting 4-45
4.7.2 Airport Maintenance Facilities 4-45
4.8 FUEL STORAGE REQUIREMENTS 4-46
4.9 DEICING FACILITIES 4-46
4.9.1 Properties of Deicing Fluid 4-46
4.9.2 Deicing Capturing Regulation 4-47
4.9.3 Deice Pad Design 4-49
4.9.4 General Design Assumptions 4-49
4.10 UTILITIES 4-50

5.0 ALTERNATIVES ANALYSIS 5-1
5.1 INTRODUCTION 5-1
5.2 EVALUATION CRITERIA 5-1
5.3 RUNWAY 2/20 EXTENSION 5-1
5.3.1 Overview 5-1
5.3.2 Assumptions 5-2
5.3.3 Alternative 1 – Maintain Current Runway Length 5-2
5.3.4 Alternative 2 – 1,000 Foot Extension to the South 5-3
5.3.5 Alternative 3 – 1,000 Foot Extension to the North 5-6
5.3.6 Recommended Alternative 5-7
5.3.7 Preferred Alternative 5-8
5.4 GA APRON EXPANSION 5-8
5.4.1 Overview 5-8
5.4.2 Assumptions 5-9
5.4.3 Alternative 1 – Maintain Current GA Apron 5-9
5.4.4 Alternative 2 – GA Apron Expansion 5-10
5.4.5 Recommended Alternative 5-12
5.4.6 Preferred Alternative 5-12
5.5 GA DEVELOPMENT 5-13
5.5.1 Overview 5-13
5.5.2 Assumptions 5-13
5.5.3 Alternative 1 – Existing GA Development and Expanded T-Hangar Facility 5-14
5.5.4 Alternative 2 – West Kearney and GA Apron Redevelopment 5-16
5.5.5 Alternative 3 – GA Development Northeast of Runway 32 Threshold 5-18
5.5.6 Alternative 4 – GA Development Southeast of Runway 32 Threshold 5-22
5.5.7 Alternative 5 – West Airfield GA Development 5-26

5.5.8 Recommended alternative 5-28
5.5.9 Preferred Alternative 5-28
5.6 AIRCRAFT DEICE PADS 5-29
5.6.1 Overview 5-29
5.6.2 Assumptions 5-29
5.6.3 Commercial Apron Deice Pad 5-30
5.6.4 GA Deice Pad 5-38
5.6.5 Cargo Deice Pad 5-46

6.0 ENVIRONMENTAL AND SUSTAINABILITY 6-1
6.1 ENVIRONMENTAL 6-1
6.1.1 NEPA Requirements 6-1
6.1.2 Environmental Analysis for Proposed Projects 6-2
6.2 AGENCY COORDINATION 6-4
6.3 SUSTAINABILITY 6-6
6.3.1 Sustainability Inventory 6-6
6.3.2 Local Sustainability Initiatives 6-7
6.3.3 Water Quality 6-7
6.3.4 Sustainable Sites 6-9
6.3.5 Water Efficiency 6-11
6.3.6 Energy Efficiency 6-13
6.3.7 Materials and Resources 6-15
6.3.8 Emissions 6-16

7.0 FINANCIAL PLANS 7-1
7.1 AIRPORT FINANCIAL STRUCTURE 7-2
7.2 MASTER PLAN CIP PHASING AND COST 7-2
7.3 MASTER PLAN CIP FUNDING 7-2
7.3.1 Federal Grants 7-2
7.3.2 State Funds 7-6
7.3.3 Private Funds 7-7
7.3.4 Local Funds 7-7
7.3.5 Financing Plan 7-9
7.4 DEBT SERVICE 7-10
7.5 OPERATING EXPENSES 7-11
7.6 NONAIRLINE REVENUE 7-13
7.7 AIRLINE REVENUE 7-15
7.8 CASH FLOW 7-15
7.9 FINDINGS 7-15

8.0 PUBLIC INVOLVEMENT AND COORDINATION 8-1
8.1 TECHNICAL COMMITTEE/AIRPORT BOARD MEETINGS 8-1
8.2 PUBLIC AWARENESS CAMPAIGN 8-2
8.3 AIRPORT USER SURVEYS 8-2
8.4 COMMUNITY MEETINGS 8-3

APPENDICES

Appendix A – Aviation Glossary
Appendix B – Environmental Documentation
Appendix C – Current Sign and Marking Plan
Appendix D – Agency Coordination

Tables

Table 2-1 - Landside And Airside Components 2-1
Table 2-2 - Airplane Design Group (ADG) 2-3
Table 2-3 - Taxiways 2-6
Table 2-4 - Instrument Approaches 2-11
Table 2-5 - Regional Instrument Approaches 2-12
Table 2-6 - Based Aircraft 2-21
Table 2-7 - Fuel Tanks 2-25
Table 2-8 - Wind Coverage 2-31
Table 2-9 - IMC Percentage 2-34
Table 2-10 - Snow Removal Equipment 2-35
Table 2-11 - Fuel Trucks 2-35
Table 2-12 - Population Trend 2-41
Table 2-13 - Top 10 Employers 2-42
Table 2-14 - Per Capita Income 2-43
Table 2-15 - Non-Attainment and Maintenance Designated Counties - Greene County 2-44
Table 2-16 - Threatened or Endangered Species 2-45
Table 2-17 - NPL Sites in Greene County 2-48
Table 2-18 - 2009 Operations 2-52
Table 2-19 - Commercial Enplaned Passengers 2-52
Table 3-1 - Summary of Aviation Activity 3-3
Table 3-2 - Regional Employment 3-7
Table 3-3 - SGF Based General Aviation Mix 3-16
Table 3-4 - SGF General Aviation Operations 3-17
Table 3-5 - Instrument Operations 3-20
Table 3-6 - Summary Cargo Forecast (in tons) 3-21
Table 3-7 - Airline Service History 3-22
Table 3-8 - Frequency and Capacity: 2000-2005 3-23
Table 3-9 - Frequency and Capacity: 2009-2010 3-24
Table 3-10 - SGF Scheduled Passenger Service 3-28
Table 3-11 - Passenger O&D Patterns – Top Markets 3-30
Table 3-12 - SGF Peak Hour Demand 3-42
Table 3-13 – SGF Base Year +1 Peak Aircraft Operations Forecast 3-43
Table 3-14 - SGF Current Airline Design Aircraft 3-44
Table 3-15 - Other Aircraft Specifications 3-45
Table 3-16 – SGF Summary of Aviation Activity 3-46
Table 3-17 - Airport Planning and TAF Forecast 3-47
Table 4-1 - Facility Requirements Summary 4-1
Table 4-2 - FAA Runway Length Requirements 4-4
Table 4-3 - Gear Configuration 4-8
Table 4-4 - FAA Design Standards 4-12
Table 4-5 - Apron Level Square Foot (SF) Recommendations Per Functional Area 4-25
Table 4-6 - Main Level Recommedations Per Functional Area 4-26
Table 4-7 – Main Level Recommendations Per Functional Area 4-27
Table 4-8 – Upper Level Recommendations Per Functional Area 4-27
Table 4-9 - Midfield Terminal Occupancy 4-28
Table 4-10 - Transient Aircraft Apron Requirements 4-42

Table 4-11 - Based Aircraft Apron Requirements 4-43
Table 4-12 - Based Hangared Aircraft Requirements 4-43
Table 5-1 - Runway 2/20 Extension Comparison Matrix 5-8
Table 5-2 - Apron Expansion Comparison Matrix 5-12
Table 5-3 – General Aviation Development Comparison Matrix 5-28
Table 5-4 – Commerical Apron Deice Pads Comparison Matrix 5-37
Table 5-5 – GA Deice Pads Comparison Matrix 5-45
Table 5-6 - Cargo Deice Pads Comparison Matrix 5-51
Table 6-1 – Summary of Environmetal Review for Proposed Projects 6-2
Table 6-2 – Agency Coordination Record 6-5
Table 7-1 – Capital Improvement Program 7-3
Table 7-2 - Capital Improvment Program and Funding Sources 7-4
Table 7-3 – HISTORICAL aip GRANTS 7-5
Table 7-4 - Anticipated Federal Entitlement Funding 7-7
Table 7-5 - Anticipated PFC Colleections 7-9
Table 7-6 - Bond Debt Service 7-10
Table 7-7 - Operating Expenses 7-12
Table 7-8 - NonAirline Revenue 7-14
Table 7-9 - Airline Rates & Cost Per Enplanement 7-16
Table 7-10 - Airport Cash Flow 7-17
Table 8-1 - Technical Committee/Airport Board Meetings 8-1
Table 8-2 - Community Meetings 8-3

Figures

Figure 2-1 - Airfield Diagram 2-2
Figure 2-2 - ARC Aircraft Types 2-4
Figure 2-3 - Taxiways 2-7
Figure 2-4 - Aprons 2-8
Figure 2-5 - Pavement Condition 2-9
Figure 2-6 - Aeronautical Chart 2-13
Figure 2-7 - Hot Spot Intersections 2-15
Figure 2-8 - Terminal Use 2-16
Figure 2-9 - Airline Space 2-17
Figure 2-10 - Consolidated Rental Car Facility 2-19
Figure 2-11 - Rental Car Counter Leases 2-20
Figure 2-12 - Rental Car ready/Return Lot Leases 2-20
Figure 2-13 - Curb Front 2-21
Figure 2-14 - GA Aircraft Parking 2-22
Figure 2-15 - Airport Owned T-Hangars 2-22
Figure 2-16 - Hangar Leases 2-23
Figure 2-17 - Cargo Facility 2-24
Figure 2-18 - ARFF Building 2-25
Figure 2-19 - Parking 2-26
Figure 2-20 - Storm Drainage 2-29
Figure 2-21 - All Weather windrose 2-32
Figure 2-22 - IFR weather windrose 2-33
Figure 2-23 - Airport Property 2-37
Figure 2-24 - City of Springfield Zoning Map 2-38
Figure 2-25 - Greene County Zoning Map 2-39
Figure 2-26 - Greene county unemployment rate 2-42
Figure 2-27 - FEMA Floodplain 1 2-46
Figure 2-28 - FEMA Floodplain 2 2-47
Figure 2-29 - Wetlands Inventory 2-51
Figure 2-30 - Airport Essentials for Based Aircraft 2-54
Figure 2-31 - Airport Facility Ratings 2-54
Figure 2-32 - Commerical Air Travel Booking – Important factors 2-55
Figure 2-33 - Overall Satisfaction with Airport 2-56
Figure 3-1 - Airport Service Area 3-4
Figure 3-2 - Regional Population 3-5
Figure 3-3 - Personal Income Per Capita 3-6
Figure 3-4 - General Aviation Worldwide Aircraft Deliveries 2000-2010 3-10
Figure 3-5 - Active General Aviation Estimated Annual Flight Hours: 2000-2010 3-11
Figure 3-6 - General Aviation in the United States: 2000-2010 3-12
Figure 3-7 - SGF Based Aircraft Projections 3-14
Figure 3-8 - Projected SGF Based Aircraft Fleet Mix 3-15
Figure 3-9 - Itinerant and Local Operations 3-18
Figure 3-10 - SGF Average Seats per Departure 3-25
Figure 3-11 - SGF Annual Airline Flight Departure and Average Seats Per Departure 3-27
Figure 3-12 - SGF Air Service Map 3-29

Figure 3-13 - SGF Network Carrier Hub Airports....3-31
Figure 3-14 - SGF Historical Passnger Demand: 2004-2010....3-32
Figure 3-15 - SGF Historical and Frquency Capacity: 2004-2010....3-33
Figure 3-16 - SGF Airline Load Factors....3-34
Figure 3-17 - Springfield Key Demographics Forecast....3-35
Figure 3-18 - SGF Enplanements Historical and Projections....3-39
Figure 3-19 - SGF 20-Year Forecast Scenarios....3-40
Figure 3-20 - Airport Forecast and Terminal Area Forecast Comparison....3-48
Figure 4-1 - Critical Aircraft Runway Requirements....4-5
Figure 4-2 - Business Jet Runway Requirements....4-6
Figure 4-3 - Taxiway Improvements....4-10
Figure 4-4 - Bypass Taxilane to Self-Serve Fuel Farm....4-11
Figure 4-5 - Runway hold bar Separation....4-13
Figure 4-6 - Non-Standard Separation....4-14
Figure 4-7 - Non-Standard Taxiway Separation....4-15
Figure 4-8 - Part 77 Imaginary Surfaces....4-20
Figure 4-9 - Future Industrial Park....4-23
Figure 4-10 - Airline Ticket Area....4-31
Figure 4-11 - 16 Gate Terminal Layout....4-39
Figure 4-12 - 26 Gate Terminal Layout....4-40
Figure 4-13 - 36 Gate Terminal Layout....4-40
Figure 4-14 - 60 Gate Terminal Layout....4-41
Figure 4-15 – Cargo Apron Expansion....4-44
Figure 4-16 - NPDES Outfall Locations....4-47
Figure 4-17 - Proposed EPA ELG Scope....4-48
Figure 5-1 – Runway Extension - Alternative 2....5-3
Figure 5-2 – Runway Extension - Alternative 3....5-6
Figure 5-3 - GA Apron Expansion – Alternative 2....5-10
Figure 5-4 - North GA T-Hangar Facility....5-14
Figure 5-5 - GA Development - Alternative 2....5-16
Figure 5-6 - GA Development - Alternative 3....5-18
Figure 5-7 - GA Development Alternative 3 Option 1....5-19
Figure 5-8 - GA Development Alternative 3 Option 2....5-20
Figure 5-9 - GA Development Location Alternative 4....5-22
Figure 5-10 - GA Development - Alternative 4 Option 1....5-23
Figure 5-11 - GA Development - Alternative 4 Option 2....5-24
Figure 5-12 - GA Development Area - Alternative 5....5-26
Figure 5-13 – Commercial Deice Pad – Alternative 2....5-31
Figure 5-14 – Commercial Deice Pad – Alternative 3....5-33
Figure 5-15 – Commercial Deice Pad – Alternative 4....5-35
Figure 5-16 – GA Deicing Pad – Alternative 2....5-39
Figure 5-17 – GA Deice Pad – Alternative 3....5-41
Figure 5-18 – GA Deice Pad – Alternative 4....5-43
Figure 5-19 – Cargo Deice Pad – Alternative 2....5-47
Figure 5-20 – Cargo Deice Pad – Alternative 3....5-49
Figure 8-1 - Master Plan Postcard....8-2

1.0 INTRODUCTION

The Springfield-Branson National Airport (SGF) is a publically owned facility consisting of approximately 2,791 acres. The airport is located five miles northwest of the central business district of Springfield, a city in Greene County, Missouri. The city is roughly 190 miles southwest of St. Louis and 150 miles southeast of Kansas City.

With a metropolitan population exceeding 430,000 and a city population of approximately 156,000, Springfield is the third largest city in the state of Missouri. The city has almost 74 square miles of incorporated land and is the county seat (administrative center) of Greene County. The city is situated on the Springfield Plateau of the Ozarks, contributing to the nickname of "The Queen City of the Ozarks". The greater part of the plateau is surrounded by forest, pastures and shrub-scrub upbringing. Flat rolling hills and cliffs border the city to the south, east and north.

The airport is owned by the City of Springfield and is managed by an 11 member administrative board. The Board is appointed by the City Manager and confirmed by the City Council. Local tax revenues or general city funds are not contributed to the airport, meaning the Board operates the airport as a self-supporting facility. The airport owns and maintains the terminal, runway / taxiway complexes, navigation / lighting systems, and leases space to private companies consisting of airlines, restaurants, and rental car agencies.

SGF is capable of generating funds for daily operations by the money received from contracts and leases with airlines and other businesses that utilize the airport facilities. Furthermore, the Federal Aviation Administration (FAA) distributes grants through a matching program for improvement projects that are qualified and approved. These federal grants are funded mainly by federal taxes on aviation fuel, airline tickets, and cargo shipments.

The Master Plan was last updated in 1992, and the Airport Layout Plan (ALP) was updated in 2009. The intent of this study is to update the Master Plan and ALP and to determine the extent, type and schedule of development needed to accommodate future aviation demand. The Master Plan Update will also examine current sustainable measures being taken by the airport, and include a plan to improve the overall sustainability of the facility and its operations. There are several primary objectives for this study, which are summarized below.

- Determine condition and sufficiency of existing facilities.
- Provide a development and expansion guidance plan for a 20-year period that is technically accurate, financially feasible and implementable. This will be determined by forecasts and safety guidance and will be facilitated in the preparation of a Capital Improvement Plan (CIP).
- Provide a Sustainability Improvement Plan for current and future conditions.
- Establish an outline to provide for future airport development, which will cost-effectively satisfy aviation demand, and reflect on possible socio-economic and environmental impacts.
- Prepare a financial plan that considers the airport's budget, revenue and expenses along with potential grant funding scenarios.
- Provide opportunities for public input throughout the process to ensure that future airport development is consistent with community values.

This page intentionally left blank to facilitate double-sided printing

2.0 INVENTORY

This chapter explains the nature and general condition of the existing facilities that encompass SGF. Information pertaining to the airport systems, including airfield, NAVAIDs, ground access, parking, pavement conditions, utilities, and the physical characteristics of the airport have been thoroughly gathered and discussed.

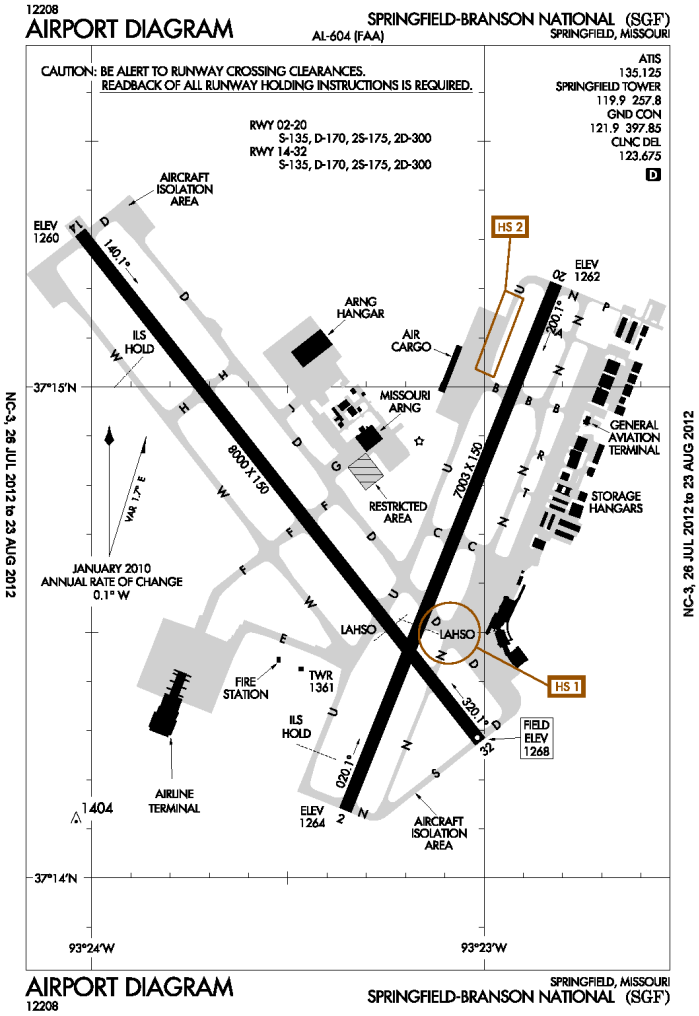
Table 2-1 summarizes the major landside and airside components of SGF. Each item listed in the table is discussed in greater detail throughout the remainder of inventory report.

TABLE 2-1 - LANDSIDE AND AIRSIDE COMPONENTS

ITEM	DESCRIPTION	CONDITION
Runways **14/32**	• 8,000' x 150' - Consists of: 5,400' of Porous Friction Course (PFC) Asphalt 2,600' of Grooved Concrete. • High Intensity Runway Lights (HIRL) • Precision Markings (Runway 14) • Non-Precision Markings (Runway 32) • Published Strength: 135,000 lbs (SWG), 170,000 lbs (DWG), 175,000 (STG), 300,000 lbs (DTG)	Below Average* Above Average* Good Good
2/20	• 7,003' x 150' –Grooved concrete • High Intensity Runway Lights (HIRL) • Precision Markings • Published Strength: 135,000 lbs (SWG), 170,000 lbs (DWG), 175,000 (STG), 300,000 (DTG)	Excellent Good
Taxiways	Refer to **Section 2.2.2**	
Apron	Commercial - 673,647 square feet GA - 1,803,461 square feet West Kearney Complex - 575,702 square feet MONG - 575,702 square feet	Excellent Average/Above Average Average Average
Navigational Aids	ILS/DME, VOR/DME, LOC, RNAV(LPV, LNAV, VNAV), HI-TACAN(Military), TACAN(Military)	Good
Visual Aids	• Medium Intensity Approach Lighting System with runway alignment indicator lights(MALSR) – Runways 2, 14 • Medium Intensity Approach Lighting System (MALSR) – Runway 20 • Precision Approach Path Indicators (PAPI) – Runways 14, 20, 32 • Visual Approach Slope Indicators (VASI) – Runway 2 • Runway End Identifier Lights (REIL) – Runway 32 • Airport Rotating Beacon	Good Good Good Good Good Good
FBO		Good
Terminal	• 275,000 Square Feet	Excellent
Parking	• Long Term / Short Term / Employee	Excellent

**Runway 14/32 will be rehabilitated in 2011*
Source: Jviation, Inc.

FIGURE 2-1 - AIRFIELD DIAGRAM



2.1 AIRPORT REFERENCE CODE

The FAA classifies airports in the United States with a coding system known as the Airport Reference Code (ARC). This classification helps apply design criteria appropriate to operational and physical characteristics of the aircraft types that operate at SGF. The ARC is made up of two separate components: aircraft approach category, designated with letters A through E, and wingspan or tail height, called the Airplane Design Group (ADG), denoted by roman numerals I through VI.

The aircraft approach category is an ***alphabetical*** classification of an aircraft based upon 1.3 times the stall speed in a landing configuration at their maximum certified landing weight; letter A being the slowest approach speed and E being the fastest. The approach category for an airport is determined by the approach speed of the fastest aircraft that operates at the airport at least 500 times per year. The categories are list below:

Category A: Speed less than 91 knots.
Category B: Speed 91 knots or more but less than 121 knots
Category C: Speed 121 knots or more but less than 141 knots.
Category D: Speed 141 knots or more but less than 166 knots.
Category E: Speed 166 knots or more.

The ADG is a ***numerical*** classification aircraft based on wingspan or tail height. If an airplane is in two categories, the most demanding category should be used. Similar to the approach category, the ADG for an airport is determined by the largest aircraft operating at least 500 times per year at the facility. The groups are identified in **For SGF**, the ARC is currently D-IV based on the most critical aircraft routinely operating at the airport. This ARC is a combination of two critical aircraft. The Boeing 757 and Airbus A300 aircraft used extensively by FedEx and UPS constitute the critical aircraft for wingspan (ADG), while Allegiant's MD-83 aircraft are the critical aircraft for approach speed.

Table 2-2**.** Examples of ARC aircraft types are shown in **Figure 2-2**.

For SGF, the ARC is currently D-IV based on the most critical aircraft routinely operating at the airport. This ARC is a combination of two critical aircraft. The Boeing 757 and Airbus A300 aircraft used extensively by FedEx and UPS constitute the critical aircraft for wingspan (ADG), while Allegiant's MD-83 aircraft are the critical aircraft for approach speed.

TABLE 2-2 - AIRPLANE DESIGN GROUP (ADG)

Group #	Tail Height (ft.)	Wingspan
I	<20	<49
II	20≤30	49≤79
III	30≤45	79≤118
IV	45≤60	118≤171
V	60≤66	171≤214
VI	66≤80	214≤262

FIGURE 2-2 - ARC AIRCRAFT TYPES

2.2 AIRFIELD/AIRSPACE

2.2.1 RUNWAYS

The existing airfield configuration at SGF consists of two active runways, identified as Runway 2/20 and Runway 14/32. These runways, along with the other existing airfield components, are displayed in **Figure 2-1**.

Runway 14/32, is positioned northwest/southeast, and is 8,000 feet long by 150 feet wide. Runway 14/32 utilizes an Instrument Landing System (ILS) with Distance Measuring Equipment (DME) at the end of Runway 14.

Runway 2/20 is oriented northeast/southwest, constructed at 7,003 feet by 150 feet wide, and also has an operable ILS at the end of Runway 2.

Both runways are constructed to support aircraft with a weight-bearing capacity no greater than 135,000 pounds for Single Wheel Gear (SWG) equipped aircraft, 170,000 pounds for Double Wheel Gear (DWG) equipped aircraft, and 300,000 pounds for Double Tandem Gear (DTG) equipped

aircraft. Runway 14/32 is comprised of 5,400 feet of Porous Friction Course (PFC) asphalt (the only asphalt surface in the movement area) and 2,600 feet of grooved concrete, which is in good condition. Runway 2/20 is constructed out of grooved concrete and is in excellent condition.

Currently the Airport Reference Point (ARP) is located at Latitude 37° 14' 44.3790" N, and Longitude 93° 23' 19.0602" W. The ARP is considered the point on the airport designated as the official airport location. Its proximity is as close as possible to the geometric center of the landing area. The magnetic bearing of any potential obstructions that may be considered hazardous within a 4 Nautical Mile (NM) circumference of the airport is measured from the ARP.

The established airport field elevation has been determined to be 1,268 feet. This elevation above mean sea level (MSL) is defined as the highest point along any of the runways, and is located at the approach end of Runway 32.

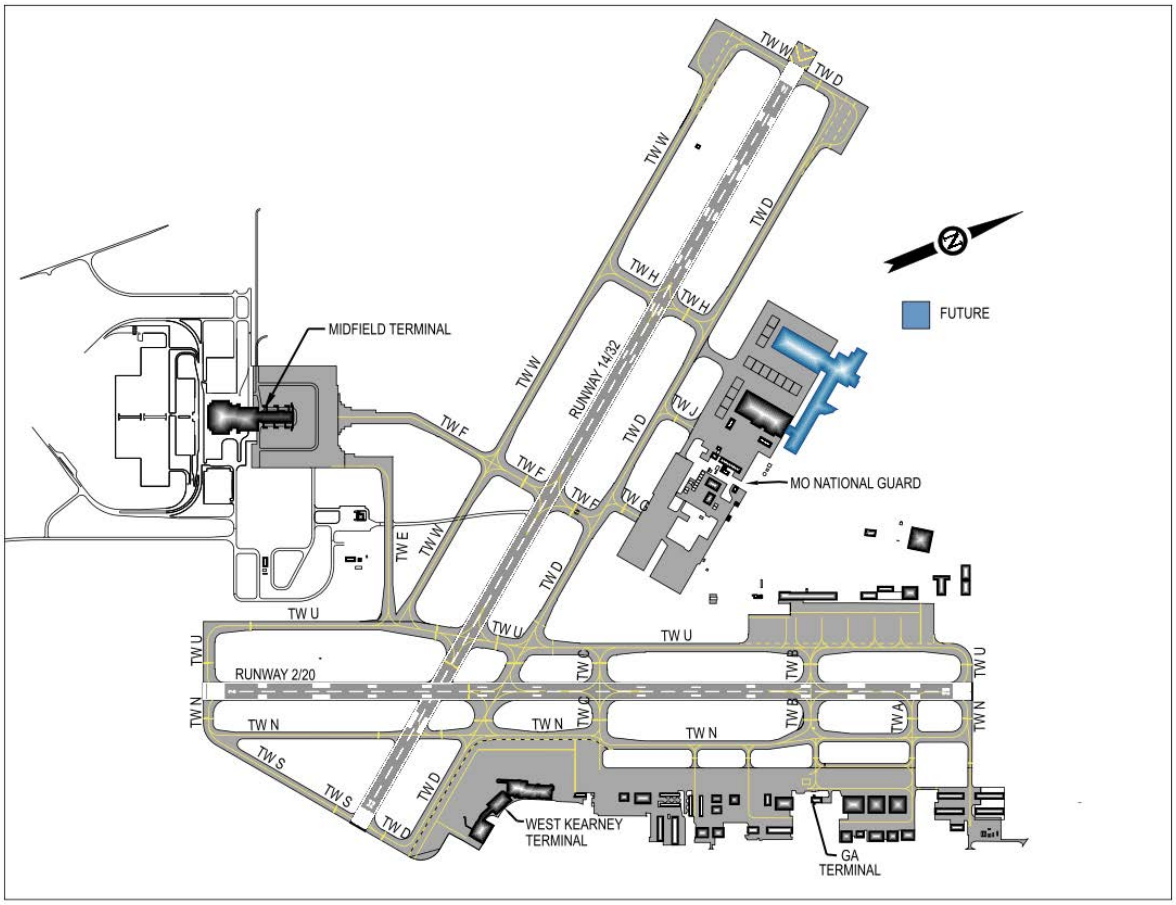
2.2.2 TAXIWAYS

An efficient and comprehensive taxiway system is essential for safe and orderly aircraft ground movements. The existing paved taxiway system at SGF consists of several parallel taxiways, spaced at varying distances from runway centerlines to taxiway centerlines. There are also numerous other taxiways of various lengths and widths used to access the functional areas of the airfield. Every taxiway is designed for ADG IV aircraft, which means that they can accommodate aircraft with up to 171 foot wingspans. Refer to **Table 2-3** for an overview of the existing taxiways as well as **Figure 2-3** for the taxiway layout.

TABLE 2-3 - TAXIWAYS

TAXIWAY	DESCRIPTION	CONDITION
A	Taxiway connector from the General Aviation (GA) Apron to Runway 2/20. Located southwest of the Runway 20 threshold.	Average
B	Connects the cargo apron to Runway 2/20 from the west and the GA Apron from the east.	Average/Above Average
C	Located at the midpoint of Runway 2/20 and connects the runway to Taxiway U to the west and the West Kearney Complex Apron to the east.	Above Average
D	Full length parallel taxiway for Runway 14/32 on the northeast side of the runway.	Above Average
E	Connects the Commercial Apron at the new terminal to Taxiway U.	Excellent
F	Connects Runway 14/32 to the Commercial Apron on the southwest and Taxiway D on the northeast.	Above Average / Excellent
G	Connects the MO National Guard apron to Taxiway D.	Excellent
H	Connects Runway 14/32 to Taxiway D.	Above Average / Excellent
J	Connects the MO National Guard Apron to Taxiway D.	Excellent
N	Full length Parallel Taxiway on the southeast side of Runway 2/20.	Average/Above Average
P	Connects Taxiway N to the fuel the north end of the GA Apron.	Average
R	Connects the GA Apron to Taxiway N.	Above Average
S	Connects the Threshold of Runway 32 to Taxiway N.	Average
T	Connects the GA Apron to Taxiway N.	Above Average
U	Full length Parallel Taxiway located on the northwest side of Runway 2/20.	Above Average
W	Parallel Taxiway located on the southwest side of Runway 14/32.	Excellent

FIGURE 2-3 - TAXIWAYS



Source: Jviation, Inc.

2.2.3 APRON

There are several apron areas around the airport. These areas, depicted in **Figure 2-4**, include the General Aviation (GA) Apron, the Midfield Terminal Apron, the West Kearney Complex Apron, and the Missouri Army National Guard (MONG) Apron.

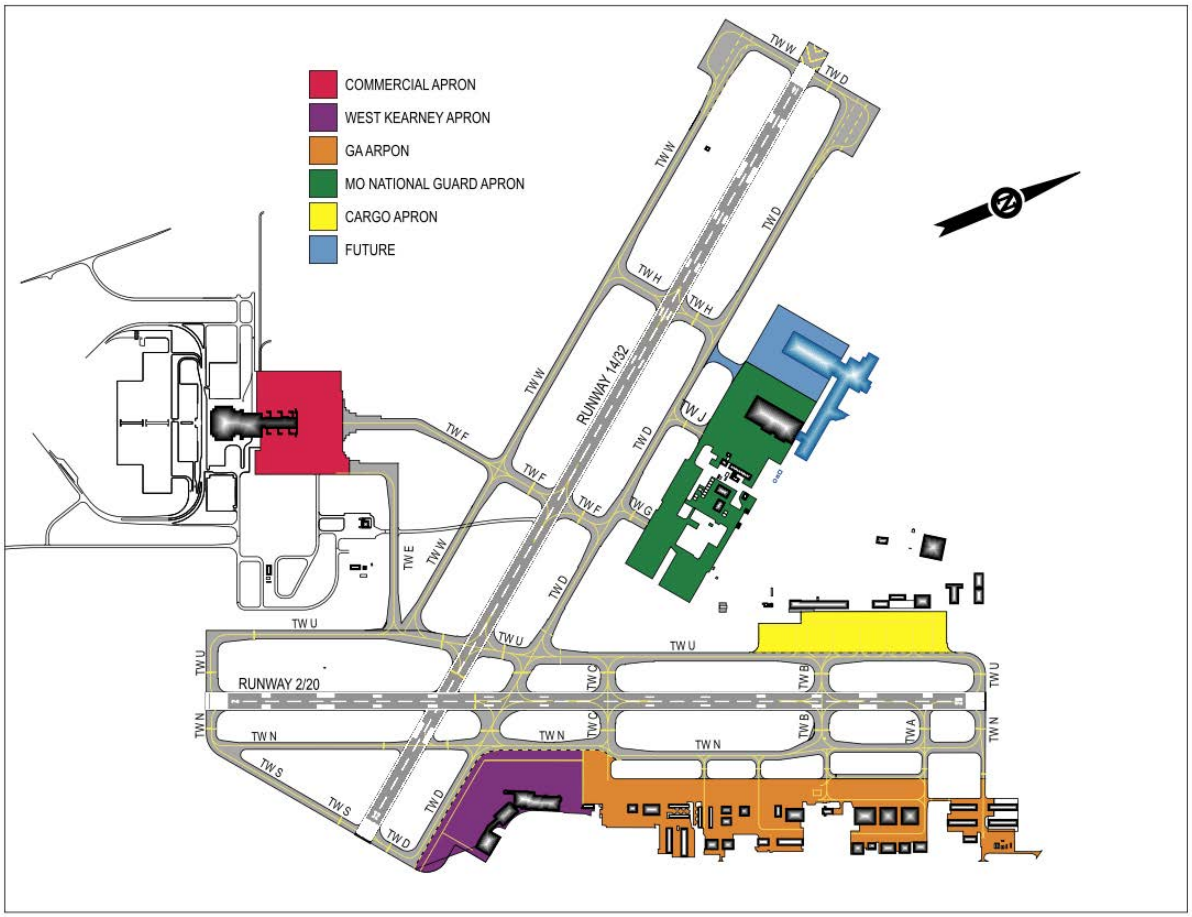
The GA Apron occupies approximately 81,054 square yards of concrete pavement, which accommodates aircraft storage/parking for GA activities. This apron is adjacent to Taxiway "N" and east of Runway 2/20. Currently the GA Apron has 55 aircraft tie downs.

The Midfield Terminal Apron occupies approximately 85,000 square yards of concrete pavement, which serves to support commercial airline operations at the airport passenger terminal with its ten aircraft gates. This apron surrounds the passenger concourse and uses connector taxiways "E" and "F" to access the parallel taxiways and associated runways to the east and south. The apron is designed to support 135,000 pounds for SWG aircraft, 170,000 pounds for DWG, and 300,000 pounds for DTG.

The apron adjacent to the West Kearney Complex includes approximately 60,000 square yards of concrete pavement. This apron supports charter operations, parking for emergency divert aircraft, and some Army National Guard aircraft parking when their facility is over capacity.
The MONG Apron occupies approximately 121,000 square yards of concrete and asphalt pavement, which accommodates aircraft parking/storage and supports the operations of MONG rotorcraft. The apron is adjacent to Taxiway "D" and east of Runway 14/30.

The Cargo Apron occupies approximately 65,000 square yards of concrete pavement, which accommodates aircraft parking and the cargo operations that occur at SGF. The apron is adjacent to Taxiway W with immediate access to the threshold of Runway 20.

FIGURE 2-4 - APRONS



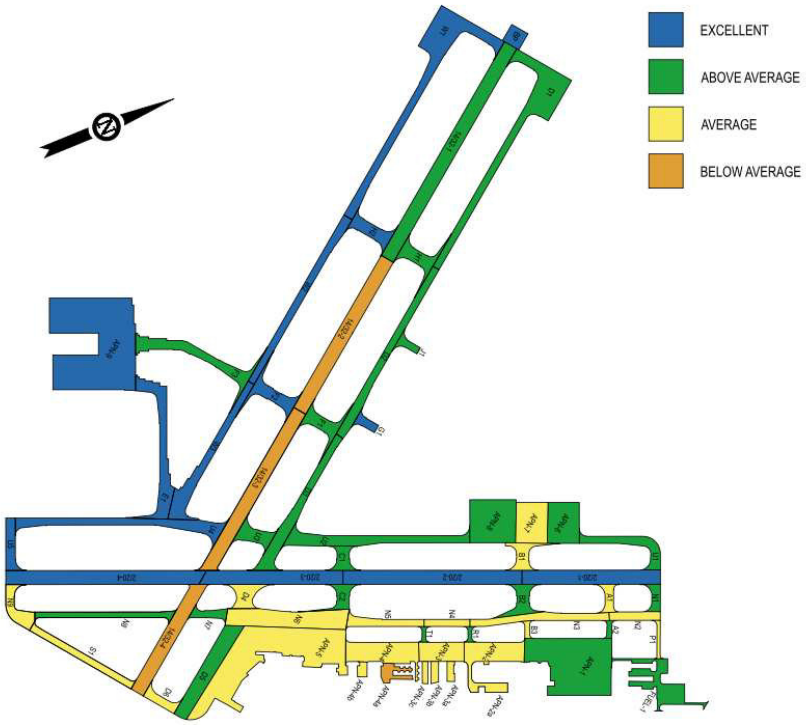
Source: Jviation, Inc.

2.2.4 PAVEMENT CONDITION

SGF currently does not have any formal pavement condition index studies on file. The air carrier apron at the new terminal is brand new and the pavement could be classified as excellent. Additionally, Taxiway W has just recently been constructed and entered service in November 2010. Other pavement on the airport can be classified as anywhere from below average to above average. Runway 14/32 is scheduled to be rehabilitated in the summer of 2011 due to its below average pavement

conditions. Jviation engineers drove the entire airfield and prepared a subjective evaluation of pavement conditions, which are depicted in **Figure 2-5.**

FIGURE 2-5 - PAVEMENT CONDITION



2.2.5 LIGHTING, MARKING, AND SIGNAGE OF RUNWAYS AND TAXIWAYS

Runway 2/20 and Runway 14/32 are both equipped with High Intensity Runway Lighting (HIRL) systems. All taxiways are equipped with Medium Intensity Taxiway Lighting (MITL). Both runways are marked with precision instrument markings.

Airfield signage serves to give pilots visual guidance information for all phases of movement on the airfield. SGF is equipped with a wide array of signage which includes the five (5) signs mandated by the FAA Advisory Circular 150/5300-13, *Airport Design*. These include instruction signs, location signs, direction signs, destination signs, and information signs. The current signage and marking plan can be found in **Appendix C**.

2.2.6 VISUAL AND NAVIGATIONAL AIRPORT AIDS

During visual conditions, a series of white and red lights are used to indicate to pilots on approach if they are high or low relative to the runway threshold. SGF has a 2-box Visual Approach Slope Indicator (VASI) installed at the end of Runway 2, which provides a three-degree glide slope. Precision Approach Path Indicators (PAPI) are installed on Runways 20, 14, and 32 and also provide a three-degree glide slope. While the PAPI and VASI both provide visual guidance, the PAPI provides more detailed guidance. The FAA has made the PAPI the preferred visual guidance aid and the VASI

is now considered obsolete. Additionally Runway 32 is equipped with Runway End Identifier Lights (REILs). These flashing lights are situated on both sides of the runway threshold, and indicate the beginning of the usable runway for approaching aircraft.

Three of the runway ends have advanced lighting aids. Medium Intensity Approach Lighting Systems with Runway Alignment Indicator Lights (MALSRs) are installed on Runways 2 and 14. Runway 20 is equipped with a similar system, which is known as a MALS and excludes the 1,000 foot long Runway Alignment Indicator Lights.

The navigational aids that are in use for SGF operations consist of an off-airport Very high frequency Omni-directional Radio beacon with Tactical Air Navigation (VORTAC), in addition to Distance Measuring Equipment (DME). The SGF VORTAC is 7.1 miles to the northeast of the airfield and is on frequency SGF 116.90. SGF lies on a 197° radial from this VORTAC.

In addition to the SGF VORTAC, the Dogwood (DGD) VORTAC is located 27.9 miles to the southeast of the airfield and is on frequency DGD 109.40. The airport lies on the 292° radial from this VORTAC.

2.2.7 Instrument Approach Equipment and Procedures

Instrument approaches are used to guide aircraft to the runway environment in the case of reduced visibility. There are two primary categories of instrument approaches. *Precision* approaches provide both horizontal and vertical guidance to approaching aircraft, and indicate to the pilot if they are too high or low on the glide slope, as well if they are off of the runway heading to the left or right. The other approach category, n*on-precision*, only provide horizontal guidance to the approaching aircraft.

There are currently two precision approaches published for SGF. Runway 2 and Runway 14 both have Category I Instrument Landing System (ILS) approach systems. An ILS utilizes two primary ground-based pieces of equipment, the *Localizer* is situated at the far end of the approach runway and broadcasts a widening signal that guides the aircraft to the runway from the left or the right. The *Glide Slope* is positioned adjacent to the touchdown zone on the approach end of the runway and broadcasts a signal upward that aircraft follow down to the runway. In addition to this equipment, the Runway 2 approach is equipped with two radio beacons that signal the approaching aircraft when they are passed over and indicate to the pilot how far the aircraft is from the runway. The *middle-marker* is located 0.5 miles from the end of the runway, while the *outer-marker* is 3.6 miles from the runway.

There are several non-precision approaches published for SGF. A non-precision approach only provides horizontal guidance to approaching aircraft and can only tell a pilot if they are left or right of the runway heading. A non-precision approach can utilize GPS satellite signals, or ground based navigational aids.

Runways 2, 20, 14, and 32 all have Area Navigation using GPS (RNAV) approach procedures. Some of these approaches are enhanced by the Wide Area Augmentation System (WAAS), which sends a corrective signal to properly equipped aircraft that allows for more precise approaches. Runway 2 has

a VHF Omnidirectional Radio Range/Distance Measuring Equipment (VOR/DME) or Tactical Air Navigation (TACAN) procedure. Runway 20 has High Altitude Tactical Air Navigation (HI-TACAN) approach procedure and a VOR or TACAN procedure. The TACAN approaches are used exclusively by military aircraft.

To complement the ILS equipment, Runway Visual Range (RVR) measuring equipment has been installed on Runway 2/20. RVR equipment derives a value that represents what the distance horizontally a pilot may see down the runway. The number represents the maximum distance a pilot may be able to see which ranges from 0 to 6000 feet.

The SGF FAA Air Traffic Control Tower Manager was interviewed as part of the inventory. He advised that the current ILS locations appear to adequately meet the demands of traffic most of the time. However, it was noted that there are issues with numerous ILS outages and that he would like to see an ILS added for Runway 32. Surveys of the pilot community indicated that an ILS on Runway 32, as well as Runway 20 would be beneficial.

The current instrument approach procedures were studied to determine the existing instrument approach minimums at the airport and are listed in **Table 2-4**. The approach minimums used at an airport are defined as the minimum visibility and cloud ceiling conditions, which allows a pilot to make use of the approach.

TABLE 2-4 - INSTRUMENT APPROACHES

Runway 02 - Approach	**Guidance**	**Minimums***	**Decision Height (feet-AGL)****
ILS	Vertical & Horizontal	1,465'/2,400'	200'
LOC	Horizontal	1,700'/4,000'	435'
RNAV (GPS) - LPV	Vertical & Horizontal	1,590'/4,000'	325'
RNAV (GPS) - LNAV/VNAV	Horizontal	1,754'/6,000'	489'
RNAV (GPS) - LNAV	Horizontal	1,720'/4,000'	455'
VOR/DME or TACAN	Horizontal	1,700'/4,000'	435'
Runway 20 - Approach	**Guidance**	**Minimums**	**Decision Height (feet-AGL)**
RNAV (GPS) - LPV	Vertical & Horizontal	1,531'/1 mile	269'
RNAV (GPS) - LNAV/VNAV	Horizontal	1,656'/1½ mile	394'
RNAV (GPS) - LNAV	Vertical & Horizontal	1,780'/1½ mile	518'
HI-TACAN	Horizontal	1,760'/1½ mile	498'
VOR or TACAN	Horizontal	1,700'/1¼ mile	438'
Runway 14- Approach	**Guidance**	**Minimums**	**Decision Height (feet-AGL)**
ILS	Vertical & Horizontal	1,462'/½ mile	200'
LOC	Horizontal	1,620'/½ mile	358'
RNAV (GPS) - LNAV/VNAV	Horizontal	1,620'/¾ mile	358'
RNAV (GPS) - LNAV	Vertical & Horizontal	1,720'/¾ mile	458'
Runway 32- Approach	**Guidance**	**Minimums**	**Decision Height (feet-AGL)**
RNAV (GPS) - LNAV	Vertical & Horizontal	1,740'/1¼ mile	473'

***** Cloud ceiling above Mean Sea Level (MSL) / Horizontal visibility in feet or miles
** Height Above Ground Level (AGL) that an aircraft must initiate a missed approach if the runway environment cannot be visually identified.

Surrounding airports in the vicinity of SGF that utilize instrument approach procedures are Bolivar Municipal Airport, Jerry Sumners Sr. Aurora Municipal Airport, Stockton Municipal Airport, Monett Municipal Airport and Ava Bill Martin Memorial Airport. The nearby airports with instrument approaches are listed in **Table 2-5**.

TABLE 2-5 - REGIONAL INSTRUMENT APPROACHES

Airport	City	Ident.	Dist. From SGF	Procedures Available
Bolivar Municipal Airport	Bolivar, MO	M17	21.1 NM North	RNAV, VOR/DME
Jerry Sumners Sr Aurora Municipal Airport	Aurora, MO	2H2	22.5 NM Southwest	GPS, VOR/DME-A
Stockton Municipal Airport	Stockton, MO	MO3	32.2 NM Northwest	GPS, VOR/DME, GPS-A
Monett Municipal Airport	Monett, MO	KHFJ	36.2 NM Southwest	RNAV
Ava Bill Martin Memorial Airport	Ava, MO	KAOV	37.7 NM Southeast	GPS, VOR-A, NDB
M. Graham Clark - Taney County Airport	Hollister, MO	KPLK	37.9 NM Southeast	GPS, VOR/DME
Branson West Municipal Airport	Branson, MO	KFWB	32.8 NM South	None
Cassville Municipal Airport	Cassville, MO	94K	41.0 NM Southwest	VOR, GPS
Floyd W. Jones Lebanon Airport	Lebanon, MO	KLBO	42.7 NM Northeast	RNAV, SDF
Branson Airport	Branson, MO	KBBG	43.7 NM Southeast	ILS, LOC, RNAV
Lamar Municipal Airport	Lamar, MO	KLLU	46.5 NM Northwest	RNAV, NDB
Mountain Grove Memorial Airport	Mountain Grove, MO	1MO	52.2 NM East	VOR/DME, GPS
Joplin Regional Airport	Joplin, MO	KJLN	53.5 NM Northwest	ILS, LOC/DME, LOC/NDB, RNAV, LOC
Northwest Arkansas Regional Airport	Bentonville, AR	KXNA	72.7 NM Southwest	ILS, LOC/DME, RNAV

Source: www.airnav.com, FAA Approach Plates (Exp 18 November 2010)

2.2.8 AIRPORT AIRSPACE USAGE

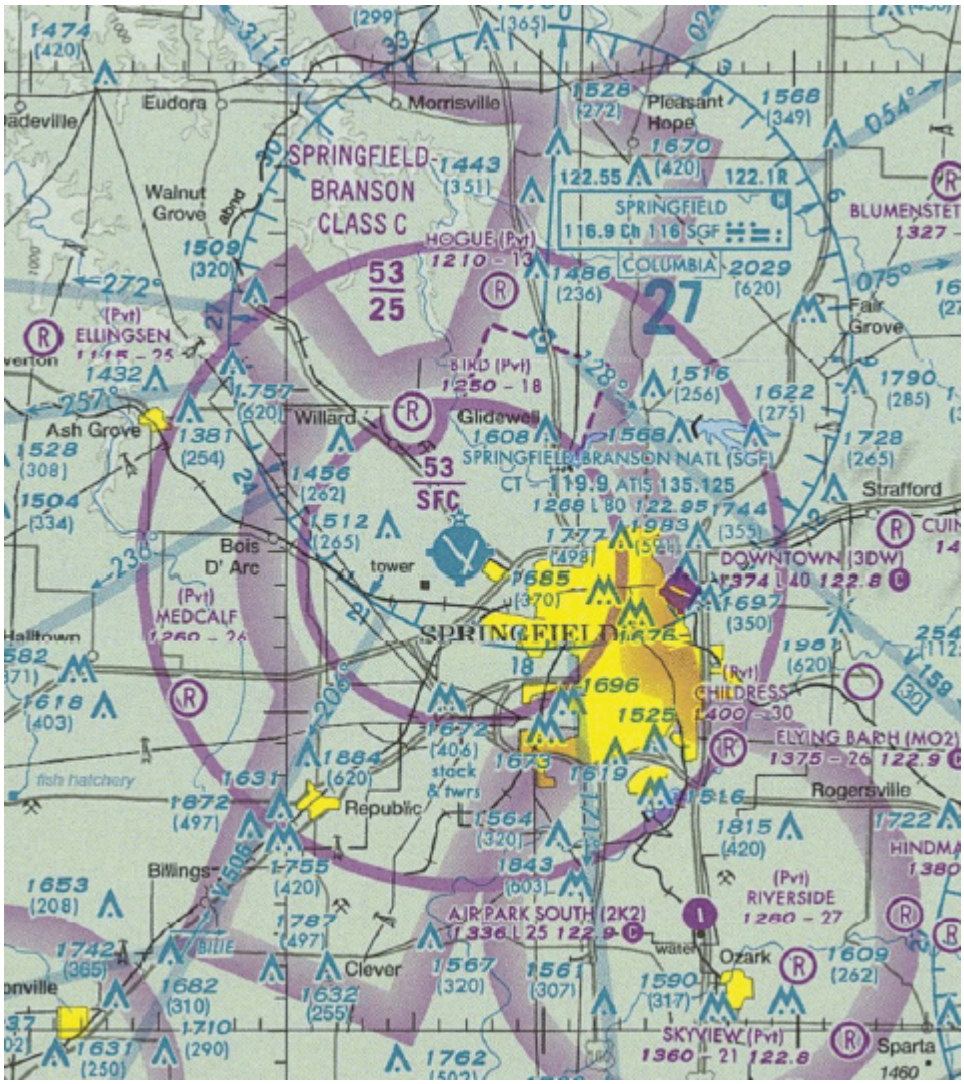
The airspace surrounding SGF is not very complicated, with SGF being the major airport in the area. The airport is protected by Class C airspace, which the FAA defines as:

Airspace from the surface to 4,000 feet above the airport elevation (charted in MSL) surrounding those airports that have an operational control tower, are serviced by a radar approach control, and have a certain number of IFR operations or passenger enplanements. Although the configuration of each Class C area is individually tailored, the airspace usually consists of a surface area with a 5 NM radius, an outer circle with a 10 NM radius that extends from 1,200 feet to 4,000 feet above the airport elevation and an outer area. Each aircraft must establish two-way radio communications with the ATC facility providing air traffic services prior to entering the airspace and thereafter maintain those communications while within the airspace.

Figure 2-6 depicts the portion of the Sectional Aeronautical Chart that surrounds SGF. The airspace represented by the magenta circles around SGF is the Class C Airspace.

There are smaller public and private airports directly to the south and north, so coordination of traffic is needed. The airspace above and surrounding SGF is in the jurisdiction of the Kansas City Air Route Traffic Control Center (ARTCC), also known as Kansas City Center.

FIGURE 2-6 - AERONAUTICAL CHART



Source: Kansas City Aeronautical Sectional Chart - Effective *11/19/2009-06/03/2010*

2.2.9 AIR TRAFFIC CONTROL

SGF is served by an Air Traffic Control Tower (ATCT) that controls the airport's air traffic 24 hours a day. There is also a TRACON facility located at the SGF Tower that provides approach control for the airport and a large portion of southwest Missouri.

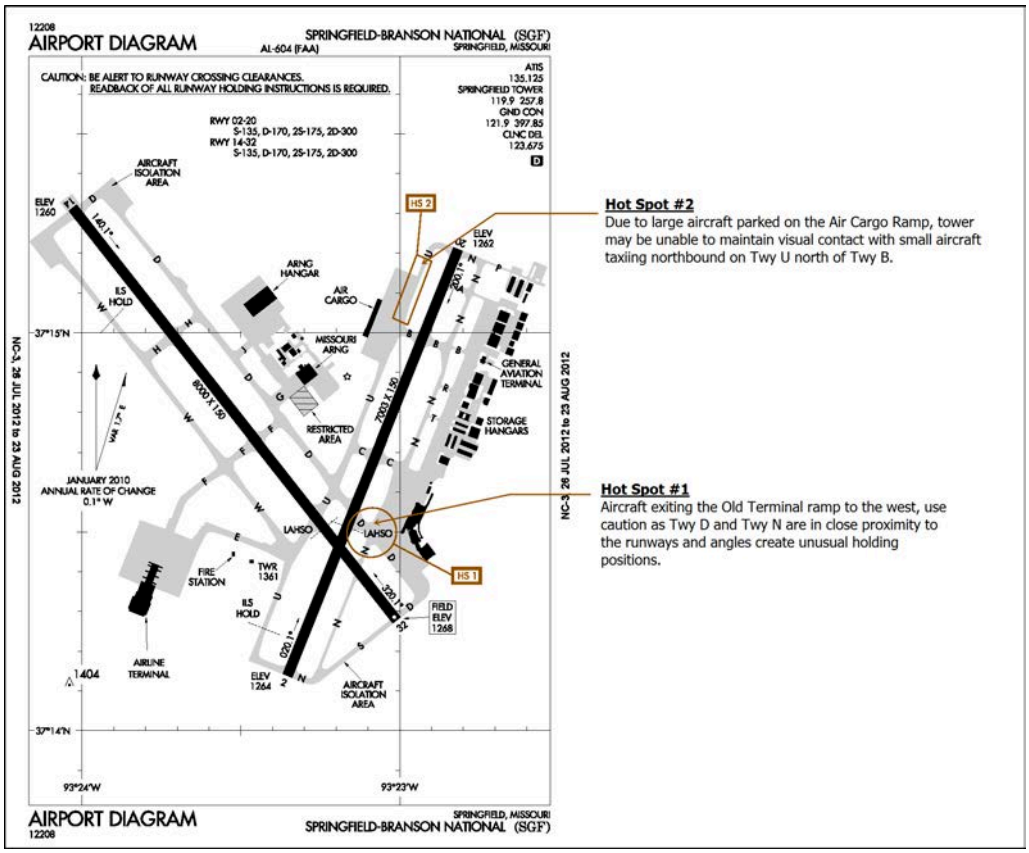
The ATCT utilizes ASR-11 airport surveillance radar that is located on the south side of the airport. The radar is the most modern, digital type of radar, and includes the ability for both *primary* and *secondary* surveillance. Primary surveillance uses a rotating antenna atop the radar tower that emits a signal that is returned to the antenna and indicates the physical location of airborne objects and precipitation events. The secondary radar is known as a beacon interrogator which receives a radio signal from an aircraft with location, altitude and identifying information.

SGF incorporates Land and Hold Short Operations (LAHSO) on both Runway 2/20 and 14/32 to protect the point where both runways intersect. A LAHSO is in place when there are simultaneous operations on the two or more runways that intersect. By allowing both runways to remain in use, airport capacity and efficiency is greatly increased. LAHSO procedures can create safety issues and have to be carefully controlled because of the potential for runway incursions occurring when aircraft are landing on both runways.

The FAA has also identified two intersections on the airport as *Hot Spot* Intersections. These are locations that either have a history or potential risk of an accident or runway incursion. These locations are identified so that pilots and airfield drivers have a heightened awareness of the potential dangers.

One Hotspot is for aircraft taxiing from the West Kearney Terminal Apron to the west where Taxiway "D" and Taxiway "N" are in close proximity to the runways. This proximity creates angles that require unusual holding positions. The second hotspot is for aircraft taxiing on Taxiway "U" north of Taxiway "B", as the Tower cannot always maintain visual sight of aircraft because of large aircraft on the air cargo apron. See **Figure 2-7** for further details.

FIGURE 2-7 - HOT SPOT INTERSECTIONS



2.2.10 Noise Abatement Procedures

SGF does not currently have any published noise abatement procedures. The airport's somewhat rural location and alignment of the runways provide for arrival and departure patterns that naturally avoid noise sensitive areas. The City and County have land use and zoning plans in place to address future growth in the direction of SGF that may have the potential for noise concerns.

2.2.11 Obstructions to Air Navigation

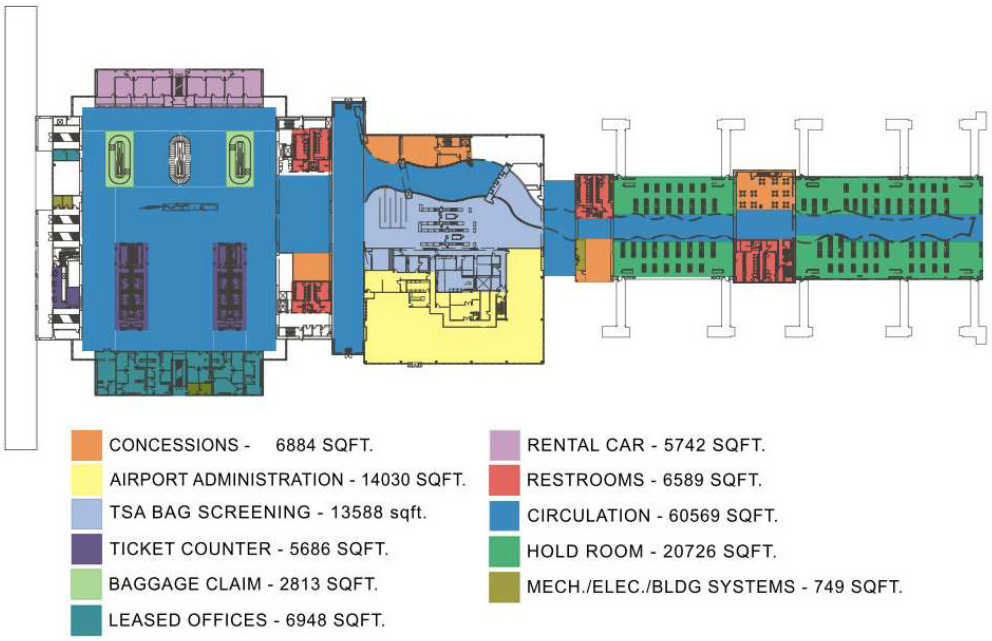
There is an obstacle procedure when pilots are departing from Runway 32due to trees that penetrate the departure surface for the runway. A minimum of a 300 foot high ceiling and one mile visibility must be present for aircraft to depart Runway 32. Some trees have been removed but a number of trees residing on private property. Coordination with the property owner will be required before this obstacle can be mitigated.

2.3 COMMERCIAL PASSENGER FACILITIES

2.3.1 TERMINAL BUILDING OVERVIEW

The new Midfield Terminal building at SGF comprises approximately 225,000 square feet of gross building area. The terminal is on Airport Boulevard, centrally located west of Runway 2/20 and south of Runway 14/32. The terminal consists of airline operations/office areas, rental car counters, passenger security screening, baggage pick-up, passenger ticketing, TSA office space, a restaurant, gift shop, airport management offices, and police. See **Figure 2-8** for a graphical depiction of the current main floor usage of the terminal.

FIGURE 2-8 - TERMINAL USE



Source: Jviation, Inc.

The Midfield Terminal opened on May 6, 2009. It is a state of the art building that is a reflection of the landscape common to southwest Missouri with a water theme carried throughout. The terminal was built with expansion in mind. Currently it has 10 gates in operation but has the ability to expand to 60 at full build out.

2.3.2 TICKET COUNTERS

The ticket counters used by the airlines are located just inside the main entrance of the terminal and to the right. There are two ticket counter areas, each with 24 total ticketing positions divided into six counters per side, as shown in **Figure 2-9**. As the terminal is new, the ticket counters are in excellent

shape and do not need to be considered for replacement for many years. There are presently six vacant positions that allow room for expansion of existing airlines or new entrants to the market.

FIGURE 2-9 - AIRLINE SPACE

Source: Jviation, Inc.

2.3.3 Outgoing Baggage Make-Up

Outgoing baggage is collected inside the terminal at the ticket counters at check-in. There are facilities for curbside check-in, although currently the only airline that uses the curbside facility is Allegiant Airlines. From either the ticket counters or curbside, bags are sent via conveyor belt to the TSA screening room located one floor below (discussed further in **Section 2.3.5**). After screening the bag is taken via conveyor belt to a consolidated baggage carousel where the airlines then transfer the bags to their prospective flights.

2.3.4 Airline Ticket Offices

The airline ticket offices are located on the south side of the main terminal, adjacent to the airline check-in counters. They provide office, storage and break room space for airline employees.

2.3.5 TSA FACILITIES

Passenger screening occurs midpoint in the terminal, allowing passengers entering the main entrance to walk straight to the security screening line. The terminal has plenty of open space and its linear design allows for easy navigation within the terminal.

Passenger screening facilities currently consist of two Walk Through Metal Detectors (WTMD) and three baggage x-ray conveyors. SGF is one of the few airport terminals designed following the new security measures that were developed as a result of 9/11, allowing for ample room for the required equipment. The current facilities are adequate to meet current passenger demand, and allow for future expansion to accommodate passenger demand. The size is also adequate to accommodate the new full body scanners that will be mandated by the TSA.

Baggage screening is conducted below the main terminal floor. Baggage is carried on a conveyor belt from the airline check-in counter to a TSA screening room where a TSA agent run the bags through one of two available Reveal CTX-80 Explosive Detection System (EDS) machines.

There is also space directly adjacent to the current TSA baggage screening room for the potential installation of an inline baggage screening system. The space is currently vacant and unfinished state but contains the necessary infrastructure for upgrade to a full inline system should the TSA pursue that upgrade for the airport.

2.3.6 GATES

The new terminal opened with 10 gates, although it has the ability to expand to 60 gates at full build out with additional building and apron construction. All of the gates are equipped with apron drive Passenger Loading Bridges (PLBs), which allow for maximum flexibility in accommodating a variety of aircraft types and sizes. Each of the gates is equipped with 400Hz ground power connections, which allow the aircraft to maintain operation of electrical systems when shut down. Remaining overnight aircraft (RON) park at the gate as there presently are no remote RON parking positions in the vicinity of the terminal. In the event of an emergency divert or other non-scheduled event, aircraft can also park on the apron at the West Kearney Complex. Deicing currently takes place on the apron at the gates.

2.3.7 HOLD ROOMS

Once travelers pass through TSA screening they enter the gate area where there is seating and open space around each of the 10 gates. Each hold room consists of seating, circulation corridors, gate podiums, and boarding doors. A total of approximately 20,000 square feet is available for this function, with all hold rooms serving two or more gates.

2.3.8 CIRCULATION

There is ample space within the terminal for passenger circulation. Main passenger flow occurs in the middle of the terminal. This central walkway is designated by a tile walkway that runs the full length of

the terminal. Circulation around the gates and passenger holding areas also allow for comfortable and efficient movement. Numerous Flight Information Display (FIDs) monitors are located thought the airport.

2.3.9 CONCESSIONS

The airport has two restaurants inside the terminal, one located before passenger screening and the second located after passenger screening. Both restaurants are McAlister's Deli shops and open at 4:45am daily and close at 7:30pm Sunday, Monday, Thursday, and Friday, 6:00pm Tuesday and Wednesday, and 4:30pm on Saturday. Vending machines located both prior to and after passenger screening are available as well.

In addition to the two restaurants, the airport has two retail and news shops. Route 66 news and gift shop is located prior to passenger screening and is open 5:00am to 10:00pm daily. The second shop is a CNBC News shop located after passenger screening and is open daily 5:00am to 10:00pm.

2.3.10 RENTAL CAR FACILITIES

Current rental car agencies include Avis, Hertz, Budget, Thrifty, National and Enterprise. A new consolidated rental car facility opened to the west of the terminal in July 2010 and is the location for gas, light maintenance (oil changes, tire repair, etc), wash bays, and overflow parking, as shown in **Figure 2-10**. Inside the new terminal rental car counters are located adjacent to baggage claim so passengers can efficiently obtain or pick up a reserved rental car. The use of the current counter and office space is shown in **Figure 2-11**. A consolidated ready/return lot exists on the west side of the new passenger terminal. Parking spaces within this lot are leased by the individual companies as shown in **Figure 2-10**.

FIGURE 2-10 - CONSOLIDATED RENTAL CAR FACILITY

Source: Jviation, Inc.

FIGURE 2-11 - RENTAL CAR COUNTER LEASES

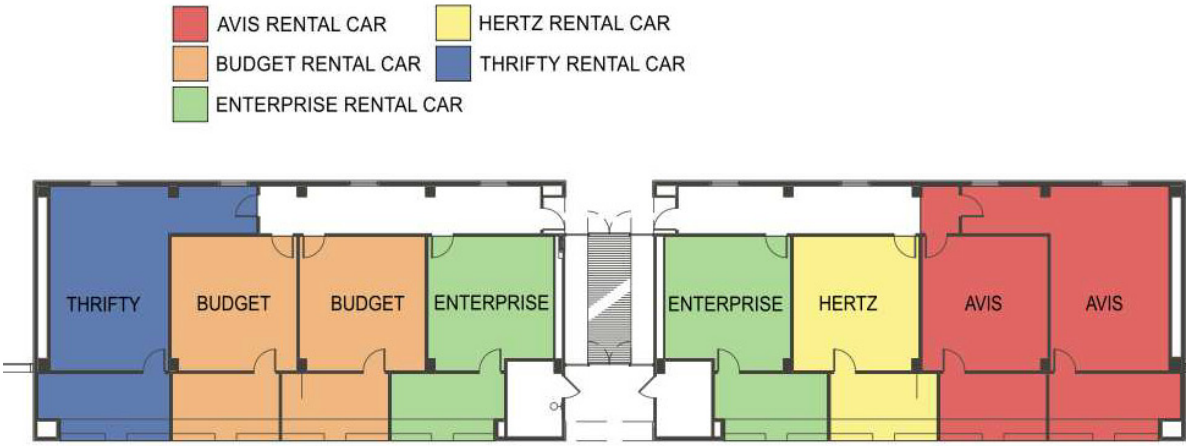
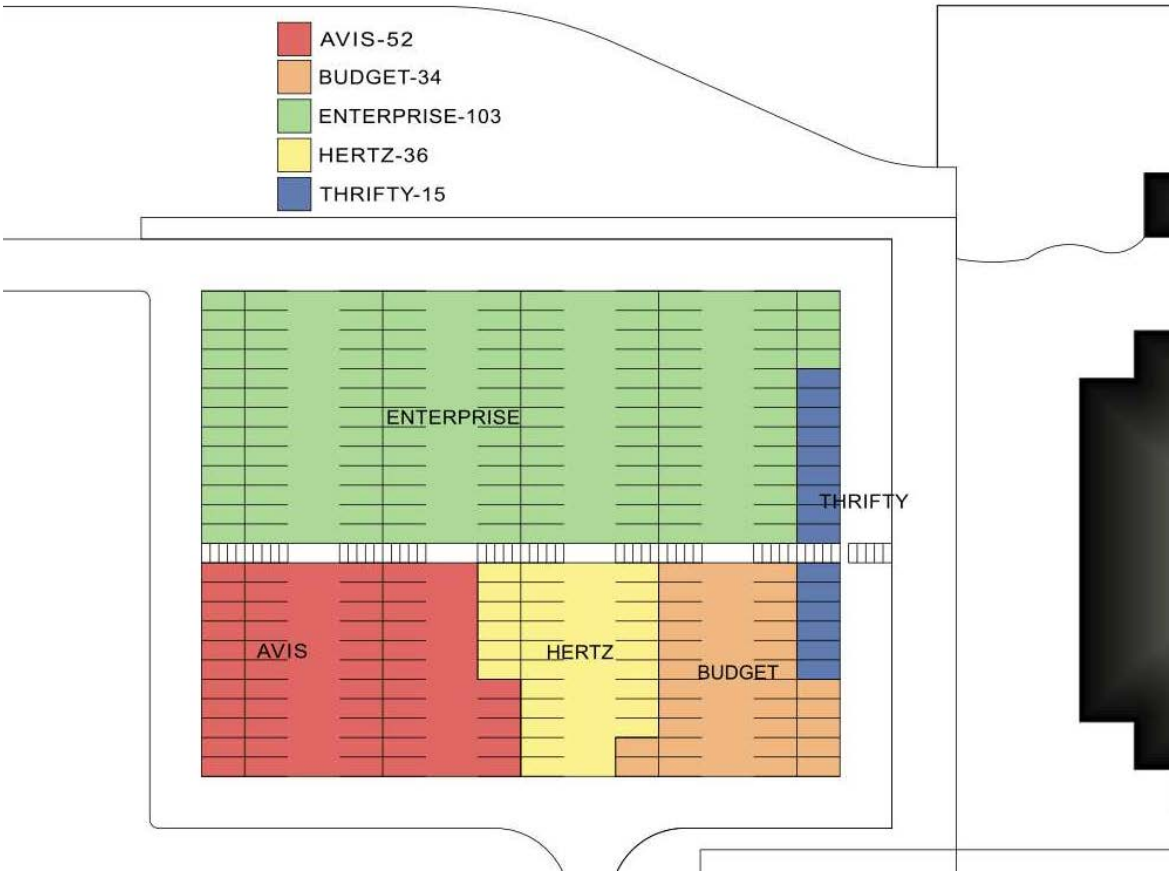


FIGURE 2-12 - RENTAL CAR READY/RETURN LOT LEASES



2.4 CURB FRONT

The curb front is directly south of the terminal and provides covered entry into the main entrance of the terminal. The pavement is in excellent condition as the facility is just over one year old and provides adequate spacing for passenger loading and unloading.
Approximately 420 Linear Feet of curb frontage exists. The curbside includes three one way lanes as shown in **Figure 2-13.**

FIGURE 2-13 - CURB FRONT

Source: Jviation, Inc.

2.5 GA FACILITIES

GA facilities are provided to support the GA activities of the airport. The GA facilities include the Fixed Base Operator (FBO), hangars and apron/tie down space. These elements are described in the following sections.

2.5.1 BASED AIRCRAFT

SGF has a total of 111 based aircraft on the airfield with single engine piston aircraft comprising a majority of the aircraft. Included in the based aircraft are two military C-23 Sherapa airplanes, used by the Missouri Army National Guard AVCRAD facility. **Table 2-6,** provides a full breakdown of based aircraft based on engine type.

TABLE 2-6 - BASED AIRCRAFT

Aircraft Type	Amount
Single Engine Piston	70
Multi Engine Piston	14
Multi Engine Turbo Prop	9
Jet	17
Helicopter	1
Total	111

Source: Springfield-Branson National Airport

2.5.2 FIXED BASE OPERATOR

SGF has one FBO, located on the northwest corner of the airport property on the GA Apron. The FBO is owned and operated by the City and provides service to GA and commercial operators at the airport, **Figure 2-14**. Services include aircraft line services, apron tie-downs, hangar storage space, catering coordination, and access to weather and flight planning services. Additionally, the City also provides ground handling services for commercial operators. This includes refueling, baggage handling, and gate pushback services. Aircraft maintenance and other services are handled by private agencies on the airport. It was noted in the returned tenant surveys that there is a demand for additional aircraft maintenance services.

FIGURE 2-14 - GA AIRCRAFT PARKING

Source: Jviation, Inc.

The City also provides all the Jet A and 100 Low Lead (Avgas) fueling on the airfield through its FBO, which is available 24 hours a day. Additionally, the fuel trucks are owned by the City. A more detailed description of the fueling equipment is discussed in **Section 2.10.8.**

2.5.3 AIRPORT HANGARS

The airport owns eight hangars with a total of 36 aircraft stalls which are leased out to tenants with month to month lease terms. Additionally, SGF also has hangar shelters that it owns and leases with month to month lease terms. Currently there is a waiting list for the hangar shelters and only two airport owned hangars are available for lease, see **Figure 2-16** for hangar ownership details.

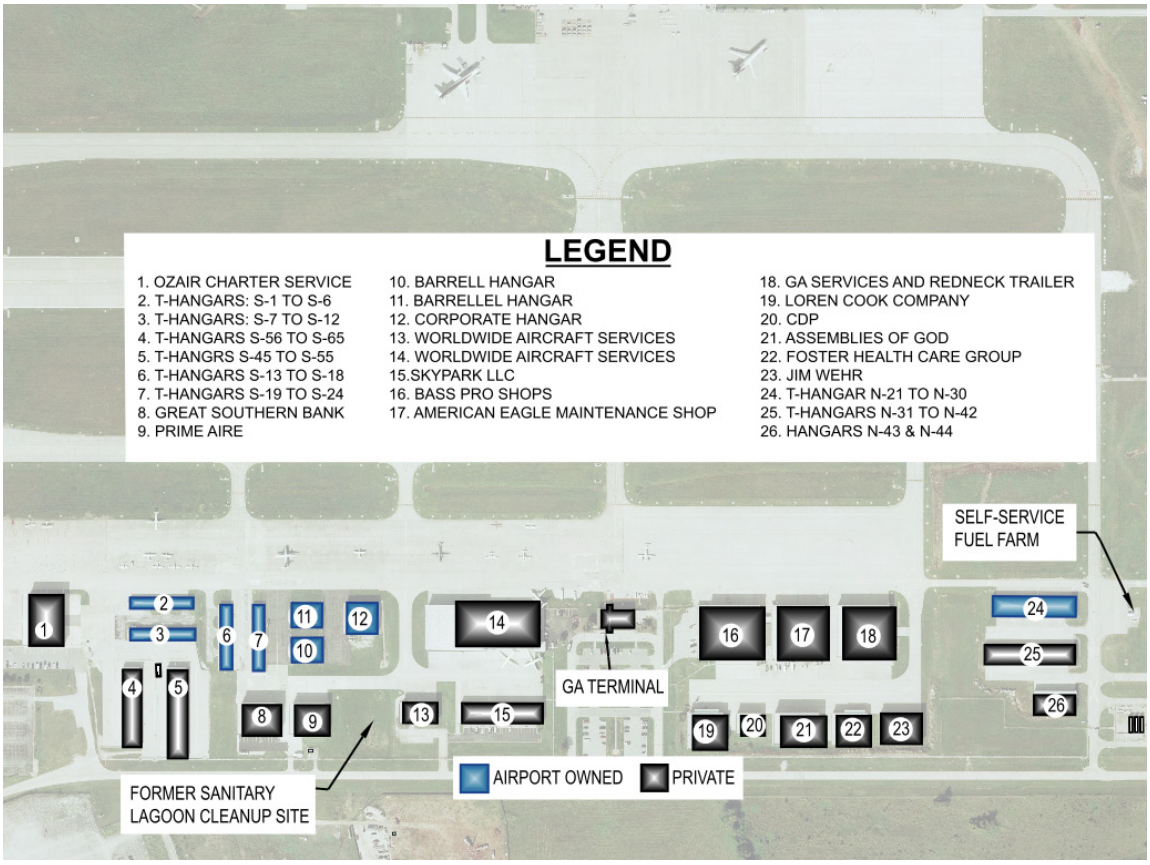
FIGURE 2-15 - AIRPORT OWNED T-HANGARS

Source: Jviation, Inc.

The airport also has leased land on the GA apron for private hangar development. The typical lease term is 20 years with two five year options at the end of the term. The airport has leased out all spaces for hangar development except for one plot that is designated as a hazardous waste cleanup site by the Environmental Protection Agency. Once this land is cleaned up and released it can be leased for hangar development.

Hangar development is nearly at capacity. There are plans for a GA Development site but the airport will not dedicate any money for infrastructure or build any hangars until the land formerly occupied by Air Park South located in Ozark, MO is sold. Private entities can build on this land with their own funding but they would have to pay for infrastructure as well as the hangar. **Figure 2-16** illustrates the airports current hangar leases.

FIGURE 2-16 - HANGAR LEASES



Source: Jviation, Inc.

2.5.4 Based and Transient Aircraft Parking Aprons & Tie downs

SGF has both parking and tie downs for based and transient aircraft located on their GA Apron on the northeast side of the airport. Transient aircraft can park just west of the main FBO building. There are 55 tie-down parking spots to the south of the GA Terminal and 10 short term parking spaces adjacent and to the north of the GA Terminal.

2.6 AIR CARGO FACILITIES

The airport's cargo facilities, **Figure 2-17** are located west of Runway 2/20, and south of the Snow Removal Equipment and Maintenance facilities. Several cargo services utilize the facilities, including United Parcel Service, BAX Global, and FedEx. Other companies that operate out of the Cargo facilities are U.S. Customs and Eagle Global Logistics.

FIGURE 2-17 - CARGO FACILITY

Source: Jviation, Inc.

SGF also has enacted a Foreign Trade Zone (FTZ) inside the Cargo Facility. This FTZ serves to offset U.S. Custom's duty payments for goods entering the United States. This duty-free treatment is deferred until the goods are sold inside the United States. Any goods that are exported again are excluded from the duty. This FTZ is in place to offset customs advantages available to overseas producers who compete with domestic companies.

2.7 SUPPORT FACILITIES

2.7.1 AIRCRAFT RESCUE AND FIRE FIGHTING BUILDING

SGF completed the construction of a new Aircraft Rescue and Fire Fighting (ARFF) building in August of 2009, **Figure 2-18**. The ARFF building is located northeast of the new passenger Terminal and adjacent to the FAA ATCT. The new building is capable of housing five fire trucks, two more than the previous fire station.

FIGURE 2-18 - ARFF BUILDING

Source: Jviation, Inc.

2.7.2 Snow Removal Equipment/Maintenance Storage Facilities

The Snow Removal Equipment (SRE) building is located on the northwest side of the Runway 20 threshold on Lester Jones Ave. The SRE building is used to house both SRE and other airfield maintenance equipment.

Additionally, the airport has utilized the old ARFF building, located on the GA apron, as another maintenance storage facility.

2.7.3 Aircraft Fuel Storage

SGF has two primary fuel farms on the airfield. There is a fuel farm located at the Midfield Terminal that consists of Jet Fuel tanks along with a gasoline and diesel fuel tank. There is also a fuel farm located near the GA facilities which has tanks for Jet Fuel, Avgas, Gasoline, and Diesel. A full breakdown of tanks located on the airfield is listed in **Table 2-7.**

TABLE 2-7 - FUEL TANKS

Location	Container Type/Capacity	Fuel Type
General Aviation	(3) 30,000-gallon AST	Jet Fuel
	(2)15,0000-gallon AST	Aviation & Gasoline
	5,000-gallon AST	Gasoline
	5,000-gallon AST	Diesel
Midfield Terminal	(3) 30,000-gallon AST	Jet Fuel
	5,000-gallon AST	Gasoline
	5,000-gallon AST	Diesel
SARA Self-Service Tank	2,500-gallon	41.0 NM Southwest
SRE Building	100-gallon AST	Waste Oil
Airfield Lighting/Electrical Vault	660-gallon Emergency Generator Fuel Tank	Diesel
Line Services Vault	300-gallon AST	Diesel
Quick Turnaround Facility (QTA)	(2) 12,000-gallon AST	Gasoline
	1,000-gallon AST	Gasoline
ARFF Building	300-gallon Tank	Diesel
Airfield Electrical Vault	550-gallon Tank	Diesel
Parking Lot	300-gallon	Diesel

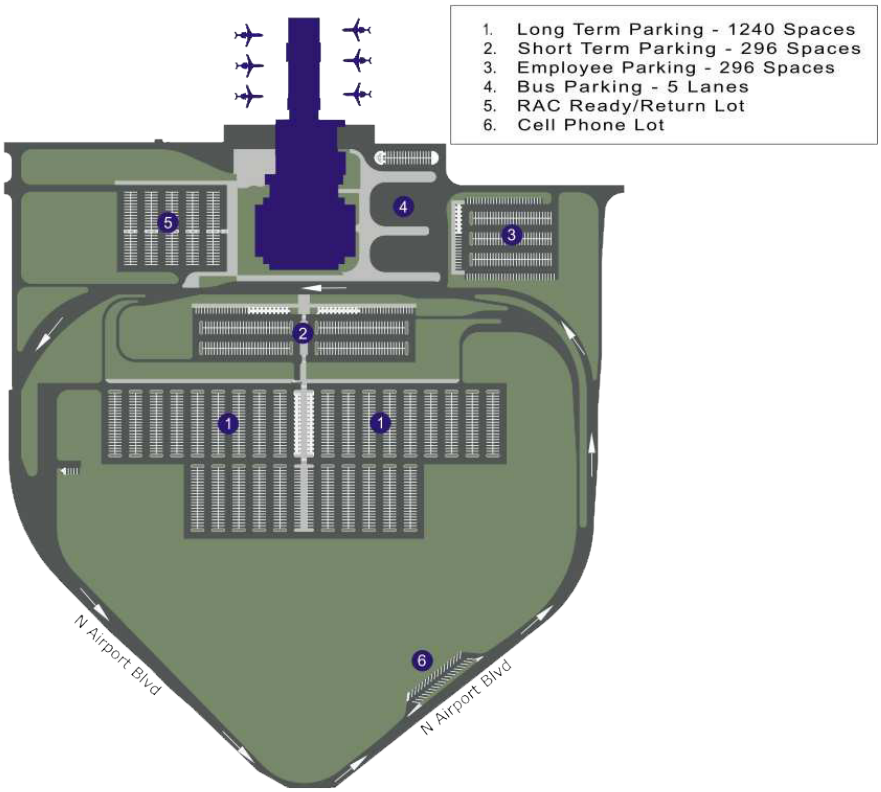
2.7.4 PARKING

The terminal has both long-term and short-term parking lots which are located directly across from the passenger terminal building. Both lots are attended 24 hours a day. The lots are in excellent condition as the terminal was just recently constructed and opened in 2009. The existing public parking has a total of 296 short-term spaces and 1,240 long-term spaces. There are also 296 employee parking spaces and five bus parking lanes.

The cost to park in short-term parking is free for the first 30 minutes and then $1.50 per 1/2 hour after, with a daily maximum of $15.00. The cost to park in long-term parking is $1.00 per hour and a daily maximum of $10.00, with a weekly maximum of $50.00. **Figure 2-19** shows an overview of parking for the Commercial Terminal.

There is additional parking at the GA Terminal for non-commercial airport users and based aircraft owners.

FIGURE 2-19 - PARKING



Source: Jviation, Inc.

2.8 SURFACE TRANSPORTATION

2.8.1 AIRPORT ACCESS ROAD NETWORK

Several improvements were made to the airport access roadway system with the construction of the Midfield Terminal. Main access to SGF is via Interstate 44 which lies to the southeast of the airport. I-44 exits onto State Highway 266 also called the Chestnut Expressway which lies to the south of the airport and connects to the main airport access road, Airport Blvd. Additionally, State Highways 160 and 65 located east of the airport also serve to connect surrounding communities to I-44 and the airport. A new roundabout was constructed at the intersection of State Highway EE, Airport Boulevard, and Farm Road 124 to facilitate access to the airport.

2.8.2 CIRCULATION ROADS

The main airport access road, Airport Boulevard is a two-lane access road that comes off State Highway 266/Chestnut Expressway and loops around the new commercial airport terminal. Access to the GA Apron and the West Kearney Complex is through Kearney St. which comes off I-44 and runs west to the airport.

2.8.3 RAILROADS

The closest railroad service is located within ¼ mile of the southern property boundary of the airport. The line, which is known as the Fort Smith Subdivision, connects the Springfield hubbing operation of Burlington Northern Santa Fe (BNSF) with Kansas City. An additional three significant BNSF lines connect Springfield to Tulsa, St. Louis, and Memphis - with additional service onward from rail yards in those cities. Presently, there are no stubs that extend into airport property.

2.9 UTILITIES

The utilities that support SGF include water, sanitary sewer, fiber optics and communications, natural gas, electricity, and stormwater. The following sections describe in detail each utility and its association with the airport.

2.9.1 WATER

Water to SFG is provided by City Utilities (CU) of Springfield, a community owned utility service provider. CU is the main water service provider for the city of Springfield. In addition to providing basic water services, CU has three water treatment facilities, two impoundment areas, and seven sources of water supply.

CU receives its water from a variety of sources to include the: Fulbright Spring, Fulbright Well No. 1, McDaniel Lake, Fellows Lake, Distribution Wells, James River, and the Stockton Lake. Fellows Lake and Stockton Lake are the two largest suppliers at a nominal capacity of Fellows Lake -10.8 millions of gallons per day (MGD) and Stockton Lake – 15.0 MGD.

The airport receives its water from CU through a 12-inch water main installed in the utility corridor between Kearney Street and Willard road. The water line loops around the south and west sides of the airport and includes a sub-loop that provides water to the terminal building, fuel farm, ARFF and consolidated rental car maintenance facility.

2.9.2 SANITARY SEWER

Sanitary sewer services are provided by the Sanitary Service Division of Public Works, which maintains the Publicly Owned Treatment Works (POTW). The POTW serves the city of Springfield and the surrounding communities. The POTW is comprised of a wastewater collection system and two treatment plants.

2.9.3 COMMUNICATIONS

Communications, to include telecom cables and pull boxes, are provided to the airport though AT&T/SBC Communications. AT&T is the primary telecommunications provider for the Springfield area. The City is also equipped with fiber optic services.

2.9.4 NATURAL GAS

CU provides the airport, city of Springfield, and surrounding region with natural gas services. They are also responsible for the acquisition and transportation of the natural gas for and to their clients.

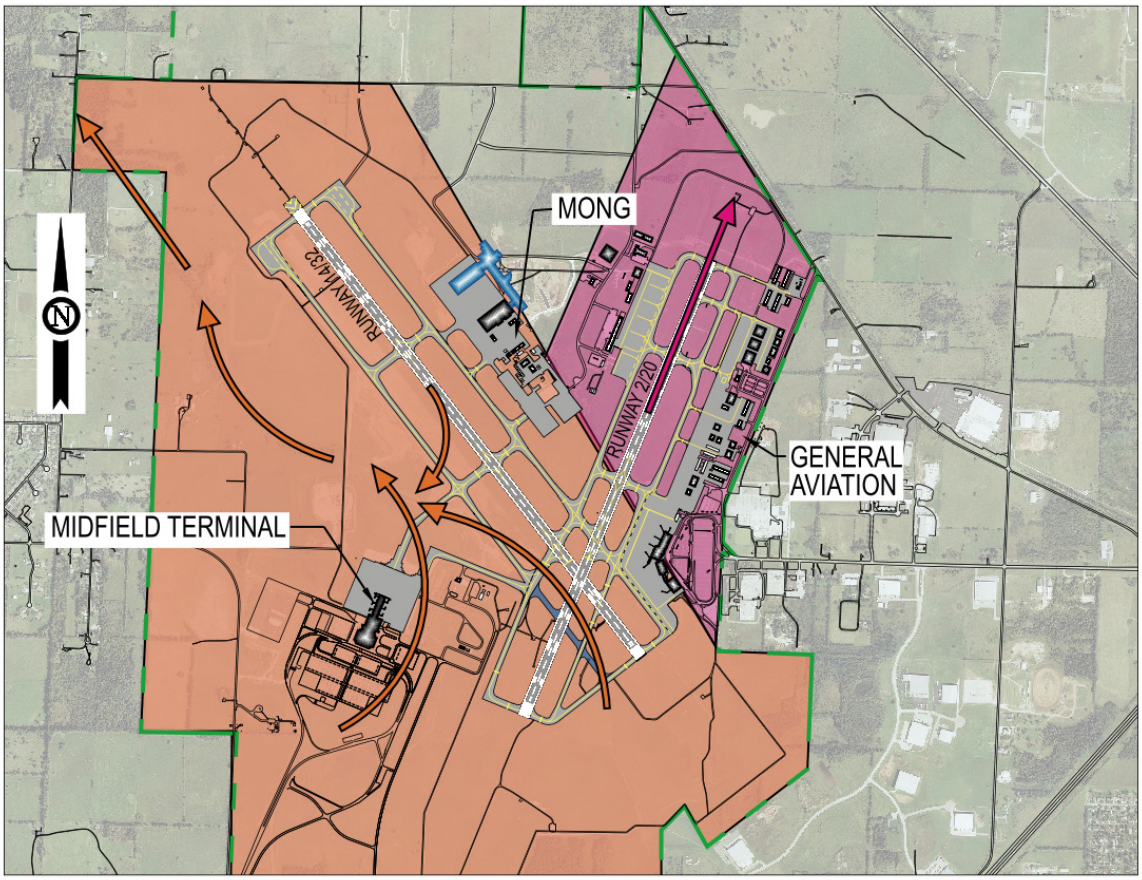
2.9.5 ELECTRICITY

Electricity to SGF is again provided by CU. CU has three main sources of power (coal, combustion turbines, and long-term purchased power sources) to include, six coal fired power plants, six combustion turbines, one renewable energy center, and three long-term purchased power sources. Other sources of electricity in the Springfield region are Ozark Electric Cooperative, Southwest Electric Cooperative, Webster Electric Cooperative and White River Valley Electric Cooperative.

2.9.6 STORMWATER

Stormwater runoff on airport property drains to the northwest into the Rainer Branch of the Clear Creek in the Sac River Basin. The stormwater drainage system is composed of open channels and pipes directing the flow of water, and drainage basins to both collect runoff and increase water quality. The airport generally drains in two directions, the eastern portion drains to the northeast, while the western portion drains to the northwest. All of the drainage eventually flows into the Rainer Branch stream as depicted in **Figure 2-20**.

FIGURE 2-20 - STORM DRAINAGE



Source: Jviation, Inc.

The Airport has developed a stormwater management system through a system of four main storm sewers draining across the airfield. The sewers are:

- 72-inch RCCP (reinforced concrete cylinder pipe) under Taxiway U, southeast of the control tower.
- 60-inch RCCP under Taxiway U, southeast of the control tower.
- 54-inch RCCP under Runway 14/32 approximately 2200' northeast of the control tower.
- 48-inch RCCP which drains the existing Runway 14/32 Safety Area and Runway 14 Glide Slope Critical area near the approach end of the Runway 14. This storm sewer system is west and downstream of the proposed Midfield Terminal Complex site1.

[1]Reynolds, Smith and Hills, Inc, *Replacement Terminal Area Development Program, Schematic Design Report*, 2005

2.10 METEOROLOGICAL DATA

The City of Springfield and the surrounding area experience a mild climate in comparison to the surrounding regions, which is attributed to the location of the city, atop the peak of the Missouri Ozark Mountain plateau.

2.10.1 WEATHER OBSERVATION EQUIPMENT

SGF has a Low Level Wind Shear Alert System (LLWAS) in place. This system alerts aircraft when wind shear occurs. A series of antennas are located on and near the airport. These antennas detect sudden changes in wind speed and direction. A computer then calculates these changes and through an algorithm detects when there is a potential for wind shear occurring around the airport. This alert gives pilots the ability to abort a takeoff or landing so they do not enter a hazardous flying condition.

SGF is also equipped with an Automated Surface Observing System (ASOS). This is a series of equipment that reports various weather conditions including:

- Sky condition (cloud height and amount)
- Visibility
- Basic present weather (Rain intensity, snow, and freezing rain)
- Obstructions to vision (fog, haze)
- Pressure
- Ambient temperature
- Wind (direction, speed, gusts)
- Precipitation accumulation
- Significant remarks (variable cloud height, wind shifts, peak winds, and rapid pressure changes)

The National Weather Service is also located immediately adjacent to SGF and utilizes a Doppler Radar on the premises. The close proximity of this radar provides highly accurate weather conditions in close proximity to the airport. This high level of reporting provides pilots with accurate conditions.

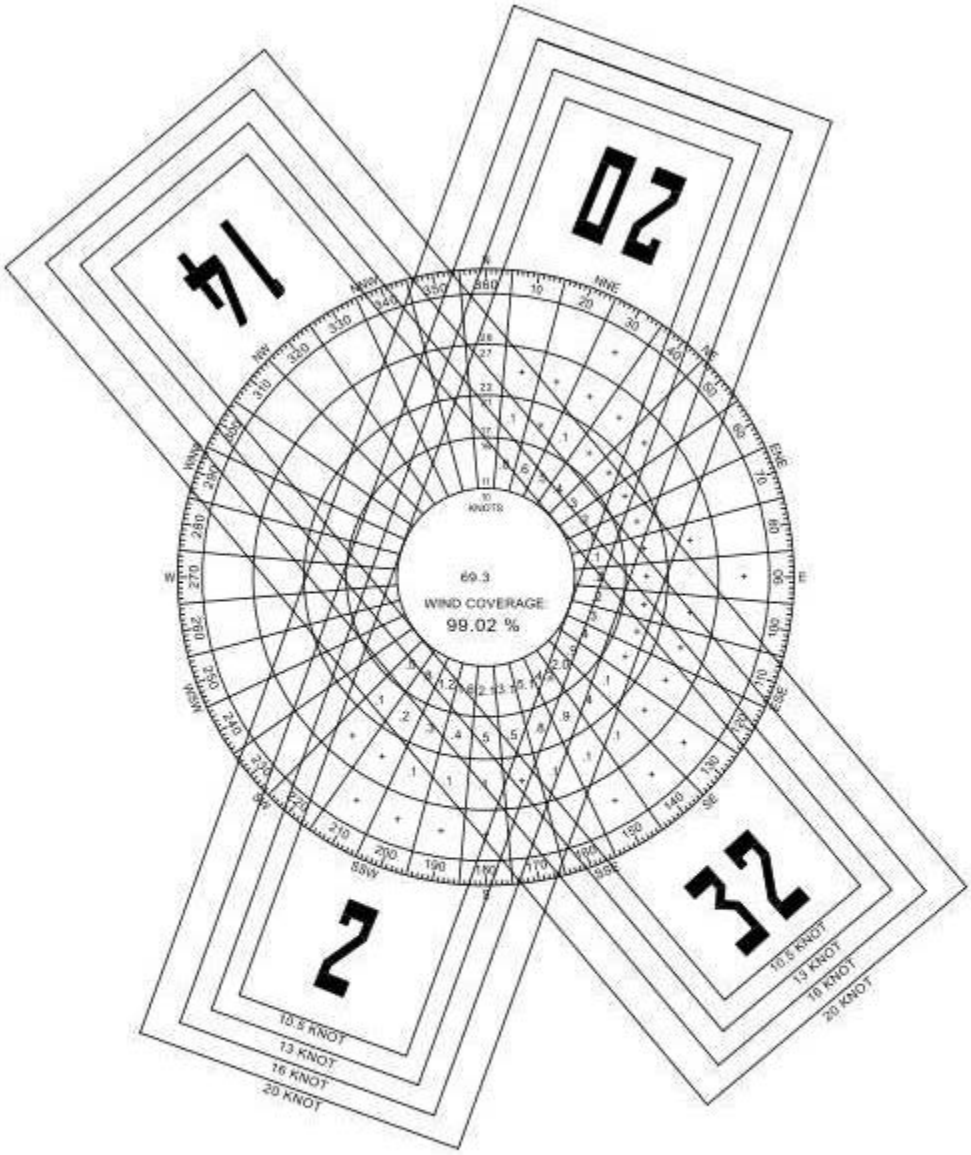
2.10.2 WIND COVERAGE

Wind coverage is extremely important in the design and alignment of airport runways. It is required under FAA AC 150/5300-13, *Airport Design,* that the airport's runway must provide more than 95% wind coverage for aircraft allowed to land at the airport. If the 95% is not achieved, a crosswind runway is recommended. **Table 2-8** shows wind coverage for all possible runway orientations. Current Runways 2/20 and 14/32 are highlighted in dark blue in **Table 2-8** and the associated Wind Roses are depicted in **Figure 2-21** and **Figure 2-22**. Springfield has adequate wind coverage with its current runway orientation for both GA operations (10.5 knot crosswinds) and for Commercial and Business Jet operations (16 knots).

TABLE 2-8 - WIND COVERAGE

Runway Orientation	All WX 10.5 knots	All WX 16 knots	IMC 10.5 knots	IMC 16 knots
1/19	94.49	99.52	92.87	99.25
2/20	91.11	99.02	89.41	98.57
3/21	86.86	98.24	85.76	97.74
4/22	82.91	97.36	83.06	97.08
5/23	79.64	96.46	80.85	96.51
6/24	77.02	95.6	78.42	96.1
7/25	75.34	95.06	76.52	95.99
8/26	74.72	95.12	75.64	96.36
9/27	74.45	95.57	76.15	96.73
10/28	77.78	96.26	78.45	97.05
11/29	81.6	97.06	82.02	97.44
12/30	86.01	97.75	85.4	97.86
13/31	89.49	98.37	87.52	98.22
14/32	92.05	98.96	89.34	98.72
15/33	94.24	99.41	91.79	99.16
16/34	95.97	99.67	94.06	99.47
17/35	96.83	99.79	95.21	99.69
18/36	96.44	99.76	95	99.64

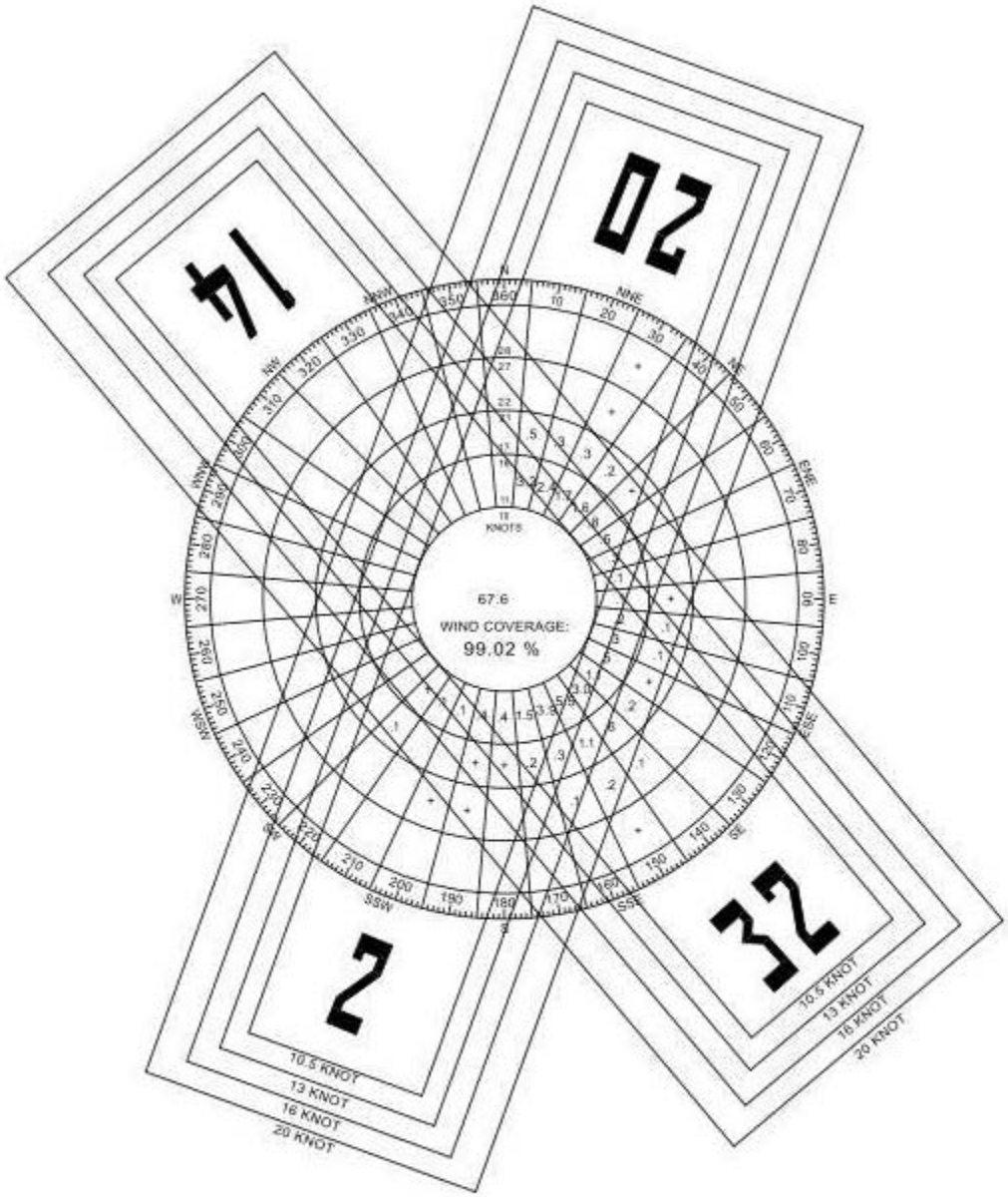
FIGURE 2-21 - ALL WEATHER WINDROSE



ALL WEATHER WINDROSE

RUNWAY DESIGNATION	20 KNOT CROSSWIND COMPONENT	16 KNOT CROSSWIND COMPONENT	13 KNOT CROSSWIND COMPONENT	10.5 KNOTCROSSWIND COMPONENT
RUNWAY 02/20	99.83%	99.02%	96.23%	91.11%
RUNWAY 14/32	99.79%	98.96%	96.09%	92.05%
COMBINED	99.99%	99.99%	99.93%	99.61%

FIGURE 2-22 - IFR WEATHER WINDROSE



IFR WEATHER WINDROSE

RUNWAY DESIGNATION	20 KNOT CROSSWIND COMPONENT	16 KNOT CROSSWIND COMPONENT	13 KNOT CROSSWIND COMPONENT	10.5 KNOTCROSSWIND COMPONENT
RUNWAY 02/20	99.72%	98.57%	95.32%	89.41%
RUNWAY 14/32	99.74%	98.72%	94.62%	89.34%
COMBINED	99.97%	99.96%	99.90%	99.53%

2.10.3 TEMPERATURE

The average temperature in Springfield is 56 °F, with July and August being the hottest months, averaging a high of 90 °F, and January being the coldest month with an average low of 23 °F. The location and geography of the region attribute to the wide temperature ranges without extreme hot or cold temperatures.

2.10.4 PRECIPITATION

Springfield receives an average of 45 inches[2] of precipitation per year, with June getting the most rain at an average of 5.02 inches per month. The driest months of the year are January and February, which receive approximately 2 inches of precipitation. The average annual relative humidity is 59%, and ranges between 53% in September to 67% in January.

2.10.5 INSTRUMENT METEOROLOGICAL CONDITIONS (IMC)

Instrument Meteorological Conditions (IMC) exists when cloud ceilings are less than 1,000 feet above ground and/or visibility is less than 3 miles. In periods of IMC, aircraft are required to follow Instrument Flight Rules (IFR). IMC conditions exist at SGF 5.19% of the time, with the majority being in the months of December and January as shown in **Table 2-9**.

TABLE 2-9 - IMC PERCENTAGE

Month	IMC %
January	12.22
February	10.02
March	6.37
April	4.12
May	3.76
June	2.47
July	2.90
August	2.01
September	3.46
October	5.46
November	4.46
December	14.56

2.11 AIRPORT EQUIPMENT

2.11.1 ARFF EQUIPMENT

The airport has five active ARFF response vehicles. The airport took delivery of a 2009 Oshkosh Striker 3000 in the spring of 2010. Additionally, SGF has two 1994 Oshkosh T1500 response trucks, a 1967Ansul Skid-Unit dry chemical vehicle, and a 1994 Jeep Cherokee. The airport has also restored its first fire response vehicle, which is a 1947 Jeep CJ2A and is on display in the new passenger terminal.

[2] National Weather Service Weather Forecast Office, Normals and Records Query

2.11.2 Snow Removal Equipment (SRE)

Currently the airport owns and operates 15 pieces of equipment for snow removal, 10 are used for heavy snow operations and five are used for light snow removal. The airport has enough equipment to adequately perform snow removal operations for the entire airport. Therefore, no additional equipment is needed and equipment is replaced on an as needed basis. Refer to **Table 2-10** for a breakdown of the SRE.

TABLE 2-10 - SNOW REMOVAL EQUIPMENT

Make	Model	Year	Use
Ford	F250 SD	2002	Light Snow Removal
Dodge	1 Ton Flatbed	1998	Light Snow Removal
Dodge	3500 4x4	2000	Light Snow Removal
GMC	2500HD	2002	Light Snow Removal
Chevrolet	3/4 Ton	1997	Light Snow Removal
Ford	F-800 Dump Truck	1995	Heavy Snow Removal
Oshkosh	P-2320-2	1981	Heavy Snow Removal
Oshkosh	P-2320-2	1981	Heavy Snow Removal
Oshkosh	P-Series Plow	2002	Heavy Snow Removal
Oshkosh	P-Series Plow	2002	Heavy Snow Removal
Oshkosh	HB-Series Blower	2002	Heavy Snow Removal
Case	921C Loader	2001	Heavy Snow Removal
Ford New Holland	NHTS100 Tractor	1998	Heavy Snow Removal
Caterpillar	950 Loader	1981	Heavy Snow Removal
Idaho Norland	Snow Blower	1981	Heavy Snow Removal

Source: Springfield-Branson National Airport

2.11.3 Aircraft Fueling Equipment

The airport owns and operates the FBO and fueling trucks on the airfield. The on duty Firefighters also serve as aircraft fuelers and currently operate nine fueling trucks which are described in **Table 2-11**.

TABLE 2-11 - FUEL TRUCKS

Location	Fueling Truck	Fuel Type
General Aviation	(2) 5,000-gallon	Jet Fuel
	(1) 3,000-gallon	Jet Fuel
	(2) 1,500-gallon	Avgas
	(1) 1,500-gallon (Defuel)	Mix
Midfield Terminal (ARFF Building)	(3) 5,000-gallon	Jet Fuel

Source: Springfield-Branson National Airport

2.11.4 AIRPORT CERTIFICATION

The FAA is required to issue operating certificates and ensure compliance under 14 CFR, Part 139 Certification of Airports to airports with scheduled air carrier services. SGF is considered a Class I Airport, as it has scheduled air service for aircraft with more than 30 passenger seats.
14 CFR, Part 139 covers three basic areas for airports, certification, the Airport Certification Manual, and airport operations. The FAA ensures airports comply with Part 139 through annual inspections. The airport is in compliance with Part 139, and had its last annual inspection on October 2010. The inspections typically include the following eight steps:
1. Pre-inspection review – review of the airport's files and the airport's certification manual.

2. In-briefing with airport management – set inspection time and schedule meetings with various airport personnel.

3. Administrative inspection of airport files, paperwork, etc – includes inspection of FAA Form 5010, review of Airport Certification Manual and Specifications, Notices to Airmen (NOTAMS), airfield self-inspection forms, etc.

4. Movement area inspection – check the condition of all facilities, equipment, pavement, operations, and indicators within the movement area of the airport.

5. Aircraft rescue and fire fighting inspection – conduct and evaluate a timed-response drill, review records, and check equipment.

6. Fueling facilities inspection – inspect fuel farms and trucks, check files for inspection documentation, review tenant certification for completion of fire safety training.

7. Night inspection – (if air carrier operations are conducted or expected to be conducted at night) evaluate airport lighting and signage, markings, airport beacon, and wind cone.

8. Post inspection briefing with airport management – discuss findings with airport, issue Letter of Correction if any violations or discrepancies were found, agree on a correction date and give any safety recommendations.

2.11.5 SECURITY

In addition to the regulations set by Part 139, the Transportation Security Administration (TSA) Title 49, Part 1542, Airport Security also places requirements on airports to be in compliance with the Transportation Security Act of 2001. Security items the airport must manage include:

- Security of the secured area
- Security of the air operations area (AOA)
- Security of the security identification display area (SIDA)
- Access control systems
- Fingerprint-based criminal history records checks (CHRC)

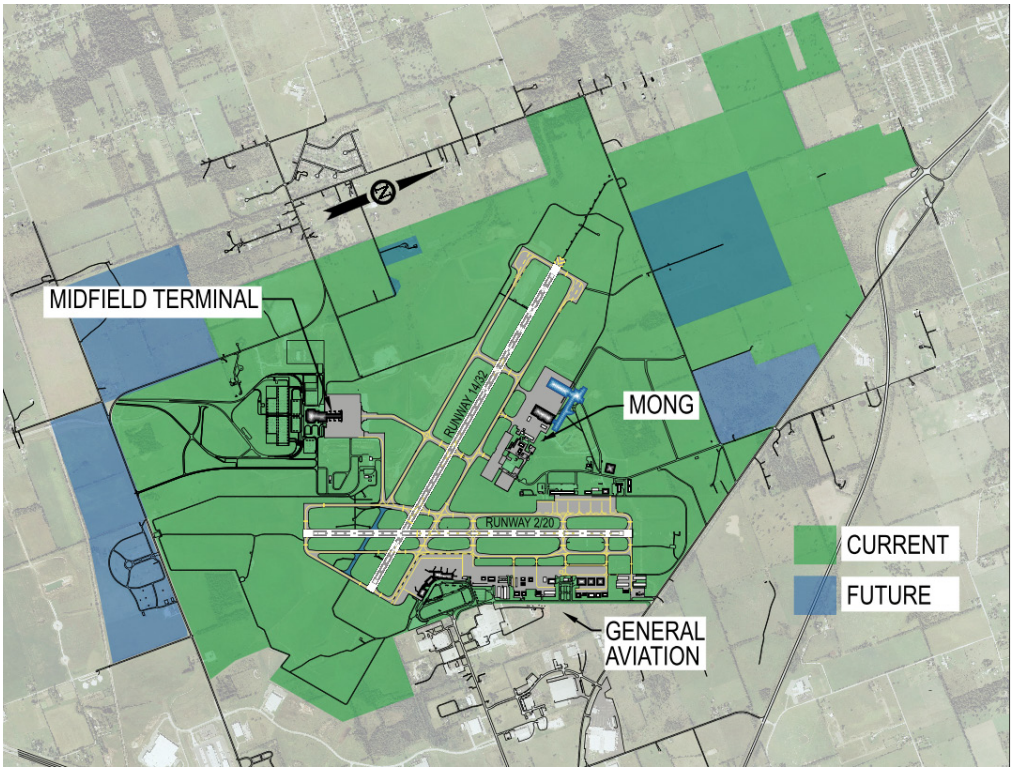
- Identification systems
- Training
- Law enforcement support
- Law enforcement personnel
- Supplementing law enforcement personnel
- Records of law enforcement response

SGF takes specific measures to ensure all required TSA regulations are met.

2.12 AIRPORT PROPERTY

The airport property is composed of approximately 2,791 acres. The original 832 acres were purchased in 1943 with the remaining 1,959 acres purchased between 1958 and 2005. FAA grants were used to purchase the majority, 89% or 2,490 acres, of the existing land. The remaining 11% was purchased independently by the sponsor. The land acquired with the FAA grant funds is required to be used for aeronautical purposes as stated in the grant assurance letters issued with the grants. The land purchased independently by the sponsor is slated to be used for aeronautical uses as depicted by the ALP. The 2009 ALP portrays the acquisition of an additional 1,572 acres in the future, all to be used for aeronautical uses. **Figure 2-23** depicts both the current and planned future airport property.

FIGURE 2-23 - AIRPORT PROPERTY

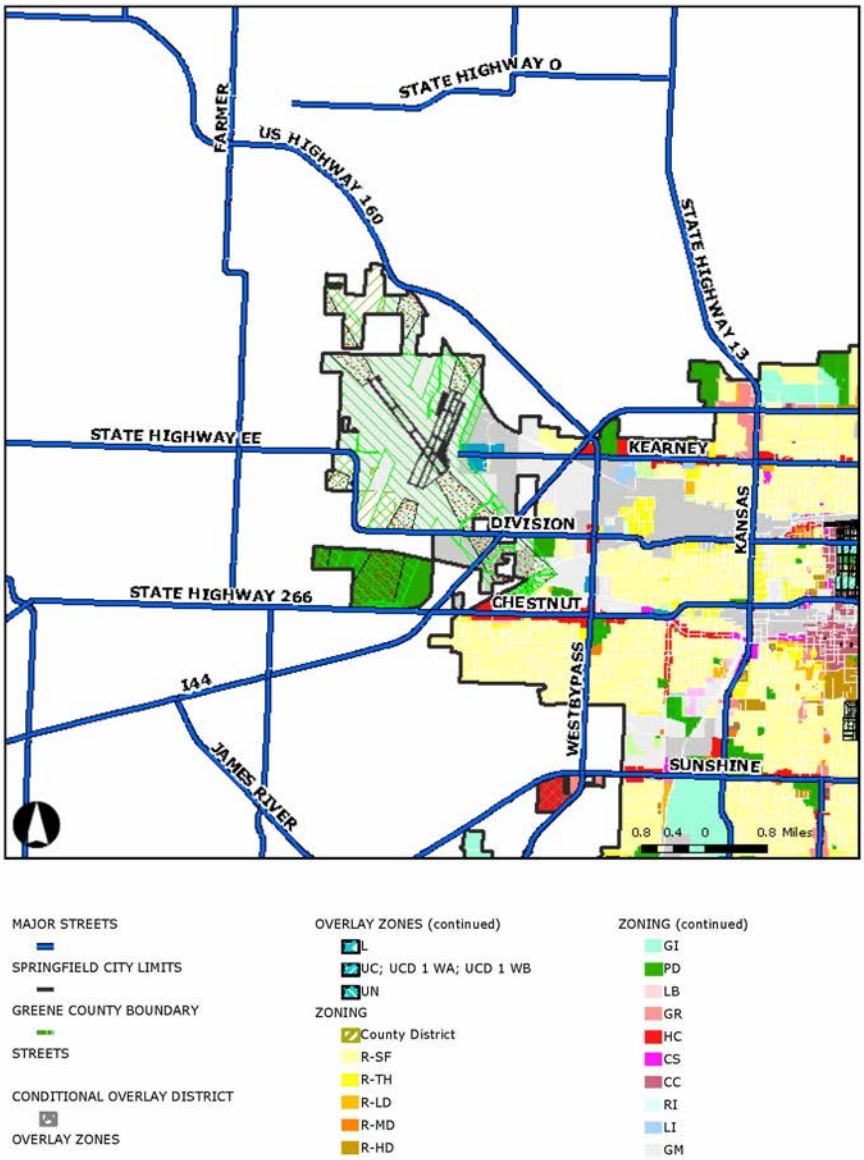


Source: Jviation, Inc.

2.13 REGIONAL SETTING AND LAND USE

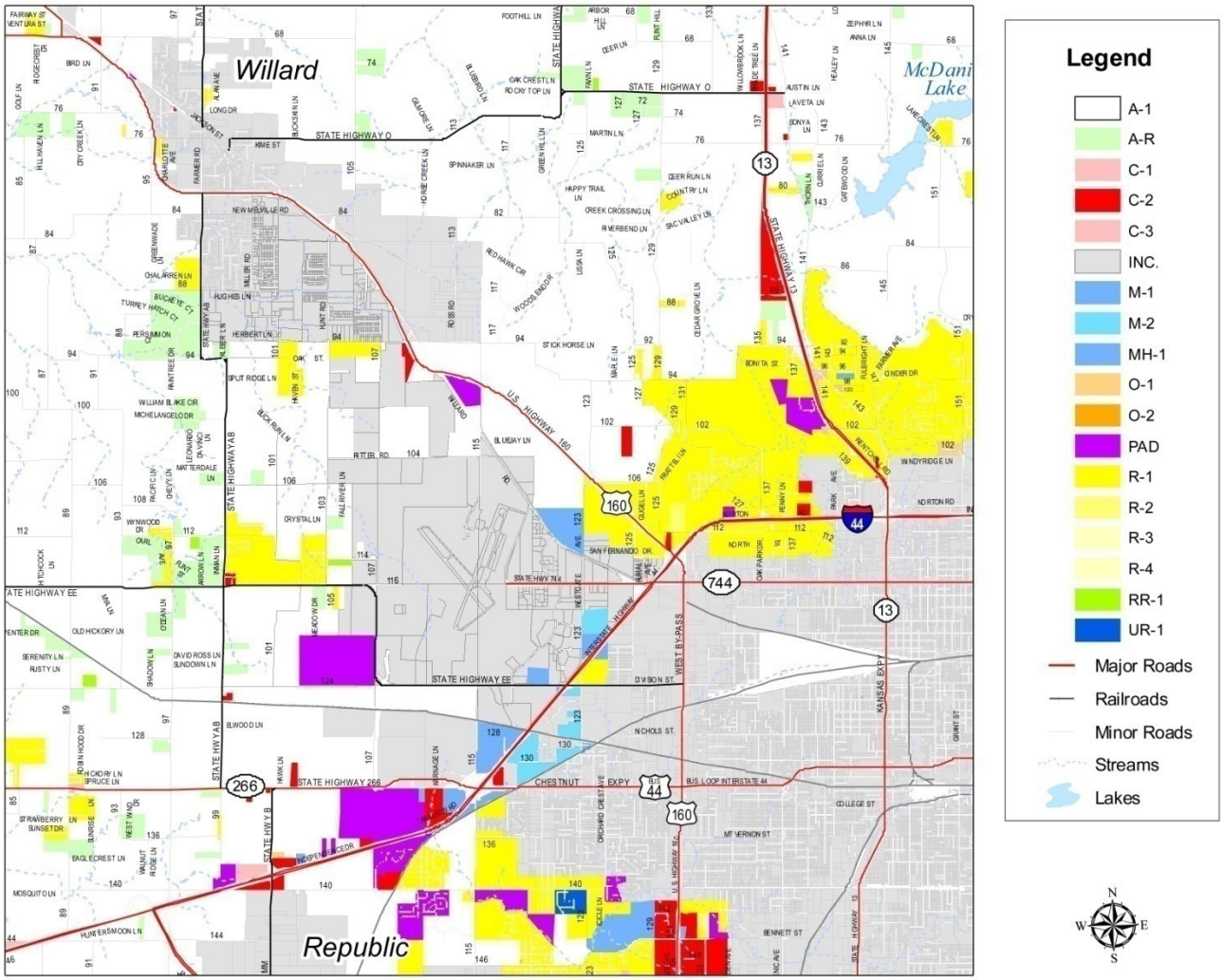
SGF is located northwest of the intersection of State Highway EE and U.S. Highway 160. As mentioned, the airport property is included in land annexed by the City of Springfield. Land included in the City of Springfield boundary and not designated as airport property ranges from Heavy Manufacturing (HM) to Industrial Commercial (IC), with a small area to the east of the airport zoned as Residential Single Family (R-SF). These areas are depicted in **Figure 2-24**.

FIGURE 2-24 - CITY OF SPRINGFIELD ZONING MAP



A large portion of the surrounding land is not included in the city of Springfield, but rather included in Greene County. Land uses to the northeast, east, southeast, and south of the airport are predominantly zoned as light manufacturing. Land to the north, west and southwest are predominantly agricultural with some areas of residential located throughout the vicinity of the airport. The land use and zoning areas are depicted in **Figure 2-25**.

FIGURE 2-25 - GREENE COUNTY ZONING MAP



Zoning and land use control is also included under Missouri State Statue 305 and specifically section 305.405 Zoning Regulations (Greene County). This section provides provisions to be included in the county zoning order and regulation. These provisions are as follows:

No dwellings shall be permitted to be constructed in an airport zone other than single-family dwellings each of which is on a lot or parcel of land of ten acres or more;

No hospitals, health institutions, clinics, sanitariums, nursing homes, convalescent homes, institutional homes, or other similar facilities shall be permitted to be constructed in an airport zone;

No public or private schools, libraries, sports arena, day care centers, churches or other places of worship, auditoriums or buildings for public assembly or use, theaters or any other similar facility shall be permitted to be constructed in an airport zone;

No building or structure shall be constructed nor shall any growth be maintained which exceeds fifty feet in height in an airport zone; no building or structure shall be constructed nor any growth maintained which is more than one hundred feet in height within any area located outside of an airport zone but located otherwise within an area two thousand feet parallel to and on each side of the centerline of any runway extended ten thousand feet from the end of and away from the runway;

No use or activity shall be conducted in an airport zone which emits radio signals, electronic emissions or interference of any kind with any navigational signal or radio communication between the airport or aircraft; nor anything which makes it difficult for pilots to distinguish airport lights or results in significant reflection of light or glare which impairs pilot visibility or otherwise creates a hazard for aircraft.

The existing airport property is incorporated in the city of Springfield and is specifically zoned as Airport Overlay (AO) District. The AO was developed to work in conjunction with other zoning districts to regulate the development of noise-sensitive land uses near the airport. The AO has three divisions AO-1, AO-2, and AO-3. AO-1 is all areas within 2,000 feet of the runway centerlines and extends out 10,000 feet from the end of the runways. AO-2 is not currently used at SGF. AO-3 is all areas surrounding the airport zones as defined:

> *Beginning at a point on the end of any runway and on the centerline of the runway; thence to the right a distance of five hundred (500) feet on a course perpendicular to said centerline to a point; thence to a point two thousand (2,000) feet to the right of and perpendicular to the centerline extended which point is directly opposite a point ten thousand (10,000) feet from the end of the runway on the said centerline extended away from the runway; thence to a point two thousand (2,000) feet to the left of and perpendicular to the centerline extended which point is directly opposite a point ten thousand (10,000) feet from the end of the runway on the said centerline extended away from the runway; thence to a point five hundred (500) feet to the left of the point of beginning and perpendicular to the said centerline; thence to the point of beginning.*

The district regulations prohibit the land uses within the AO districts. Land uses prohibited in AO-1 and AO-3 are residential, public, and recreational uses. AO-3 is modified to allow single family dwellings with the requirement of Noise Level Reduction measures taken. In addition to further land use regulation, hotels and motels are also prohibited in AO-3.

2.14 COMMUNITY PLANNING INITIATIVES

The City of Springfield and Greene County completed a 20-year *Vision 20/20 Strategic Plan for Springfield and Greene County*. The Plan addressed issues such as affordable housing, Center City, cultural, growth management and land use, public education, regional transportation, and water quality. The most recent year-end follow-up report was completed in 2007 (Year Three), which addressed the airport in its review of completed action items:

Regional -The common growth boundary of the City of Willard was near complete. As such, the growth boundary would need to take into consideration the airport boundary and protect the airport zones.

Transportation - The airport should continue with plans for additional general aviation facilities in order to provide for increased capacity for general aviation.

The initial Plan and the 2007 Review do not specifically address action items for the airport after year three.

2.15 COMMUNITY SOCIOECONOMIC ANALYSIS

The socioeconomic status of the city of Springfield and the Metropolitan Statistical Area (MSA) is crucial to the accuracy of the forecast and planning of the airport. Fluctuation of population, employment, income, and development play into the projected activity levels at the airport.

2.15.1 POPULATION

The U.S. Census Bureau reported that the Springfield Metro Area population was 430,900 in 2009. The Metro Area is a five county area including Greene, Christian, Webster, Polk and Dallas counties. The area experiences an annual population growth of 1.9%.

Springfield is the county seat for Greene County, which had an estimated population of 269,630 in 2009, an increase of 12% from 2000. The city of Springfield had an estimated population of 157,630 in 2009, approximately 58% of the population in Greene County. Springfield's population has grown approximately 12% from 1990 to 2009, as depicted in **Table 2-12**. The state of Missouri's population growth of 15% is slightly higher than that of Springfield.

TABLE 2-12 - POPULATION TREND

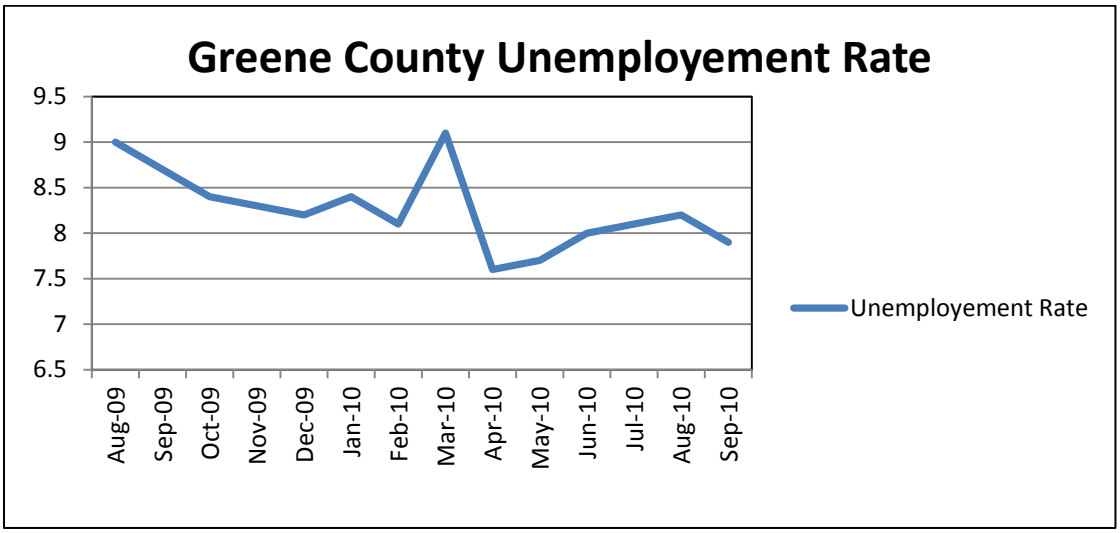
	1990	2000	2009
Springfield (City)	140,494	151,580	157,630
Missouri	5,117,073	5,595,211	5,987,580

Source: U.S. Census Bureau, 2009 Population Estimates, Census 2000, 1990 Census

2.15.2 EMPLOYMENT

The Bureau of Labor Statistics reported Greene County had an average unemployment rate of 8.3% between August 2009 and September 2010. Opposite to national trends, the unemployment rate has a general downward trend with a highest rate being at 9% in August of 2009 and the lowest at 7.6 in April 2010. The unemployment fluctuation over the past year is show in **Figure 2-26**.

FIGURE 2-26 - GREENE COUNTY UNEMPLOYMENT RATE



The top five workforce sectors are Education and Health Services, Government, Retail Trade, Leisure and Hospitality, and Professional and Business Services. Together these five sectors account for 65% of the workforce. The workforce had an annual growth rate of 2.2% in 2009, which exceeds that of the nation at 1.3%. The top 10 employers in the metro area are depicted in **Table 2-13**.

TABLE 2-13 - TOP 10 EMPLOYERS

	Company Name	Industry	Metro Area Employees
1	St. John's Health System	Health Care	6,841
2	Cox Health Systems	Health Care	6,355
3	Wal-Mart Stores Inc.	Retail	3,927
4	Springfield Public Schools	Education	3,154
5	Missouri State University	Education	3,065
6	United States Government	Government	2,800
7	State of Missouri	Government	2,346
8	Bass Pro Shops/Tracker Marine	Retail/Manufacturing	2,326
9	Citizens Memorial Healthcare	Health Care	1,600
10	City of Springfield	Government	1,540

Source: Springfield Business Development Corporation, Major Employers, 2009

2.15.3 INCOME AND COST OF LIVING

The Bureau of Economic Analysis reported the per capita income for the Springfield Metro Area in 2008 was $31,496, slightly lower than that of Missouri, which was at $36,356 as shown in **Table 2-14**. The per capita income has an annual growth of 5.5%, slightly less than that of the United States at 5.8% and approximately the same as the state of Missouri. The Bureau of Economic Analysis also reported the average household income was $57,476 for the Metro Area in 2009.

TABLE 2-14 - PER CAPITA INCOME

	1990	2000	2008
Springfield (MSA)	$15,143	$24,335	$31,496
Missouri	$17,582	$27,891	$36,356
United States	$19,354	$30,318	$40,673

Source: Bureau of Economic Analysis, Regional Economic Information System, 2010

The Council for Community and Economic Research reports the Cost of Living Index for Springfield is 89.2%. This percentage shows the comparison between the cost of living in Springfield and the National average, or that it is 10.8% less expensive to live in Springfield than the average American city. Other Missouri cities cost of living are Kansas City (MO) 96.3% and St. Louis at 89.8%, both higher than that of Springfield.

2.16 ENVIRONMENTAL OVERVIEW

FAA Order 1050.1E, Environmental Impacts: Policies and Procedures, and Order 5050.4B, National Environmental policy Act (NEPA): Implementation Instruction for Airport Actions, address specific environmental categories that are evaluated in environmental documents through NEPA. The following section inventories these categories and their existence at the airport.

2.16.1 AIR QUALITY

Air quality analysis for federally funded projects must be prepared in accordance with applicable air quality statutes and regulations that include the Clean Air Act of 1970[3], the 1977 Clean Air Act Amendments[4], the 1990 Clean Air Act Amendments[5], and the National Ambient Air Quality Standards[6] (NAAQS). In particular, the air pollutants of concern in the assessment of impacts from airport-related sources include six "criteria pollutants"; carbon monoxide (CO), lead (Pb), nitrogen dioxide (NO2), ozone (O3), particular matter (PM-10 and PM-2.5), and sulfur dioxide (SO2).

The airport is located in Greene County, which is designated by the U.S. Environmental Protection Agency as attainment status for all parts of the county in all criteria. Several counties in Missouri, not including Greene County, are designated as non-attainment and maintenance status as depicted in **Table 2-15.**

[3] U.S. Code. The Clean Air Act of 1970. U.S. Congress, Public Law 91-604, 42 U.S.C. §7401
[4] U.S. Code. The 1977 Clean Air Act Amendments, U.S. Congress, Public Law 95-95, 42 U.S.C. §7401
[5] U.S. Code. The 1990 Clean Air Act Amendments, U.S. Congress, Public Law 101-549, 42 U.S.C. §7401
[6] 40 CFR Part 50, Section 121, National Ambient Air Quality Standard

TABLE 2-15 - NON-ATTAINMENT AND MAINTENANCE DESIGNATED COUNTIES - GREENE COUNTY

County	Pollutant	Area Name	Nonattainment in Year	Maintenance Year	Classification
Franklin Co	8-Hr Ozone	St Louis, MO-IL	04- 10	/ /	Moderate
Franklin Co	PM-2.5 1997	St. Louis, MO-IL	05-10	/ /	Nonattainment
Iron Co	Lead	Iron County (part); Dent Township, MO	92-99	12/18/2000	
Iron Co	Lead	Iron County (part); Liberty and Arcadia, MO	92-03	11/29/2004	
Jefferson Co	8-Hr Ozone	St Louis, MO-IL	04- 10	/ /	Moderate
Jefferson Co	Lead	Jefferson County (part); Herculaneum, MO	92-10	/ /	
Jefferson Co	PM-2.5 1997	St. Louis, MO-IL	05-10	/ /	Nonattainment
St Charles Co	8-Hr Ozone	St Louis, MO-IL	04-10	/ /	Moderate
St Charles Co	PM-2.5 1997	St. Louis, MO-IL	05-10	/ /	Nonattainment
St Louis	8-Hr Ozone	St Louis, MO-IL	04-10	/ /	Moderate
St Louis	CO	St Louis, MO	92-98	03/29/1999	Not Classified
St Louis	PM-2.5 1997	St. Louis, MO-IL	05-10	/ /	Nonattainment
St Louis Co	8-Hr Ozone	St Louis, MO-IL	04-10	/ /	Moderate
St Louis Co	CO	St Louis, MO	92-98	03/29/1999	Not Classified
St Louis Co	PM-2.5 1997	St. Louis, MO-IL	05-10	/ /	Nonattainment

Source: Environmental Protection Agency, MO – Greene County, 2010

2.16.2 DEPARTMENT OF TRANSPORTATION ACT: SECTION 4(F)

The Department of Transportation (DOT) Act, Section 4(f)[7] 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 unless there is no feasible or prudent alternative and the use of such land includes all possible planning to minimize harm resulting from the use".

An analysis of DOT 4(f) properties within 10 miles of the airport was completed. (See **Appendix B** for a list of properties.) The Frisco Highline Linear Park, a 62 acre trail, runs within 1 mile of the airport, and is the closest DOT 4(f) property.

2.16.3 FARMLANDS

The Farmland Protection Policy Act (FPPA) regulates federal actions that may impact or convert farmland to a non-agricultural use. FPPA defines farmland as "prime or unique land as determined by the participating state or unit of local government and considered to be of statewide or local importance". Greene County has a significantly large amount of prime and/or unique farmland, as well as high development which relates to a relatively rapid loss of high-quality farmland (see **Appendix B** for the Missouri Prime and Unique Farmland map). The city of Springfield and the airport are located in areas depicted as "Urban Areas" and do not contain prime and/or unique farmlands.

[7] *U.S. Department of Transportation Act, section 4(f),* recodified and renumbered as § 303(c) of 49 U.S.C.

2.16.4 FISH, WILDLIFE, AND PLANTS

Requirements have been set forth by The Endangered Species Act[8], The Sikes Act[9], The Fish and Wildlife Coordination Act[10], The Fish and Wildlife Conservation Act[11], and then Migratory Bird Treaty Act[12], for the protection of fish, wildlife, and plants of local and national significance.

Greene County has several species listed by the U.S. Fish and Wildlife Service as being threatened or endangered as depicted in **Table 2-16**.

TABLE 2-16 - THREATENED OR ENDANGERED SPECIES

Species	Status	Habitat
Geocarpon (*Geocarpon minimum*)	Threatened	Moist soils in exposed sandstone glades
Gray bat (*Myotis grisescens*)	Endangered	Caves
Niangua darter (*Etheostoma nianguae*)	Threatened/ Critical Habitat	Rivers
Ozark cavefish (*Amblyopsis rosae*)	Threatened	Caves in the Boone and Burlington limestone formations of the Ozark Mountains
Missouri bladder-pod (*Lesquerella filiformis*)	Threatened	Open glades in shallow limestone soils
Western prairie fringed orchid (*Platanthera praeclara*)	Threatened	Wet prairies & sedge meadows

Source: U.S. Fish and Wildlife Service, Endangered Species – Missouri, 2010

2.16.5 FLOODPLAINS

Executive Order 11988, *Floodplain Management*[13] directs federal agencies to "avoid to the extent possible the long and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative". An examination of the Flood Insurance Rate Maps (FIRM) for Greene County shows that there Zone A flood zones associated with the Rainer Branch located within airport property west of Runway 14/32 and north of the Midfield Terminal as well as north of the threshold of Runway 2/20, as can be seen in **Figure 2-27** and **Figure 2-28**. FEMA defines a Flood Zone A as one that has the potential to flood in a 100-year storm and a Flood Zone X is a zone that will flood in a 500-year storm event. Flood Zone A areas are considered to be a higher threat as the chances of a 100-year storm is far greater than a 500-year storm.

[8] Endangered Species Act of 1973, U.S. Congress, Public Law 93-205, 16 U.S.C §1531-1544
[9] Sikes Act, Amendments of 1974, U.S. Congress, Public Law 93-452
[10] Fish and Wildlife Coordination Act of 1958, U.S. Congress, Public Law 85-624, 16 U.S.C §661-666c
[11] Fish and Wildlife Conservation Act of 1980, U.S. Congress, Public Law 96-366, 16 U.S.C §2901-2912
[12] Migratory Bird Treaty Act of 1981, 16 U.S.C §703-712
[13] Executive Order 11988, Floodplain Management, 1977

FIGURE 2-27 - FEMA FLOODPLAIN 1

Source: FEMA Map Service Center

FIGURE 2-28 - FEMA FLOODPLAIN 2

Source: FEMA Map Service Center

2.16.6 Hazardous Materials, Pollution Prevention, and Solid Waste

The Resource Conservation and Recovery Act (RCRA)[14], Comprehensive Environmental Response, Compensations, and Liability Act (CERCLA)[15], Superfund Amendments and Reauthorization Act (Superfund)[16], and the Community Environmental Response Facilitation Act (CERFA)[17] are the four predominant laws regulating actions related to the use, storage, transportation, or disposal of hazardous materials, chemicals, substances, and wastes. Federal actions that pertain to the funding or approval of airport projects require the analysis of the potential for environmental impacts per the regulating laws. Furthermore, property listed or considered for the National Priority List (NPL) should be evaluated in relation to the airport's location.

NPL listed properties in Greene Country are listed in **Table 2-17**. The North-U Drive Well Contamination is the located approximately four miles from the airport and is the closest site in Greene County.

[14] U.S. Code, 1976, Resource Conservation and Recovery Act, 42 USC, §6901
[15] U.S. Code 1980, Comprehensive Environmental Response, Compensation and Liability Act, 42 USC, §9601-9628
[16] U.S. Code 1986, Superfund Amendments and Reauthorization Act, 42 USC
[17] U.S. Code 1992, Community Environmental Response Facilitation Act, Public Law 102-426

Table 2-17 - NPL Sites in Greene County

Site Aliases	EPA ID	Distance to Airport
Fulbright Landfill	MOD980631139	4.5 miles
North-U Drive Well Contamination	MOD007163108	4.0 miles
Solid State Circuits, Inc.	MOD980854111	9 miles

Source: EPA, Colorado Site Locator, 2010

The Litton-ITD site, a remedial investigation site, is also located on and adjacent to airport property, which includes a hangar development site. The former sanitary lagoon is the only portion of the site located on airport property; however several monitoring wells are also located on airport property. Areas adjacent to the airport have been undergoing remedial investigations since 2005, and include GPS data collection of sample points, soil and groundwater sampling, and laboratory analysis for VOCs and metals. Both VOCs and metals were found to be present in the sites; therefore remedial investigations are still in progress on the Litton site.

2.16.7 Historical, Architectural, Archaeological, and Cultural Resources

The National Historic Preservation Act[18] and the Archaeological and Historical Preservation Act[19] regulate the preservation of historical, architectural, archaeological and cultural resources. Federal actions and undertakings are required to evaluate the impact on these resources.

The National Register of Historic Places lists 69 properties within and near the city of Springfield. A historic district, known as the Rock Fountain Court Historic District is located about three miles southeast of the airport property. The district includes nine individual stone veneered cabins that were constructed along the Historic U.S. Route 66 for lodging in the 1940s.

The nearest registered individual building to the airport is the original St. John's Mercy Hospital Building, which is approximately 4.5 miles to the southeast of the airport. The hospital was originally constructed in 1906 in the Jacobethan Revival style of architecture. The building was decommissioned as a hospital in 1952, when the hospital was moved to its present location on Carpenter Street. Today, the building serves as senior housing, and is known as the Franciscan Villas. A complete list of NRHP listed properties can be found in **Appendix B**.

2.16.8 Light Emissions and Visual Impacts

Federal regulations do not specifically regulate airport light emissions; however, the FAA does consider airport light emissions on communities and properties in the vicinity of the airport. A significant portion of light emissions at airports are a result of safety and security equipment and facilities. The airport has several primary sources of light including:

- Runway Lighting: lights outlining the runway and classified by the intensity or brightness the lights are capable of producing. Typically they are classified as High Intensity Runway Lights (HIRL) or Medium Intensity Runway Lights (MIRL).

[18] U.S. Code, 1966, National Historic Preservation Act of 1966, Public Law 89-665
[19] U.S. Code, 1974, Archaeological and Historical Preservation Act of 1974, 16 USC 469

- Taxiway Lighting: lights outlining the taxiways and classified by the intensity or brightness the lights are capable of producing.
- Visual Approach Slope Indicator (VASI) system: arrangement of lights offering descent guidance to approaching aircraft.
- Precision Approach Path Indicator (PAPI): row of lights that provide visual glide slope guidance in non-precision approaches.
- Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights (MALSR): combination of threshold lamps, steady burning light bars and flashers, that provide visual information to pilots on runway alignment, height perception, role guidance, and horizontal references.
- Airport Beacon: rotating light used to locate the airport.

Other sources of light can include parking lot lights, ramp/apron lights, building lights, and passenger/airport vehicle lights and aircraft lights.

A significant portion of the lights sources aid in the safety of operations at the airport and produce an insignificant amount of light on the areas outside the immediate airport property.

2.16.9 Noise

Aircraft noise and noise surrounding airports are two of the most contentious issues related to the environment at airports. The FAA examines actions and development that may change runway configurations, airport/aircraft operation and/or movements, aircraft types, and flight patterns, all of which could ultimately alter the noise impacts on the communities in the vicinity of the airport.

The airport does not currently have a published noise abatement procedure plan. The city of Springfield has zoned the land surrounding the airport as "General Industry, Transportation and Utilities" which reduces the sensitivity of the surrounding areas as minimal residential communities will be exposed to aircraft and airport noise. Noise contours will be developed for current conditions as well as for future conditions as part of the master plan update.

2.16.10 Water Quality

The Clean Water Act[20] provides the federal government the "authority to establish water quality standards, control discharges, develop waste treatment management plans and practices, prevent or minimize the loss of wetlands, location with regard to an aquifer or sensitive ecological area such as a wetland area, and regulate other issues concerning water quality".

The city of Springfield is required to have a National Pollution Discharge Elimination System (NPDES) permit for the storm water drainage system. The permit is known by the City as the Municipal Separate Storm Sewer System and specifies required activities of the City such as stream and

[20] U.S. Code, 1977 The Clean Water Act, 33 U.S.C. §1251-1387

runoff monitoring, public education, industry inspections, etc. The NPDES is administered by the Missouri Department of Natural Resources and requires a new permit every five years.

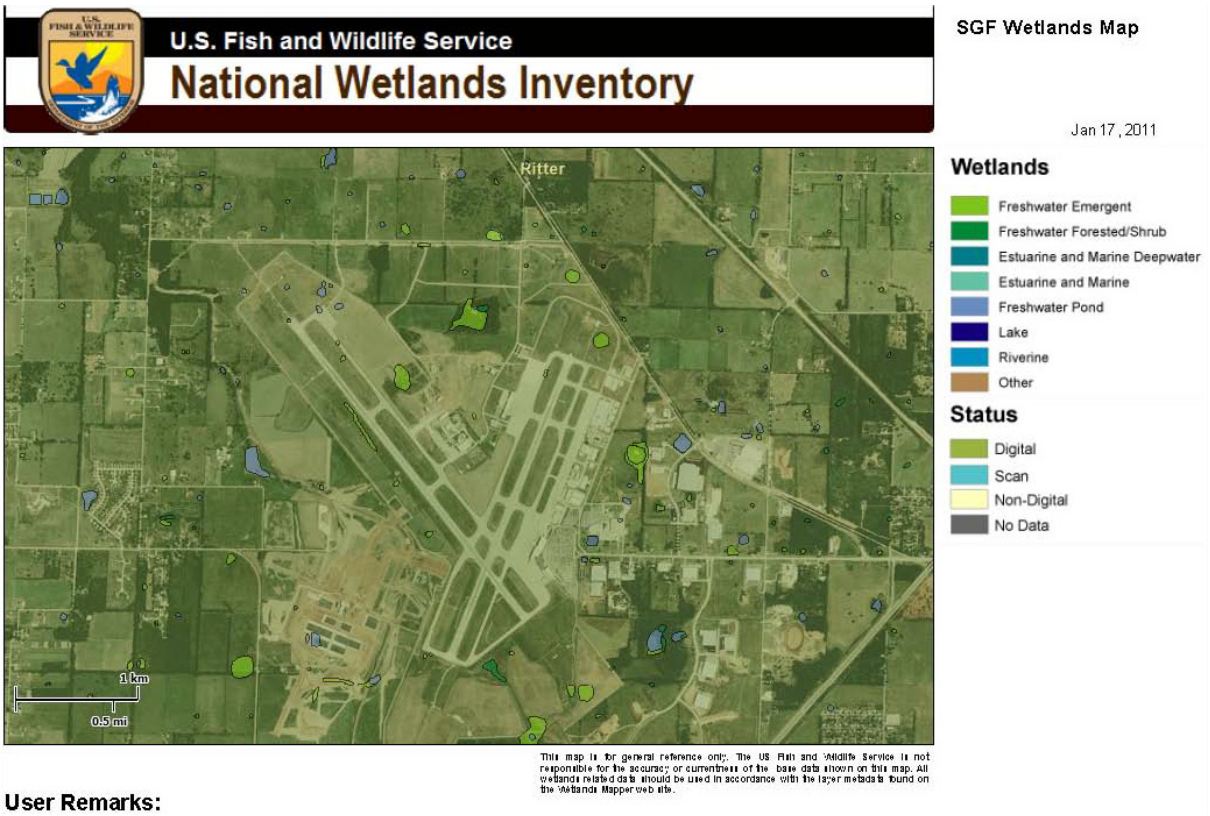
2.16.11 WETLANDS

Executive Order 11990, Protection of Wetlands, defines wetlands as "those areas that are inundated by surface or groundwater with a frequency sufficient to support and under normal circumstances does or would support a prevalence of vegetative or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction." Federal agencies are required to minimize the destruction, loss, or degradation of wetlands.

An examination of the National Wetlands Inventory depicts that several wetlands exist on airport property, which are depicted in **Figure 2-29**. The three types of wetlands present are Freshwater Emergent wetlands, Freshwater Forested and Shrub, and Freshwater Ponds. Freshwater emergent wetlands are generally described as areas of herbaceous march, fen, swale and wet meadows. Freshwater Forested and Shrub wetlands are areas of forested swamp or wetland shrub bog or wetland, and Freshwater Ponds are simply local ponds of standing freshwater.

Additionally, the construction of the new terminal required the removal and mitigation of approximately 1.4 acres of wetlands. The City is responsible for the maintenance of the wetlands mitigation site, now located at the Rutledge-Wilson Community Farm Park. The mitigation plan states that the SGF is responsible for an 80% success rate of the trees in the wetlands. The mitigation plan was accomplished through local, state, and federal permits.

FIGURE 2-29 - WETLANDS INVENTORY



2.16.12 Wild and Scenic Rivers

The Wild and Scenic Rivers Act of 1968, as amended[21], describes those river segments designated as, or eligible to be included in, the Wild and Scenic Rivers System. Impacts should be avoided or minimized to the extent possible when the rivers or river segments that fall under this Act may be affected by a proposed action. In addition, the President's 1979 *Environmental Message Directive* on Wild and Scenic Rivers[22] directs Federal agencies to avoid or mitigate adverse effects on rivers identified in the Nationwide Rivers Inventory as having potential for designation under the Wild and Scenic Rivers Act.

There are two nationally designated Wild and Scenic Rivers located within 100 miles of SGF, but none close enough to constitute an environmental concern. The Eleven Point River is approximately 100 miles to the southeast of the airport in Missouri. While the Buffalo National River is approximately 90 miles to the south of Springfield in Arkansas. Additional rivers are located nearby, such as the James River, but they are not considered Wild and Scenic because of extensive damming or other factors that preclude them from this designation.

[21] U.S. Code, The Wild and Scenic Rivers Act of 1968, 16 USC 1271-1287, 1977
[22] Office of Environmental Policy, 1979, Policy Guidelines for Wild and Scenic Rivers, 1980

2.17 CURRENT AVIATION ACTIVITY

An understanding of past and present aviation activity is essential to understanding the adequacy of existing facilities to handle future demand.

2.17.1 AIRCRAFT OPERATIONS

An aircraft operation is defined as an aircraft takeoff or landing. The airport reported 57,883 operations in 2009, comprised of air carrier, air taxi, GA, and military operations. The number of operations is displayed in **Table 2-18**. Air Taxi and GA Itinerant make a majority of the total operations at a combined total of 71%.

TABLE 2-18 - 2009 OPERATIONS

	2009 Operations	Percent of Total Ops
Air Carrier	3,502	6%
Air Taxi	22,264	39%
GA Local	7,696	13%
GA Itinerant	18,733	32%
Military	5,688	10%
Total	57,883	100%

2.17.2 COMMERCIAL ACTIVITY

SGF has three regularly scheduled commercial airlines operating at the airport, Delta, United, and American Airlines. The airport reported a total of 407,089 enplanements in 2009, 311,632 of which were from the commercial airlines. **Table 2-19** displays the trend of enplanements for the three airlines in 2005, 2007 and 2009.

TABLE 2-19 - COMMERCIAL ENPLANED PASSENGERS

Airlines	2005	2007	2009	% Change (05-19)
American Airlines	173,346	154,271	136,331	(27%)
Delta (Includes Northwest Airlink)	138,930	118,756	96,389	(44%)
United	109,570	107,681	82,367	(33%)
Non-Scheduled	3,468	2,839	3,593	3%
Scheduled Charter (Allegiant)	18,579	57,800	91,864	494%
Total Commercial Enplanements	443,893	441,347	410,544	(8.1%)

Source: Springfield-Branson National Airport, Statistical Summary, 2005-2009

In addition to the scheduled commercial airlines, SGF offers scheduled charter service with Allegiant. The enplanements from Allegiant and other non-scheduled flights, as shown in **Table 2-19**, have increased significantly from 2005 to the present. Further discussion of commercial activity will be provided in **Chapter 3,** *Aviation Activity Forecasts*.

2.18 SURVEY RESULTS AND ANALYSIS

In order to accurately interpret the needs of the Springfield aviation community, several surveys were developed to poll the local public and those operating through the airport. The surveys were sent to based aircraft owners, local businesses, business aircraft operators, and airport tenants.

2.18.1 BASED AIRCRAFT OWNERS

Of the surveys sent out to the based aircraft owners, 47 surveys were returned. The majority of the based aircraft at SGF were found to be single engine aircraft, averaging 65% of the total based aircraft. The remaining based aircraft were split between: turbo-prop (11%), Jet (10%) and multi-engine (15%). The owners of the aircraft, in majority, felt the existing hangar facilities were sufficient for their existing needs.

The based aircraft owners were polled on their satisfaction of the existing instrument approaches procedures; it was found that the majority were satisfied but if given the option additional instrument approaches would be well received. Several runways were suggested for instrument upgrades, with Runway 20 being requested the most for an ILS installation. 100% of the respondents were satisfied with the runway lengths.

A substantial portion of the respondents were found to be satisfied with the FBO services offered. Of those that were not satisfied, the most common comments were the need for aircraft and avionics maintenance facilities and services as well as decreased fuel prices.

The surveys also asked "What facilities, activities, or capabilities do you consider essential for the airport to provide?" Aircraft fueling services (self-service, FBO fueling) was rated as the most important capability offered with the GA terminal and precision instrument approach as the second and third most important facilities.

The surveyed group was asked to rate the airport facilities to include: runway orientation, runway length, condition of pavement, instrument approaches, visual aids, navigational aids, hangar space, hangar/pad lease rates, FBO services, Unicom services, apron space, and Air Traffic Control services. **Figure 2-31** depicts the rating of each facility. The aviation community is most satisfied with the runway length, Air Traffic Control, and the condition of the pavement facilities at SGF. The hangar space and hangar/pad lease rates are the areas the aviation community feels need the most improvement. Of these categories surveyed, the respondents stated that Air Traffic Control and hangar space and rates are of the most importance to the aviation community.

FIGURE 2-30 - AIRPORT ESSENTIALS FOR BASED AIRCRAFT

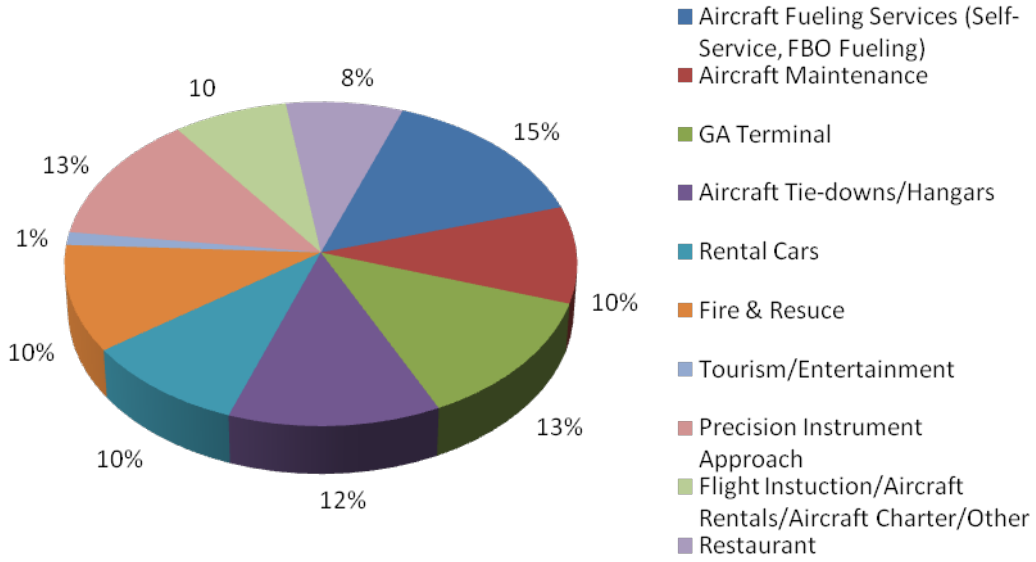
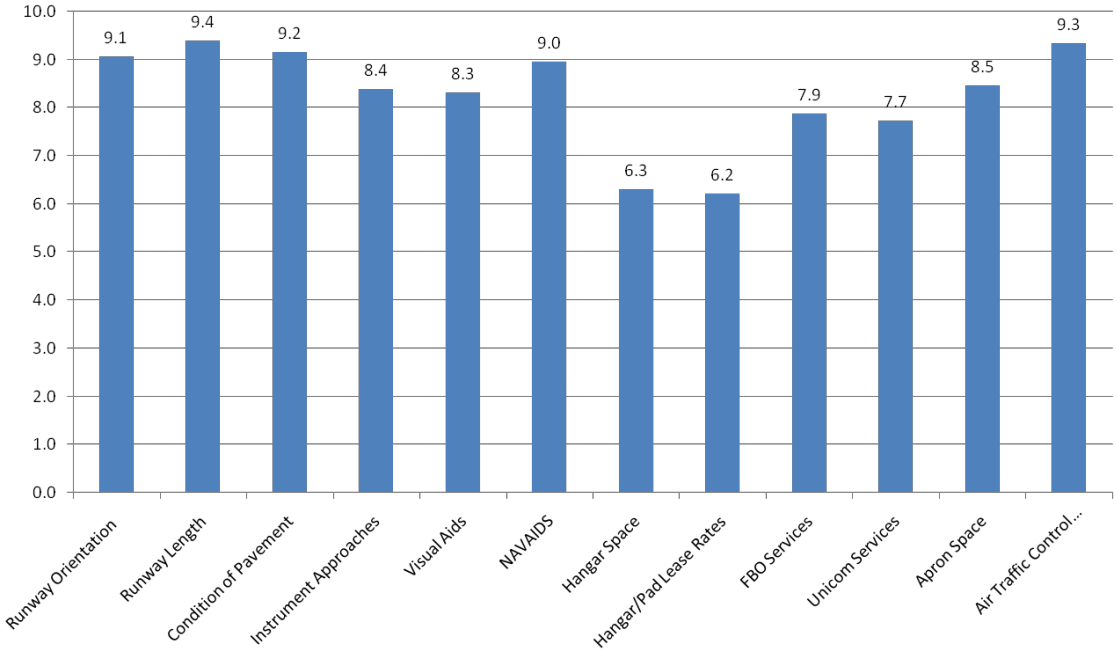


FIGURE 2-31 - AIRPORT FACILITY RATINGS



Final comments from the based aircraft owners mentioned extreme satisfaction with the customer service at the FBO and that the airport was "extremely" vital to the business development, transportation infrastructure, and tourism industry of the surrounding area.

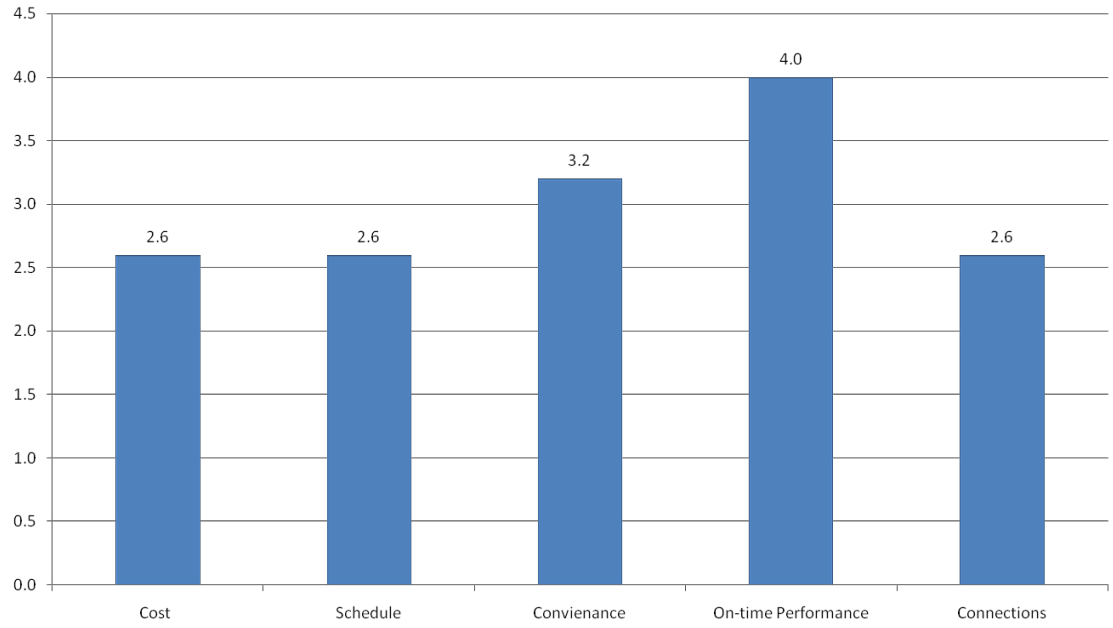
2.18.2 Local Businesses

Of the local businesses that were surveyed, only six surveys were completed and returned. The respondents were asked to rate the importance of the airport on a scale of 1 to 10. The average rating

of the airport was 8.2 out of 10. 67% of the local businesses that responded use GA, and all of the respondents used commercial airline service for local, national and international travel.

The airport most often used in place of SGF is Branson Airport, which, according to the surveys, on average saves the business approximately $224. **Figure 2-32** depicts what factors are most important when booking commercial air travel. On-time performance and convenience rated as the top two most important booking factors, while cost, schedule and connections were rated equally as the least important factors.

FIGURE 2-32 - COMMERICAL AIR TRAVEL BOOKING – IMPORTANT FACTORS



2.18.3 BUSINESS AIRCRAFT

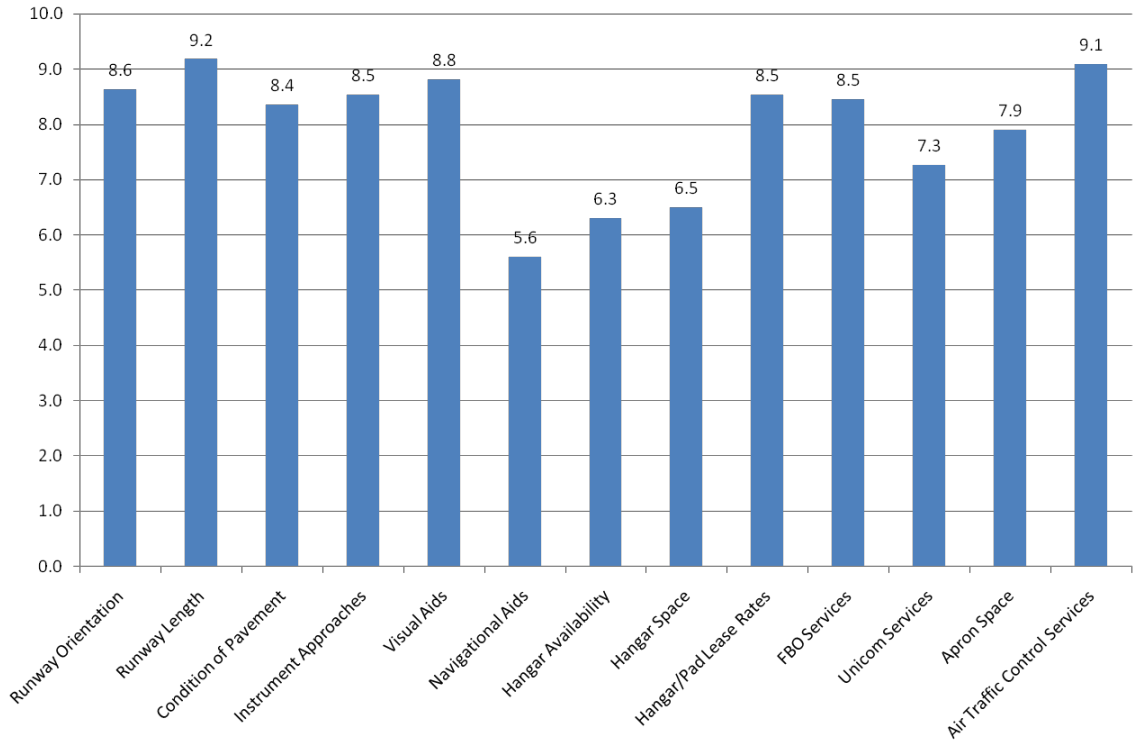
Of the surveys mailed to business aircraft owners, 11 surveys were returned. It was found, that an average of 202 round trips were made per year by the business aircraft owners, with an average of 142 of these trips made on commercial airlines, and the remaining 60 on business aircraft. A majority of the aircraft used were either Turbo-prop or Jet aircraft.

The satisfaction of the runway length and width was found to be at 100% as all the respondents stated they were adequate for their needs. 82% of the respondents were satisfied with the existing instrument procedures; however, it was also found that a majority believed Runways 2 and 14 should be equipped for a precision-instrument approach. The overall satisfaction with the operational characteristics of the runways was found to be satisfactory, with little to no delays experienced throughout the business aircraft operations.

Over half, 55%, of the respondents currently lease or own hangars at the airport. 27% of the respondents stated that they require more hangar space. It was found that in addition to being generally satisfied with the hangar space offered, the respondents are also content with the current

aircraft services and deicing capabilities, and feel they are meeting their existing needs. Comments regarding the improvement of the current aircraft services included; reliable and reputable maintenance services, and better fuel prices. In addition, 73% of the respondents feel the services provided are adequate, with the only comments including; snow plows not removing snow close enough to hangars and the runway closures in the summer increase taxi times. **Figure 2-33** depicts the overall satisfaction with the services and facilities.

FIGURE 2-33 - OVERALL SATISFACTION WITH AIRPORT



The respondents were asked to review the satisfaction of the GA apron and terminal. 73% stated that the apron size and configuration was adequate for their existing needs; however improvements to the GA terminal and parking were suggested. It was found that more parking is needed as the existing parking lot will fill up on busy days. Updated and added amenities at the GA terminal were also mentioned as desired improvements.

2.18.4 TENANTS

Airport tenants were surveyed for their satisfaction of the airport's facilities and the use of sustainable practices.

2.18.4.1 Rental Cars

Of the five rental car companies operating at the airport, two completed and returned the survey. Comments regarding the satisfaction of the airport facilities included the need for more parking/turn around and staging areas. It was stated that the quick turn-around area is

already over capacity and is anticipated to get worse with the addition of more rental car agencies.

In regards to the use of sustainable practices, both agencies utilize sustainable vehicles such as hybrids and sub-compacts cars. Green cleaning supplies, paperless billing and reporting, and energy conservation programs (automated lights and temperature control) are also utilized; however, neither agency has yet initiated a recycling program.

2.18.4.2 Concessions

Of the concessions at the airport, only one completed and returned the survey. They stated that the existing facilities are adequate for their needs, with the suggestions that restrooms should be located closer to the front door and the switch board information desk could be made more useful for the public. The concessionaire implements sustainable practices through the use of a paper recycling program.

2.18.4.3 Airlines

Of the airlines that operate at the airport, one completed and returned the survey. They showed complete satisfaction with the existing facilities and state they more than met their present needs. The airline utilizes a recycling program for both aluminum cans from the aircraft, and paper and cardboard. The airline is also planning to purchase alternative fuel or electric ground support equipment to reduce emissions and energy consumption in addition to maintaining their relatively short turnaround time of 25 minutes. The airline also mentioned that a common request of their passengers is a nice sit down restaurant.

2.18.4.4 Airline Maintenance

One airline maintenance department completed and returned the survey. They stated the new facility is nice, but requested more room to house parts and equipment, and the access to the facility is not satisfactory. They feel a two lane perimeter road from the hangar to the terminal would be a great improvement to the current practice of driving off-airport.

The maintenance facility has implemented several sustainable practices and operations. They have employed energy reduction initiatives, actively collect waste from fuel operations and oil, and have a paper and cardboard recycling program in place.

3.0 AVIATION ACTIVITY FORECASTS

3.1 INTRODUCTION

Aviation activity forecasts are essential for airport master plans because they determine future demand activity levels. Per FAA Advisory Circular (AC) 150/5070-6B: *Airport Master Plans*, aviation forecasts should be realistic, based upon the latest available data, reflect current conditions at the airport, and provide adequate justification for airport planning and development. Additionally, forecasts must be prepared for short- (5 year), medium- (10 year), and long-term (20 year) periods, and specify the existing and future critical aircraft.

It is important to note that while forecasting is essential for a successful master plan, they are only approximations of future activity based on historical data and present conditions. There are many factors that can influence forecasts positively and negatively as time goes on. For this reason, forecasts and the projects that they justify, should be revisited frequently.

3.1.1 PURPOSE

Boyd Group International was retained to prepare a 20-year forecast of aviation activity at SGF. The forecasts will be used as a basis for determination of future facility needs.

3.1.2 DATA SOURCES

In preparing the commercial aviation forecasts contained herein, a number of data sources were consulted. These include, but were not limited to, the following:

- **FAA Terminal Area Forecast (TAF):** The FAA Terminal Area forecast issued in December 2009 for SGF was consulted for comparative purposes, as was the updated FAA APO Forecast. Additionally, the Terminal Area Forecast Summary for Fiscal Years 2010-2030, and also prepared by the FAA, was consulted.
- **FAA Advisory Circular 150/5070-6:** This document was consulted to ensure that the methodology employed and forecasts produced were in compliance with FAA requirements for development of airport master plans.
- **FAA Form 5010-1:** This document provided historical operational and enplanement data for SGF as filed with/by the FAA, and was utilized primarily to cross-reference other data sources.
- **Aviation DataMiner™ Software:** This is proprietary software of Boyd Group International that analyzes a range of air traffic data, including traffic, capacity, average fare, and market efficiency, reported to the U.S. Department of Transportation by the airline industry on forms DB1B and T-100. The system also forecasts airline fleet changes and additions on an on-going basis.

- **Innovata, LLC:** Innovata, LLC is the "official" source that IATA requires airlines to report flight schedule data, supplanting the Official Airlines Guide (OAG). Data from Innovata, LLC was used to review current and historical airline flight schedule data.
- **"Forecasting Aviation Activity by Airport":** Released by the FAA in July 2001, followed with subsequent updates and revisions, "Forecasting Aviation Activity by Airport" provided supplemental guidance to ensure that contained forecasts were prepared in compliance with FAA requirements.
- **Woods & Poole Economics:** Historical and forecast socioeconomic data for the Springfield Metropolitan area and surrounding counties that comprise the service area of Springfield region was obtained from Woods & Poole Economics of Washington, DC. Use of this data source is recommended by the FAA in the "Forecasting Aviation Activity by Airports."
- **Springfield Economic Data:** Because it is the population and economic center of SGF market area, the economic (i.e., industrial base, average wages, etc.) data utilized focuses on SGF, MO metropolitan statistical area (MSA).

Other information was obtained from organizations on the worldwide web for economic data (i.e., economic studies for the Springfield region, Springfield Socio Economic Profile, etc.) and company websites (i.e., aircraft manufacturers, airlines, etc.) for information specific to operations at SGF. Additionally, the study utilized its internal library and databases of regional airport markets collected during the course of over two decades of completing work on behalf of various airports.

3.2 FORECAST SUMMARY

Table 3-1 summarizes the Aviation Activity Forecast for CY2009 through CY2030 at SGF. Detailed discussion of these forecasts, along with data and key supportive assumptions, are provided in the following sections of this chapter.

TABLE 3-1 - SUMMARY OF AVIATION ACTIVITY

	Forecast Levels					Compound Annual Growth Rate			
	Base Year 2009	Base +1 2010	Base +5 2014	Base +10 2019	Base +20 2030	2009 to 2010	2009 to 2014	2009 to 2019	2009 to 2030
Passenger Enplanements									
Passenger Enplanements	399,656	400,213	443,945	506,127	676,305	0.1%	1.8%	2.2%	3.3%
Operations Itinerant									
Air Carrier/Commuter	19,972	19,382	20,031	21,553	29,000	-1.49%	0.05%	0.70%	2.36%
Operations									
Itinerant									
General Aviation	19,125	17,624	18,832	19,836	22,226	-4.0%	-0.3%	0.3%	0.9%
Military	3,360	3,360	3,727	4,249	5,678	0.0%	1.7%	2.2%	3.3%
Local									
General Aviation	8,542	8,748	9,704	11,063	14,783	1.2%	2.1%	2.4%	3.5%
Military	1,757	1,757	1,803	1,804	1,804	0.0%	0.4%	0.2%	0.2%
TOTAL OPERATIONS	52.756	50.872	54.098	58.505	73.491	-1.8%	0.4%	0.9%	2.1%
Instrument Operations	49,454	20,574	22,822	26,019	34,768	-35.5%	-12.1%	-5.7%	-2.2%
Peak hour Operations - Air Carrier	7	7	7	8	10	-1.5%	0.0%	0.7%	1.9%
Peak hour Operations - All Other	10	10	10	11	14	-2.0%	0.6%	1.1%	1.9%
Peak hour Operations - Total	17	17	18	19	24	-1.8%	0.4%	0.9%	1.9%
Cargo/Mail (enplaned+deplaned tn)	25,235	25,728	27,421	29,582	34,423	1.0%	1.4%	1.5%	2.0%
Based Aircraft									
Single Engine (Nonjet)	122	122	133	150	183	0.0%	1.4%	1.9%	2.6%
Multi Engine (Nonjet)	26	25	30	32	42	-1.9%	2.4%	1.9%	3.0%
Jet Engine	16	15	18	20	22	-3.2%	2.0%	2.0%	2.0%
Helicopter	1	1	1	1	1	0.0%	0.0%	0.0%	0.0%
Other	4	4	4	5	6	0.0%	0.0%	2.0%	2.6%
TOTAL	169	167	186	208	254	-0.6%	1.6%	1.9%	2.6%
Average Aircraft Size (Seats)									
Air Carier	56.4	57.3	63.5	70.1	73.0	0.8%	2.0%	2.0%	1.6%
Average Enplaning Load Factor									
Air Carier	70.3%	72.2%	67.0%	60.9%	56.2%	1.3%	-0.8%	-1.3%	-1.4%
GA Operations Per Based Aircraft	164	158	153	149	146	-1.8%	-1.1%	-0.9%	-0.7%

Source: Boyd Group International

3.3 SGF MARKET PROFILE

The forecasts play a significant role in virtually all areas of planning and provide the basis for determining the scope, size, and timing of developments at SGF over the period of 2010 through 2030.

Key to development of these forecasts is the correct use of assumptions regarding internal and external forces that may impact future aviation activity at SGF. Factors that can influence

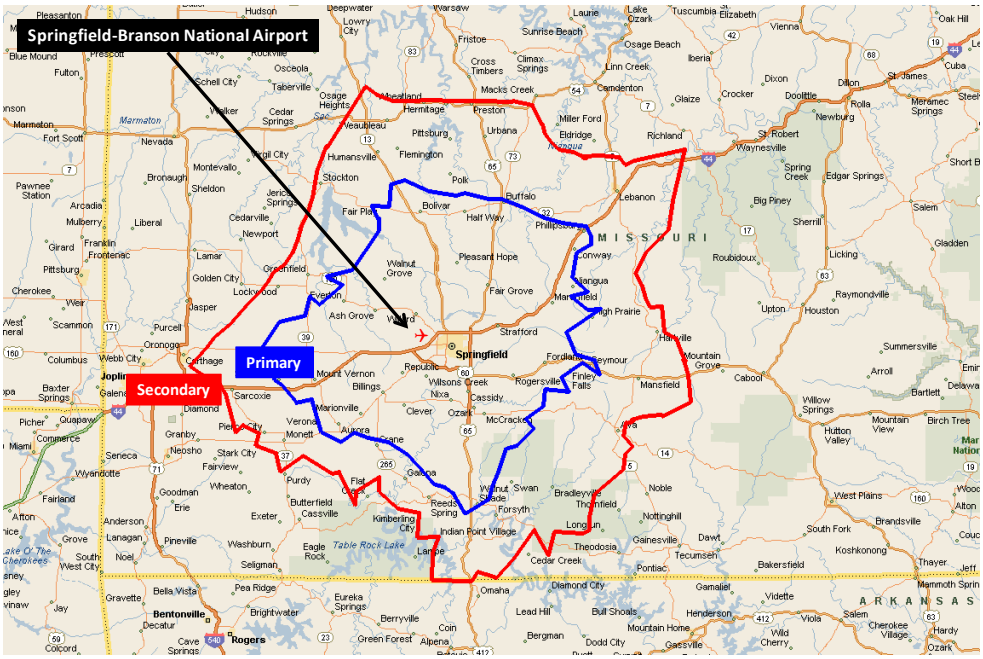
activity levels include regulatory policy, technological advancements and innovations, aviation industry trends, and local fluctuations in population, employment, and the economic base.

This section provides data and analysis related to the market forces within the SGF service area and provides discussion of how such may impact future levels of activity at SGF. Much of the data has been correlated to historical levels of aviation activity at SGF and the foundation for trend analysis and extrapolation in the development of forecasts.

3.3.1 SERVICE AREA

The service area of SGF encompasses 16 counties in Southwestern Missouri that includes a population over 793,000. The population and economic core of this service area is the five-county Metropolitan Statistical Area (MSA), along with the eleven-counties surrounding the MSA, which together provide the basis for the economic and demographic analysis. In 2010, the Springfield MSA, the primary service area, has an estimated population of 443,000; while the secondary service area has a population of approximately 350,000. This is illustrated in **Figure 3-1**.

FIGURE 3-1 - AIRPORT SERVICE AREA



Source: Boyd Group International

The location of Springfield to Interstate 44, along with the fact that it is the economic center of Southwestern Missouri, makes it the area's primary air service portal. This results in approximately 400,000 people living within a 45-minute drive of the airport, with an additional 393,000 within a less-than-two-hour drive.

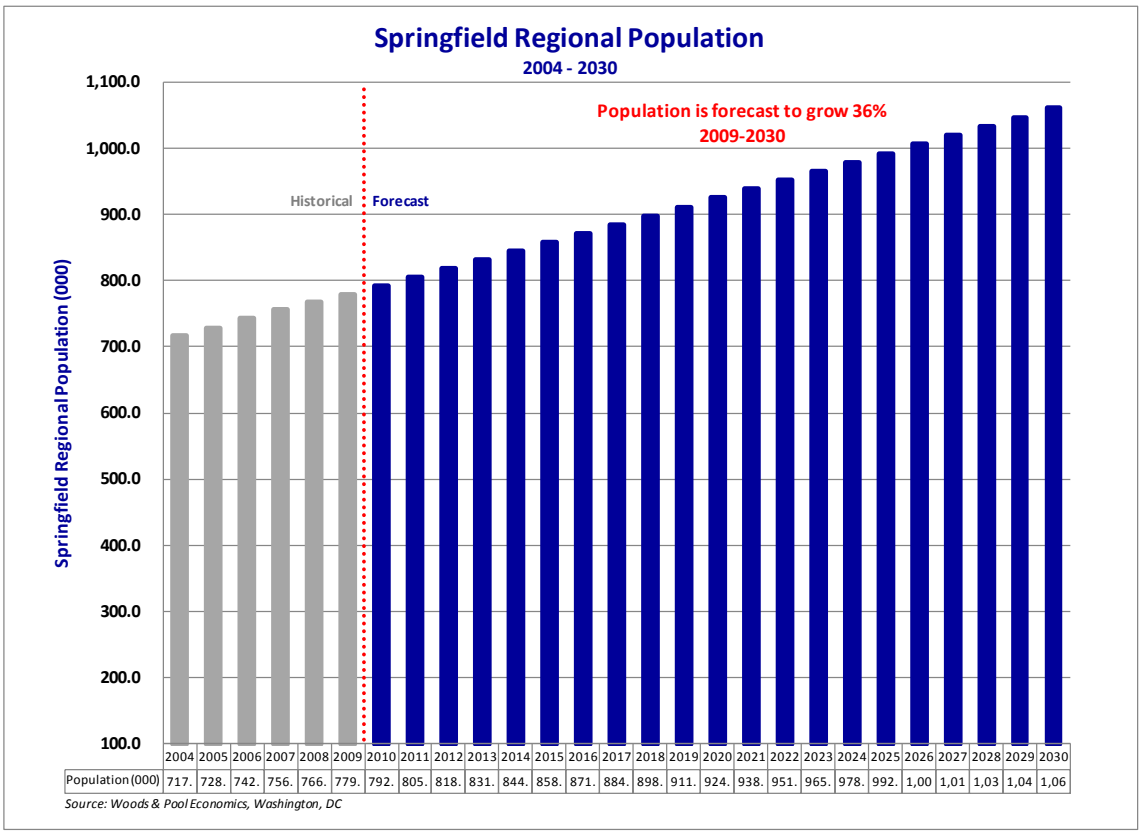
3.3.1.1 Demographic and Economic Characteristics - SGF Service Area

Consideration of a community's economic and demographic characteristics is important to the determination of commercial and GA activity. Prior to preparing the forecasts in this document, current and forecast economic trends and population SGF's primary and secondary service area were analyzed.

3.3.1.2 Population of SGF Service Area

The Springfield MSA has experienced population growth since 1990, and has a continued steady growth rate of 2% projected throughout the planning period. **Figure 3-2** shows the population growth in the Springfield area has continuously outperformed that in the State of Missouri, the Plains region, and nation since 1990. Over the 2009-2030 forecast period, the MSA population is projected to increase from 435,000 to 619,000. Population growth for the total SGF catchment area is expected to grow from 779,000 to 1,060,000 for the same period.

FIGURE 3-2 - REGIONAL POPULATION

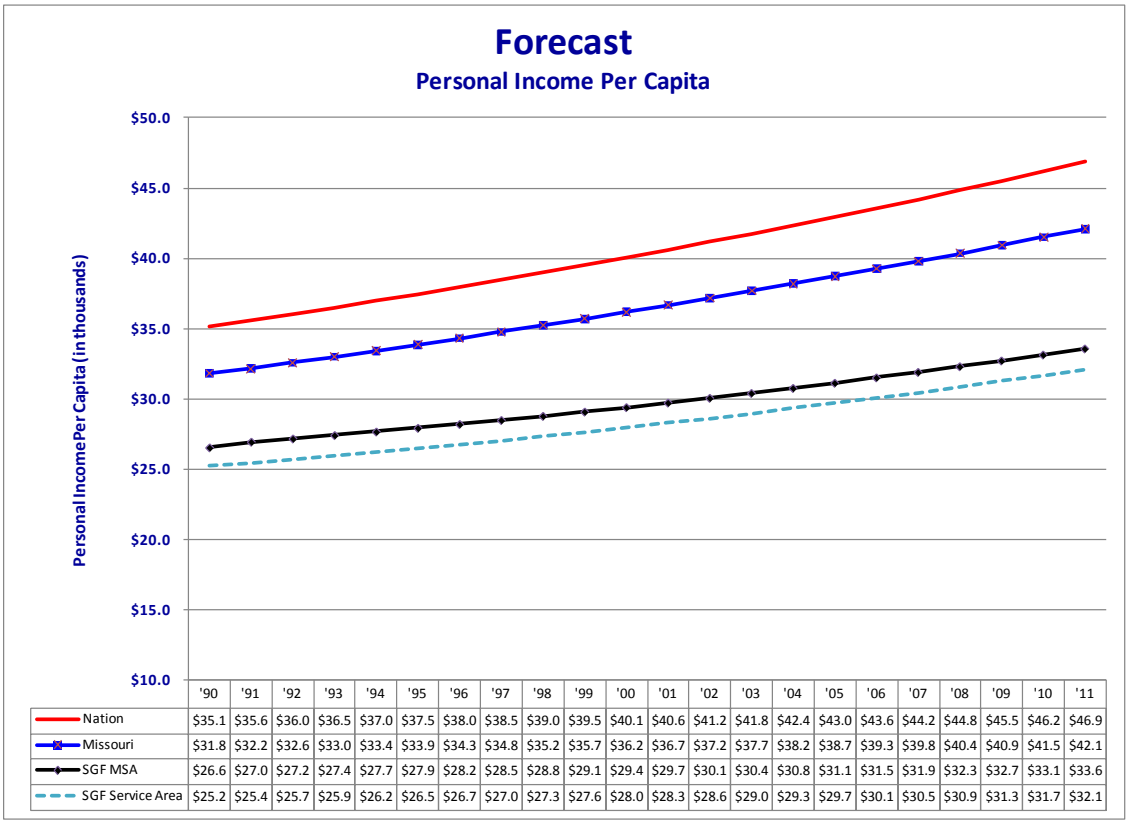


The earned income and disposable income of local residents – along with the travel patterns generated by specific businesses and industry – play a major role in determining the ability of an airport service area to generate sufficient demand to support scheduled air service, as well as generate other aviation-centric activities (i.e., general and business aviation).

3.3.1.3 Personal Income of SGF Service Area

As measured in constant 2004 dollars, per capita income within the Springfield region is forecast to increase from approximately $25,300 during 2009, to approximately $36,800 during 2030. **Figure 3-3** represents a cumulative growth rate of 27% over the 20-year forecast period, with a compound annual growth rate (CAGR) of 1.4%. While this is a positive trend for the SGF catchment area CAGR of 1.6%, it is below both the national CAGR of 1.7%, and the State of Missouri's.

FIGURE 3-3 - PERSONAL INCOME PER CAPITA



	'90	'91	'92	'93	'94	'95	'96	'97	'98	'99	'00	'01	'02	'03	'04	'05	'06	'07	'08	'09	'10	'11
Nation	$35.1	$35.6	$36.0	$36.5	$37.0	$37.5	$38.0	$38.5	$39.0	$39.5	$40.1	$40.6	$41.2	$41.8	$42.4	$43.0	$43.6	$44.2	$44.8	$45.5	$46.2	$46.9
Missouri	$31.8	$32.2	$32.6	$33.0	$33.4	$33.9	$34.3	$34.8	$35.2	$35.7	$36.2	$36.7	$37.2	$37.7	$38.2	$38.7	$39.3	$39.8	$40.4	$40.9	$41.5	$42.1
SGF MSA	$26.6	$27.0	$27.2	$27.4	$27.7	$27.9	$28.2	$28.5	$28.8	$29.1	$29.4	$29.7	$30.1	$30.4	$30.8	$31.1	$31.5	$31.9	$32.3	$32.7	$33.1	$33.6
SGF Service Area	$25.2	$25.4	$25.7	$25.9	$26.2	$26.5	$26.7	$27.0	$27.3	$27.6	$28.0	$28.3	$28.6	$29.0	$29.3	$29.7	$30.1	$30.5	$30.9	$31.3	$31.7	$32.1

Source: Woods & Poole

It is important to emphasize the forecasts, do not attempt to contemplate future impacts of globalization on Springfield's regional economy. One example of this is the growth of tourism in the region (and possibly the growth of international inbound tourists should Branson attempt to reposition itself in the marketplace as did Las Vegas about a decade ago), nor whether potential cross-border investment will have a material effect on job generation, income, and spending patterns in the region.

These dynamics cannot be easily forecast nor their potential impacts to air transportation be measured. However, it must be kept in mind that such dynamics will likely change the SGF service area over the next 20 years.

3.3.1.4 Economic Characteristics of SGF Service Area

The current and expected employment base in the region served by SGF is one that is forecast to remain quite stable, shown in **Table 3-2**. Other than tourism, which represents approximately 15% of total employment, no other portions of the regional economic base appear to be in an industry that might be vulnerable to a material economic swing.

TABLE 3-2 - REGIONAL EMPLOYMENT

Industry	Annual Average Employment
Construction	12,632
Manufacturing	18,044
Wholesale Trade	10,214
Retail Trade	31,166
Transportation and Warehousing	11,374
Information	4,998
Finance and Insurance	9,637
Real Estate and Rental and Leasing	4,197
Professional, Scientific, and Technical Services	6,668
Management of Companies and Enterprises	3,485
Administrative and Support Services	11,279
Educational Services	17,683
Health Care and Social Assistance	34,195
Arts, Entertainment, and Recreation	6,364
Accommodation and Food Services	25,996
Other Services	7,499
Public Administration	7,238
Other Industry	1,877
Region Annual Average Employment	**224,546**

Source: U.S. Census Bureau

Historically, the Springfield MSA was the primary trade center for southwestern Missouri and northwestern Arkansas, with an economic base centered on agriculture and retail. By the mid-1880s, the railroad arrived in Springfield, bringing with it a more economically diverse business base that strengthened the city's position as the commercial center for the region. Throughout the 20th century, the Springfield area continued to grow, adding government, higher education, and tourism as significant components of the economic base. Springfield is now the third largest city in the State of Missouri, behind St. Louis and Kansas City.

Springfield has long functioned as the gateway for tourists to the Ozark Mountain Region and has served the primary entry point to the Branson entertainment center. Jobs in the leisure and entertainment industry represent approximately 15% of the employment for the region.

While tourism will continue to play a large role in the regional economy, trade, manufacturing, health care, and education are central to the region's economic health.

Although manufacturing and education are not strong growth industries, they do provide a degree of employment stability.

3.3.1.5 Higher Education

Within the SGF service area is a student population of over 42,000 individuals attending a variety of public and private higher education institutions including Missouri State University, Drury University, Evangel University, Southwest Baptist University, Cox College of Nursing and nine other colleges in the area. While it is typically difficult to quantify travel generation attributable to institutions of higher learning,[23] the nature of activity at these entities (e.g. research, student travel, employer recruitment, athletic events) dictate that they do indeed create demand for commercial air service.

3.4 FORECAST DETAIL

This chapter provides detailed forecasts of aviation activity for SGF over the 20-year forecast period of 2010 through 2030. While the forecasts contained herein provide meaningful data on which key planning functions can be accomplished, it is important to note that aviation activity at SGF can (and likely will) be subject to short-term fluctuations over the 20-year period.

The drivers of such fluctuations can be unique to the SGF service area, or can be the result of more macro-level factors affecting aviation activity across the nation. That being said, the projections represent the most likely levels of aviation activity at the end of the 20-year forecast period.

3.4.1 METHODOLOGY

Trend analysis and extrapolation represents the primary forecasting methodology used in preparation of the 20-year forecast contained in this document. This involved analysis of historical data correlated to demographic and economic trends in the SGF service area, and then projecting such relationships into the future based on economic and demographic forecasts.[24]

As appropriate, smoothing of historical data was performed to take into consideration extraordinary events such as American Airlines reducing its connecting hub at St. Louis (STL), and the resultant elimination of nonstop service between SGF and STL in August 2009. In developing the forecast, adjustments were made to take into account anticipated changes in airline strategies, fleets, etc.

That said, while there is mathematical logic behind the projections contained herein, it is important to understand that forecasting aviation activity cannot be done with absolute certainty. Shifts in the airline industry – including changes in fleets, route systems, and marketing relationships between carriers – are dynamic and on-going, and will affect traffic levels at a given airport over the period of the forecast. For example, while the recent merger of United Airlines and Continental Airlines was not

[23] Typically, travel decisions within universities are done on a non-centralized basis, making hard data difficult to determine. Also, differing discipline focus at universities affect the nature and size of in-bound originating traffic.

[24] Primarily using data from Woods & Poole Economics.

entirely unexpected, the announced acquisition of AirTran Airways by Southwest Airlines caught virtually the entire industry by surprise. While it is reasonable to assume that additional "surprises" will occur over the forecast period, it is impossible to state what they will be and how they may directly impact SGF.

Nonetheless, based on expected trends across the aviation industry, it is possible to develop logical forecasts for long-term planning purposes. This involves evaluating historical trends, evaluating the likely impacts of economic and social changes, attempting to assess the future actions and viability of aviation companies, and other factors. Many of these are outside the direct control of SGF.

It is also noted that the relatively stable nature of the population base and the growth trends expected in southwestern Missouri do not point to any major "disruptions" that would result in a significant spike or decline in traffic. With respect to passenger enplanements, it is expected that capacity and schedules will track with the natural growth in the economy. On the air service side, airline economic realities (e.g. fuel, aircraft acquisition expenses, labor expense increases, average aircraft size) indicate that entry of a full-schedule (i.e., multiple daily frequencies) low-cost carrier is not likely for the SGF market size. In this context, the forecast is conservative based on the data and on reasonable market expectations.

3.5 GENERAL AVIATION FLEETS

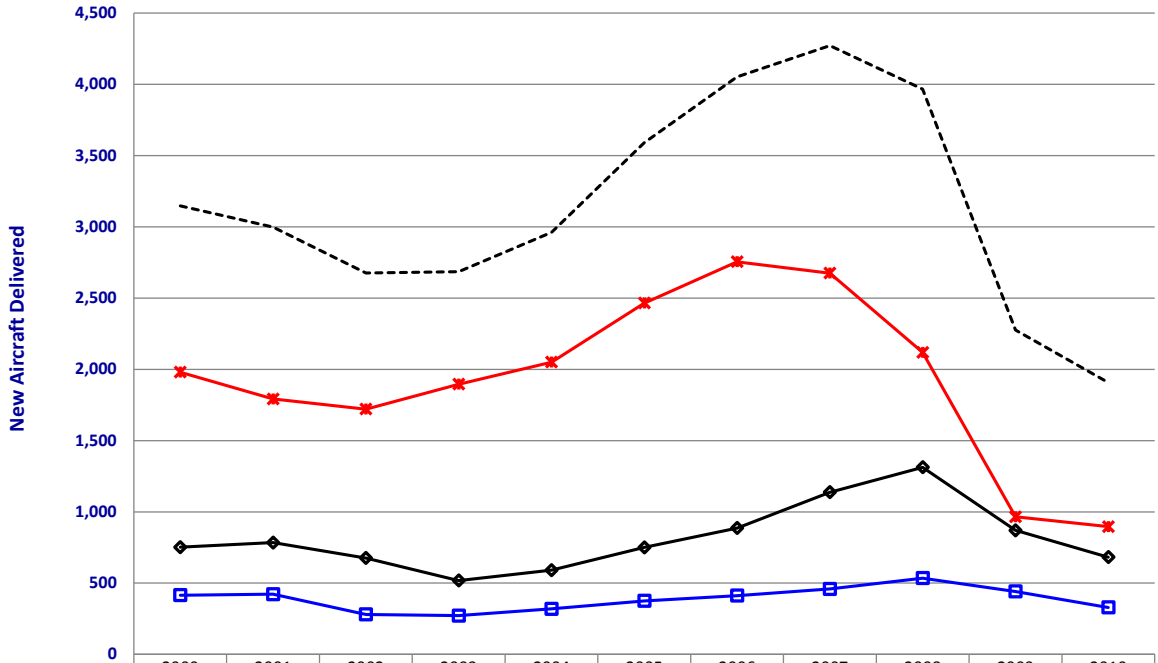
GA is defined as all flying other than scheduled commercial service and military operations.

3.5.1 GENERAL AVIATION OUTLOOK – THE MACRO PICTURE

Worldwide deliveries of GA aircraft continue to decline for the third consecutive year as the industry struggles to escape the worst recession in decades. Industry groups report that aircraft deliveries are down 14.5% in the third quarter of 2010, from the same period a year ago. It is expected that the decline in deliveries will continue during the fourth quarter reaching more than 18% by year end. The industry forecast is hopeful that 2011 will be a flat year before recovery begins.

It is noteworthy that the GA market mirrors economic conditions. After the start of the new millennium, aircraft sales declined slightly due in part to a cyclical economy, but also the lingering uncertainties following September 11 and higher fuel prices. However, growth in new aircraft deliveries resumed with the 2003 rebounding economy. With the exception of jets and turboprops, deliveries again plunged with the 2008 recession. As the recession continued into 2009, deliveries of jets and turboprops joined piston aircraft in the slide, and total GA deliveries fell 42% from the previous year (see **Figure 3-4**).

FIGURE 3-4 - GENERAL AVIATION WORLDWIDE AIRCRAFT DELIVERIES 2000-2010



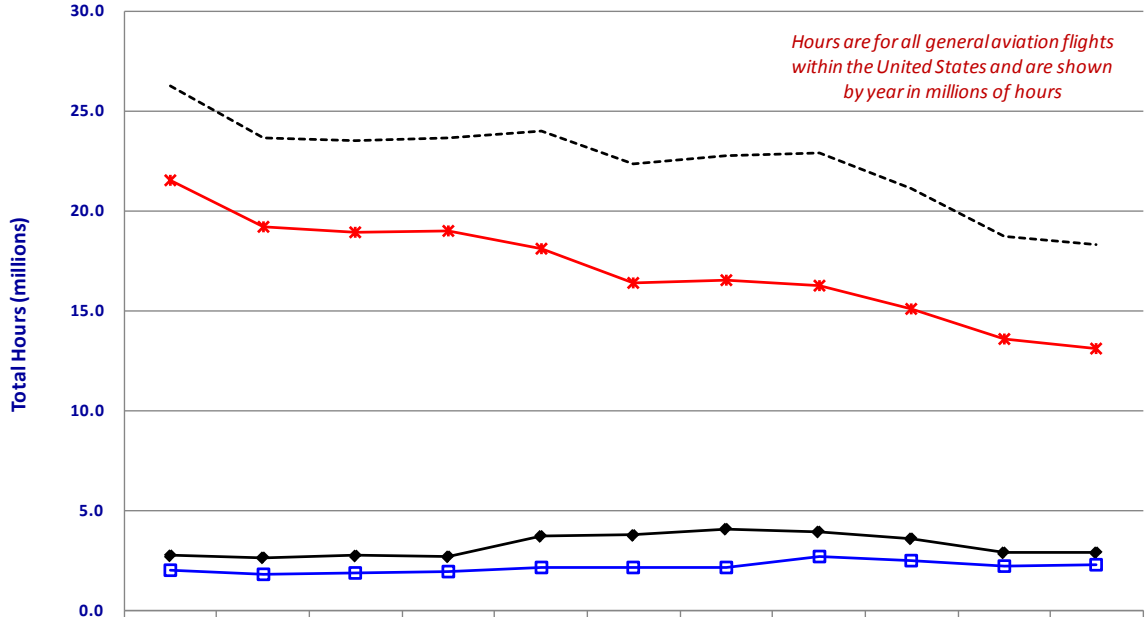
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Piston	1,980	1,792	1,721	1,896	2,051	2,465	2,755	2,675	2,119	965	896
Jets	752	784	676	518	591	750	886	1,138	1,313	870	682
Turboprops	415	422	280	272	319	375	412	459	535	441	329
Total Delivered	3,147	2,998	2,677	2,686	2,961	3,590	4,053	4,272	3,967	2,276	1,907

Source: Boyd Group International

The United States remains the largest GA market in the world, representing approximately 70% of the estimated 320,000 aircraft global fleet. There are over 229,000 fixed-wing and rotorcraft GA aircraft in the United States, operating close to 26 million flight hours annually. GA continues to be a major U.S. industry, even during a recession year, contributing more than $150 billion to the economy.

While new aircraft sales have dropped dramatically over the last three years, the total GA fleet has remained relatively stable with only a slight decline of 2.5% over this same period. The total number of flight hours by GA aircraft in the United States is down 18% and is based on fixed-wing GA aircraft operating 23 million flight hours during 2007 and the FAA's estimate of 18 million hours during 2010 (see **Figure 3-5** and **Figure 3-6**).

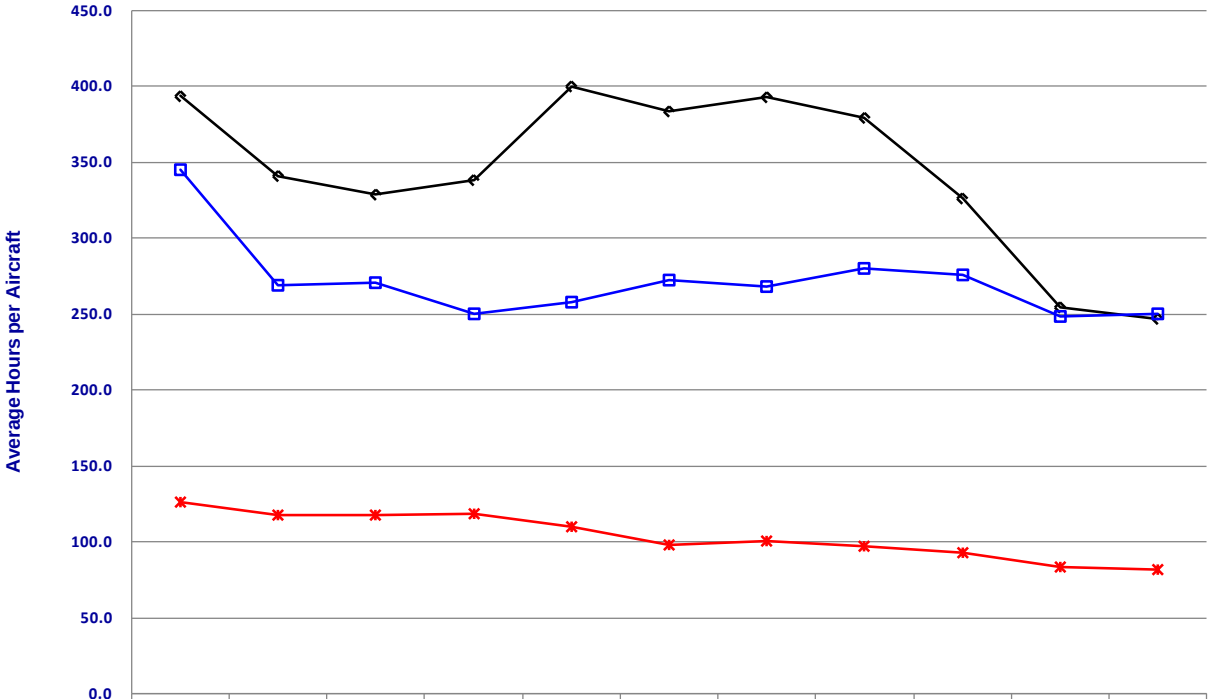
FIGURE 3-5 - ACTIVE GENERAL AVIATION ESTIMATED ANNUAL FLIGHT HOURS: 2000-2010



	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Piston	21.5	19.2	18.9	19.0	18.1	16.4	16.5	16.3	15.1	13.6	13.1
Jet	2.8	2.7	2.7	2.7	3.7	3.8	4.1	3.9	3.6	2.9	2.9
Turboprop	2.0	1.8	1.9	1.9	2.2	2.2	2.2	2.7	2.5	2.2	2.3
Total GA Hours	26.2	23.6	23.5	23.6	24.0	22.3	22.8	22.9	21.1	18.7	18.3

Source: Boyd Group International

FIGURE 3-6 - GENERAL AVIATION IN THE UNITED STATES: 2000-2010



	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Piston	126.0	117.6	117.3	118.2	109.8	97.9	100.9	97.4	92.5	83.7	81.3
Jet	393.5	340.8	328.5	338.1	400.0	383.5	392.8	379.2	326.0	254.1	246.5
Turboprop	344.7	268.8	270.4	250.0	257.9	272.0	268.2	279.7	275.8	248.7	249.7

Source: Boyd Group International

The FAA forecasts moderate growth in GA activity based on the dual assumptions of a stabilizing economic environment and generally stable fuel prices. A secondary factor is the ability of manufacturers to stimulate increased demand in GA through the introduction of new models and technology that contribute to both lower costs of entry and operations, as well as higher rates of safety.[25]

Please note that GA is subject to the following specific vulnerabilities:

Fuel Price Volatility: Volatility in the price of oil directly impacts GA activity, particularly among "entry level" users (i.e. student pilots and recreational flyers) that utilize single-engine piston aircraft and whose activity is highly dependent on discretionary income. Simply put, as the cost of entry goes up, it is likely to deter interest in pilot training, and therefore the demand for new GA aircraft.

For business aviation, the only offset to fuel price volatility is the value of time versus money equation which results less fuel price elasticity than for recreational flying. Going forward, a sustained period of fuel prices, higher than the peak levels achieved during the summer of 2008, could further curtail

[25] Key to this will be to increase the number of licensed pilots in the United States which has been steadily declining over the past decade. Whereas historically large numbers of pilots entered the civilian world after military service (i.e., World War II and Vietnam), military downsizing and declining interest in aviation resulting from financial turmoil in commercial aviation has contributed to lower numbers of new pilots in recent years.

entry-level business/corporate aviation activity as the value of time equation shifts in favor of scheduled commercial services.

It is also noted that the supply and distribution chains for aviation gasoline (100LL) may be vulnerable in the future to factors that could drive the price significantly higher, thereby reducing GA flying.[26]

Security Regulations: While business aviation has been attractive to time-sensitive corporate travel, it has become even more attractive in the post September 11th environment where "hassle factor" has become a new term associated with airline travel.

In this sense, general and business aviation demand has grown from the September 11th terrorist attacks.[27] It also, however, shares with the airline industry vulnerability from fallout in the form of stricter security regulations for business aviation that may evolve in the future. In this sense, any new security requirements on GA that increase costs or the "hassle factor", could depress demand – both in terms of number of aircraft, as well as hours actually flown - over the long-term.

Recession/Economic Downturn: General and business aviation are particularly sensitive to economic swings as has been demonstrated by the 2008 economic downturn. A decline in disposable income or consumer confidence can be expected to slow interest and demand in recreational GA flying. An overall downturn in the economy also dampens business flying and – critically – demand for new GA aircraft.

While the likelihood of the above risk factors is viewed as moderate on a sustained basis, they could negatively impact GA activity both on a national level and at SGF.

[26] The relatively low number of gallons of avgas demand, combined with distribution issues surrounding a fuel containing lead, may point to producers becoming reluctant to invest in maintaining production of the fuel.

[27] While difficult to quantify, it could be argued that the hassle factor inherent with commercial air travel has helped to increase the cost premium that the market is willing to accept for business aviation travel. This, in turn, could be reducing (though not eliminating at the lower end of the spectrum) negative effects of higher fuel prices may have on demand for business aviation.

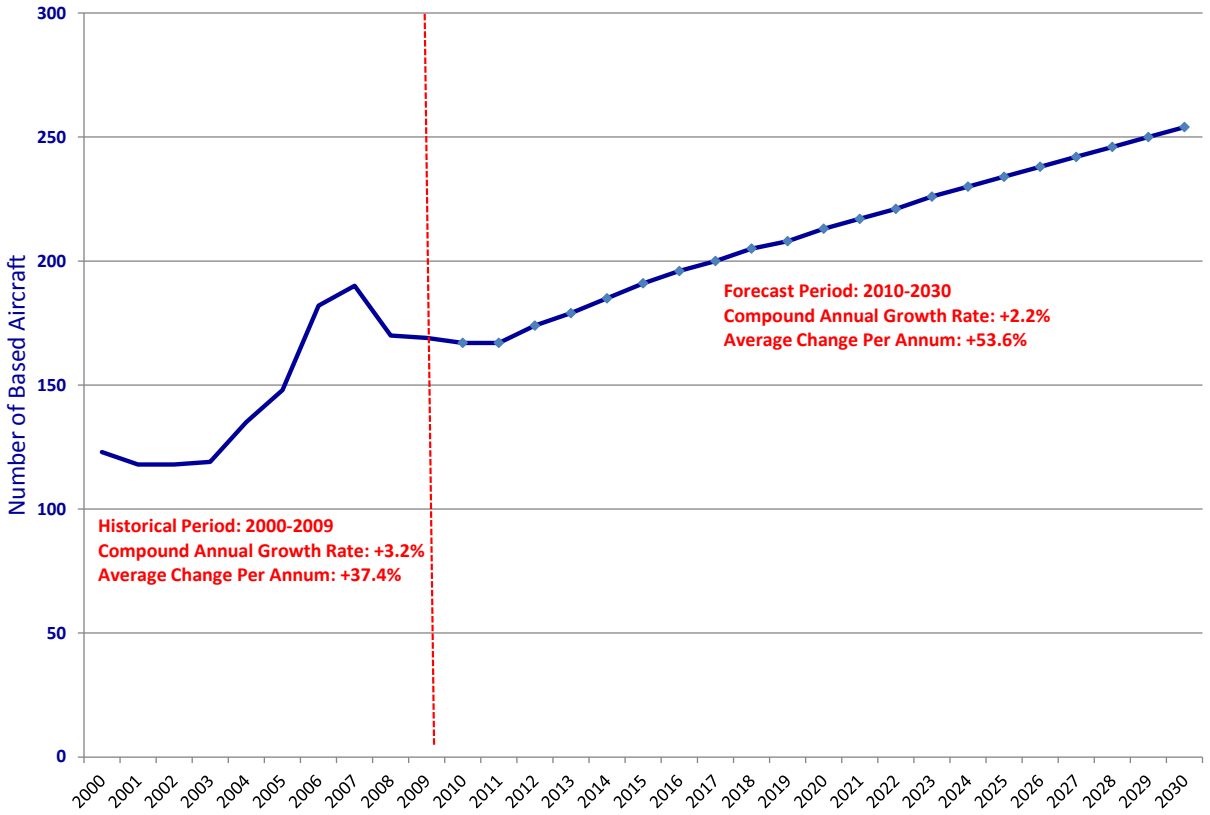
3.5.2 BASED AIRCRAFT

Based aircraft are defined as those that are permanently stored at an airport. Including military aircraft and helicopters, presently 167 aircraft are based at SGF.[28] Since 1990, this number has widely fluctuated, ranging from a low of 91 units during 1991, to a high of 186 units during 2007.

To forecast the number of aircraft projected to be based at SGF over the next 20 years, relationship of income and population to growth in the national GA fleet were extrapolated. This was also accomplished for the Springfield MSA and the total SGF service area. Smoothing of the raw forecast data was accomplished to account for declining numbers of new pilot certificates, higher fuel costs, and the availability of money for aircraft purchase.

Over the 20-year forecast period, the number of aircraft based at SGF is projected to increase from the current 167 units to approximately 254 units, displayed in **Figure 3-7**. This equates to a slightly more than a 2% compound annual growth rate.

FIGURE 3-7 - SGF BASED AIRCRAFT PROJECTIONS



Source: Boyd Group International

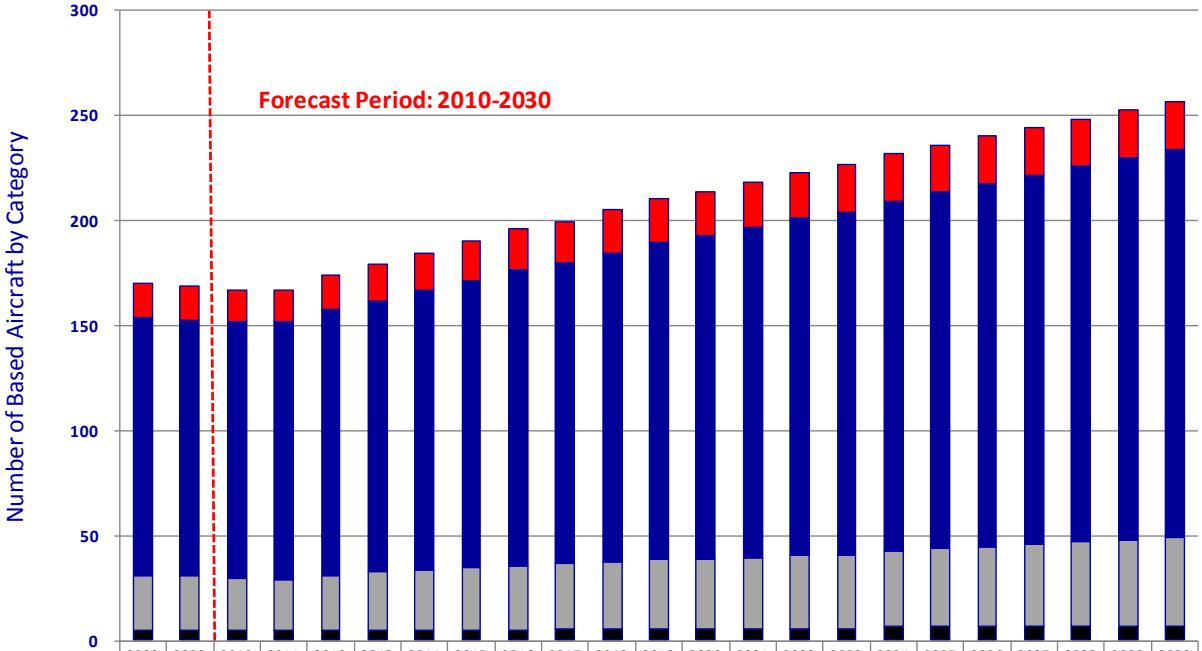
[28] Note that the number of based aircraft stored at a particular airport may fluctuate throughout any given year. All data presented herein is provided on an annual average basis.

3.5.3 FLEET MIX

The mix of based aircraft is projected to shift over the forecast period, with gains recorded among the single-engine and jet fleets while multi-engine fleets (both piston and turboprop) are projected to decline.

- Over the 20-year forecast period, the number of jet aircraft based at SGF is projected to increase from the current 15 to approximately 22 units by 2030, or 46%;
- The number of single-engine aircraft are projected to increase the from 122 units to 183 units, or approximately 50%; and
- The number of multi-engine propeller aircraft is projected to increase from the current 25 units to 42 units, or approximately 68%. It should be noted that in the peak year there were 39 multi-engine aircraft based at SGF.

FIGURE 3-8 - PROJECTED SGF BASED AIRCRAFT FLEET MIX



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Jet	16	16	15	15	16	17	17	18	20	20	21	21	21	22	22	23	23	23	23	23	23	23	23
Single-Engine	123	122	122	123	127	129	133	137	141	143	147	151	154	157	160	163	166	169	172	176	179	182	185
Multi-Engine	26	26	25	24	26	28	29	30	31	31	32	33	33	34	35	35	36	37	38	39	40	41	42
Military	4	4	4	4	4	4	4	4	4	5	5	5	5	5	5	5	6	6	6	6	6	6	6
Helicopter	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Source: Boyd Group International

Figure 3-8 shows the projection of increased numbers of single-engine and jet aircraft at SGF is consistent with macro-level delivery trends reported by the General Aviation Manufacturers Association (GAMA).

TABLE 3-3 - SGF BASED GENERAL AVIATION MIX

Year	Single-Engine	Pct of Total	Multi-Engine	Pct of Total	Jet	Pct of Total	Helicopter	Pct of Total	Military	Pct of Total	Total Aircraft	Pct of Total
Historical												
2009	122	72.2%	26	15.4%	16	9.5%	1	0.6%	4	2.4%	169	100.0%
Projection												
2010	122	73.1%	25	15.0%	15	9.0%	1	0.6%	4	2.4%	167	100.0%
2011	123	73.7%	24	14.4%	15	9.0%	1	0.6%	4	2.4%	167	100.0%
2012	127	73.0%	26	14.9%	16	9.2%	1	0.6%	4	2.3%	174	100.0%
2013	129	72.1%	28	15.6%	17	9.5%	1	0.6%	4	2.2%	179	100.0%
2014	133	71.9%	29	15.7%	18	9.7%	1	0.5%	4	2.2%	185	100.0%
2015	137	71.7%	30	15.7%	19	9.9%	1	0.5%	4	2.1%	191	100.0%
2016	141	71.9%	30	15.3%	19	9.7%	1	0.5%	5	2.6%	196	100.0%
2017	143	71.5%	31	15.5%	20	10.0%	1	0.5%	5	2.5%	200	100.0%
2018	147	71.7%	32	15.6%	20	9.8%	1	0.5%	5	2.4%	205	100.0%
2019	150	72.1%	32	15.4%	20	9.6%	1	0.5%	5	2.4%	208	100.0%
2020	153	71.8%	33	15.5%	21	9.9%	1	0.5%	5	2.3%	213	100.0%
2021	156	71.9%	34	15.7%	21	9.7%	1	0.5%	5	2.3%	217	100.0%
2022	159	71.9%	34	15.4%	22	10.0%	1	0.5%	5	2.3%	221	100.0%
2023	162	71.7%	35	15.5%	22	9.7%	1	0.4%	6	2.7%	226	100.0%
2024	165	71.7%	36	15.7%	22	9.6%	1	0.4%	6	2.6%	230	100.0%
2025	168	71.8%	37	15.8%	22	9.4%	1	0.4%	6	2.6%	234	100.0%
2026	171	71.8%	38	16.0%	22	9.2%	1	0.4%	6	2.5%	238	100.0%
2027	174	71.9%	39	16.1%	22	9.1%	1	0.4%	6	2.5%	242	100.0%
2028	177	72.0%	40	16.3%	22	8.9%	1	0.4%	6	2.4%	246	100.0%
2029	180	72.0%	41	16.4%	22	8.8%	1	0.4%	6	2.4%	250	100.0%
2030	183	72.0%	42	16.5%	22	8.7%	1	0.4%	6	2.4%	254	100.0%

Source: FAA Historical Data Master Records
Projections by Boyd Group International

3.5.4 LOCAL AND ITINERANT OPERATIONS

An aircraft operation is defined as either a landing or departure at an airport.

Local operations are those performed by aircraft in the local traffic pattern or within sight of the airport, are known to be departing for (or arriving from) practice areas within 20-miles of the airport, or are executing simulated instrument approaches, non-precision approaches, visual approaches or "touch and go" operations. Itinerant operations are all other operations.

After peaking at over 92,000 operations in 1999, GA activity at SGF declined to nearly half that figure during 2009. The rate of decline experienced at SGF exceeds that seen on a national basis as reported by the FAA for towered airports.

The accelerated rate of decline reflects that GA operations were down 50% as well as a high percentage of single-engine aircraft among this fleet population which, as reported by the FAA and discussed above, has seen a reduced number of flight hours in recent years.

TABLE 3-4 - SGF GENERAL AVIATION OPERATIONS

Year	General Av Operations	YoY % Chg	# of Based Aircraft	% Itinerant Operations	% Local Operations	Local Ops Per Based Aircraft	Itin Ops Per Based Aircraft
				Historical			
2009	27,667	-9.8%	169	69.1%	30.9%	51	113
				Projection			
2010	26,372	-4.7%	167	66.8%	33.2%	50	105
2011	27,226	3.2%	167	67.0%	33.0%	50	106
2012	27,654	1.6%	174	66.7%	33.3%	48	103
2013	28,091	1.6%	179	66.3%	33.7%	47	101
2014	28,536	1.6%	185	66.0%	34.0%	45	99
2015	28,990	1.6%	191	65.6%	34.4%	44	97
2016	29,452	1.6%	196	65.3%	34.7%	42	96
2017	29,925	1.6%	200	64.9%	35.1%	42	95
2018	30,407	1.6%	205	64.6%	35.4%	41	93
2019	30,899	1.6%	208	64.2%	35.8%	40	93
2020	31,401	1.6%	213	63.8%	36.2%	39	92
2021	31,913	1.6%	217	63.5%	36.5%	38	91
2022	32,435	1.6%	221	63.1%	36.9%	38	90
2023	32,968	1.6%	226	62.7%	37.3%	37	89
2024	33,511	1.6%	230	62.3%	37.7%	36	88
2025	34,067	1.7%	234	62.0%	38.0%	36	88
2026	34,633	1.7%	238	61.6%	38.4%	35	87
2027	35,211	1.7%	242	61.2%	38.8%	34	87
2028	35,799	1.7%	246	60.8%	39.2%	34	86
2029	36,398	1.7%	250	60.4%	39.6%	33	86
2030	37,010	1.7%	254	60.1%	39.9%	33	85

Source: FAA Historical Data Master Records
Projections by Boyd Group International

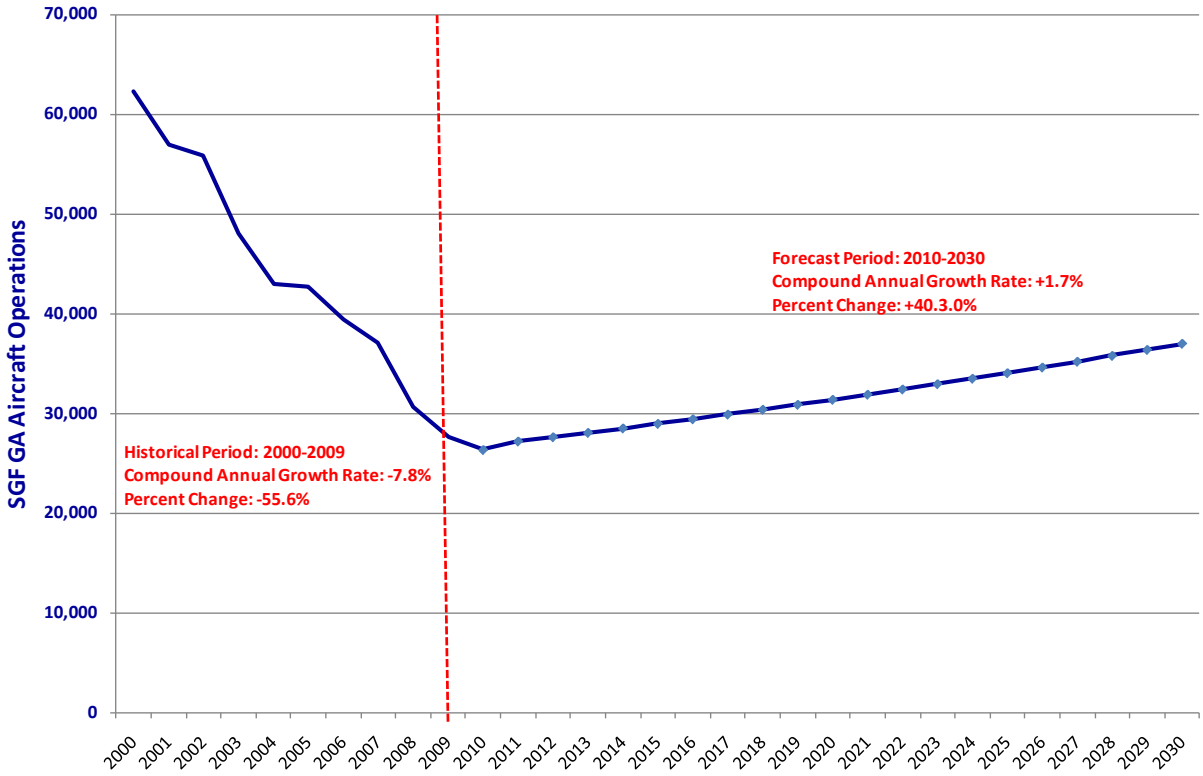
To project GA activity at SGF over the forecast period, the operation per based aircraft (OPBA) ratio was utilized. This methodology divides the known variables of total GA operations by the number of based aircraft. The historical data is then utilized to project future operations based on extrapolation and trend analysis (see **Table 3-4**).

To fine tune this calculation, smoothing of the data was conducted based on projected shifts in the based fleet mix and the resultant marginal changes in mix between local and itinerant operations. It is important to note that operations per based aircraft methodology does not assume that each based

aircraft will conduct the calculated number of operations, but that this represents the calculated average among all operators – both based and non-based.

Over the 20-year forecast period, total GA operations at SGF are projected to increase from approximately 27,000 during 2009 to approximately 37,000 during 2030. This equates to an annual average increase of approximately 1.6% allowing SGF to return near to year 2006 activity levels (see **Figure 3-9)**.

FIGURE 3-9 - ITINERANT AND LOCAL OPERATIONS



Source: Boyd Group International

This forecast assumes that the increase in number of based aircraft will accompany a decrease in the number operations per based aircraft from the current estimate of approximately 158 annually to 140 annually by the end of the forecast period. This latter point takes into consideration the trend toward reduced flight hours for single-engine aircraft on a macro-basis, as well as an increased percentage of based aircraft represented by jet aircraft which tend to operate fewer, but longer average segment length, than propeller-driven aircraft.

3.5.4.1 Touch and Go Operations

Touch and go operations are landings during which the aircraft continue to roll down the runway and take off again, or where the pilot conducts a low pass (i.e., practicing instrument approaches). Generally, such training flights remain within the airport pattern and are considered local operations. Accordingly, touch and go operations are included in the above projections for local operations over the forecast period.

Touch and go operations reduce the availability of the runway for other operations. Where commercial operations constitute a substantive portion of the airport's total operations, large volumes of repetitive field operations can reduce airport capacity. This is not, however, believed to be a potential factor at SGF over the forecast period.

3.5.4.2 Instrument Operations

Instrument operations are defined as a landing or takeoff conducted while operating on an instrument flight plan. An instrument approach is defined as a series of determined maneuvers for the orderly transfer of an aircraft under instrument flight conditions from the beginning of the initial approach to landing or to a point from which landing may be made visually.

Since 2000, the number of annual instrument operations at SGF has averaged 38,000, shown in **Table 3-5**. As a percentage of total operations, instrument operations have averaged 46% of total operations during the same period, including a high of 52% in 2007 and a low of 44% in 2000. The recent period of 2007 to 2009 has seen instrument operations contained within a relatively tight band of 52-53%.[29]

Over the forecast period, it is projected that instrument operations will remain relatively flat as a percentage of total operations. The change in percentage of GA and military operations is projected to represent an increase of around 2.7%, whereas the percentage of commercial flight operations conducted under Instrument Flight Rules (IFR) will fluctuate over the forecast period between 30% and 32%.

[29] Historical data includes primary operations at SGF only and does not include over flights.

TABLE 3-5 - INSTRUMENT OPERATIONS

Year	General Av Ops.	Gen Av Inst Ops.	% Instrument	Commercial Operations	Comm. Inst. Operations	% Instrument	Military Operations	Military Inst. Ops.	% Instrument	Total Ops.	Total Inst Ops.	% Instrument
Historical												
2000	62,244	31,046	49.9%	13,803	11,169	80.9%	14,514	5,484	37.8%	90,561	47,699	52.7%
2005	42,757	27,003	63.2%	24,874	10,074	40.5%	8,116	4,444	54.8%	75,747	41,521	54.8%
2006	39,414	25,128	63.8%	22,352	9,352	41.8%	6,887	3,884	56.4%	68,653	38,364	55.9%
2007	37,092	24,557	66.2%	22,675	10,368	45.7%	6,027	3,639	60.4%	65,794	38,564	58.6%
2008	30,679	21,363	69.6%	22,053	10,960	49.7%	4,946	3,535	71.5%	57,678	35,858	62.2%
2009	27,667	18,493	66.8%	19,973	6,852	34.3%	5,117	3,360	65.7%	52,757	28,705	54.4%
Projection												
2010	26,372	12,687	48.1%	19,382	5,426	28.0%	5,117	3,360	65.7%	50,872	21,473	42.2%
2011	27,226	13,017	47.8%	20,031	5,567	27.8%	5,250	3,448	65.7%	52,507	22,032	42.0%
2012	27,654	13,359	48.3%	20,128	5,713	28.4%	5,388	3,538	65.7%	53,170	22,610	42.5%
2013	28,091	13,711	48.8%	20,128	5,864	29.1%	5,530	3,631	65.7%	53,749	23,206	43.2%
2014	28,536	14,073	49.3%	20,031	6,019	30.0%	5,676	3,727	65.7%	54,243	23,819	43.9%
2015	28,990	14,446	49.8%	19,935	6,178	31.0%	5,826	3,826	65.7%	54,752	24,450	44.7%
2016	29,452	14,829	50.3%	20,328	6,342	31.2%	5,981	3,927	65.7%	55,761	25,099	45.0%
2017	29,925	15,223	50.9%	20,728	6,511	31.4%	6,140	4,032	65.7%	56,793	25,765	45.4%
2018	30,407	15,628	51.4%	21,137	6,684	31.6%	6,303	4,139	65.7%	57,847	26,451	45.7%
2019	30,899	16,044	51.9%	21,553	6,862	31.8%	6,471	4,249	65.7%	58,924	27,155	46.1%
2020	31,401	16,472	52.5%	22,087	7,045	31.9%	6,644	4,363	65.7%	60,132	27,879	46.4%
2021	31,913	16,911	53.0%	22,656	7,233	31.9%	6,821	4,479	65.7%	61,390	28,623	46.6%
2022	32,435	17,363	53.5%	23,263	7,426	31.9%	7,003	4,599	65.7%	62,701	29,388	46.9%
2023	32,968	17,827	54.1%	23,910	7,625	31.9%	7,190	4,721	65.7%	64,068	30,173	47.1%
2024	33,511	18,304	54.6%	24,599	7,828	31.8%	7,383	4,848	65.7%	65,493	30,980	47.3%
2025	34,067	18,793	55.2%	25,359	8,038	31.7%	7,580	4,977	65.7%	67,005	31,808	47.5%
2026	34,633	19,296	55.7%	26,194	8,253	31.5%	7,783	5,110	65.7%	68,609	32,659	47.6%
2027	35,211	19,811	56.3%	26,869	8,473	31.5%	7,991	5,247	65.7%	70,070	33,531	47.9%
2028	35,799	20,340	56.8%	27,561	8,699	31.6%	8,204	5,387	65.7%	71,564	34,427	48.1%
2029	36,398	20,883	57.4%	28,271	8,931	31.6%	8,423	5,531	65.7%	73,092	35,345	48.4%
2030	37,010	21,439	57.9%	29,000	9,169	31.6%	8,647	5,678	65.7%	74,656	36,286	48.6%

Source: FAA Historical ATADS Data
Projections by Boyd Group International

3.5.4.3 Helicopters

There is only one helicopter based at SGF, therefore, forecasting growth over a 20-year period does not result in any substantial growth.

3.5.4.4 Cargo Operations

Air cargo activity at SGF is generally limited to FedEx and UPS, with both carriers operating large mainline Boeing and Airbus aircraft. Both FedEx and UPS transport over 95% of all SGF cargo reported as either air freight or air mail (see **Table 3-6)**. Given minimal forecast change in the composition of the economy of the SGF service area and stability relative to domestic air cargo strategies, minimal change in air cargo activity is foreseen at SGF over the forecast period.

TABLE 3-6 - SUMMARY CARGO FORECAST (IN TONS)

Springfield-Branson National Airport (SGF)

Summary Cargo Forecast (in Ton)

	Forecast Levels					Compound Annual Growth Rate			
	Base Year 2009	Base +1 2010	Base +5 2014	Base +10 2019	Base +20 2030	2009 to 2010	2009 to 2014	2009 to 2019	2009 to 2030
Cargo									
Freight	25,307.7	25,727.9	27,421.3	29,582.4	34,423.1	0.8%	1.3%	1.4%	1.9%
U.S. Mail	527.0	535.8	571.1	616.1	716.9	0.8%	1.3%	1.4%	1.9%
Total Cargo	25,835	26,264	27,992	30,198	35,140	0.8%	1.3%	1.4%	1.9%

Source: DOT/BTS T100 Traffic

3.6 SCHEDULED AIRLINE SERVICE

3.6.1 HISTORICAL CAPACITY AND SERVICE

Since 1980, SGF has been served by a number of different airlines with multiple non-stop destinations. Changes in the SGF air service have been influenced more by the financial turmoil and restructuring of the United States airline industry than by any material changes in regional economy. **Table 3-7** details the history of SGF airline routes.

TABLE 3-7 - AIRLINE SERVICE HISTORY

Between			Service Period	
SGF and	Carrier	Aircraft Type	From	To
Atlanta	Delta Connection	CRJ 200	Dec-05	Current
Cincinnati	Delta Connection	CRJ 200	Apr-04	Sep-08
Denver	United Express	BAE146:CRJ 200/440	Feb-95	Current
	United Airlines	B737-200	Oct-98	Feb-95
	Continental Airlines	B727-200	Nov-86	Jan-89
	Frontier Airlines	B737-200	Feb-83	Jun-86
	Ozark Airlines	DC-9-30	Jan-78	Apr-85
Dallas/Ft. Worth	American Eagle	SF-340:ATR:ERJ:CRJ	Dec-92	Current
Detroit	Northwest Airlink	CRJ 200	Jun-03	Seasonal
Las Vegas	Allegiant Air	MD-80	Apr-05	Current
Los Angeles	Allegiant Air	MD-80	May-09	Current
Little Rock	United Express	BAE146-300	Feb-95	May-01
	United Airlines	B727-200:B737-300	Oct-88	Feb-95
	Frontier Airlines Inc.	B737-200	Jun-84	Sep-84
	Delta Air Lines	B727-200	Jan-78	Jun-79
Joplin	Northwest Airlink	SF3	Jan-00	Jul-00
Kansas City	US Airways Express	METRO III:BE1900	Oct-80	May-03
	Frontier Airlines	B737-200	Jan-83	Jun-86
	Ozark Airlines	FH227:DC-9	Jan-78	Sep-84
	Delta Air Lines	B727-200:DC-9	Jan-78	Jun-79
Orlando	Allegiant Air	MD-80	Oct-05	Current
Memphis	Delta Connection	CRJ 200	Oct-02	Current
	Northwest Airlink	AV RJ85	Sep-02	Jan-06
	Northwest Airlines	DC9-30	Sep-96	Jan-08
Minneapolis/St. Pau	Delta Connection	CRJ 200	Jun-04	Seasonal
Chicago-ORD	United Express	ERJ-145:CRJ 200/700	Mar-93	Current
	American Eagle	ERJ-145	Jan-94	Current
	United Airlines	B727-200:B737-300	Oct-98	Jun-97
Phoenix-Gateway	Allegiant Air	MD-80	Oct-08	Current
St. Petersburg	Allegiant Air	MD-80	Dec-06	Current
Salt Lake City	Delta Connection	CRJ 200	Jul-05	Nov-05
St. Louis	American Eagle	ERJ-145	Feb-94	Aug-09
	American Connection	J-41:ATR:ERJ-145	Jul-02	Dec-06
	American Airlines	MD-80:B717	Jan-02	Jul-09
	Trans World Express	J-31:ATR	Apr-91	Jun-02
	Trans World Airlines	DC-9:MD80	Nov-85	Dec-01
	Ozark Air Lines	DC9-30	Jan-78	Oct-86
Tulsa	Ozark Airlines	DC9-30	Jan-78	Jan-86
	Air Midwest	METRO II	Mar-84	Dec-84

Source: BTS T100 Traffic

Table 3-8 and **Table 3-9** illustrate changes in scheduled service at SGF over the past decade where average weekly frequency declined from 230 flights per week in year 2000 to 217 flights per week in 2010 (a decrease of 5.7% or 13 flights) while capacity (departure seats) during this period dropped 3.7% (loss of 508 weekly seats).

It should be noted that Allegiant Air's 2004 entry into the market with 150-seat MD 80 aircraft masks a decline in SGF's core "scheduled" airline capacity.[30] During the past decade, airlines have replaced mainline aircraft with 50-seat regional jets, reduced frequency in some markets, and cancelled service

[30] Allegiant Air recently announced it is increasing the capacity on its MD 80 aircraft 162-seats.

to two hub airports. These changes translate into a 17% (39 flights) decline in average weekly frequency and a 29% decline in capacity or a loss of 3,450 weekly departure seats.

TABLE 3-8 - FREQUENCY AND CAPACITY: 2000-2005

Between SGF and:	Carrier	Weekly Frequency	Aircraft	Average Capacity	Weekly Capacity
		July 2000			
Chicago-ORD	United Express	21	CRJ	50	1,050
Dallas/Ft. Worth	American Eagle	21	ERJ	50	1,050
	American Eagle	14	AT7	66	924
	American Eagle	28	SF3	34	952
Denver	United Express	14	BAE-146	90	1,260
Joplin	Northwest Airlink	6	SF3	34	204
Kansas City	US Airways Express	25	BE1900	19	475
Memphis	Northwest Airlink	35	SF3	34	1,190
St. Louis	Trans World Airlines	33	MD80	142	4,686
	Trans World Airlines	7	DC9	100	700
	Trans World Express	13	J41	29	377
	Trans World Express	6	ATR	48	288
	Trans World Express	7	ATR7	68	476
Weekly Total		**230**		**59.3**	**13,632**
		July 2005			
Chicago-ORD	American Eagle	21	CRJ	50	1,050
	United Express	35	CRJ	50	1,750
Cincinnati	Delta Connection	21	CRJ	50	1,050
Dallas/Ft. Worth	American Eagle	42	ER4	50	2,100
	American Eagle	28	ERD	44	1,232
Denver	United Express	28	CRJ	50	1,400
Detroit	Northwest Airlink	14	CRJ	50	700
Las Vegas	Allegiant Air	4	MD80	150	600
Memphis	Northwest Airlines	7	DC9	100	700
	Northwest Airlink	14	CRJ	50	700
Minneapolis/St. Pa	Northwest Airlink	14	CRJ	50	700
Salt Lake City	Delta Connection	14	CRJ	50	700
St. Louis	American Connectio	13	J41	29	377
Weekly Total		**255**		**51.2**	**13,059**

Source: BTS T100 Traffic

Note that while **Table 3-8** and **Table 3-9** illustrate schedules for the month of July over various years at SGF, the analysis found historically airlines have offered 10.5% more seats during summer months than during winter months.

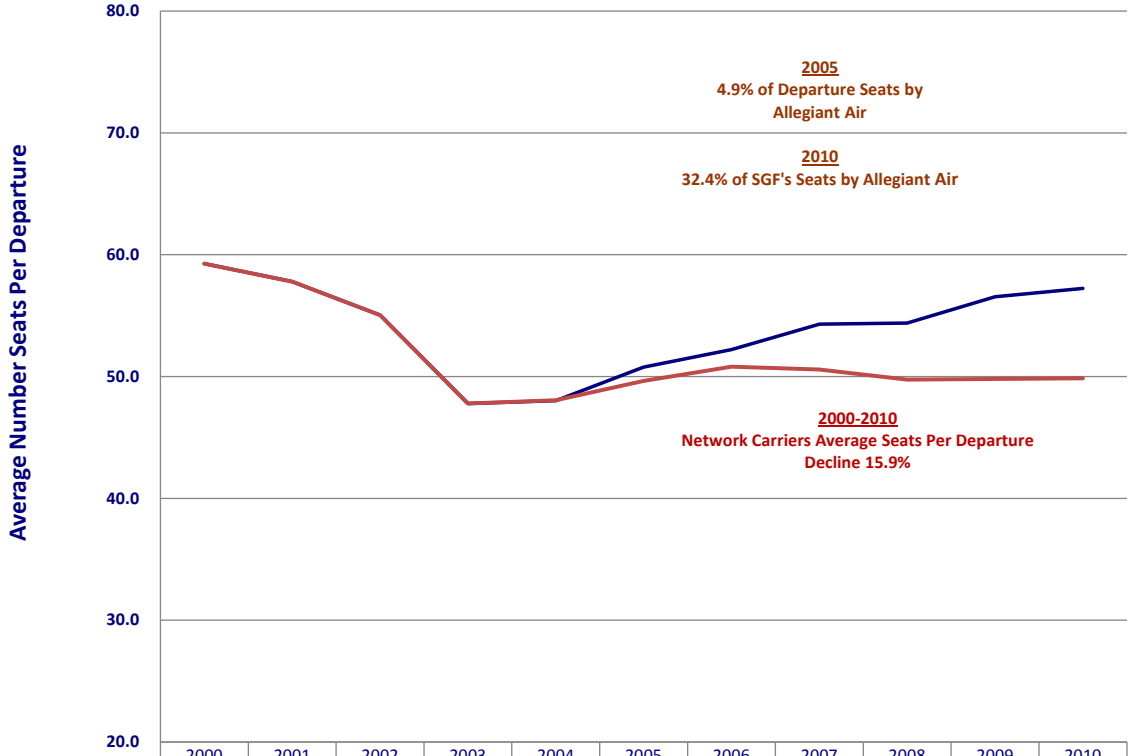
TABLE 3-9 - FREQUENCY AND CAPACITY: 2009-2010

Between SGF and:	Carrier	Weekly Frequency	Aircraft	Average Capacity	Weekly Capacity
		July 2009			
Atlanta	Delta Connection	27	CRJ	50	1,350
Chicago-ORD	American Eagle	21	ER4	50	1,050
	American Eagle	6	ERD	44	264
	United Express	8	CRJ	50	400
	United Express	20	ER4	50	1,000
Dallas/Ft. Worth	American Eagle	48	ER4	50	2,400
Denver	United Express	14	CRJ	50	700
	United Express	7	ER4	50	350
Las Vegas	Allegiant Air	5	MD80	150	750
Los Angeles	Allegiant Air	2	MD80	150	300
Memphis	Northwest Airlines	21	CRJ	50	1,050
Minneapolis/St. Pa	Northwest Airlink	7	CRJ	50	350
Orlando-SFB	Allegiant Air	5	CRJ	150	750
Phoenix-Gateway	Allegiant Air	2	CRJ	150	300
St. Petersburg	Allegiant Air	3	CRJ	150	450
St. Louis	American Connectio	7	ER4	50	350
Weekly Total		**203**		**58.2**	**11,814**
		July 2010			
Atlanta	Delta Connection	28	CRJ	50	1,400
Chicago-ORD	American Eagle	20	ER4	50	1,000
	American Eagle	7	ERD	44	308
	United Express	6	CRJ	50	300
	United Express	22	ER4	50	1,100
Dallas/Ft. Worth	American Eagle	55	ER4	50	2,750
Denver	United Express	20	CRJ	50	1,000
	United Express	1	CR7	66	66
Detroit	Delta Connection	7	CRJ	50	350
Las Vegas	Allegiant Air	6	MD80	150	900
Los Angeles	Allegiant Air	4	MD80	150	600
Memphis	Delta Connection	21	CRJ	50	1,050
Minneapolis/St. Pa	Delta Connection	7	CRJ	50	350
Orlando-MCO	Allegiant Air	6	CRJ	150	900
Phoenix-Gateway	Allegiant Air	3	CRJ	150	450
St. Petersburg	Allegiant Air	4	CRJ	150	600
Weekly Total		**217**		**60.5**	**13,124**

Source: BTS T100 Traffic

As with frequency and capacity, the change in average seats per departure between July 2000 and July 2010 shows a 2% gain, from 59.3 to 60.5 seats per departure. As shown in **Figure 3-10**, the average number of seats per departure declined by 16%, from 59.3 to 49.9.

FIGURE 3-10 - SGF AVERAGE SEATS PER DEPARTURE



	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Seats - All Carriers	59.3	57.8	55.0	47.8	48.0	50.8	52.2	54.3	54.4	56.5	57.2
Seats - Network Carriers	59.3	57.8	55.0	47.8	48.1	49.6	50.8	50.6	49.7	49.8	49.9

Source: Boyd Group International

3.6.2 AIRLINE FLEET APPLICATIONS AT SGF

The average number of available seats per departure at SGF has somewhat increased since 2000 resulting from Allegiant Air entering SGF market in 2004 and operating MD 80 aircraft.

Other changes in airline service at SGF and its impact on frequency and capacity between 2000 and 2010 include:

- During 2001, AMR Corporation absorbed TWA into the American Airlines and by the summer of 2003 had replaced MD 80 and other aircraft in SGF-STL market with 50-seat regional jets, reducing capacity by 47% (loss of 2,698 weekly departing seats). In August 2009, American withdrew from SGF-STL market in conjunction with dismantling the STL hub.
- In October 2002, Northwest downgraded service between SGF and Memphis (MEM) from 100-seat DC-9-30 aircraft to 50-seat regional jets.
- Delta initiated Cincinnati (CVG) service with 50-seat regional jets in April 2004 but discontinued the service in September 2008.
- Delta began offering nonstop service to Atlanta (ATL) in December 2005, adding 1,300 weekly departing seats.

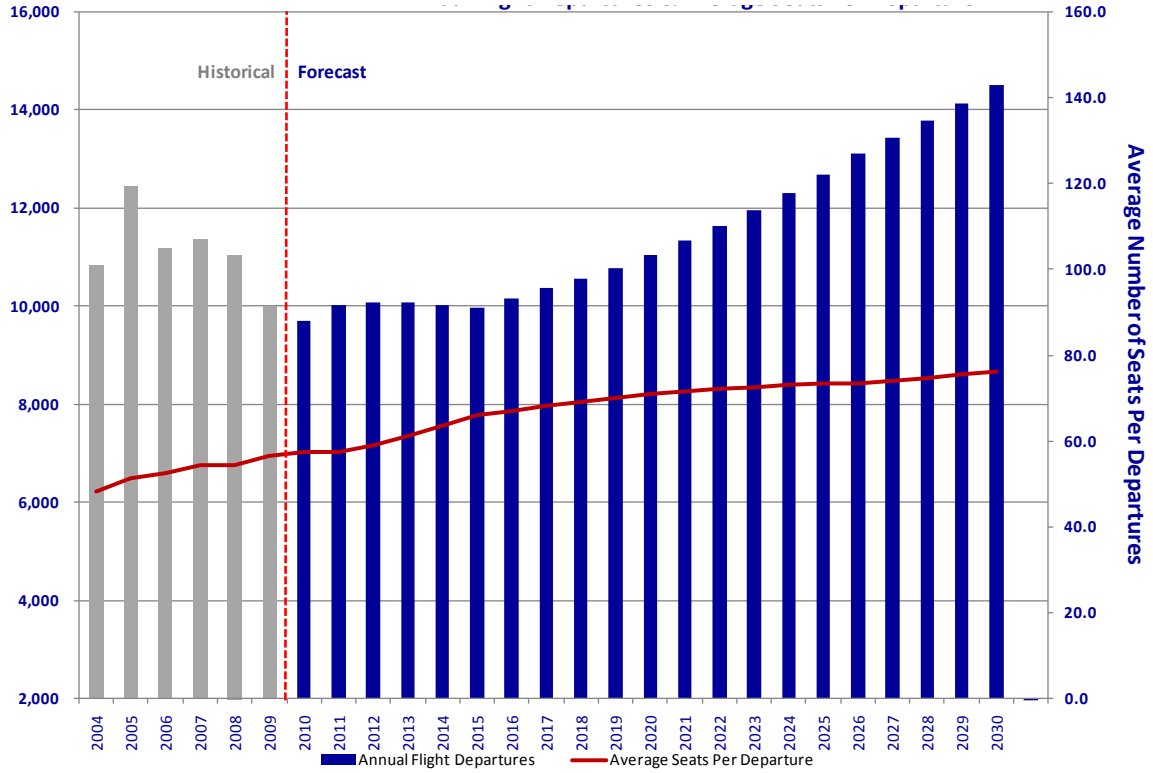
- Delta briefly provided service between SGF and Salt Lake City (SLC) with 50-seat regional jets between June and November 2005.
- Northwest Airlines entered SGF - Detroit (DTW) market with 50-seat regional jets in June 2003 and exited the market in September 2010. Post-merger, Delta temporarily cancelled, but then reinstated DTW flights with 350 weekly departing seats.
- Northwest Airlines entered SGF - Minneapolis/St. Paul (MSP) market with 50-seat regional jets in June 2004 and, post-merger, Delta discontinues the service at the end of the summer 2010.
- Between April 2005 and May 2009, Allegiant Air added service between SGF and five new destinations increasing average weekly departing seats by 3,450.

On a macro-level, the industry is trending toward larger units of airliner capacity, which is expected to continue through 2015 as airlines remove 50-seat (and smaller) aircraft from service replacing them with units of 66-seats and greater.[31] This includes both turboprop and jet aircraft.[32] Replacements tend to be the CRJ-700/900 series, Embraer E-jet and, in some cases, the 74-seat Bombardier Q400 turboprop. As noted on **Figure 3-11**, this will cause the average daily frequencies (as measured in departures) to decrease at SGF but yield an increase in overall number of average daily departing seats.

[31] The number 66 represents CRJ-700 airliners that carriers such as United are reconfiguring to dual (first and economy) cabins.

[32] Airline systems are reducing the number of 50-seat jets in their fleets. In the first 8 months of 2010, over 40 have been removed from North American fleets, and over 600 more are forecast to come out of US fleets by 2015. *Source: Aviation DataMiner 2011 – 2016 Global Airliner Demand & Trend Forecast.*

FIGURE 3-11 - SGF ANNUAL AIRLINE FLIGHT DEPARTURE AND AVERAGE SEATS PER DEPARTURE



Source: Boyd Group International

Over the 20-year forecast period, the average number of seats available per airline departure is projected to increase from approximately 57 during 2010, to approximately 76 by year 2030. During the same period, the annual number of airline departures is projected to increase from 9,691 during 2010 to approximately 14,500 at the end of the forecast period in 2030. (See **Table 3-10**)

TABLE 3-10 - SGF SCHEDULED PASSENGER SERVICE

Year	Passenger Enplanements	Y-o-Y % Chg.	Low Forecast Enplanements	High Forecast Enplanements	Commercial Departures	Y-o-Y % Chg.	Avg. Seats per Departure	Departing Seats	Avg Load Factor
Historical									
2009	399,656	4.5%	382,403	399,656	9,986	-9.5%	56.5	564,665	70.8%
Projection									
2010	400,213	0.1%	400,213	400,213	9,691	-3.0%	57.2	554,527	72.2%
2011	410,641	2.6%	406,737	411,381	10,015	3.3%	57.3	573,936	71.5%
2012	421,413	2.6%	413,308	422,895	10,064	0.5%	59.0	594,023	70.9%
2013	432,516	2.6%	419,911	434,758	10,064	0.0%	61.1	614,814	70.3%
2014	443,945	2.6%	426,556	446,971	10,016	-0.5%	63.5	636,333	69.8%
2015	455,704	2.6%	419,616	459,539	9,968	-0.5%	66.1	658,604	69.2%
2016	467,794	2.7%	439,925	472,465	10,164	2.0%	67.1	681,655	68.6%
2017	480,223	2.7%	446,655	485,758	10,364	2.0%	68.1	705,513	68.1%
2018	492,997	2.7%	453,400	499,427	10,568	2.0%	69.1	730,206	67.5%
2019	506,127	2.7%	460,171	513,480	10,777	2.0%	70.1	755,764	67.0%
2020	519,624	2.7%	466,958	527,930	11,043	2.5%	70.8	782,215	66.4%
2021	533,492	2.7%	473,764	542,783	11,328	2.6%	71.5	809,593	65.9%
2022	547,741	2.7%	480,587	558,049	11,631	2.7%	72.0	837,929	65.4%
2023	562,379	2.7%	487,417	573,736	11,955	2.8%	72.5	867,256	64.8%
2024	577,413	2.7%	494,267	589,852	12,299	2.9%	73.0	897,610	64.3%
2025	592,854	2.7%	501,123	606,409	12,679	3.1%	73.3	929,026	63.8%
2026	608,705	2.7%	507,973	623,411	13,097	3.3%	73.4	961,542	63.3%
2027	624,970	2.7%	514,844	640,864	13,434	2.6%	74.1	995,196	62.8%
2028	641,654	2.7%	521,723	658,775	13,780	2.6%	74.7	1,030,028	62.3%
2029	658,765	2.7%	528,602	677,149	14,136	2.6%	75.4	1,066,079	61.8%
2030	676,305	2.7%	535,472	695,992	14,500	2.6%	76.1	1,103,392	61.3%

SOURCE: Historical enplanement data from FAA
Historical commercial operations from Carrier T-100 filings
Projections by Boyd Group International, Aviation DataMiner®

3.6.3 CURRENT COMMERCIAL AIR SERVICE AT SGF

SGF functions as the primary air service gateway for southwestern Missouri and is currently served by three branded airline systems, plus vacation carrier Allegiant Air. American Airlines provides access via its hub operations at Dallas/Ft. Worth Airport (DFW) and Chicago-O'Hare (ORD), United via its Denver International Airport (DEN) and Chicago-O'Hare (ORD) hubs, and Delta Air Lines to its hub operations at Atlanta (ATL), and Memphis (MEM). Allegiant provides less than daily non-stop service to Phoenix-Gateway (AZA), Orlando (MCO), St. Petersburg (PIE), Las Vegas (LAS), and Los Angeles (LAX) (see **Figure 3-12**).

FIGURE 3-12 - SGF AIR SERVICE MAP

Source: Boyd Group International

3.6.4 COMPETING AIRPORTS

SGF has limited competition from other commercial airports within the region, with the closest airport with major airline service being Northwest Arkansas Regional (XNA) at Bentonville, Arkansas, a two-hour drive from SGF. XNA is served by a five network airline system plus vacation carrier Allegiant Airlines providing non-stop service to 16 destinations. SGF is served by a three airline system as well as Allegiant. Combined, these carriers offer nonstop service to 10 destinations. In addition to the airline systems providing service at SGF, XNA is served by US Airways and Continental Airlines.

The other alternatives are Tulsa, Oklahoma (TUL), a three hour drive, and Lambert International Airport (STL) in St. Louis, an approximate a 3.5 hour drive from SGF. Traffic leakage to these airports constitutes primarily fare-sensitive, discretionary consumers as Southwest Airlines serves both TUL and STL.

3.6.5 PASSENGER ORIGIN AND DESTINATION DEMAND PATTERNS

Table 3-11 illustrates that the Origin and Destination (O&D) demand generated by SGF is almost entirely dependent on the traffic-aggregating power of connecting hubs at DFW, ORD, ATL, and

DEN. Allegiant Air's traffic is entirely point-to-point and does not connect with other airlines to onward destinations. In fact, other than DFW, no other hub market alone has enough demand to support nonstop, point-to-point service. The number one hub market – Dallas/Ft. Worth – generates an average of 58 passengers per day, each way ("PDEW"), which would equate to a 38% load factor on three round trip flights.

TABLE 3-11 - PASSENGER O&D PATTERNS – TOP MARKETS

Rank	Market	Passengers In & Out	Passengers Per Day Each Way	Percent Originating	Percent of Pax
1	LAS	63,541	87.0	79.9%	9.0%
2	LAX	41,869	57.4	57.9%	5.9%
3	DFW	40,975	56.1	46.2%	5.8%
4	AZA	32,465	44.5	58.1%	4.6%
5	ORD	30,777	42.2	51.3%	4.3%
6	MCO	28,840	39.5	77.1%	4.1%
7	PIE	28,024	38.4	71.1%	4.0%
8	SFB	27,991	38.3	68.7%	4.0%
9	ATL	25,860	35.4	46.3%	3.7%
10	DEN	18,183	24.9	43.9%	2.6%
Top Ten	**Totals**	**338,525**	**463.7**	**62.0%**	**47.8%**
All Mkts.	**Totals**	**708,156**	**970.1**	**56.4%**	**100.0%**

Source: Aviation DataMiner analysis of DOT reported data for year ending June 30, 2010

The data underscores the fact that SGF will continue to be primarily dependent upon airline hub operations for the majority of its capacity. In this regard, all three hubbing airlines – American, United and Delta – show no indications of reducing service to any hub presently served from SGF (see **Figure 3-13**).

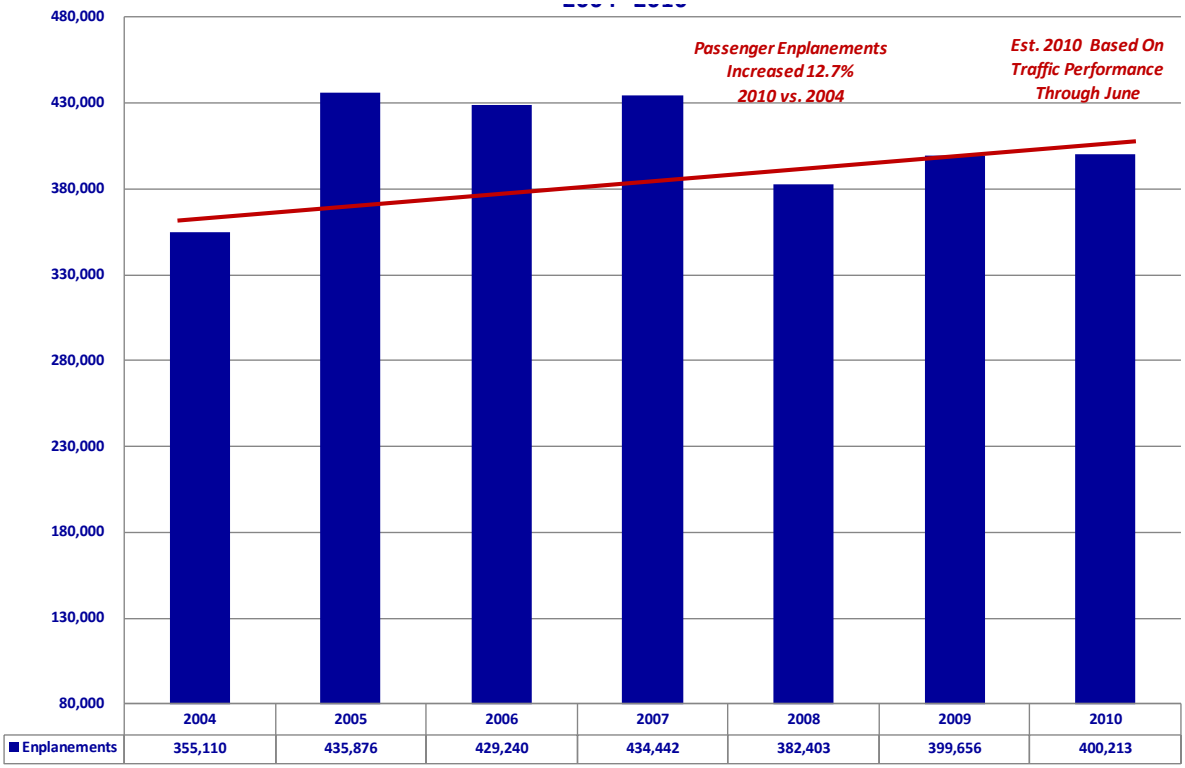
FIGURE 3-13 - SGF NETWORK CARRIER HUB AIRPORTS

Source: Boyd Group International

3.6.6 HISTORICAL PASSENGER DEMAND

Figure 3-14 shows SGF has experienced an overall enplanement growth of 12.7% between 2004 and 2010. Based on enplanement performance for the first half of the year, enplanements will exceed 400,000 at SGF during 2010.

FIGURE 3-14 - SGF HISTORICAL PASSNGER DEMAND: 2004-2010

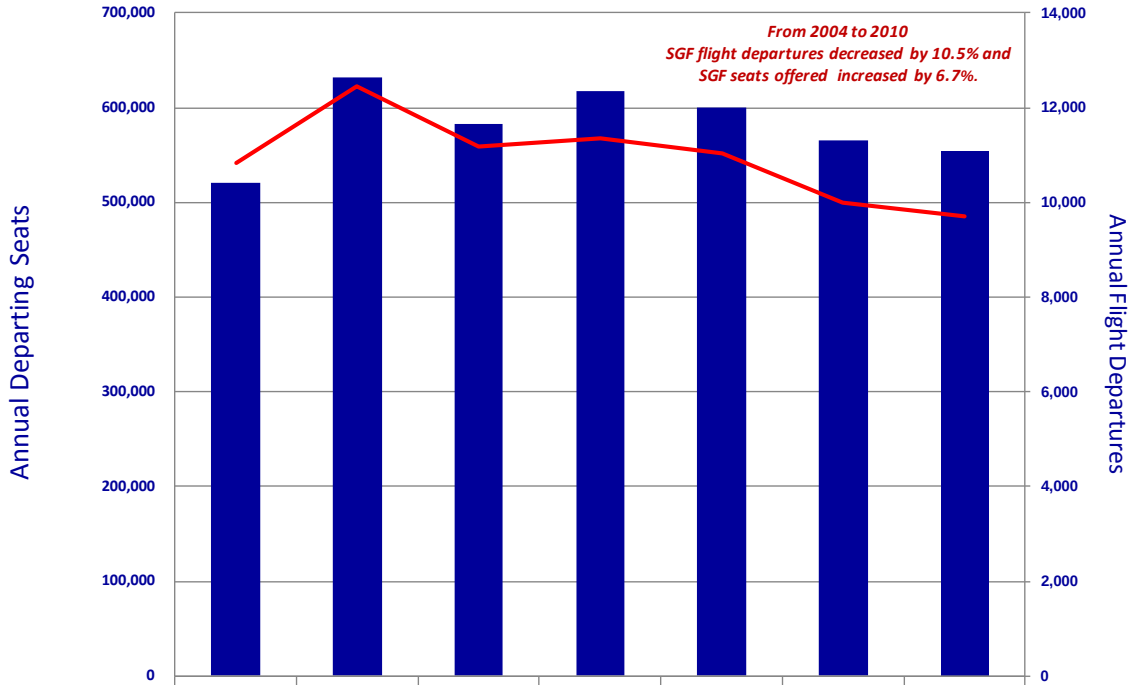


Source: Boyd Group International

3.6.7 AIRLINE HISTORICAL FREQUENCY AND CAPACITY AT SGF

Historical capacity, shown in **Figure 3-15**, closely tracks with passenger demand, shown in **Figure 3-14**, with mirrored peaking in years 2005 and 2007. This expansion and contraction of capacity with demand has allowed airlines to maintain strong load factors between 66% and 70% through the 2004 to 2010 operating period.

FIGURE 3-15 - SGF HISTORICAL AND FRQUENCY CAPACITY: 2004-2010



	2004	2005	2006	2007	2008	2009	2010
Capacity (Departure Seats)	519,903	632,132	582,930	616,979	599,940	564,665	554,527
Annual Flight Departures	10,826	12,450	11,164	11,362	11,030	9,986	9,691

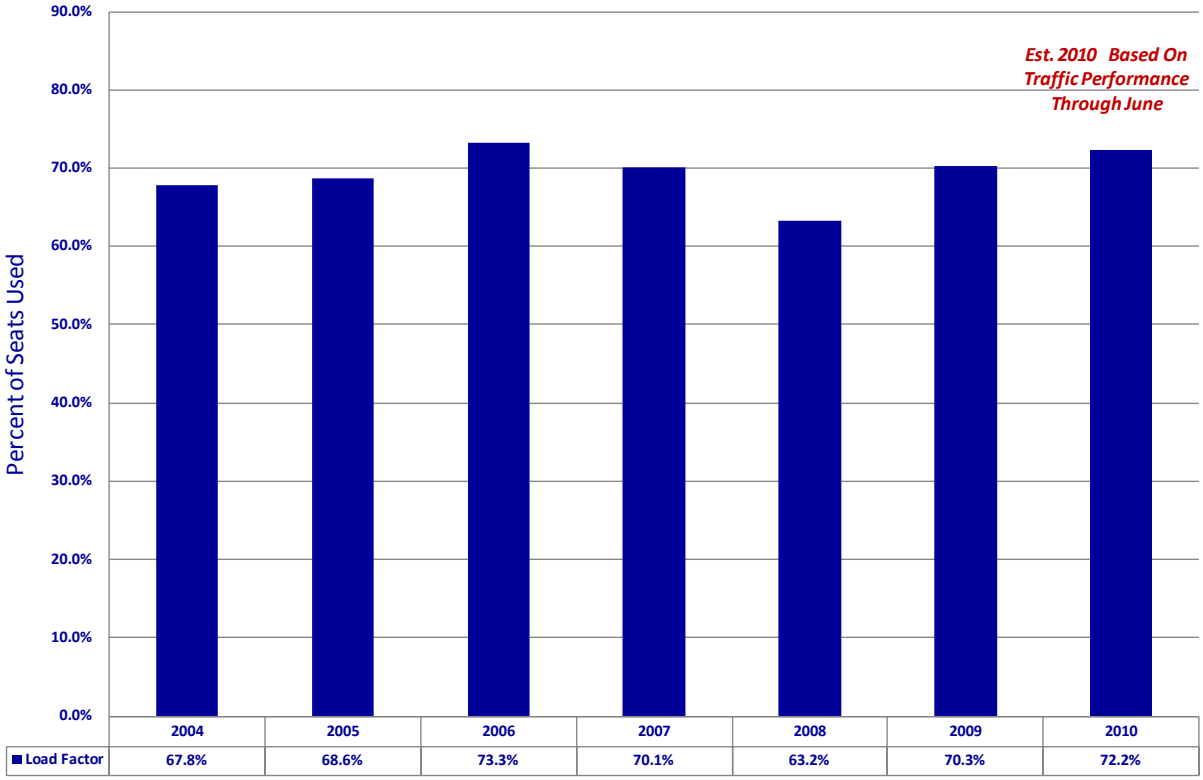
Source: Boyd Group International

Capacity, as measured by the number of departing seats, peaked during 2005 and but has decreased during each of the subsequent years, a factor that does not make SGF much different from many similarly sized airports across the United States. Additionally, it is important to note that while capacity has declined, load factors (i.e. the percentage of seats filled) remained generally consistent during the same period. This is indicative of the airline industry's focus on filling a lesser number of seats with a higher yielding passenger. Simply put, for the airlines the focus is less on the quantity of passengers and more on the quality of the fares.

3.6.8 AIRLINE LOAD FACTORS

Figure 3-16 below depicts actual outbound seats flown versus the number of passengers on-board. Data for 2010 is a projection based on actual performance for January through June.

FIGURE 3-16 - SGF AIRLINE LOAD FACTORS

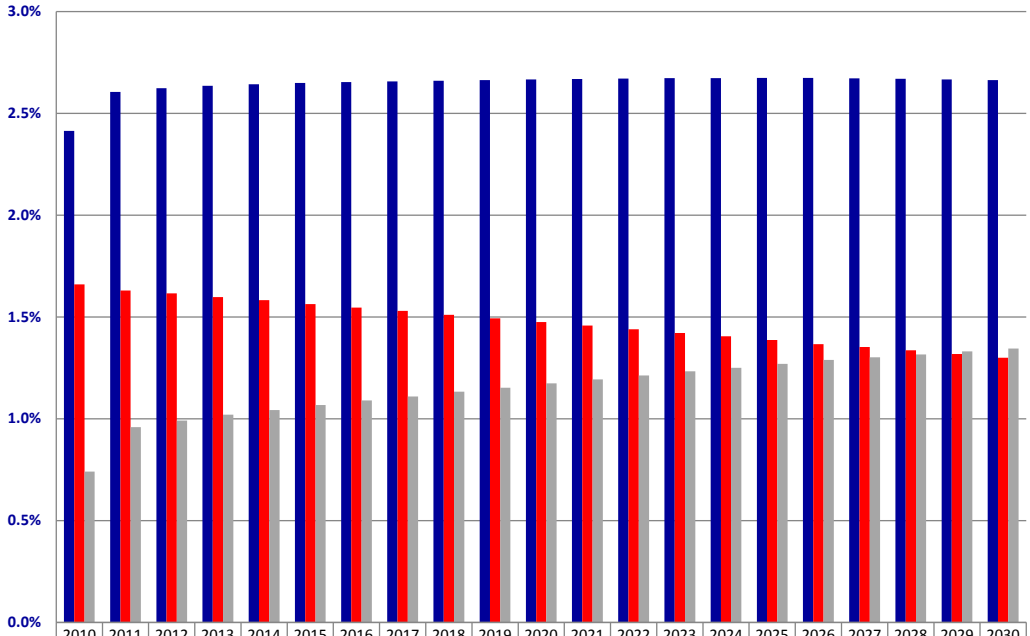


Source: Boyd Group International

3.6.9 KEY ECONOMIC METRICS AND ANNUAL GROWTH

There are several key metrics that relate to air service demand generation. These include population, personal income, and income per capita. Based on forecasts from Woods & Poole Economics, personal income per capita within the SGF region is expected to grow an average of 2.7% year per annum, with a 1.5% decline in overall total population (see **Figure 3-17**).

FIGURE 3-17 - SPRINGFIELD KEY DEMOGRAPHICS FORECAST



	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Change - Personel Income	2.4%	2.6%	2.6%	2.6%	2.6%	2.6%	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%
Change - Population	1.7%	1.6%	1.6%	1.6%	1.6%	1.6%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%	1.3%	1.3%	1.3%
Change - Income Per Capita	0.7%	1.0%	1.0%	1.0%	1.0%	1.1%	1.1%	1.1%	1.1%	1.2%	1.2%	1.2%	1.2%	1.2%	1.3%	1.3%	1.3%	1.3%	1.3%	1.3%	1.3%

Source: Woods & Poole Economics

The negative population growth rate would generally point to slow or no growth in air traffic demand. However, the forecast growth in personal income – a key driver in consumer spending on air travel – should offset most of the impacts associated with declining population base. It is understood that any forecast of this timeframe becomes increasingly vulnerable as it moves further into the future. However, review of the past five years (2005-2010) indicates use of these metrics as reasonable.

3.6.10 Regional Growth in Personal Income

A valuable metric is the relationship between personal income and generation of passengers. On **Figure 3-18**, annual enplanements were related to the population of the SGF primary service area for the years 2005 through 2014.

The steady increase in the number of enplanements per population is consistent with the growth in personal income and per-capita income in the region, and helps to validate the assumption that traffic in the region should remain relatively stable despite an anticipated slight decline in population.

3.6.11 Passenger Enplanements – Forecast Approach

The following data indicate the key dynamics regarding the SGF air service market, and were used in the completion of reasonable forecasts for SGF:

- The population base has been growing and is forecast to continue to do so into the future;
- The air passenger demand has shown a steady rate of growth;
- Key economic indicators, particularly personal income, are forecast to grow at a steady rate of between 1.5 and 2.5% throughout the forecast period;
- Airline capacity has tracked with demand and current markets served on a nonstop basis are mostly to hub airports and, therefore, are perceived to be important to incumbent carriers with regard to maintaining network integrity; and
- There is the possibility that SGF could support flights to one additional airline/hub. With the United/Continental merger, Houston Intercontinental (IAH) could become a gateway to the Southeast thereby strengthening the new United's position in the SGF market.

3.6.12 Factors Impacting Passenger Enplanements Forecasts

Demand for commercial air service and enplanement levels at airports are affected by a variety of factors, including but not limited to:

General Economic Environment: The macroeconomic environment in the United States impacts demand for air travel, including economic growth, disposable income levels, and consumer confidence.

In addition to macro-level factors, the economic environment of an airport service area is also an important element in forecasting demand. This includes trends in local employment levels, stability of the core economic base, and emerging trends in economic activity (e.g., energy business, biotechnology). The nature of traffic in a given market, whether it is premium-fare business traffic or discretionary demand dependent on disposable income, will play a role in carrier decisions with respect to service levels.

Population and Demographics: Generally speaking, positive trends in socioeconomic and demographic factors in an airport service area result in a corollary increase in demand for air transportation. The use of income and personal income per capita projections for the Springfield MSA was a key component in development of passenger enplanement forecasts.

Airline Strategies: The strategic decisions of airlines play a major role in stimulating or suppressing passenger demand at an airport. Such strategy decisions can include one or any number of the following: pricing models, frequency, schedules, aircraft type, destinations, etc.

Service at Neighboring Airports: Service levels at neighboring airports can impact enplanements at a local airport and is usually explained in the form of "traffic leakage." For example, as Southwest Airlines provides service at both Tulsa and St. Louis, some travelers generated in SGF market area will drive to these airports if there is reasonable disparity in ticket prices (higher or lower) than at SGF. However, due to the relatively long drive times between the SGF market hours (3+ hours), this leakage dynamic is likely to be minimal.

3.6.13 Forecast Uncertainties Specific To SGF

Air passenger traffic is affected by a range of economic and other factors. Specific to SGF, the following should be noted:

- **United Is Merging With Continental.** Exactly how the new, combined carrier will re-structure, post-merger, is not entirely certain. While it is likely that the Denver and Chicago access points will not be affected, there is the possibility that union agreements could change how and where the airline system applies its smaller units of capacity (i.e., regional jets) and what any potential caps on 50 seat and 60+ seat regional jets could have on future aircraft deployments. This could open additional opportunities for SGF.
- **Fuel Prices.** There is no certainty with regard to the cost of jet fuel. The price of crude oil, refining capacity, and transportation logistics of Jet-A are all extremely volatile. The economics of smaller aircraft (e.g. CRJ 200 and ERJ 145) that are suited to markets such as SGF are particularly affected by shifts in fuel process.
- **Hub Connectivity Options Are Specific and Identifiable.** SGF is connected to the United States air transportation system today via five network airlines connecting to hub airports – these are Atlanta, Chicago, Dallas/Ft. Worth, Denver, and Memphis.
- **U.S. Airline Fleets Will Increase In Average Aircraft Size.** The average aircraft size serving SGF has steadily decreased over the past ten years. Changes in airline fleets will result in this stabilizing and then gradually increasing during the forecast period. In particular, 50-seat jets are being retired and in markets such as SGF, will be replaced by larger 66-to-75-seat jets.
- **Connecting Hubs.** While the number of connecting banks may not increase at the hubs which SGF relies upon for access, the increased size of aircraft operated will accommodate the forecast increase in enplanements.

These factors have all been considered in development of enplanement projections for SGF over the forecast period.

3.6.14 METHODOLOGY

Forecasting enplanements for an airport with the size and dynamics of SGF must be pursued on a going-forward basis, founded on known and estimated changes in population, economics, and air service issues.

Macro approaches, such as regression analyses are not suitable, as they do not address nor contemplate the types of episodic events that have a material effect on enplanement levels. For example, the elimination of service to American's St. Louis connecting hub had a material effect on the market that mathematical models cannot address. Furthermore, the very fleet structure of the airline industry is evolving, changing the levels of unit capacity offered. First, smaller 29 to 34-seat aircraft were supplanted by 50-seat Regional Jets. Next the 66-seat CRJ 700 entered SGF market replacing some CRJ 200 aircraft and it is expected that other 50-seat aircraft will be replaced with larger 66 to 90-seat aircraft during the first 5 to 7 years of the forecast period. These forecasts are based on current industry trends and cannot accurately be projected using methodologies that assume a steady trend line from the past.

The primary forecasting methodology used trend analysis and extrapolation. This involved analysis of historical data correlated to demographic and economic trends in the SGF service area, and forecasted these relationships into the future based on economic and demographic forecasts along with known and expected changes in the airline service at SGF.[33]

As previously discussed, it must be clearly understood that forecasting aviation activity at a specific airport cannot be done with absolute certainty. Shifts in the airline industry – including changes in fleets, route networks, and marketing relationships – continually evolve and will affect the traffic levels at a given airport over any forecast period. Because many of these dynamics are the result of subjective corporate decisions, they cannot be projected with complete accuracy.

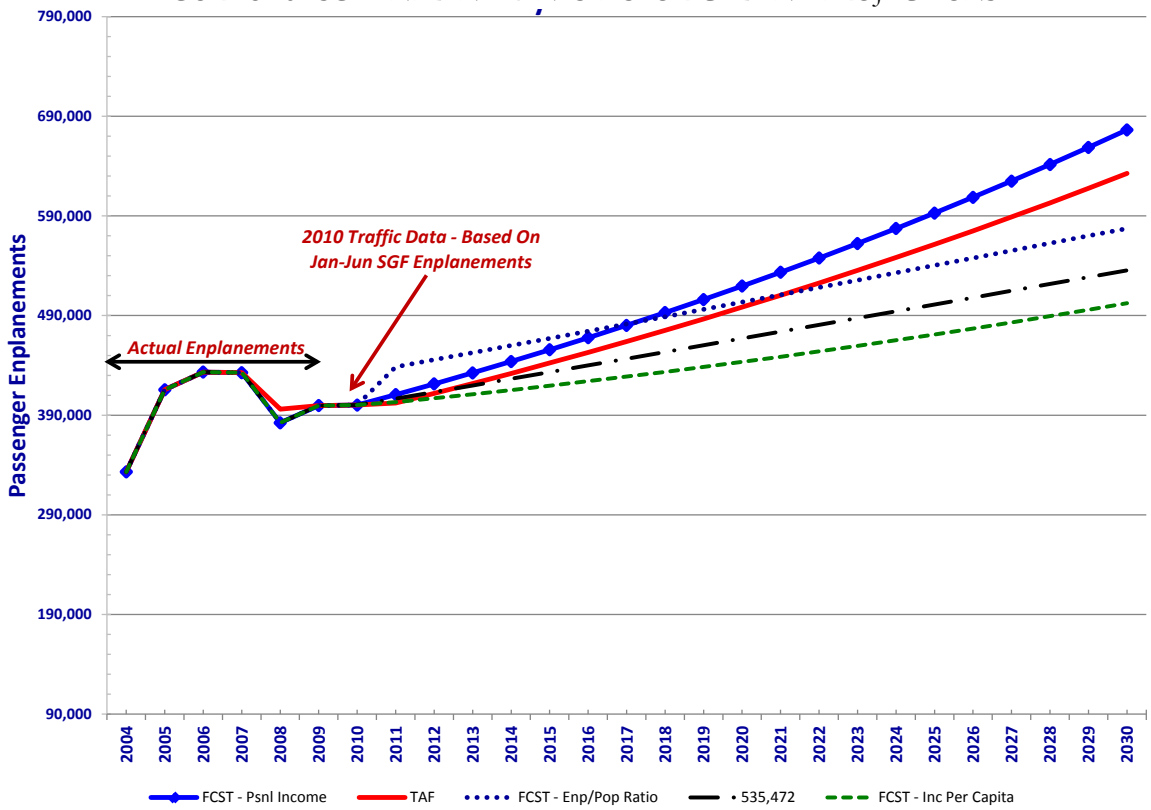
3.6.15 REGIONAL MARKET CHANGES

Based on the data and analyses herein, it is projected that the SGF region is growing, albeit at a relatively modest rate but yet still above that projected in the latest FAA developed Terminal Area Forecast (TAF). The TAF indicates that enplanements at SGF will grow at approximately 2.5% annually for the forecast period. This is countered by the fact that the airport has seen passenger traffic grow by 12.7% over the past six years and airlines have consistently scheduled capacity to meet the passenger demand.

The initial approach applied the growth rate in each key economic indicator – population, personal income, per-capita income, and enplanement-to-population ratios.

[33] Primarily using data from Woods & Poole Economics.

FIGURE 3-18 - SGF ENPLANEMENTS HISTORICAL AND PROJECTIONS



Source: Boyd Group International

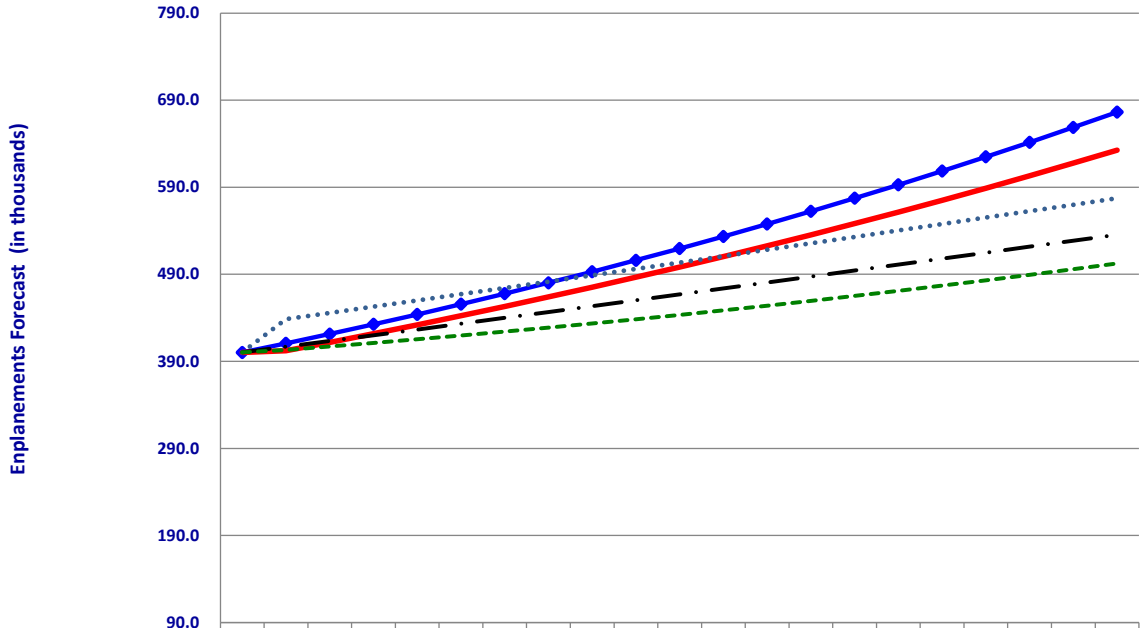
The first conclusion previously noted, is that the TAF is in line with recent trends and key metrics in the SGF region.

Four traffic projections were accomplished based on: percentage changes in population growth, growth in income per capita, growth in personal income, and growth based on the enplanement-to-population ratio of 2010. These were compared to the TAF and to a forecast based on the rate of national enplanement growth as derived from the FAA Aerospace Forecasts 2010-2030, as shown in **Table 3-17**.

3.6.16 AIRLINE ENPLANEMENT FORECAST PROJECTION

After ascertaining from **Figure 3-18** that actual growth rates historically have tracked higher than the TAF, the same data are depicted only for the forecast period of 2010 through 2030 in **Figure 3-19**.

FIGURE 3-19 - SGF 20-YEAR FORECAST SCENARIOS



	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Psnl Income Driven (000)	400.2	410.6	421.4	432.5	443.9	455.7	467.8	480.2	493.0	506.1	519.6	533.5	547.7	562.4	577.4	592.9	608.7	625.0	641.7	658.8	676.3
TAF	400.2	402.2	411.9	421.8	432.0	442.4	453.0	464.0	475.2	486.6	498.4	510.4	522.7	535.3	548.2	561.4	575.0	588.9	603.1	617.7	632.6
Enplanements/Population Ratio	400.2	438.6	445.7	452.8	459.9	467.1	474.4	481.6	488.9	496.2	503.5	510.8	518.2	525.6	532.9	540.3	547.7	555.1	562.6	570.0	577.4
Population Driven	400.2	406.7	413.3	419.9	426.6	433.2	439.9	446.7	453.4	460.2	467.0	473.8	480.6	487.4	494.3	501.1	508.0	514.8	521.7	528.6	535.5
Income p/Capita	400.2	403.2	407.0	411.1	415.3	419.6	424.1	428.7	433.5	438.4	443.4	448.7	454.0	459.5	465.2	471.0	477.0	483.1	489.4	495.9	502.5

Source: Boyd Group International

Based on steady increases in personal income and population, it is assumed that the relationship between personal income as it grows and the enplanements per population will remain stable. It is also assumed that the annual rates of enplanement growth experienced since 2004 will not be sustained throughout the 20-year forecast period. For this reason, the following assumptions were relied upon in preparation of this forecast:

- The passenger enplanement levels that are expected to be attained in 2010 are fundamental and sustainable. Airline load factors show no softening from historical levels. Therefore, this enplanement level is the starting point for the forecast;
- Future air service levels at SGF will be positively affected by the forecast increases in personal income, and population, however growth will be tempered by airline strategies which focused on exuberant capacity additions;
- Growth in demand will be satisfied primarily by incumbent carriers, however there may be other carriers entering the SGF market over the forecast period; and
- The rate of enplanement growth is expected to continue at a steady, albeit moderate, rate throughout the forecast period.

Based on these assumptions, the following conclusions are reached:

- The TAF forecast tracks with economic and demographic trends in the market area;
- The population and income metrics for the region are forecast to grow;
- It is reasonable to assume, in light of relatively stable economic projections, that the SGF market will maintain its approximate current enplanement-to-income ratio; and
- This approach results in forecast enplanements that are only marginally higher than the national forecast growth in domestic enplanements as determined in the *FAA Aerospace Forecast 2010 – 2030*.

Therefore, the most reasonable forecast is determined to be the approach based on personal income with an annual growth rate between 2.6% and 2.7% throughout the forecast period. This forecast scenario is compatible with the FAA national enplanement growth rate of approximately 2.7% annually.

3.6.17 Peak Period Demand

Peak period demand was analyzed from the perspective of air carrier operations for passenger terminal facilities and GA/military for airfield operations (see **Table 3-12).** For the purpose of this analysis, an operation is defined as either a flight arrival or departure.

Historically, air carrier peak operations are concentrated in the early morning and late afternoon time periods. This has remained relatively constant, with the only notable exception being a lengthening of the operational day as airlines have become more astute with respect to asset deployment. It is noted that peak period does not indicate any potential for passenger terminal congestion, with the maximum of 10 air carrier operations indicated within a 60-minute period. Total peak period runway operations are not expected to exceed 24 within a 60-minute period.

Air Carrier peak hour for both departing flights and departing capacity has historically been between 0900 and 1000.[34] This reflects the first morning push to the two connecting hubs served from SGF by aircraft that remain overnight ("RON" in airline parlance). For the remainder of the day, the number of operations (arrivals and departures) and capacity tends to fluctuate but never exceeds the peak period levels – 24 operations in a 60-minute period.

[34] Illustrated data is for a typical air carrier weekday schedule during the month of July. Operations are reduced on weekends and, as noted previously, there is little seasonal fluctuation in the level of commercial operations at SGF. Also, while the data reflects arrivals and departures, the peak periods for terminating arrivals are in the late evening. These aircraft represent the morning originators in the 0600-0700 period.

TABLE 3-12 - SGF PEAK HOUR DEMAND

Springfield-Branson National Airport Peak Period Operations					
Year	Base Year 2009	Base +1 2010	Base +5 2014	Base +10 2019	Base +20 2030
Peak Month Operations					
Air Carrier	2,073	2,012	2,079	2,237	3,010
GA & Military	3,005	2,887	2,839	3,079	3,708
Total Operations	5,078	4,898	4,918	5,316	6,718
Peak Day Operations					
Air Carrier	61	59	61	66	100
GA & Military	100	96	104	113	136
Total Operations	161	155	165	179	236
Peak Hour Operations					
Air Carrier	7	7	7	8	10
GA & Military	10	10	10	11	14
Total Operations	17	17	18	19	24
Air Carrier - Peak Period					
Peak Mo. Seats	103,087	115,111	132,093	156,885	229,047
Peak Day Seats	3,785	3,717	4,266	5,067	7,635
Peak Hour Seats	514	505	580	688	763
Peak Mo. Passengers	82,962	83,078	88,546	95,524	111,156
Peak Day Passengers	2,679	2,683	2,860	3,085	3,590
Peak Hour Passengers	364	365	388	419	488
Avg. Seats p/Dep.	69.2	70.1	77.8	85.9	76.1
Avg. Passengers p/Dep	49	51	52	52	49
Avg. Load Factor	70.8%	72.2%	67.0%	60.9%	63.9%

Source: Boyd Group International

Given that airline schedules at SGF are generally timed to feed banks of connecting flights at hub airports, it is believed that there will be little variation from historical patterns over the forecast period. The peak morning hours for air carrier capacity (arriving and departing seats) have remained relatively stable over the past two years.

Factors which could result in variations include an air carrier entering the SGF market from a different hub airport, increased in aircraft size, or a major retiming of schedules at the current hubs resulting from the strategic decision of an airline. The likelihood of the latter occurring at the existing five-hub airports is viewed as very low.

However, the likelihood of 50-seat aircraft being replaced with larger 66+ seat aircraft and/or new entrant airlines entering the market from additional hubs is viewed as a possibility. Either event could impact peak hour demand for both frequency and capacity resulting in increased apron and terminal congestion at SGF.

3.6.18 Future Peak Hour Operations

Factors which could result in variations in aircraft operations include larger aircraft replacing smaller ones on existing service and new service to an additional airport. Both events are highly likely to occur within the first three to five years of the forecast period. In addition, future peak hour operations are estimated based on the airline systems serving SGF continuing to schedule flights to feed banks of connecting flights at hub airports. It is believed that there will be little variation from historical patterns throughout the forecast period (see **Table 3-13**).

TABLE 3-13 – SGF BASE YEAR +1 PEAK AIRCRAFT OPERATIONS FORECAST

Springfield-Branson National Airport Peak Period Forecast									
	Forecast Levels					Compound Annual Growth Rate			
	Base Year 2009	Base +1 2010	Base +5 2014	Base +10 2019	Base +20 2030	2009 to 2010	2009 to 2014	2009 to 2019	2009 to 2030
Airline Operations									
Capacity (Arrival & Departure Seats)	514	505	580	688	763	-0.9%	2.0%	2.7%	2.5%
Air Carrier (Arrival & Departing Flights)	7.4	7.2	7.5	8.0	10.0	-1.5%	0.0%	0.7%	1.9%
Other Flight Operations									
General Aviation & Military	10.0	9.6	10.4	11.3	13.6	-2.0%	0.6%	1.1%	1.9%
Total Flight Operations	17.4	16.8	17.9	19.3	23.6	-1.8%	0.4%	0.9%	1.9%

Source: Boyd Group International

3.6.19 Current Design Aircraft

The current aircraft most commonly used in commercial operations at SGF is the Embraer EMB 145 and the Bombardier CRJ 200, with a combined 17,500 annual operations. However, current larger aircraft operating at SGF are Allegiant's MD-80 with 1,350 annual operations and FedEx's Airbus A300-600 with 962 operations. Therefore, based on current aircraft operational information, the ARC for SGF is D-IV, (see **Table 3-14**). This designation is based on a combination of the MD-80 and the A300-600 aircraft.

TABLE 3-14 - SGF CURRENT AIRLINE DESIGN AIRCRAFT

Airline Operations		
	Design Aircraft	
	Current	Current
Aircraft Model	Boeing MD-83	Airbus A300-600
Length Overall	147 feet 8 inches	177 feet 5 inches
Wingspan	107 feet 9 inches	147 feet 1 inch
Height Overall	30 feet 2 inches	54 feet 3 inches
Maximum Ramp Weight	161,000 lbs	380,500 lbs
Typical Approach Speed	144 knots	137 knots
Approach Speed Category	D	C
Airplane Design Group	III	IV

Source: Boyd Group International

3.6.20 Future Design Aircraft

There are no larger ("more critical") aircraft than those included in the current design aircraft group that occasionally uses SGF (less than 500 annual operations). Also, reviewing fleet trends in the airline industry in general, and those at the carrier systems serving SGF, the largest aircraft projected for use at SGF in the forecast period are the 150-seat MD-80 and the A300-600 cargo aircraft.

Other aircraft to consider for future planning purposes is as follows:

Currently UPS operates the Boeing 757-200 in cargo service at SGF. Future 757-200 passenger flights could serve SGF as Allegiant Air is expanding their fleet to include this aircraft type.

Major airline systems, faced with declining regional jet (50-seats) economics and no viable replacement of these airliners on the drawing board, will be moving toward larger units of capacity. In fact, the average aircraft size under the operational control of U.S. airline systems is forecast to grow from 126.8 to 145.1 seats between 2010 and 2017. A substantial reason for this is that almost 40% of all new airliners ordered in that period will be in the 66-seat to 125-seat category. This equates to approximately 2,100 additional airliners in this category and includes the CRJ-700, E190, and the CS 300.

The main carrier systems operating at SGF, as well as carriers considered for future service, all now have larger CRJ and E-Jets within their systems and it is forecast that the 66-99 seat versions will increasingly be the capacity floor.

Table 3-15 contains the profile of other commercial aircraft which currently or could be operating at SGF during the forecast period. Specifications for each of these aircraft are reviewed in the table below.

TABLE 3-15 - OTHER AIRCRAFT SPECIFICATIONS

Other Airline Operations				
Design Aircraft	**Current**	**Future**	**Future**	**Future**
Aircraft Model	Bombardier CRJ-700	Embraer E-190	Embraer E-195	Bombardier CS300
Length Overall	106 feet 8 inches	118 feet 11 inches	126 feet 10 inches	124 feet 10 inches
Wingspan	76 feet 3 inches	94 feet 3 inches	94 feet 3 inches	115 feet 1 inches
Height Overall	24 feet 10 inches	34 feet 8 inches	34 feet 7 inches	37 feet 9 inches
Maximum Ramp Weight	77,500 lbs	105,712 lbs	107,916 lbs	132,800 lbs
Typical Approach Speed	125 knots	120 knots	125 knots	135 knots
Approach Speed Category	C	C	C	C
Airplane Design Group	II	III	III	III

Source: Aircraft Manufacturers

In the case of SGF, the main carrier systems operating at the airport – American, Delta, and United – all have CRJ 700s within their system. Also, in February 2010, Republic Airways Holdings, parent company of Frontier and contract carrier to major carrier systems, became the North America launch customer for the 100 to 149-seat Bombardier CS300.[35]

3.7 FORECAST COMPARISONS

3.7.1 COMPARISON SUMMARY TO TERMINAL AREA FORECAST (TAF)

The following tables and chart summarize the aviation activity, which has been presented throughout this document.

Overall, passenger enplanements at SGF are anticipated to increase over the 20 period of 2010-2030 covered in this forecast (see **Table 3-16**). Air carrier operations are expected to relatively remain stable over the period, reflecting an increase in the number of seats per departure that will facilitate accommodating the growth in enplanements. It is expected that the trend toward larger aircraft will continue and some of the aircraft types currently serving SGF will be removed from service within the next five years.[36]

[35] This was followed by an order for additional Embraer E-jets during October 2010.
[36] Operations in this chart reflect arrivals and departures and passenger data reflect only enplanements.

TABLE 3-16 – SGF SUMMARY OF AVIATION ACTIVITY

Springfield-Branson National Airport (SGF)

Summary of Aviation Activity Forecast

	Forecast Levels					Compound Annual Growth Rate			
	Base 2009	Base +1 2010	Base +5 2014	Base +10 2019	Base +20 2030	2009 to 2010	2009 to 2014	2009 to 2019	2009 to 2030
Airline Passenger Enplanements	399,656	400,213	443,945	506,127	676,305	0.1%	1.8%	2.2%	3.3%
Operations									
Airline	19,972	19,382	20,031	21,553	29,000	-1.49%	0.05%	0.70%	2.36%
Itinerant									
General Aviation	19,125	17,624	18,832	19,836	22,226	-4.0%	-0.3%	0.3%	0.9%
Military	3.360	3.360	3.727	4.249	5.678	0.0%	1.7%	2.2%	3.3%
Local									
General Aviation	8,542	8,748	9,704	11,063	14,783	1.2%	2.1%	2.4%	3.5%
Military	1,757	1,757	1,803	1,804	1,804	0.0%	0.4%	0.2%	0.2%
TOTAL OPERATIONS	52,756	50,872	54,098	58,505	73,491	-1.8%	0.4%	0.9%	2.1%
Instrument Operations	49,454	33,614	36,971	41,510	55,566	-17.6%	-4.7%	-1.6%	0.7%
Peak hour Operations - Air Carrier	7	7	7	8	10	-1.5%	0.0%	0.7%	1.9%
Peak hour Operations - All Other	10	10	10	11	14	-2.0%	0.6%	1.1%	1.9%
Peak hour Operations - Total	17	17	18	19	24	-1.8%	0.4%	0.9%	1.9%
Cargo/Mail (enplaned+deplaned tons)	25,835	26,264	27,992	30,198	35,140	0.8%	1.3%	1.4%	1.9%
Based Aircraft									
Single Engine (Nonjet)	126	129	138	151	185	1.2%	1.5%	1.7%	2.4%
Multi Engine (Nonjet)	26	27	30	33	42	1.9%	2.4%	2.2%	3.0%
Jet Engine	17	17	18	21	23	0.0%	1.0%	1.9%	1.9%
Helicopter	1	1	1	1	1	0.0%	0.0%	0.0%	0.0%
Other	4	4	4	5	6	0.0%	0.0%	2.0%	2.6%
TOTAL	174	178	191	211	257	1.1%	1.6%	1.8%	2.5%
Airline Average Aircraft Size (Seats)	56.5	57.3	63.5	70.1	76.1	0.7%	2.0%	2.0%	1.9%
Airline Avg. Enplaning Load Factor	70.3%	72.2%	69.8%	67.0%	61.3%	1.3%	-0.1%	-0.4%	-0.9%
GA operations per based aircraft	159	146	151	156	151	-4.2%	-0.9%	-0.2%	-0.3%

Source: Boyd Group International

TABLE 3-17 - AIRPORT PLANNING AND TAF FORECAST

Springfield-Branson National Airport (SGF)

Airport Forecast and TAF Forecast

	Year	Airport Forecast	TAF	AF/TAF (% Difference)
Passenger Enplanements				
Base Year	2009	399,656	399,656	0.0%
Base Year +1	2010	400,213	400,213	0.0%
Base Year +5	2014	443,945	431,959	2.8%
Base Year +10	2019	506,127	486,611	4.0%
Base Year +20	2030	676,305	632,583	6.9%
Airline Operations				
Base Year	2009	19,972	24,149	-17.3%
Base Year +1	2010	19,382	24,390	-20.5%
Base Year +5	2014	20,031	24,634	-18.7%
Base Year +10	2019	21,553	24,880	-13.4%
Base Year +20	2030	22,226	25,129	-11.6%

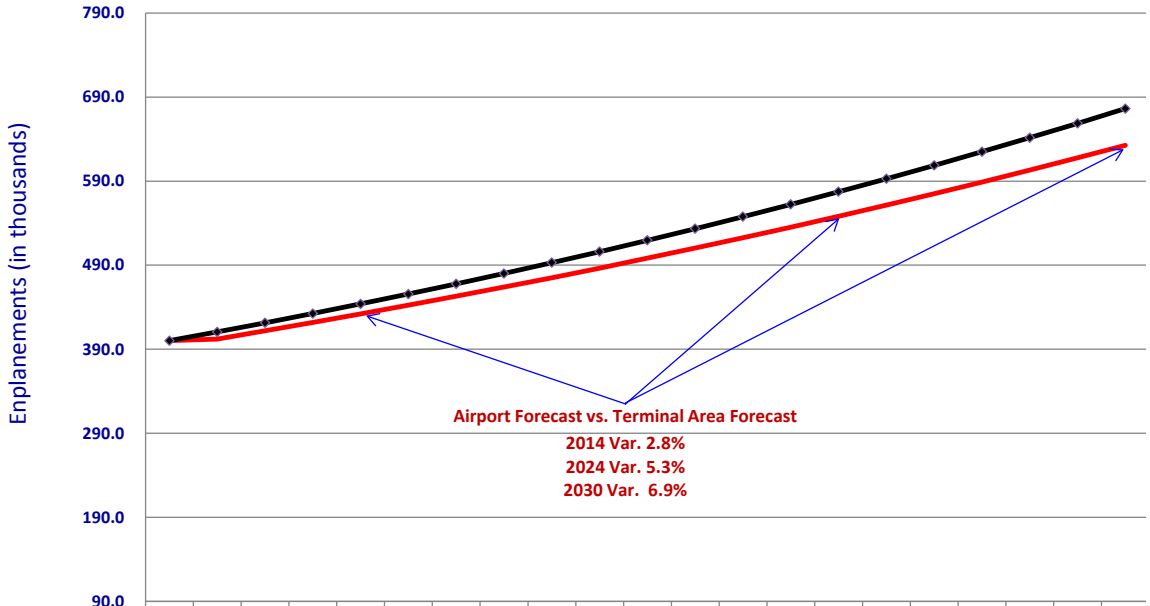
Note: Enplanements are departing passengers only
Airline Operations equals Arriving + Departing Flights

Source: Boyd Group International

At the end of 2030, the baseline forecast of passenger enplanements is forecast to be 577,413 compared to the FAA projection of 632,583 in the TAF, shown in **Table 3-17**. This represents a variance of approximately 5.3% above the FAA TAF.

3.7.2 AIRPORT FORECAST/TAF COMPARISON OF FORECASTED ENPLANEMENTS

FIGURE 3-20 - AIRPORT FORECAST AND TERMINAL AREA FORECAST COMPARISON



	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
TAF	400.2	402.2	411.9	421.8	432.0	442.4	453.0	464.0	475.2	486.6	498.4	510.4	522.7	535.3	548.2	561.4	575.0	588.9	603.1	617.7	632.6
Psnl Income Driven (000)	400.2	410.6	421.4	432.5	443.9	455.7	467.8	480.2	493.0	506.1	519.6	533.5	547.7	562.4	577.4	592.9	608.7	625.0	641.7	658.8	676.3

Source: Boyd Group International

Please note projections are based on the SGF region personal income growing at an annual rate of approximately 2.7% throughout the forecast period with population growing at a lower rate of 1.5%. Also, even though all scheduled passenger service at SGF is provided by regional affiliates of major airlines, it is expected these airlines will continue to remove smaller 50-seat regional jets and jet aircraft from the SGF market, replacing them with larger 66-to-99-seat jet aircraft. This year over year 2% increase in capacity (departure seats) will allow the level of air service offered to keep pace with expected air service demand (see **Figure 3-20**).

4.0 FACILITY REQUIREMENTS

This chapter documents the facilities required to meet the demand requirements described in **Chapter 3**, *Aviation Activity Forecasts*. Current facilities were examined to determine if they were satisfactorily meeting the demands of the airport. Current and future deficiencies have been identified and trigger points have been detailed, outlining which activity levels will result in the need for the addition or expansion of facilities.

This chapter primarily focuses on what needs to be done, without necessarily determining how the needs will be met. Certain items identified in this chapter have multiple possible solutions that need to be examined and vetted with local and federal officials. These items will be explored in the next phase of the Master Plan, which is known as the Alternatives Analysis. Chapter 4 serves as a tool to identify what is required.

4.1 SUMMARY

A summary of the recommended improvements are provided in **Table 4-1.** These improvements are discussed in detail in the following sections of this Chapter. Certain improvements will be further examined in **Chapter 5**, *Alternatives,* to evaluate options to accommodate the facility requirements.

TABLE 4-1 - FACILITY REQUIREMENTS SUMMARY

Facility	Improvements Recommended
Runway Capacity	No Improvement Needed
Runway Orientation	No Improvement Needed
Runway Length	Runway 14/32 – No Improvement Needed Runway 2/20 - 1,000' Extension Recommended
Runway Pavement Strength	No Improvement Needed
Runway Surface	No Improvement Needed
Runway Safety Areas	No Improvement Needed
Runway Object Free Areas	No Improvement Needed
Runway Protection Zones	The airport should plan to acquire, or at a minimum obtain, an avigation easement for all land within the future RPZs.
Runway Line of Sight	Aircraft should be limited from parking on the south end of the Cargo Apron if the FAA ATCT deems this line of sight to be enough of a hazard.
Taxiways	Taxiway N - Widened from 50' to 75' Bypass Taxilane from GA Apron to Taxiway P
Airfield Markings	Address runway hold bar separation issues
Navigational Aids	No improvement needed
Instrument Approaches	Runway 32 – Obtain the best possible LPV approach without approach lighting requirements. Runway 20 - Improved LPV approach
Terminal Requirements	No short-term improvements needed
Hangar Facilities	Aircraft storage is nearly at capacity and additional space to construct hangars is required
Airport Equipment	No Improvement Needed
Support Facilities	FBO - General Improvements GA Aircraft Maintenance Study
Fuel Storage Requirements	No improvement needed
Deice Pads	To adequately meet requirements mandated in proposed Effluent Limitation Guidelines for aircraft deice, dedicated deice pads locations are recommended

Source: Jviation, Inc.

4.2 AIRSIDE REQUIREMENTS

Utilizing various sources, including FAA Advisory Circulars, the airport and consultant experience, criteria was established to measure the adequacy of the current airfield at SGF. The airside areas evaluated include the Runways, Taxiways, FAA Safety Standards, Navigational and Landing Aids, Airspace Requirements, and Obstructions.

4.2.1 RUNWAYS

The ability of runways to meet the requirements of the users of the airport is one of the most critical components to the success of an airport. Runways must have the capacity, length, strength, and proper orientation to the wind to meet the demands of its users. This section will examine several key factors used in the determination of the adequacy of the runway systems.

4.2.1.1 Runway Capacity

Runway Capacity is defined by the FAA as "a measure of the maximum number of aircraft operations that can be accommodated on the airport or airport component in an hour."[37] Capacity is further divided into two categories: Visual Flight Rules (VFR) and Instrument Flight Rules (IFR). Utilizing guidance contained in FAA Advisory Circular 150/5060-5, *Airport Capacity and Delay*, the runway capacity for SGF has been calculated to be 77 VFR flights and 56 IFR flights per hour.

Another factor in runway capacity is Annual Service Volume (ASV), which is a reasonable estimate of the airport's annual capacity. A number of factors that may occur over the period of a year are used to determine ASV. These factors include runway use, aircraft mix, and weather conditions. ASV is calculated using the following criteria:

$$ASV = C_W \times D \times H$$

C_W	weighted hourly capacity
D	ratio of annual demand to average daily demand
H	ratio of average daily demand to average peak hour demand

Using this equation, the ASV for SGF has been calculated to be 215,000 annual operations. For 2010, total annual operations reached 52,649.

Average delay per aircraft is another key metric used to analyze runway capacity. As airports near capacity, average aircraft delay increases. The FAA advises that once average aircraft delay reaches between 4 and 6 minutes per aircraft, the airport is near capacity and/or is congested. For SGF, average delay per aircraft as a result of airfield capacity is less than one minute.

[37] FAA Advisory Circular 150/5060-5, Airport Capacity and Delay

Although capacity needs are met with the assumptions used, there are many factors that could change this in the future. A future parallel runway has been planned for Runway 2/20. Although there is not a current need for the runway, it would be prudent to continue to plan for it in the future. The runway will continue to be shown on the ALP drawings.

Based on the criteria for measuring runway capacity, no projects for expanding runway capacity are needed at this time. SGF should continue to depict parallel Runway 2L/20R as a post-planning improvement.

4.2.1.2 Runway Orientation

Runway orientation, the alignment in relation to magnetic north, is primarily influenced by wind. The ideal runway orientation at an airport is one that results in the prevailing wind creating the least amount of crosswind operations. Recognizing that there is variable weather conditions, aircraft are designed so they can land with an acceptable degree of crosswind, referred to as the crosswind component. When conditions are above the maximum allowable crosswind component for a particular type of aircraft, said aircraft must use another runway or divert to another airport. To reduce the amount of diversions due to wind, the most ideal layout of runways would be one that results in an allowable crosswind component for the design aircraft 95% of the time.

The historic combined wind coverage for SGF, as discussed in detail in **Section 2.10.2**, exceeds the 95% ideal crosswind coverage for all weather, VFR, and IFR conditions with the current configuration.

Given the present layout and adequate wind coverage, no additional crosswind runway or realignment is required.

4.2.1.3 Runway Length

As previously discussed, SGF has two runways: Runway 14/32 and Runway 2/20. Runway 14/32 is 8,000 feet long, while Runway 2/20 is 7,003 feet long. **Table 4-2** displays FAA-recommended runway length requirements for SGF, which were produced using the FAA AC 150/5325-4, *Runway Length Requirements*, guidance. This will also serve to establish the actual length that would be required for any runway that does not meet the standards.

TABLE 4-2 - FAA RUNWAY LENGTH REQUIREMENTS

RUNWAY LENGTHS RECOMMENDED FOR AIRPORT DESIGN[1]

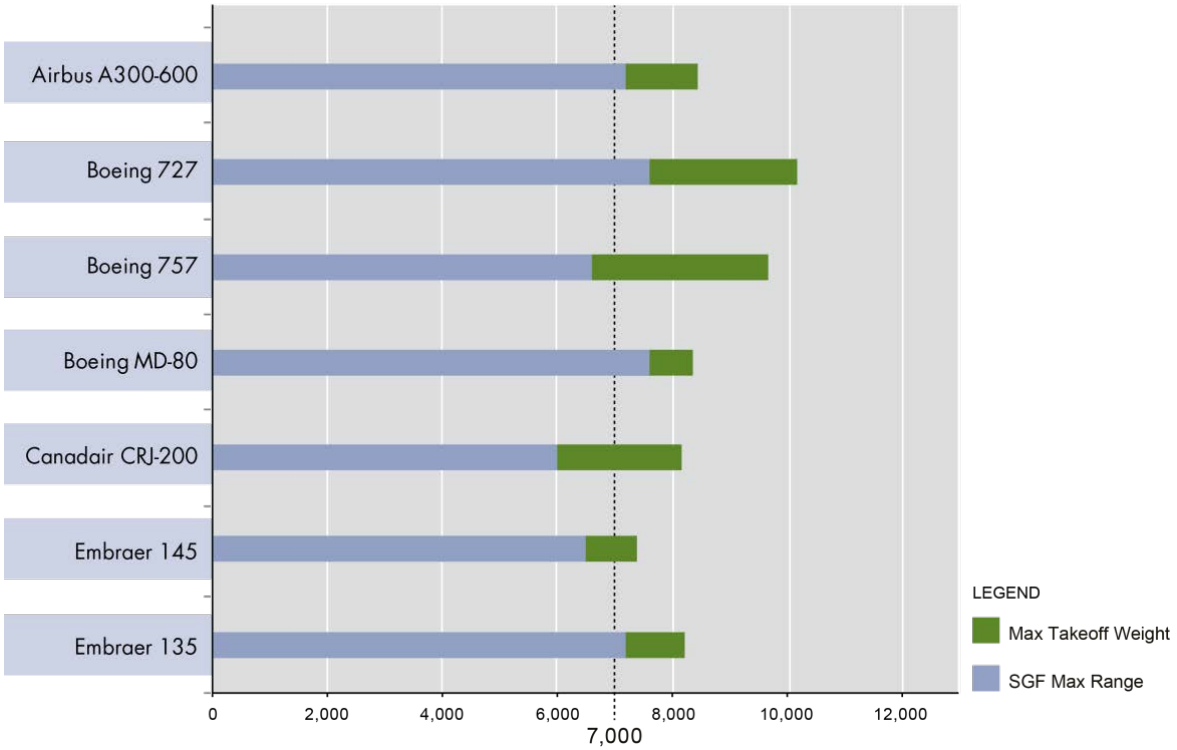
AIRPORT AND RUNWAY DATA	
Airport elevation	1,268′
Mean daily maximum temperature of the hottest month	90.00° F
Maximum difference in runway centerline elevation	8′
Length of haul for airplanes of more than 60,000 pounds	1,419 miles
Dry runways	
RUNWAY LENGTHS RECOMMENDED FOR AIRPORT DESIGN	
Small airplanes with approach speeds of less than 30 knots	340'
Small airplanes with approach speeds of less than 50 knots	900'
Small airplanes with less than 10 passenger seats	
95% of these small airplanes	3,490'
100% of these small airplanes	4,130'
Small airplanes with 10 or more passenger seats	4,510'
Large airplanes of 60,000 pounds or less	
75 percent of these large airplanes at 60 percent useful load	4,960′
75 percent of these large airplanes at 90 percent useful load	6,880'
100 percent of these large airplanes at 60 percent useful load	5,890'
100 percent of these large airplanes at 90 percent useful load	8,880'
Airplanes of more than 60,000 pounds	7,270′

Source: FAA AC 150/5325-4B, Runway Length Requirement for Airport Design.

Based on the data in **Table 4-2**, 100% of large airplanes at 90% of useful load would require 8,880 feet of runway.

As the FAA runway length data provided in **Table 4-2** is generic in nature and applies to a broad spectrum of aircraft, specific aircraft performance manuals for aircraft that operate at SGF were consulted. **Figure 4-1** depicts the data from these manuals, which represent the worst case scenario: a fully loaded aircraft departing on a hot summer day.

FIGURE 4-1 - CRITICAL AIRCRAFT RUNWAY REQUIREMENTS

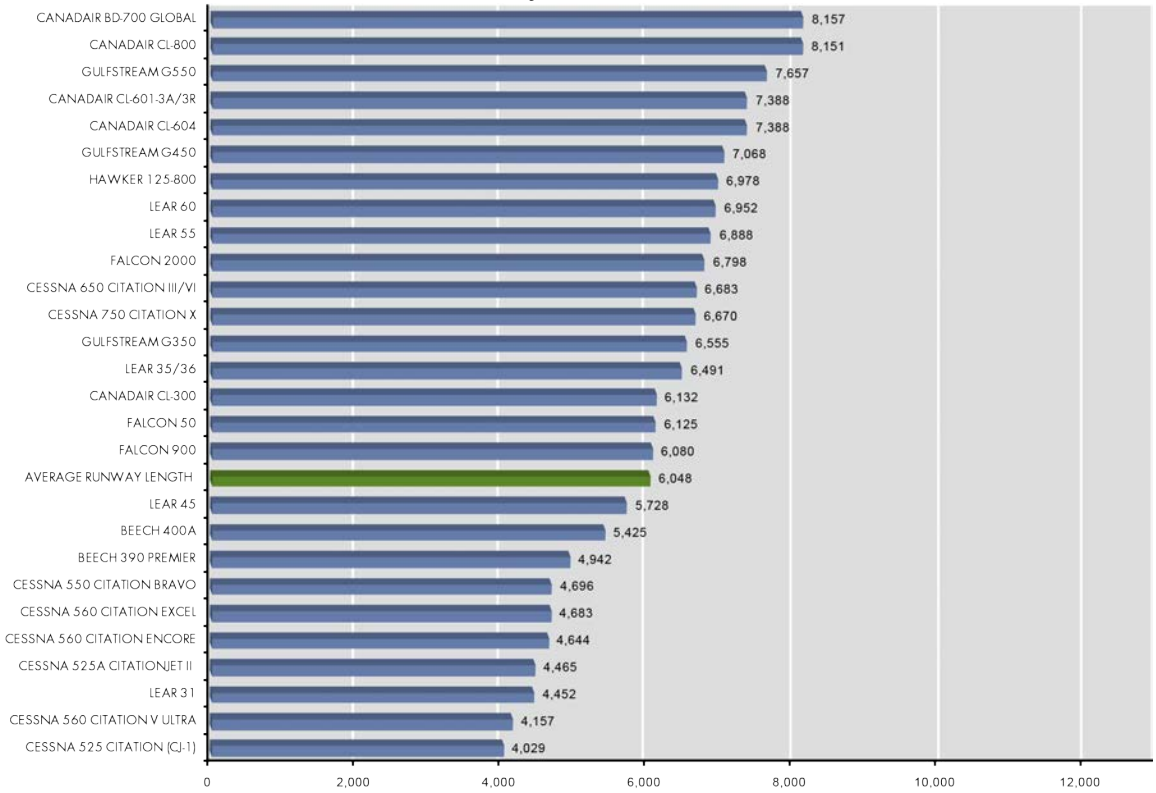


Source: Jviation, Inc.

According to the information presented in **Figure 4-1**, all but one aircraft type require 8,000 feet or more for departure without requiring a reduction in load on hot summer days. The only aircraft that do not require 8,000 feet or more of runway is the Canadair CRJ-700 and the Embraer 145. While the CRJ-700 aircraft is common to SGF at this time, it is anticipated that it will be phased out in the long run for larger and more efficient aircraft, as described in **Chapter 3**, *Aviation Activity Forecasts*. Additionally, the Embraer 145 requires a runway that is longer than 7,000 feet, leaving Runway 14/32 as the only option.

Finally, the critical GA business aircraft were examined to determine their runway takeoff requirements. **Figure 4-2** represents the requirements for a large majority of the corporate jet fleet and also indicates the average length needed based on these criteria. This table also consulted aircraft performance manuals, which are representative of a fully loaded aircraft on a hot summer day.

FIGURE 4-2 - BUSINESS JET RUNWAY REQUIREMENTS



* Runway Requirements are approximations only from manufacturer Balanced Field Length or Take Off Field Length at Max Takeoff Weight adjusted for mean max temp. (90°F) and field elevation (1,268ft).

Source: Jviation, Inc.

Based on **Figure 4-2**, the average business jet runway length requirement is 6,048 feet. The most demanding aircraft is the Canadair BD-700 Global Express, while the least demanding is the Cessna 525 (Citation Jet I).

While 14/32 is adequate per FAA criteria at 8,000 feet, Runway 2/20 at 7,003 feet does not meet the recommended length for the larger aircraft operating at the airport. The performance manuals for both the design aircraft and the other large aircraft that frequent SGF also show that Runway 2/20 is not long enough to meet the needs of the aircraft.

It is recommended that Runway 2/20 be extended to meet the needs of current users without requiring limitations on passenger loads. Options for the extension of Runway 2/20 will be investigated in Chapter 5, Alternatives Analysis.

4.2.1.4 Declared Distances

Declared distances are used to achieve a standard safety area through the reduction of usable runway length. Typically, these are used when the existing runway environment cannot provide the minimum safety area mandated by the FAA for the Aircraft Reference Code (ARC) identified at a specific airport.

At SGF, declared distances are in place for Runway 2/20 due to the presence of the FAA Instrument Landing System (ILS) localizer antenna 890 feet north of the threshold for Runway 20. With an ARC of D-IV, SGF is required to maintain a safety area that extends 1,000 feet past each runway end. The existing location of the localizer antenna renders the safety area for Runway 2/20 as non-standard. To offset this non-standard safety area declared distances for Accelerated-Stop Distance Available (ASDA) and Landing Distance Available (LDA) are reduced from 7,003 feet to 6,893 feet for Runway 2. Due to the location of the antenna, the distances available for Runway 20 are not impacted.

The FAA recognizes that the localizer antenna will be required to be relocated outside of the 1,000 foot safety area.

As the antenna is FAA owned equipment, it will be moved using FAA funding with no burden on the airport. Currently it is unclear when the FAA will relocate the antenna as it is subject to FAA budget availability.

It is recommended that the localizer be located outside of the Runway Safety Area. This will be done using FAA funding not associated with airport improvement grants.

4.2.1.5 Runway Width

With an Airport Reference Code (ARC) of D-IV, the minimum required runway width for SGF is 150 feet. Both Runways 2/20 and 14/32 are 150 feet wide, meeting the minimum requirements for the design aircraft.

No additional runway width is required.

4.2.1.6 Runway Strength

The runways at SGF are constructed so that they can support aircraft with a weight bearing capacity of no greater than 135,000 pounds for Single Wheel Gear (SWG) equipped aircraft, 170,000 pounds for Dual Wheel Gear (DWG) equipped aircraft, 175,000 pounds for Single Tandem Gear (STG) equipped aircraft, and 300,000 pounds for Dual Tandem Gear (DTG) equipped aircraft. **Table 4-3** describes the common aircraft and their associated gear configuration.

TABLE 4-3 - GEAR CONFIGURATION

Gear Configuration	Weight(lbs)	Aircraft Classification
SWG	135,000	Most GA Aircraft including small and mid-sized business jets
DWG	170,000	Narrowbody aircraft such as B-737 and Airbus A319
STG	175,000	C-130
DTG	300,000	Large narrowbody and small widebody, such as the B-757 A300-600

The heaviest aircraft that routinely operate out of SGF are the Boeing 757, with a maximum takeoff weight (MTOW) of 250,000 pounds, and the Airbus A300-600 with a MTOW of 363,760 pounds. While the A300-600 has a MTOW above the published weight for DTG aircraft, this aircraft does not routinely operate at full capacity. Additionally, the MD-80 operated by Allegiant contributes the greatest amount of damage to a runway due to the gear configuration. Given the frequency of flights and operations at less than full capacity, pavement loading does not appear to be an issue on either runway.

At this time there is no anticipated need for any runway strengthening projects as most operators operate below the published weight.

The Lockheed C-5 Galaxy and Boeing C-17 are large military transport aircraft that are occasionally operated out of SGF in support of the Missouri National Guard. The C-5 has a MTOW at 840,000 pounds and the C-17 has a MTOW of 585,000 pounds, both well above the published weight for DTG aircraft. However, these aircraft are not frequent to SGF and do not operate at full capacity as they only serves to bring helicopters from active duty operations for repairs and other maintenance work.

No additional runway strength is required.

4.2.1.7 Runway Surface

As discussed in **Section 2.2.1**, the runways at SGF are currently constructed of grooved concrete. Routine maintenance, including spall and joint repair, should continue to be performed on a regular basis to extend the pavement life of the runways.

4.2.2 TAXIWAYS

Taxiways are designed to provide movement from the runways of an airport to the developed aviation related areas of the airport. SGF has a complex taxiway system that consists of both partial and full length parallel taxiways, runway exit taxiways, ramp/apron taxiways entrances, and run-up areas. Ideally, the taxiway system should allow an aircraft to taxi to an associated runway in the most direct manner without having to change speed, or cross active runways. FAA Advisory Circular 150/5300-13, *Airport Design*, establishes some basic design principles for taxiways and includes the following:

- Construct as many bypass, multiple access, or connector taxiways as possible to each runway end
- Provide taxiway run up areas for each runway end
- Provide each active runway with a full parallel taxiway
- Build all taxiway routes as direct as possible
- Avoid developed areas, which might create ground traffic congestion

Additional recommendations for taxiway layout contained in the FAA's Engineering Brief #75, *Incorporation of Runway Incursion Prevention into Taxiway and Apron Design,* have been incorporated into the latest update to Advisory Circular 150/5300-13, Change 17. The engineering brief and its recommendations are now a required standard. The taxiway and apron layouts were evaluated for compliance with the recommendations from the engineering brief, which include:

- Limit the number of aircraft crossing an active runway
- Optimize pilots' recognition of entry to the runway (increase situational awareness) through design of taxiway layout, for example:
- Use a right angle for taxiway-runway intersections (except for high speed exits)
- Limit the number of taxiways intersecting in one spot
- Avoid wide expanses of pavement at runway entry
- Ensure the taxiway layouts take operational requirements and realities into account to:
- Safely and efficiently manage departure queues
- Avoid using runways as taxiways
- Use taxi strategies to reduce the number of active runway crossings
- Correct runway incursion "hot spots"

The taxiway design standards for width and separation are dictated by Airplane Design Group (ADG). At SGF, ADG IV (aircraft with a wingspan up to 171 feet) is used to establish the criteria for the current system and for any planned future taxiways. All taxiways require a Taxiway Safety Area (TSA) and Taxiway Object Free Area (TOFA). These standards allow for the safe movement of aircraft without the threat of striking any objects or other aircraft. For ADG IV aircraft, the TSA is 171 feet and the TOFA is 259 feet from centerline.

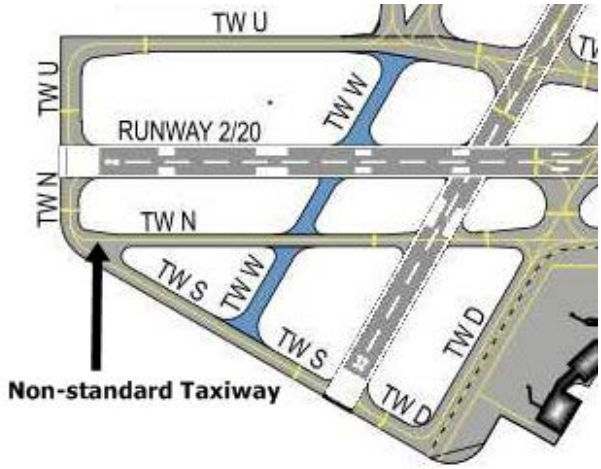
Using the aerial survey obtained for this project, all taxiways were evaluated to determine if they met current width, TSA, and TOFA standards. All of the taxiways at SGF are in good condition and meet

applicable design standards, with the exception of a portion of Taxiway N. Taxiway N is a non-standard taxiway based on the width standard for the largest aircraft operating at SGF (50' taxiway width versus 75' standard) where it runs from Runway 14/32 to the intersection of Taxiway S and the threshold of Runway 2, as depicted in **Figure 4-3**.

Although it meets width standards for the majority of aircraft operating at SGF, it is recommended that Taxiway N be improved so that it meets width standards for Aircraft Design Group IV (e.g. Boeing 757, Airbus A300).

Taxiway W, as depicted in **Figure 4-3**, is planned for future completion and extends the taxiway to the end of Runway 32. This extension would create a five point intersection which does not meet guidance in Advisory Circular 150/5300-13 or from the FAA Office of Runway Safety. Additionally, the point at which aircraft taxiing on Taxiway W cross existing Runway 2/20 would be in close proximity to the touchdown location for aircraft arriving on Runway 2.

FIGURE 4-3 - TAXIWAY IMPROVEMENTS



Source: Jviation, Inc.

It is recommended that the extension of Taxiway W continue to be depicted on the ALP. If future changes in airport layout mitigate this five way intersection consideration can be given to the extension of Taxiway W.

In interviews with GA users it was identified that the only access point to the self-serve fuel farm located north of the GA Apron is through the use of Taxiway N. When Runway 20 is the primary runway in use users advised that Taxiway N can become congested with aircraft waiting to depart and aircraft taxiing to the self-serve fuel farm. Often aircraft have to wait for enough aircraft to depart to reach the Taxiway P and accesses the self-serve fuel farm. With the self-serve fuel farm a popular fueling option it is used frequently.

It is recommended that a bypass be constructed, connecting the existing GA Apron with Taxiway P.

FIGURE 4-4 - BYPASS TAXILANE TO SELF-SERVE FUEL FARM

Source: Jviation, Inc.

4.2.3 FAA SAFETY STANDARDS

For all airport planning efforts, FAA design standards are a primary consideration, as they are designed to ensure the safety of aircraft operations by ensuring safe conditions are met across the country. **Table 4-4** summarizes the FAA design standards from FAA Advisory Circular (AC) 150/5300-13, *Airport Design*, along with the current condition on the two runways. As previously stated, SGF is a D-IV airport based on current operations. Runway and taxiway dimensional standards must meet or exceed the specified widths and clearances specific to the critical aircraft to ensure safe operations for landing, take-off, and taxi.

TABLE 4-4 - FAA DESIGN STANDARDS

	ARC D-IV	**Existing Runway 14/32**	**Existing Runway 2/20**
Runway Safety Area Width Length Beyond RW End	 500ft 1000ft	 500ft 1000ft	 500ft 1000ft
Taxiway Safety Area Width	171ft	171ft	171ft
Taxiway Object Free Area Width	259ft	259ft	259ft
Runway CL to Parallel TW CL	400ft	400ft	400ft
Runway CL to Aircraft Parking	500ft	>500ft	>500ft
Taxiway CL to Parallel TW CL	215ft	N/A	N/A
Runway Hold Line	263ft	250 - 263ft	250-263ft

Source: FAA AC 150/5300-13, Airport Design

4.2.3.1 Shoulders and Blast Pads

SGF currently does not have paved shoulders on either the runways or taxiways. Chapter 8 of AC 150/5300-13, *Airport Design,* recommends 25-foot paved shoulders for ADG-IV and higher. Due to the amount of pavement at SGF, it would be a substantial investment to construct shoulders.

Chapter 3 of AC 150/5300-13, *Airport Design,* recommends blast pads that are 200 feet wide by 200 feet long. SGF currently has one blast pad that is located at the threshold of Runway 14 while the remaining runway ends do not have blast pads.

Shoulders and blast pads are recommended to reduce erosion and jet blast hazards.

4.2.3.2 Safety Areas

A safety area is a defined surface surrounding the runway or taxiway that is specifically prepared and suitable for reducing the risk of damage to airplanes in the event of an undershoot, overshoot, or excursion from the paved surface. The current safety areas for both runways at SGF are adequate and meet FAA standards for dimensions and grading. Additionally, the safety areas for the associated taxiway system for SGF are also adequate.

The safety areas meet the current standards; however, they should continue to be monitored, and erosion and other maintenance-related issues should be rectified as soon as possible.

4.2.3.3 Runway Hold Bars

Runway hold bars are in place to prevent aircraft or ground vehicles from entering an active runway. The hold bars are to be positioned so that no part of the aircraft or vehicle penetrates the runway safety area or other airfield airspace surfaces. Additionally, for airports that have an ADG where aircraft have an approach speed class of D (they approach at a higher rate of speed), the distance the hold bar must be placed from the runway centerline increases one foot for every 100 feet above sea level.

SGF has an approach speed class of D and the surveyed airfield elevation is 1,268 feet above sea level. Therefore, an extra 13 feet of separation must be added to the current standard 250 foot hold bar separation, creating a 263 foot separation. There are five taxiway connectors on Runway 2/20 where the runway hold bar is less than 263 feet from the runway centerline, as depicted in **Figure 4-5**.

It is recommended that all hold bars be relocated to meet current design standards

FIGURE 4-5 - RUNWAY HOLD BAR SEPARATION

Source: Jviation, Inc.

4.2.3.4 Object Free Area (OFA)

An OFA is an area on the ground that is centered on a runway, taxiway, or taxilane centerline, and is provided to enhance the safety of aircraft operations by clearing the area of above-ground objects. Acceptable objects in the OFA are objects that need to be located in that area for air navigation or aircraft ground maneuvering purposes, or are less than three inches tall. The OFAs for both runways at SGF adequately meet the standards set forth for both dimension and protection. However, there were some minor discrepancies found in the placement of taxiway movement area hold bars, allowing aircraft to taxi along a taxiway and remain clear of aircraft waiting for clearance. With an ADG IV standard, the Taxiway OFA should be clear 129.5 feet from the taxiway centerline. As shown in **Figure 4-6** and **Figure 4-7**, these issues are minor and are not widely found across the airfield.

It is recommended that all hold lines be remarked to meet the standard of 86.5 feet from taxiway centerline.

FIGURE 4-6 - NON-STANDARD SEPARATION

Source: Jviation, Inc.

FIGURE 4-7 - NON-STANDARD TAXIWAY SEPARATION

Source: Jviation, Inc.

4.2.3.5 Obstacle Free Zone (OFZ)

The OFZ is a volume of airspace intended to protect aircraft in the early and final stages of flight. It must remain clear of object penetrations, except for frangible NAVAIDs located in the OFZ because of their function. The OFZ is comprised of the Runway OFZ and, where applicable, the Precision OFZ, the Inner-Approach OFZ, and the Inner Transitional OFZ.

All portions of the OFZ are free of restricted obstacles.

4.2.3.6 Runway Protection Zone (RPZ)

The RPZ is a trapezoidal area off of each runway end designed to enhance the protection of people and property on the ground. In order to ensure that the RPZs are kept clear of incompatible uses, the land included in the RPZ should be owned by the airport or protected via an avigation easement. In the land under current RPZ locations, the airport either owns or already has RPZ avigation easements in place. For land under proposed future RPZ locations, there are some areas that the airport does not own or do not have a current easement. The land under the proposed future RPZs that is not under airport control is labeled for purchase or for future easement and is shown on the airport's Exhibit A Property Map.

It is recommended that the airport acquire all land within the future RPZ, or at a minimum obtain an avigation easement.

4.2.3.7 Building Restriction Lines (BRLs)

The BRLs are lines that run parallel to each of the runways and offset at a distance that ensures that new construction is below the FAR Part 77 Airport Imaginary Surfaces. The BRLs at SGF are calculated based on a 35 foot tall structure. Structures that are taller than 35 feet will require additional analysis to ensure compliance with the FAR Part 77 surfaces.

The airport controls all land within the existing BRLs and all buildings that are not fixed by function (e.g. Localizer building) are outside of the BRLs.

4.2.3.8 Runway Visibility Zone (RVZ)

The RVZ is required to ensure clear visibility for converging aircraft when an airport has intersecting runways. The RVZ is a four-sided polygon that connects at the midpoint of the runway intersection to each of the runway ends. The terrain needs to be graded and permanent objects need to be designed or sited so that there will be an unobstructed line of sight from any point five feet above one runway centerline to any point within the runway visibility zone.

All RVZ requirements are met.

4.2.3.9 Runway Line of Sight

The Runway Line of Sight standard requires that two points, five feet above the runway centerline be mutually visible for the entire length of the runway. However, if there is a parallel taxiway, the two five-foot points must be visible for one-half of the runway length.

All Runway Line of Sight Requirements are met.

4.2.3.10 Air Traffic Control Tower (ATCT) Line of Sight

The ATCT must have a clear visual line of sight to all critical areas of the airport, particularly the runway ends. There are some line of sight issues pertaining to aircraft taxiing down Taxiway U adjacent to the Cargo Apron. When larger cargo jets are parked on the apron, their vertical stabilizers can obstruct the view of aircraft taxiing towards the threshold of Runway 20. The FAA has deemed this spot a hot spot, as previously discussed in **Section 2.2.9**. To address this line of sight issue, the tower would either have to be elevated or relocated.

It is recommended that aircraft be limited from parking on the south end of Cargo Apron. Alternatively, if the FAA ATCT deems this line of sight enough of a hazard, the tower can be raised to a level that eliminates the obstruction to line of site.

4.2.4 NAVIGATIONAL AND LANDING AIDS

4.2.4.1 Instrument Approaches

There are two types of Instrument Approach Procedures (IAPs): traditional ground based and satellite based (GPS). Approach minimums are based upon several factors, including obstacles, navigation equipment, approach lighting, and weather reporting equipment.

There are two primary classifications of ground based navigation systems. Both are used at SGF, and either *non-precision*, provide horizontal guidance only (e.g. VOR, NDB, TACAN, etc.), or *precision,* provide both horizontal and vertical guidance (e.g. ILS) is given. In most cases, the lowest possible minimums with horizontal only guidance is 300-1 (i.e. 300 feet cloud ceiling allowance and one mile visibility).

Instrument Landing Systems (ILS) approaches are broken into three categories: CAT I, CAT II, and CAT III. CAT II and CAT III systems require increased airport investments, such as in-pavement runway and taxiway lighting, duplicate equipment installations, and longer approach lighting systems. They are therefore typically only used at the nation's busiest airports where weather delays can have reverberating effects throughout the entire country. Additionally, many airlines do not use CAT II and CAT III approaches because of the added aircraft equipment and crew training. CAT I ILS approaches are the most common type of ILS at commercial service airports such as SGF.

GPS satellite based instrument approaches follow the same basic guidelines as ground based systems, with the lowest possible minimums for approaches with horizontal only guidance being 300-1. With the addition of vertical guidance through Wide Area Augmentation System (WAAS) or Local Area Augmentation System (LAAS), the lowest minimums are generally 200-½. The visibility can be reduced by ¼ mile with the installation of an approach lighting system.

As discussed in **Chapter 2**, *Inventory*, the airport has a variety of different instrument approach types. These include precision instrument approaches utilizing ILS, as well as non-precision approaches that utilize GPS or ground-based navigational aids such as VORs.

A review of the meteorological data from the National Climatic Data Center[38] shows that total IFR conditions occur approximately 5.6% of the time, resulting in about 490 hours of IFR conditions throughout the year. Most of these conditions are low cloud or poor visibility situations in which the pilot can often choose to use one of the airport's non-precision approaches. Conditions which require the use of a precision approach account for approximately 0.6% of the year, or about 52 hours annually.

[38] National Climatic Data Center, 10-Year Wind Rose Summary for Springfield, MO

It was also mentioned in the user surveys that an ILS for Runways, 2 and 32 would be beneficial. After studying the historical wind data for SGF, it was determined that the current ILS systems for Runways 20 and 14 adequately serve the airport users by providing over 98% coverage during IFR conditions.

The current ILS system adequately meets the needs of current users and those forecasted, no additional equipment is required at this time.

4.2.4.2 NextGen/Global Positioning System (GPS) Approaches

Recent technological advancements have made possible the use the satellite-based navigation systems that rival their ground-based predecessors in accuracy. These capabilities will further improve with the completion of the FAA's NextGen program, which is a complete upgrade of the nation's airspace. NextGen creates new technologies to improve safety and capacity of the national system and includes new features and enhancements for pre-departure, departure, climb, en-route, and arrival phases of a flight. More information on the NextGen program can be obtained from the FAA's website[39].

Until the last few years, GPS technology was available, but it was only used to establish horizontal positioning. Improvements, such as the Wide Area Augmentation System (WAAS), which uses a network of ground-based antennas to send correcting signals to the GIS satellite constellation, allow for far greater accuracy and enable the use of GPS for near-precision approaches.

An approach developed using GPS WAAS technology is known as a Localizer Performance with Vertical Guidance (LPV). LPV approaches are currently published for the two runways at SGF with ILS installations: Runways 2 and 14. Due to user comments as discussed in **Chapter 2,** *Inventory*, and a review of meteorological data, the addition of WAAS approaches to the other two runways, 20 and 32, particularly Runway 32, are desirable improvements.

In order to get an LPV approach, there are differing levels of requirements based on the types of landing minimums that are desired.[40] For example, in order to have an LPV approach published with minimums of less than ¾ mile visibility and 250 foot decision height, the runway must be equipped with High or Medium Intensity Runway Lighting, have a clear 34:1 approach slope surface, and have an advanced approach lighting system.

In order to get an LPV approach for a runway, that runway must meet certain criteria. All of the runways at SGF meet the minimum criteria, with the runways with advanced approach lighting meeting the criteria for a very good LPV approach.

[39] http://www.faa.gov/nextgen/
[40] Requirements for each approach type can be found in Appendix 16 of FAA Advisory Circular 5300-13, *Airport Design.*

4.2.4.3 Instrument Approach Improvements

Runway 14 – Currently this runway has a precision approach using an ILS, as well as three non-precision approaches using localizer or GPS technology.

As more aircraft are equipped with GPS-certified navigation systems, it is recommended to upgrade the runway's instrument approach through the publication of an LPV approach.

Runway 32 – A review of meteorological data indicates that Runway 32 is the runway with least need for instrument landing purposes. Very rarely are the winds and visibility such that an advanced approach would be required for this runway. With little to no investment, an LPV approach could be published that would slightly improve the landing minimums. Benefits are limited since the runway end does not have an approach lighting system. Land will be reserved for a future approach lighting system for this runway; however, it is not recommended at this time to plan for their installation.

The best possible LPV approach without approach lighting requirements should be requested.

Runway 2 – Runway 2 currently offers the most approach options and the best available landing minimums for the airport.

No additional improvements are needed.

Runway 20 – This runway currently has numerous non-precision GPS approaches, as well as a non-precision VOR approach. There is also an existing non-precision LPV approach.

It is possible that with the recent approach survey and the existing approach lighting of the airport that the existing LPV approach can be improved.

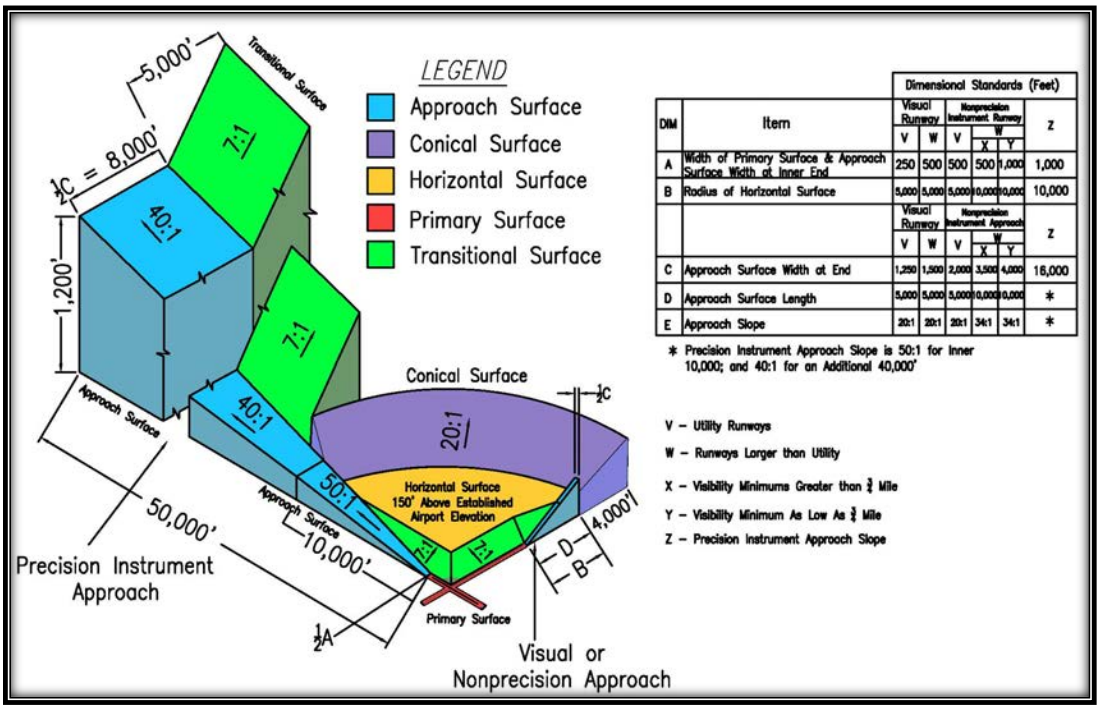
4.2.5 AIRSPACE REQUIREMENTS

The current airspace designated for SGF, as well as the immediate surrounding airspace, adequately satisfies current levels of operations. Additionally, the airspace will be adequate to accommodate the level of operations outlined in the FAA approved forecasts.

FAR Part 77 defines and establishes the standards for determining obstructions that affect airspace in the vicinity of an airport. Prior to any airport development, a FAR Part 77 evaluation must be conducted regardless of project scale to verify that there will be no hazardous effect to air navigation due to construction. FAR Part 77 defines the airport's imaginary surfaces, which are geometric shapes that are in relation to the airport and each runway. The size and dimensions of these imaginary surfaces is based on the category of each runway for current and future airport operations. The five imaginary surfaces are the Primary, Approach, Horizontal, Conical, and Transitional shown in **Figure 4-8**, and are defined below. Any object which penetrates these surfaces affects navigable airspace and is therefore considered an obstruction.

In respect to FAR Part 77, Runway 14 is a larger than utility runway with a precision instrument approach and visibility minimums lower than ½ mile. Runway 32 is a larger than utility runway with a non-precision instrument approach and visibility minimums lower than 1 mile. Runway 2 is a larger than utility runway with a precision approach and visibility minimums lower than ½ mile. Runway 20 is a non-precision instrument approach with visibility minimums lower than ½ mile.

FIGURE 4-8 - PART 77 IMAGINARY SURFACES



DIM	Item	Dimensional Standards (Feet)					
		Visual Runway		Nonprecision Instrument Runway			Z
		V	W	V	W X	W Y	
A	Width of Primary Surface & Approach Surface Width at Inner End	250	500	500	500	1,000	1,000
B	Radius of Horizontal Surface	5,000	5,000	5,000	10,000	10,000	10,000
		Visual Runway		Nonprecision Instrument Approach			Z
		V	W	V	W X	W Y	
C	Approach Surface Width at End	1,250	1,500	2,000	3,500	4,000	16,000
D	Approach Surface Length	5,000	5,000	5,000	10,000	10,000	*
E	Approach Slope	20:1	20:1	20:1	34:1	34:1	*

* Precision Instrument Approach Slope is 50:1 for Inner 10,000; and 40:1 for an Additional 40,000'

Source: Jviation, Inc.

Primary Surface - The Primary Surface is an imaginary obstruction-limiting surface that is specified as a rectangular surface longitudinally centered about a runway. The specific dimensions of this surface are functions of types of approaches existing or planned for the runway.

Approach Surface - The Approach Surface is an imaginary obstruction-limiting surface that is longitudinally centered on an extended runway centerline and extends outward and upward from the primary surface at each end of a runway at a designated slope and distance upon the type of available or planned approach by aircraft to a runway.

Horizontal Surface - The Horizontal Surface is an imagery obstruction-limiting surface that is specified as a portion of a horizontal plane surrounding a runway located 150 feet above the established airport elevation. The specific horizontal dimension of this surface is a function of the types of approaches existing or planned for the runway.

Conical Surface - The Conical Surface is an imaginary obstruction-limiting surface that extends from the edge of the horizontal surface outward and upward at a slope of 20 to 1 for a horizontal distance of 4,000 feet.

Transitional Surface - The Transitional Surface is an imaginary obstruction-limiting surface that extends outward and upward at right angles to the runway centerline and the runway centerline extended at a slope of 7 to 1 from the sides of the primary surface.

4.2.6 OBSTRUCTIONS

Obstructions are defined as any object of natural growth, terrain, permanent or temporary construction equipment, or permanent or temporary manmade structure that penetrates an imaginary surface.

As part of this master plan update a detailed obstruction survey was conducted following guidelines in the FAA AGIS program. This obstruction data was used to determine the impacts to the approach and departure surfaces, including the proposed One Engine Inoperative (OEI) surface. The updated ALP set includes plan and profile depictions of obstructions for each runway end, both existing and future. Additionally, the ALP provides recommendations for mitigating these airspace obstructions. Finally, all obstruction data collected under the AGIS program that is verified and approved by the National Geodetic Society is automatically forwarded on to the FAA to update existing flight procedures, if required, and for future flight procedure development.

4.3 LANDSIDE REQUIREMENTS

4.3.1 REGIONAL TRANSPORTATION NETWORK

The roads and highways that provide access to SGF are adequate to handle both the current conditions and the future growth predicted in the approved FAA Forecast. This is due in part to the reconfiguration of the airport and the location of the new Midfield Terminal. To support this relocation, regional roads and access to the terminal were built and/or improved. This relocation included a new roundabout and direct access to I-44. The ease of access to major highways provides for a quick transition from the airport to the travelers' final destinations.

No additional improvement to the regional transportation network is required.

4.3.2 ON-AIRPORT CIRCULATION ROADWAYS

The on-airport circulation roadways meet current needs. With the opening of the new Midfield Terminal, a new roadway system was constructed to provide access to the travelling public. These roadway systems adequately handle current passenger capacity and will be able to support future growth anticipated in the approved FAA Forecast. The roadway system that supports the West Kearney Complex and GA facilities is also adequate and can handle the current capacity needs for operations at both facilities.

It is recommended that roadways be monitored to ensure that any additional growth from both the Missouri Army National Guard and Expedia do not impact adjacent facilities.

4.3.3 PARKING

Parking at SGF is currently adequate for meeting the current passenger demand level. There are times during peak travel periods where parking (particularly long-term) reaches roughly 80% capacity. When capacity starts to reach 90%, expansion for parking should be considered. This can be done through expansion of the current parking lots by adding additional spaces. Many vehicles bypass short-term parking for the long-term parking lot. As capacity is reached, one option is to manage capacity through pricing. For example, the cost of long-term parking could be raised, along with a reduction in the price of short term parking to encourage some traffic to shift into the currently underutilized short-term lots. It is not anticipated that there will be a significant modal shift as far as what type of transportation people will use to get to the airport within in the next 20 years. It is likely that personal vehicles will remain the primary method for getting to the airport.

There is additional parking at the old Kearney and GA Terminals which serves the GA travelers and employees working for the Missouri National Guard and Expedia. Parking is currently adequate at these facilities. While there is room for additional growth, once capacity is reached, plans should begin for additional parking.

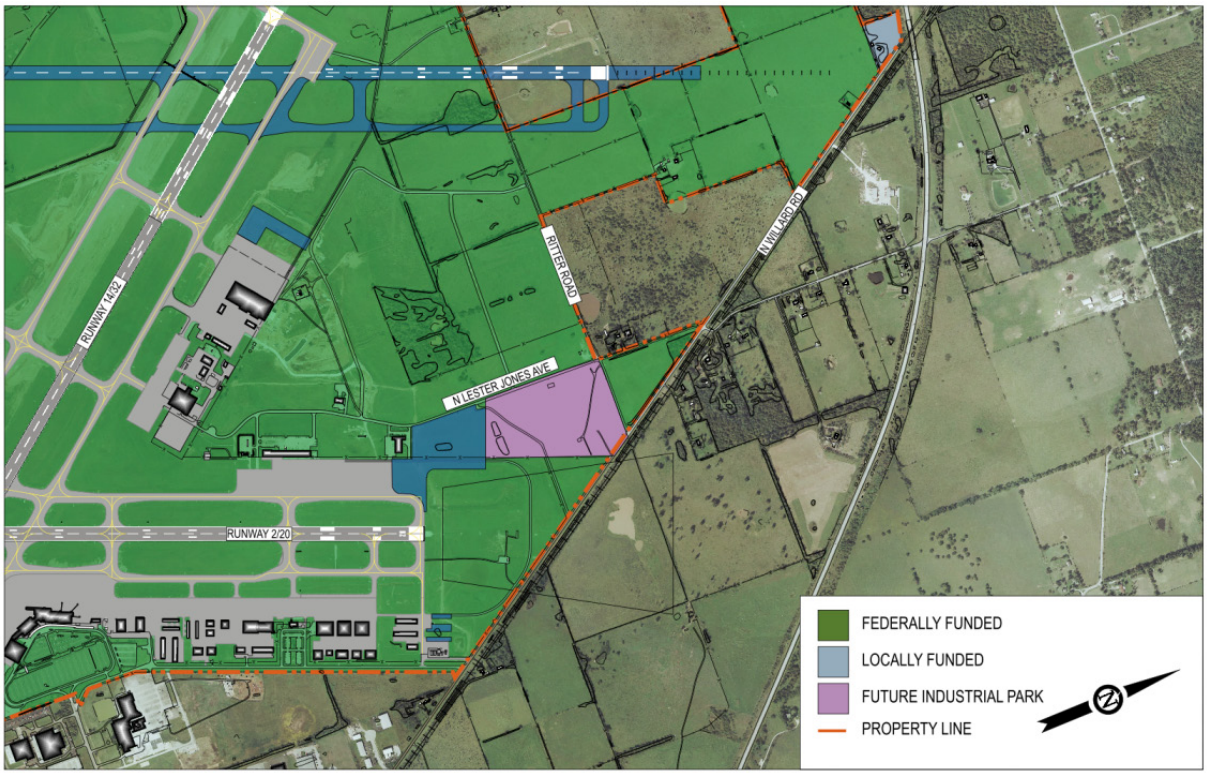
There are no additional parking requirements at this time.

4.3.4 LAND USE

The airport has identified land for a proposed industrial park located on the north edge of the airfield at the intersection of N. Lester Jones Ave and Ritter Road, as depicted in **Figure 4-9**. This land was purchased using FAA grant funding and as such is restricted in how the land can be used. For any use that is not directly related to aeronautical activities the FAA would require a land release following the guidelines found in Chapter 22 of **FAA Order 5190.6B**, *FAA Airport Compliance Manual*.

It is recommended that the airport formally request that the land identified for a future industrial park be released from aeronautical obligations.

FIGURE 4-9 - FUTURE INDUSTRIAL PARK



Source: Jviation, Inc.

4.4 TERMINAL REQUIREMENTS

Of all of the airport areas, the terminal area is the one that is most susceptible to major impacts arising out of minor changes. For example, an airline scheduling change of just 30 minutes has the potential to require an additional gate, significantly add to the hourly throughput of passenger screening, and overload a secure hold room. Airline scheduling and equipment changes are impossible to accurately predict in both the short- and long-term. For this reason, annual enplanements and peak activity based on today's operation carried forward are the most reasonable indicators of future activity levels. Airport Management should continue to evaluate the adequacy of each functional area of the terminal and analyze airline scheduling changes for their impact to these areas.

4.4.1 LEVEL OF SERVICE

Level of Service indicators for the passenger terminal at SGF were estimated for each of the terminal's functional areas. These assessments were made from a review of as-built drawings from the terminal construction, several site visits to observe passenger flows, and detailed analysis using industry standard planning factors. All of this information has been compiled below to present a picture of the performance of the different functional areas of the terminal under the current load demands placed on them.

The FAA, along with the International Air Transportation Association (IATA), has developed standards for use in analyzing space requirements at airports. IATA defines standards in relation to the "Level of Service" that should be maintained by the airport operator. These service levels are discussed as a means to assess the ability of the particular areas to comfortably perform their intended purpose. The service levels are as follows:

A – An excellent level of service. Conditions of free flow, no delays, and excellent levels of comfort.

B – A high level of service. Conditions of stable flow, very few delays, and high levels of comfort.

C – Good level of service. Conditions of stable flow, acceptable delays, and good levels of comfort.

D – Adequate level of service. Conditions of unstable flow, acceptable delays for short periods of time, and adequate levels of comfort.

E – Inadequate level of service. Conditions of unstable flow, unacceptable delays, and inadequate levels of comfort.

F – Unacceptable level of service. Conditions of cross-flows, system breakdowns, and unacceptable delays; an unacceptable level of comfort.

The airport currently operates at an "A" or "B" level, while the facility generally provides an excellent level of comfort with room for growth.

The text in the following sections describes each functional area of the terminal building and assigns a level of service to that function. Generally, the spaces for each function of this terminal achieve a Service Level of "A" under the loading produced by the current peak level of passengers. Given the growth projections, maintaining a Service Level of "A" during peak periods in all areas of the terminal may prove to be cost prohibitive. Depending on the economic climate of the future, it may be appropriate to accept Service Level "B" standards in certain areas. Only when Service Levels start to degrade to the level of C should consideration be given to adding or changing services in the terminal.

Conceptual planning factors have been determined specifically for each functional area. Planning factors are the "units of facility", such as square feet or linear feet, that adequately serve a "unit of demand", such as a passenger who is either arriving or departing. These planning factors were specifically derived to reflect the unique operations of SGF. The planning factors used will ensure high performance of each of the spaces within the building.

Activity levels at an airport are represented as Annual Enplaning Passengers (ANNEP), Peak Hour Originating Passengers (PHOP), Peak Hour Terminating Passengers (PHTP), and Peak Hour Passengers (PHP). These activity levels were described in detail in **Section 3.6.17.** While annual traffic (ANNEP) is a useful benchmark for describing the activity from year to year, peak hour (PHOP and PHTP) activity is most important to determine the size of terminal facilities. For example, ticket counters and outbound baggage facilities primarily serve PHOP, whereas baggage claim areas serve only PHTP. Some facilities, like restrooms, serve all types of passengers and are sized to handle the highest peak hour passenger demand (PHP). Peak 20 minute flight arrivals are considered in determining the sizing of baggage claim areas and the number and type of baggage claim devices.

Based on historical airport activity, virtually all passengers at the airport are assumed to be origination and destination (O&D) passengers. Connecting activity is expected to be minimal. Consequently, PHOP will, for practical purposes, equal PHTP.

TABLE 4-5 - APRON LEVEL SQUARE FOOT (SF) RECOMMENDATIONS PER FUNCTIONAL AREA

Type of Occupancy – Apron Level	Existing	Conceptual Planning Factor		2009	2010	2014	2019	2030
Airline Functions								
Inbound Baggage	13,614	24.00	SF/PHTP	4,368	4,392	4,656	5,040	5,856
Outbound Baggage	5,620	24.00	SF/PHOP	4,368	4,392	4,656	5,040	5,856
Tug/General Circulation	54,027	0.04	SF/ANN	31,972	32,017	35,516	40,490	54,104
Ground Service Equipment Offices	3,365	0.01	SF/ANN	3,997	4,002	4,439	5,061	6,763
Airport Operations Offices/Workshop Areas	3,610	0.01	SF/ANN	3,997	4,002	4,439	5,061	6,763
TSA Bag Screening Room	13,501	1250.0	SF/MAC	2,500	2,500	2,500	3,750	3,750
Restrooms	520	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Subtotal	**94,257**							
Building Service Areas								
Vertical Circulation	2,109	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Loading Dock	4,369	0.012	SF/Total	1,422	1,422	1,422	1,422	1,422
Maintenance/Storage	3,841	0.01	SF/Total	1,185	1,185	1,185	1,185	1,185
Mechanical/Electrical/ Building Systems	13,888	0.12	SF/Total	14,216	14,216	14,216	14,216	14,216
Subtotal	**24,207**							
Total Apron Level	**118,464**							

Source: Jviation, Inc.

TABLE 4-6 - MAIN LEVEL RECOMMEDATIONS PER FUNCTIONAL AREA

Type of Occupancy – Main Level	Existing SF	Conceptual Planning Factor		2009SF	2010SF	2014SF	2019SF	2030SF
Airline Functions								
Baggage Claim Area	6,767	28.00	SF/PHTP	5,096	5,124	5,432	5,880	6,832
Baggage Claim Frontage	*234*	*1.20*	LF/PHTP	*218*	*220*	*233*	*252*	*293*
Baggage Claim Service Office	282	1.48	SF/PHOP	269	271	287	311	361
Curbside Baggage Check	922	2.20	SF/PHOP	801	803	854	922	1,074
Curbside *Checking Frontage*	*40*	*0.20*	LF/PHTP	*36*	*37*	*39*	*42*	*49*
Curbside Baggage Offices	598	2.75	SF/PHOP	501	503	534	578	671
Ticket Counter Area	3,792	12.50	SF/PHOP	2,275	2,288	2,425	2,625	3,050
Ticket *Counter Length*	*328*	*0.80*	LF/PHOP	*146*	*146*	*155*	*168*	*195*
Ticketing Kiosks	1,520	8.15	SF/PHOP	1,483	1,491	1,581	1,712	1,989
Ticket Counter Queuing	3,728	15.50	SF/PHOP	2,821	2,837	3,007	3,255	3,782
Airline Offices	3,071	14.25	SF/PHOP	2,594	2,608	2,765	2,993	3,477
Departure Lounges	21,024	2,100	SF/Gate	21,000	21,000	21,000	21,000	33,600
Loading Bridges	6,262	625.0	SF/Gate	6,250	6,250	6,250	6,250	10,000
Subtotal	**47,966**							
Concessions								
Concessions – Food (Non-Secure)	2,680	0.0032	SF/ANN	2,558	2,561	2,841	3,239	4,328
Concessions - Food (Secure)	1,846	0.0032	SF/ANN	2,558	2,561	2,841	3,239	4,328
Concessions – News/Gifts (Non-Secure)	1,043	0.0015	SF/ANN	1,199	1,201	1,332	1,518	2,029
Concessions – News/Gifts (Secure)	1,198	0.0015	SF/ANN	1,199	1,201	1,332	1,518	2,029
Concessions – Vending Machines	160	0.0004	SF/ANN	320	320	355	405	541
Travel Agent	844	0.008	SF/ANN	639	640	710	810	1,082
Information	749	0.0009	SF/ANN	719	720	799	911	1,217
Rental Car Counter Area	5,118	0.0040	SF/ANN	3,197	3,202	3,552	4,049	5,410
Rental Car Counter Length	150	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Rental Car Queuing Area	1,770	0.0010	SF/ANN	799	800	888	1,012	1,353
Subtotal	**15,558**							

Source: Jviation, Inc.

TABLE 4-7 – MAIN LEVEL RECOMMENDATIONS PER FUNCTIONAL AREA

Type of Occupancy – Main Level	Existing SF	Conceptual Planning Factor		2009SF	2010SF	2014SF	2019SF	2030SF
Non-Secure Public Areas								
Circulation - General	24,174	0.022	SF/ANN	17,585	17,609	19,534	22,270	29,757
Circulation - Ticketing	10,080	12.50	SF/PHOP	2,275	2,288	2,425	2,625	3,050
Circulation - Baggage Claim	11,950	12.50	SF/PHTP	2,275	2,288	2,425	2,625	3,050
Meet and Greet / Waiting Area	1,870	8.00	SF/PHTP	1,456	1,464	1,552	1,680	1,952
Chapel/Meditation Room	587	0.0005	SF/ANN	400	400	444	506	676
Restrooms	2,589	3.50	SF/PHP	1,274	1,278	1,358	1,467	1,708
Airport Administration	14,253	0.011	SF/ANN	8,792	8,805	9,767	11,135	14,879
Subtotal	**65,503**							
Secure Public Areas								
Circulation	12,454	0.012	SF/ANN	9,592	9,605	10,655	12,147	16,231
Restrooms	2,678	3.50	SF/PHP	1,274	1,278	1,358	1,467	1,708
TSA Security Queuing	2,206							
TSA Security Screening	3,654	1,200	SF/chkpt	2,400	2,400	2,400	2,400	3,600
TSA Reconciliation Area / Secure Exit	3,241	N/A	N/A	N/A	N/A	N/A	N/A	N/A
TSA Offices	2,250	1.40	SF/PHO	255	256	272	294	342
TSA Break Room	730	2.94	SF/PHO	535	538	570	617	717
SUBTOTAL Secure Public Areas	**27,213**							
Building Service Areas								
Vertical Circulation (Non-Public)	1,892	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Vertical Chases	653	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Maintenance/Storage	2,497	0.01	SF/Total	1,625	1,625	1,625	1,625	1,625
Mechanical/Electrical/Building Systems	1,168	0.12	SF/Total	19,494	19,494	19,494	19,494	19,494
Subtotal	6,210							
Total Main Level	**162,450**							

Source: Jviation, Inc.

TABLE 4-8 – UPPER LEVEL RECOMMENDATIONS PER FUNCTIONAL AREA

Type of Occupancy – Upper Level	Existing SF	Conceptual Planning Factor		2009SF	2010SF	2014SF	2019SF	2030SF
Building Service Areas								
Vertical Circulation (Non-Public)	1,458	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Mechanical/Electrical/ Building Systems	24,464	0.12	SF/Total	3,111	3,111	3,111	3,111	3,111
Total Upper Level	**25,922**							

Source: Jviation, Inc.

Using these planning factors as a tool for analysis, the varying demands placed on the different components of the Commercial Terminal can be studied. Based on this study, certain areas are likely to become crowded and need expansion at different timeframes than others.

4.4.2 BUILDING SYSTEMS / CODE COMPLIANCE ANALYSIS

The International Building Code (IBC) determines the maximum occupancy of a building, or portion of a building, based on the function of that space. For instance, a mechanical room will only allow for one occupant per 300 square feet, due to the expectation of large equipment occupying a large majority of the space. Conversely, a business office will allow for one occupant per 100 square feet, assuming more room will be given for use by people. The terminal building fits into the Occupancy Classification for a "Covered Mall" (per IBC 402.2 – the definition includes Passenger Terminals). The variety of different uses on the Main Level yields an approved maximum occupancy of 4,576 persons. The Apron Level has a maximum occupancy of 430 persons while the Upper Level has a maximum occupancy of 86 persons.

TABLE 4-9 - MIDFIELD TERMINAL OCCUPANCY

Midfield Terminal Occupancy			
Life Safety Means of Egress Calculations (Per Code)			
Type of Occupancy – Apron Level	SF Interior	SF/Person	Occupancy Load
Baggage Handling	90,780	300	302
Business	6,478	100	65
Storage	6,650	300	22
Mechanical	12,284	300	41
TOTAL APRON LEVEL	**116,192**		**430**
Type of Occupancy – Main Level	SF Interior	SF/Person	Occupancy Load
Baggage Claim	12,810	20	641
Circulation	68,138	100	682
Business	26,850	100	269
Waiting Areas	39,603	15	2640
Mercantile	4,718	30	157
Storage	702	300	2
Assembly	2,674	15	178
Mechanical	2,030	300	7
TOTAL MAIN LEVEL	**157,525**		**4,576**
Type of Occupancy – Upper Level	**SF Interior**	**SF/Person**	**Occupancy Load**
Mechanical	25,657	300	86
TOTAL UPPER LEVEL	**25,657**		**86**
TOTAL BUILDING	**299,374**		**5,092**

Source: Jviation, Inc.

The building code requires the installation of a minimum amount of restrooms, drinking fountains, and service sinks to serve the maximum total occupancy. The layout of the terminal meets or exceeds all of these requirements. In fact, the restrooms of this facility are sufficient to satisfy the code requirement for 8,910 occupants, a level of service much higher than currently in place. Additional factors influence the space plan of the facility, such as the Level of Service rating which will be discussed in further detail in following sections.

The terminal also meets and exceeds all fire code requirements. There are fire extinguishers placed throughout the facility as well as a built-in automated fire suppression sprinkler system. Exits are clearly marked and placed throughout the facility to decrease the travel distance from any point in the terminal to an exit. At no point in the terminal is a person ever more than 195 feet from a point of egress, the code requirement for a building of this type requires a 200 foot minimal travel distance (IBC 402.4.4). Due to the large doors on the Apron Level, the egress widths satisfy the requirements for 1,643 persons. The Main Level was designed with enough egress openings to satisfy the requirement for 8,910 persons, nearly twice the allowable occupancy load. Due to the size of the service elevators and number of stairwells that access the Upper Level, the building code recognizes that this level provides adequate egress for 1,020 persons. Fire rated separations have been installed between the mechanical and electrical rooms and the public areas.

Although the maximum occupancy of the Main Level is over ten times higher than the current PHP, this does not suggest that the terminal is ten times oversized. The way passengers use the terminal does not necessarily follow traditional building code for egress. People in a terminal do not tend to be evenly disbursed throughout the building. While the building code assumes an average number of people spaced evenly throughout the square footage of the building, the actual peak passenger loading tends to come in surges. When a large plane arrives, it sends a wave of passengers through the terminal toward the baggage claim, restrooms, and exits. At certain times, parts of the terminal may be experiencing high traffic volume, while other areas are empty. The Life Safety Systems have been designed to allow these surges of people egress to safety regardless of where in the building they may happen to be when there is an emergency. Therefore, the Life Safety Systems of the terminal are sufficient to handle the anticipated peak loads throughout the forecasting period.

No improvements are required to meet code requirements. As the building expands, it will be required to meet current standards.

4.4.3 APRON LEVEL

While the travelling public accesses the aircraft via passenger loading bridges from the Main Level, the lower apron level is reserved for airline ramp service personnel and provides unimpeded access to the aircraft. This area contains the loading docks, maintenance workshops, baggage processing, the TSA Baggage Screening area, and Ground Service Equipment (GSE) offices. Generally, this Level of the Terminal functions at a high level of service and has ample room for the current and forecasted operations with significant room for growth.

There is currently no need for additional space on the apron level; however, the apron level should grow incrementally as additional gates are added.

4.4.3.1 Inbound Baggage

This functional area is currently at a Service Level "A". The original design of the terminal planned for an additional baggage carousel, and the space has been laid out for this future

growth. Based on the anticipated passenger loads, the airport may need to expand to include the third carousel sometime near the tail end of the 20 year planning period.

No additional inbound baggage capacity is required at this time.

4.4.3.2 Outbound Baggage, Baggage Make-up

This functional area is currently at a Service Level "A". Based on the anticipated passenger loads, the airport may need to expand the Baggage Make-up area sometime near end of the 20 year planning period when additional gates may be added. There is space for an additional baggage make-up carousel, which is used by the airlines to sort outgoing baggage.

No additional baggage make-up capacity is required at this time.

4.4.3.3 Circulation – Tugs and General

This functional area is currently at a Service Level "A". In contrast to the confined conditions many airports operate under, this new terminal was constructed with ample room for its employees. There is enough room for the tug trains to stage, load, unload, and pass each other with a safe amount of clearance. This results in a safer work environment for the employees, and results in less wear and tear on the equipment and on the building itself. The circulation space also functions as unassigned space that another function, such as baggage makeup, can utilize as necessary.

No additional ramp circulation improvement is required at this time.

4.4.3.4 Airport Operations Offices, Workshop areas

This functional area is currently at a Service Level "A". Using standard planning level factors, this space appears to be undersized. When it is considered that the Apron Level has unassigned general circulation space and available storage areas that the Airport Operations personnel may also take advantage of, the functional Level of Service for this area is excellent.

No additional office space is required at this time.

4.4.3.5 TSA Baggage Screening Room

This functional area is currently at a Service Level "A". The TSA has plenty of space at the Apron Level with 13,501 square feet at their disposal. Their space is currently occupied by two Reveal CTX 80 Machines to scan the checked luggage along with manual scanning stations to scan baggage that requires further searching. An additional room was constructed to allow for ultimate in-line baggage operations. The TSA screening room, along with the in-line baggage room, are spacious, allowing adequate room to perform all necessary functions and provide for future growth and whatever additional TSA screening machinery might be employed.

No additional TSA Baggage Screening space is required at this time.

4.4.3.6 Loading Dock

This functional area is currently at a Service Level "A". There are two loading docks on either side of the Terminal, each with nearby access to service elevators to efficiently stock the supplies of the concessioners and provide maintenance support to the airport.

No additional loading dock space is required at this time.

4.4.4 MAIN LEVEL

The Main Level of the Terminal is the portion that serves the public. Visitors experience the terminal all at the same elevation from the parking lot to the jet bridges. This allows the terminal to exceptionally comply with the requirements of the Americans with Disabilities Act (ADA), as the entire terminal is accessible to all handicapped and disabled travelers. The Main Level of the terminal has a spacious feel and generally performs at a Service Level "A". The following discussion of the various functional components will outline what areas may begin to feel the growing pains throughout the planning period, and which may require expansion or renovation.

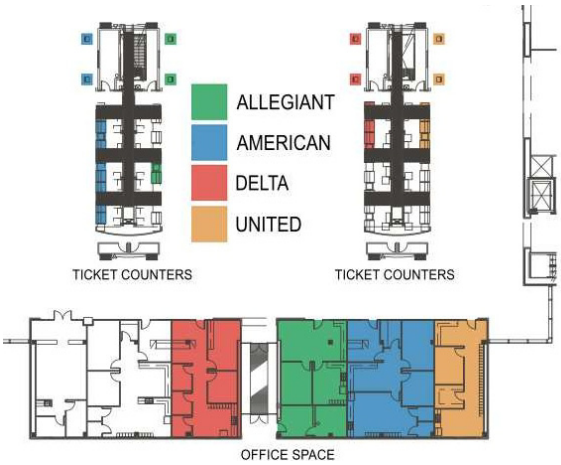
4.4.5 AIRLINE FUNCTIONS

4.4.5.1 Ticketing Area

The Ticketing Area includes Ticketing Counters, Passenger Queuing, Airline Ticket Offices, and outbound baggage handling operations. In general, this functional area is currently at a high level of service. As enplanements grow in the future, the Ticketing Area should increase proportionally to accommodate PHP.

The following sections provide descriptions of each component of the Ticketing Area, assuming standard airport trends. **Figure 4-10** depicts a diagram of how the different components interrelate in an ideal situation.

FIGURE 4-10 - AIRLINE TICKET AREA



Source: Jviation, Inc.

4.4.5.2 Curbside check-in

There are 922 square feet under the overhang in between the main entrance doors which serves as the cover for the curbside check-in. There are 40 linear feet of curbside check-in frontage. Based on the current level of usage, this area appears to function at a high level with a Service Level "A". Using the existing layout as a model to anticipate future needs, the current configuration will remain adequate until the planning year 2019. At this point, the expected peak originating passenger count will begin to demand more curbside check-in space. Nevertheless, the anticipated frontage needed for 2030 will only require approximately nine additional linear feet, so it is likely that the existing configuration will not need expansion.

No additional curbside space is required at this time.

4.4.5.3 Kiosks

There are currently eight check-in Kiosk locations, each with significant available space for queuing. The kiosk area has 1,520 square feet devoted to its use. This functional area is currently at a Service Level "A". Given the industry trend of greater use of both internet check-in and Kiosk self check-in at the airport, there might be technological drivers pushing for increased high tech check-in methods that may continue to change how this part of the terminal functions.

The terminal has adequate space to add additional check-in kiosks as needed.

4.4.5.4 Ticket Counters

This functional area is currently at a Service Level "A". The length of the ticket counter is a function of the number of passengers (PHOP) who use the counter for ticketing and baggage check-in. The existing terminal facilities have a total of 20 ticket counters comprising 328 linear feet of ticketing counter frontage available. Only half of the existing counters are currently being used by the airlines. There is adequate room to grow and accommodate more airlines while maintaining an excellent level of service. Since the current counter space appears adequate, the planning factor for ticket counter length was adjusted to reflect the current usage. As a result, the programming table reflects this adjustment.

The area for the space behind the ticket counter is based on the ticket counter length multiplied by the actual depth of 10.5 feet from the front of the counter to the rear wall. This space is where the agents operate during the check-in procedure. Likewise, this area is sufficient to accommodate the anticipated growth of the airport.

No additional ticket counter space is required at this time.

4.4.5.5 Queuing Area

The existing passenger queuing area includes the delineated 15 feet in front of the counters. Since there is existing counter space that is unused, the existing queuing space is more than adequate. Furthermore, if more queuing space is needed for the next 20 years, there is circulation space immediately adjacent to the current queues which this function may spread into.

No additional queuing space is required at this time.

4.4.5.6 Airline Offices

Airline Operations spaces include employee facilities, administrative offices, maintenance, catering, and storage. The space requirements of these facilities are affected by the total number of passengers coming and going from the airport. Therefore, ANNEP is used in determining the needed space. This functional area is currently at a Service Level "A". Currently, there are several offices being used by the City for various administrative purposes which could be reassigned to serve future airline needs when a higher level of peak passenger travel occurs.

No additional airline office space is required at this time.

4.4.5.7 Departure Lounges, Gates

The Midfield Terminal is currently configured with ten gates. This functional area is currently at a Service Level "A" with generous space allotted for the departure lounges and circulation space. This layout appears to be sufficient through the 2019 planning period. It is likely that an additional five to six gates will be necessary based on the projections for 2030. Two factors will play an intricate role in determining if and when more gates are needed, the aircraft type and the level of passengers. These factors are very difficult to predict and are subject to influences beyond the airport's control, including ticket pricing, airline scheduling requirements, etc.

An increase of flight frequency into the airport will place a higher demand on the gates. The size of the aircraft will impact the neighboring gates by placing a higher demand on the hold rooms and on the apron parking space. The current trend is that more passengers will be travelling on fewer larger flights. While this may act to decrease the number of flights per gate, there will be an increase in larger aircraft. This change in aircraft fleet has a large impact on the apron and its utilization. The existing apron parking layout can accommodate two larger aircraft at the two southern most gates. If more simultaneous large aircraft begin to use the airport on a regular basis, an apron expansion to the north would be necessary to allow for clearance behind the wings and tails of the aircraft. Alternatively, additional terminal gates could be constructed to the north with wider separation between adjacent gates to allow for simultaneous parking. The use of larger aircraft alone has a significant impact on the peak passenger levels. If there is the same number of annual passengers on one flight as there

would be on a combined three flights, the peak passenger levels begin to spike, and even though the same number of passengers is using the terminal throughout the year, more of them are using it simultaneously. As the average number of flights per gate per day begins to approach 8.0, there begins to be an operational need for additional gates.

The second factor is the increase of passengers using the facility. The demands placed by the passengers are reflected in the need to increase space in the hold rooms. As annual enplanements approach 600,000, the Level of Service of the hold rooms begins to decrease, as do the available seats. This results in more passengers standing in the circulation area and spilling over into the hold rooms' adjacent gates. If the trend of larger aircraft continues, this will put an added strain on the hold rooms during peak hours. Fortunately, the terminal has sufficient unassigned circulation space adjacent to the hold rooms which will be able to buffer the need for expansion for some time.

Using a hybrid model, which accounts for each of these factors, the existing layout appears sufficient through the 2019 planning period. The current configuration allots approximately 2,100 square feet per gate supported by 12,454 square feet of circulation space. As the average number of flights per gate begins to approach 8.0 and the annual enplanements approach 600,000, there begins to be an operational need for more gates. It is anticipated that an expansion of five to six gates will be necessary to satisfy the projections for 2030.

The planned expansion of the gates is described in Section 4.4.10.

4.4.5.8 Baggage Claim

There are two existing baggage carousels on the Main Level of the Midfield Terminal with the intention of adding a third when demand requires it. The area around these two carousels is 6,767 square feet. The Baggage Claim frontage presents 282 linear feet. This functional area is currently at a Service Level "A". There is an additional unassigned 11,950 square feet of circulation space around the baggage claim area where mingling, waiting, and collecting activities can seamlessly spill over into. The current configuration meets the peak demand for the largest aircraft served by the airport with adequate room for passengers and meet and greeters.

Due to the checked bag fees imposed by most airlines, the current trend in the industry has been to check fewer bags. Nationally, the average passenger is carrying on more and checking less. However, given the steady trend of increasing enplanements, it is anticipated that the Level of Service of this area will drop into the "B" range if additional flights are added at peak hours between 2014 and 2019.

It would be prudent to closely monitor the industry trends regarding the checked baggage and the actual checked bag counts during the next five years to more precisely determine when expansion will be required. Based on the empirical data of how this area is functioning, the

airport may weigh the passenger demand and Level of Service improvement against the cost of constructing the third carousel.

No additional baggage claim space is required at this time.

4.4.6 CONCESSIONS

Terminal Concessions spaces are for food and beverage vendors, news and gift shops, vending machines, rental car agencies, and travel agents that primarily serve passengers using the terminal.

Planning factors for food/beverage, news/gift/sundry, rental car, and other concessions are based on ANNEP, since their annual revenue potential is tied to total volume of passenger traffic. The planning factors for this report are typical of airports similar to SGF.

4.4.6.1 Food – Non-Secure

There are currently 2,680 square feet of space allocated to the non-secure restaurant, with plenty of surrounding circulation space that can be commandeered in order to satisfy the need for additional seating. This functional area is currently at a Service Level "A".

No additional non-secure food concessions space is required at this time. However, additional options may create additional demand.

4.4.6.2 Food – Secure

There are currently 1,846 square feet of space allocated to the secure restaurant. This functional area is currently at a Service Level "A". However, using common planning factors, it is suggested that there may be need for additional food vendors in the secure area.

No additional secure food concession space is required at this time. However, additional options may create additional demand.

4.4.6.3 News and Gifts – Non-Secure

There are currently 1,043 square feet of space assigned to the non-secure news and gift shop. This functional area is currently at a Service Level "A". Based on the observed function of this site, it appears to adequately meet the current needs of the passengers, and will provide high levels of service for the next 20 years. Increased passenger levels may drive the need for additional vendors following the 2019 planning year.

No additional non-secured news and gift concession space is required at this time; however, as passenger levels increase, so too will the needs for news and gift concessions.

4.4.6.4 News and Gifts – Secure

There are currently 1,198 square feet of space assigned to the secure news and gift shop. This functional area is currently at a Service Level "A". Based on the observed function of this site, it appears to adequately meet the current needs of the passengers, and will provide high levels of service for the next 20 years. Increased passenger levels may drive the need for additional vendors following the 2019 planning year.

No additional secured news and gift concession space is required at this time; however, as passenger levels increase, so too will the need for news and gift concessions.

4.4.7 Non-Secure Public Areas

4.4.7.1 Circulation

There is ample circulation space in the terminal. This is valuable space because it gives versatility to the other spaces. There is room for various queuing spaces to spill over throughout the terminal so that peaks can be handled. This functional area is currently at a Service Level "A" and will remain at a high level until the 2030 planning year, when it is anticipated that the addition of the third baggage carousel, expanded kiosks, and more vendors will spill into this space.

No additional circulation space is required at this time.

4.4.7.2 Airport Administration Offices

The area dedicated to Airport Administrative Offices varies widely between airports. The planning factor used in this document to estimate the required square footage for the office area is based on annual enplanements and reflects the level of administrative staff needed for the volume of passenger traffic. This functional area is currently at a Service Level "A" and adequately serves the need of the airport administration.

No additional administrative space is required at this time.

4.4.8 Secure Public Areas

4.4.8.1 TSA Checkpoint

It is the desire of the airport to make the screening process as streamlined and comfortable for passengers as possible. The functional layout currently allows for a Service Level "A" to be satisfied. However, the actual passenger experience can vary between an "A" and a "D", based on TSA staffing levels. The terminal was designed to include two screening lanes and was laid out with enough space for a third lane. However, the staffing levels and efficiency of the TSA have a large impact on the actual Level of Service realized. Given the size and traffic

of this airport, the Service Levels for the TSA checkpoint are largely dependent on maximum queuing wait time:

Service Level "A" – 5 minutes

Service Level "B" – 10 minutes

Service Level "C" – 15 minutes

Service Level "D" – 20 minutes

The TSA has two stations for identification verification and one walk through metal detector. The existing checkpoint contains two X-Ray machine lanes which act as the constricting point in the process. These are followed by a generous reconciliation area for passengers to recollect their belongings.

Frequently, the TSA operates only one of the X-Ray machine lanes resulting in a maximum queue time of 20 minutes with a Service Level in the "C" to "D" range. When both lanes are open, the processing time improves to a Service Level of "A". Based on queuing models, two complete independent TSA lanes should not have a wait time of more than 5 minutes during the current 182 PHO level. Thus, the staffing levels of the TSA can swing the Level of Service between "A" and "D".

When the PHO passenger level reaches 230, it would be necessary to open the third screening lane in order to maintain an "A" Level of Service at peak times. The planning forecast indicates this will occur between 2025 and 2030. Based on the current TSA scanning rates and the enplanement forecast for 2030, the wait time with only one TSA screening lane would increase the queuing wait to 32 minutes, while two lanes would have a wait time of 7 minutes, and three lanes would be necessary to maintain an "A" Level of Service.

No additional TSA checkpoint space is required at this time. Ample space exists to accommodate existing and future TSA screening technologies.

4.4.8.2 TSA Offices, Break room, Miscellaneous

In addition to ample space for the security checkpoint, the terminal was designed to accommodate the requirements the U.S. General Services Administration (GSA) has outlined for TSA facilities. The TSA offices are comprised of 2,250 square feet of offices and locker rooms. They have an additional 730 square feet to use for a private break room. The TSA also has adequately assigned space in the Apron Level of the terminal to accommodate additional offices, training rooms, storage, and future screening areas.

No additional TSA office space is required at this time.

4.4.9 BUILDING SERVICE AREAS

4.4.9.1 Maintenance and Storage

This functional area is currently at a Service Level "A". At nearly every existing facility, storage space is at a premium. One of the benefits of this terminal is that it was constructed to allow for enough storage into the future. At the present time, there is an abundance of storage; however, as facilities age and grow, tools, equipment, files, and supplies always tend to accumulate and take up a great deal of space. Having sufficient room for storage adds to the level of efficiency and organization of the airport staff and contributes to improved working conditions.

No additional storage space is required at this time.

4.4.9.2 Mechanical, Electrical, Building Systems, Vertical Circulation (stairs & elevator)

This functional area is currently at a Service Level "A". These service spaces in a building are generally moveable, and may be located based on a design concept or layout. In this case, the majority of these services are located in the Upper Level. Given the total square footage of the terminal, the net Mechanical, Electrical, Communication, and Building System components are right in line with industry standard planning factors. As it is a new terminal, the building was designed with the latest, efficient types of mechanical equipment. Therefore, SGF does not have to attempt to retrofit existing spaces, a detriment most airports face while upgrading equipment.

4.4.9.3 Apron Level

13,888 square feet of the apron level are utilized by the Mechanical, Electrical, Communication, and Building System components. 2,109 square feet are used for vertical circulation, including elevator shafts and stairwells.

No additional building system space is required at this time; however, the spaces should continue to grow as the terminal building expands.

4.4.9.4 Main Level

653 square feet of the main level are utilized by Vertical Chases for HVAC ducts and other building system conduit runs. 2,497 square feet of this floor comprise closets and access panels for the Mechanical, Electrical, Communication, and Building System infrastructure. 1,892 square feet are used for vertical circulation, including elevator shafts and stairwells.

No additional main level building system space is required at this time.

4.4.9.5 Upper Level

The upper level 25,922 square feet devoted entirely to Mechanical, Electrical, Communication, and Building System infrastructure. 1,458 square feet of this floor are used for vertical circulation, including elevator shafts and stairwells.

No additional upper level building system space is required at this time.

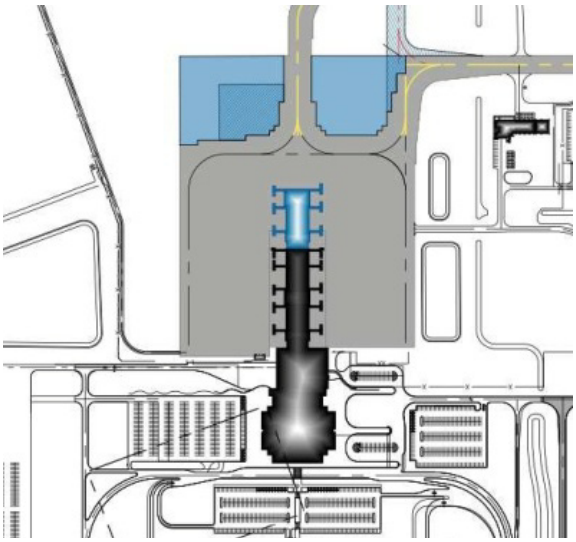
4.4.10 Future Terminal Expansion

As previously described, the terminal currently has 10 gates equipped with passenger loading bridges. When the terminal was designed, future expansion was planned into the concept. The terminal can expand up to 60 gates incrementally as needed. One concept for the phasing of the expansion is described in the following sections, however the actual phasing should be determined when needed to match the needs and budget at the time.

4.4.10.1 16 Gates –Extend Existing Terminal in Linear Fashion

The first expansion planned for the terminal will be to add additional gates on the north end of the current terminal, as shown in **Figure 4-11**. This expansion will continue the linear layout of the building by adding six gates in line with the 10 gates currently in place. Other than modifying areas around the expansion area for drainage, this layout will also have a minimal impact on the airfield pavement, as the apron can be extended out to the north edge of Taxiway "E" to accommodate this expansion. Ground maneuvering patterns will remain the same configuration.

FIGURE 4-11 - 16 GATE TERMINAL LAYOUT

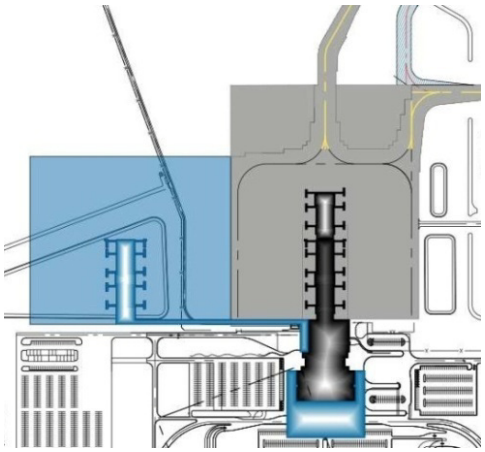


Source: Jviation, Inc.

4.4.10.2 26 Gates –Add Concourse to the West

As shown in **Figure 4-12**, this phase will replicate the original 10 gate module as a new concourse to the west. With this additional concourse, the 26 total gates will be available. This expansion will be necessary when the passenger enplanements have increased significantly over levels forecast in this study. Based on the impact that these additional passengers and flights will have on the levels of service for the terminal, additions to primary passenger processing functions in the terminal may be necessary to adequately accommodate this gate expansion.

FIGURE 4-12 - 26 GATE TERMINAL LAYOUT

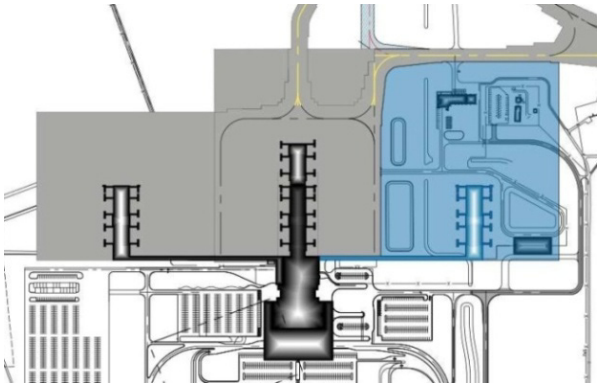


Source: Jviation, Inc.

4.4.10.3 36 Gates – Add Concourse to the East

This expansion is a mirror of the original 10 gate module to the east. This will increase the capacity of the airport to 36 gates. As shown in **Figure 4-13**, the apron expansion required for the east concourse construction will require the displacement of the existing Fuel Farm, Control Tower, ARFF building, and major airfield drainage and detention ponds. The growth forecast indicates that this level of expansion will not be required until well after the planning period of this study and after a reasonable design life for those structures has been met.

FIGURE 4-13 - 36 GATE TERMINAL LAYOUT

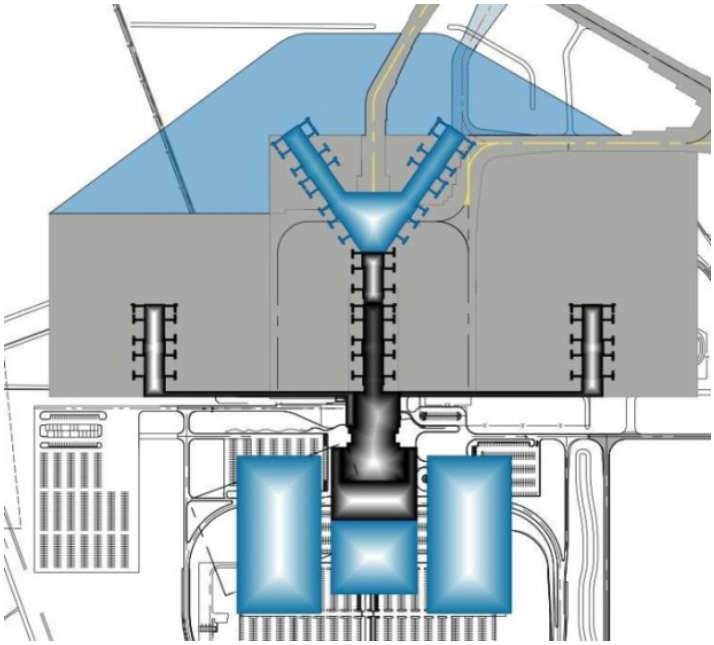


Source: Jviation, Inc.

4.4.10.4 60 Gates – Ultimate Build Out

At the ultimate build out for the Midfield Terminal, the facility can grow up to 60 gates, as shown in **Figure 4-14**. At this level of activity, the terminal would need to be replicated to the south, and it will be flanked on the east and west by two parking garages. Smaller aircraft will dock inside the acute angle of the "Y", and larger aircraft will dock along the outside perimeter. This build out scheme allow for great flexibility and versatility in how the needs of the growing airport may best be met.

FIGURE 4-14 - 60 GATE TERMINAL LAYOUT



Source: Jviation, Inc.

4.5 GENERAL AVIATION

Apron frontage is premium airport space and should be thoughtfully utilized. The planning and design of aprons take into account the location of airport terminal buildings, FBO buildings, and other aviation related access facilities at an airport. Aprons provide parking for based and transient airplanes, access to the terminal facilities, fueling, and surface transportation. FAA Advisory Circular 150/5300-13, *Airport Design, Appendix 5,* provides guidelines in assisting with the determination of the layout and design of airplane parking apron(s) and tie-down area(s) for based and transient aircraft.

4.5.1 TRANSIENT AIRCRAFT APRON

The FAA has established a method, found in FAA Advisory Circular 150/5300-13, *Airport Design,* which includes factors that affect the determination of the area needed for transient parking. This method involves the analysis and estimation of the demand for transient airplanes and utilizes forecasting numbers from numerous tables mentioned throughout **Chapter 3**, *Aviation Activity Forecasts*.

Table 3-4 (SGF General Aviation Operations) indicates that in 2030 there will be 37,010 GA operations at SGF. **Table 3-12** (SGF Peak Hour Demand) specifies that in 2030 an estimated 136 GA and Military operations will occur on the airport's peak day of operation. The Advisory Circular considers 50% of the peak day operations as a reasonable figure to assume for transient aircraft. This equates to a peak of 68 aircraft using the apron at once. Allowing an area predetermined by the FAA of 360 square yards for each aircraft is considered adequate space for each transient aircraft. This results in roughly 24,480 square yards of desired apron space required for transient aircraft in 2030. This space takes into account Taxilane OFA width criteria (found in FAA Advisory Circular 150/5300-13, *Airport Design*) and any other necessary space for fueling, parking, and other airplane related actions. **Table 4-10** summarizes the current space available, along with the minimum apron space required, using the above calculations for the years 2011, 2019, and 2030. There is approximately an additional 78,333 square yards available at the West Kearney Complex. This space is inefficient for most standard transient operations due to its distance to the FBO.

TABLE 4-10 - TRANSIENT AIRCRAFT APRON REQUIREMENTS

Year	General Aviation Operations	Peak Day Operations – GA & Military	Minimum Apron Space Required (square yards)	Current Apron Space (square yards)	Surplus or Shortfall (square yards)
2011	27,226	100 total – 50 transient	18,000	46,078	+ 28,078
2019	30,899	113 total – 57 transient	20,520	46,078	+ 25,558
2030	37,010	136 total – 68 transient	24,480	46,078	+21,598

Source: Jviation, Inc.

4.5.2 AIRCRAFT PARKING APRONS

Apron space utilized for based airplanes should be separate from that of transient airplanes. Moreover, the area needed for parking based airplanes typically is a smaller space per airplane than for transient aircraft. The smaller required space results in knowledge of the specific type of based airplanes at the airport in addition to closer clearance allowed between airplanes. Currently, according to the Airport, only ten based aircraft tied down on the apron versus 152 housed inside of a hangar/shelter.

The FAA has established a method in determining apron needs for based airplanes, which also uses previously discussed forecasting numbers found in **Chapter 3**, *Aviation Activity Forecasts*. This method assumes that 300 square yards of apron space is necessary for each aircraft. This area should be adequate for all single engine and light twin engine airplanes, such as the Cessna 310, which has a wingspan of 37 feet and a length of 27 feet. This space also takes into account Taxilane OFA width criteria and any other necessary space for fueling, parking, and other airplane related actions. Assuming the same ratio of based aircraft that are tied down today will continue into the future, estimated based aircraft apron requirements have been developed. **Table 4-11** summarizes the projected SGF based aircraft that will require apron tie-downs and apron space for the years 2011, 2019, and 2030.

TABLE 4-11 - BASED AIRCRAFT APRON REQUIREMENTS

Year	Projected Tied Down Based Aircraft	Minimum Apron Space Required (square yards)	Current Apron Space (square yards)	Surplus or Shortfall (square yards)
2011	10	3,000	19,268	+16,268
2019	13	3,900	19,268	+15,368
2030	15	4,500	19,268	+14,768

Source: Jviation, Inc.

Aircraft parking for General Aviation (GA) aircraft is adequate during normal day to day operations. It has been identified through the user surveys that parking does tend to get congested during high peak operations.

Additional transient aircraft parking will be considered in the Alternatives Chapter of this study.

4.5.3 AIRCRAFT STORAGE REQUIREMENTS

The airport is equipped with both aircraft hangars and hangar shelters which are owned by the airport or by private entities. Currently, there are only two airport owned hangars available for lease and a waiting list for hangar shelters. There is only one leasable spot remaining for private development which is not currently available due to ongoing hazardous material cleanup. SGF presently has approximately 363,000 square feet of hangar space (30 hangars), which is primarily for based aircraft use. The hangars are typically at or near full occupancy. Dividing the 363,000 square feet of hangar space by the 152 current hangared aircraft results in approximately 2,390 square feet of hangar for each based aircraft. Specific demand will be based on the actual size of aircraft that ultimately will be based at SGF and will require new hangar construction; however, for planning purposes it is assumed that the current ratio of 2,390 square feet per aircraft will continue, as shown in **Table 4-12**. Currently, the airport has insufficient aircraft hangar space and this is only forecast to get worse as time goes by.

TABLE 4-12 - BASED HANGARED AIRCRAFT REQUIREMENTS

Year	Based General Aviation Aircraft	Based General Aircraft Using Tie-downs	Minimum Hangar Space Required (square feet)	Current Hangar Space (square feet)	Surplus or Shortfall (square feet)
2011	162	10	363,280	363,000	-280
2019	202	13	451,710	363,000	-88,710
2030	247	15	554,480	363,000	-191,480

Source: Jviation, Inc.

With aircraft storage nearly at capacity, alternative hangar development options will be investigated in the Alternatives Chapter to accommodate future growth.

4.5.4 FBO FACILITY NEEDS

The airport currently owns and operates the only FBO located on the airfield. The facility provides basic FBO functions such as aircraft fueling services, management of the tie-down apron, and aircraft storage. In addition, the facility provides space for other basic functions such as a pilot lounge, flight planning room, and restrooms. The facilities and equipment adequately handle the current demand with only minor impacts during heavy traffic periods.

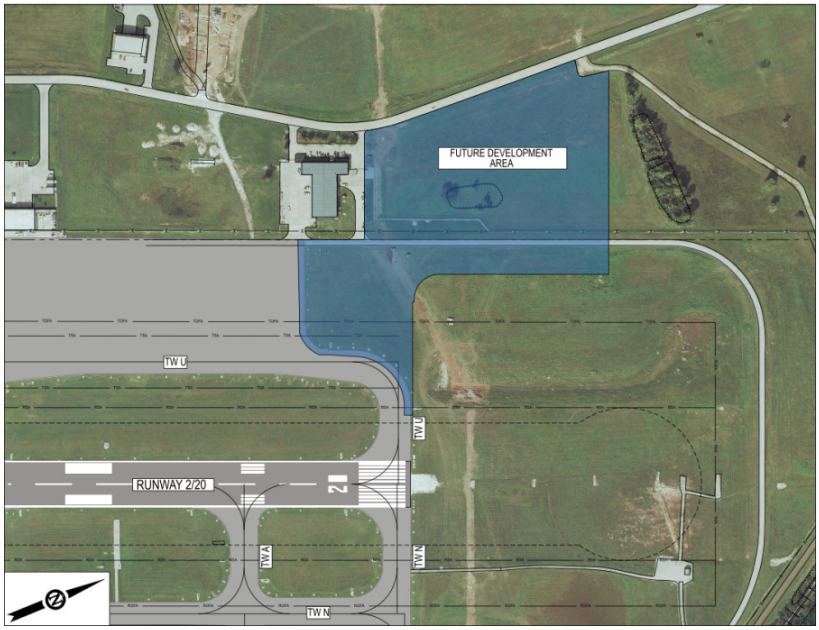
The based aircraft and business aircraft user surveys identified that while the facilities are adequate, they can be updated to match the services commonly found at FBOs around the country.

4.6 AVIATION SUPPORT FACILITIES

4.6.1 AIRPORT CARGO APRON EXPANSION

While the Cargo Apron meets both the current demand and the demand forecast in **Chapter 3**, ***Aviation Activity Forecasts***, it is still recommended to expand the current cargo apron from the edge of the existing apron and north to N. Lester Jones Ave, depicted in **Figure 4-15.** This would provide enough apron space to accommodate future airport development, which could include corporate or commercial airline hangars, aircraft maintenance, or any other type of aeronautical use. This is also adjacent to drainage basins and storm runoff would need to be controlled to protect these areas.

FIGURE 4-15 – CARGO APRON EXPANSION



Source: Jviation, Inc.

4.6.2 AIR CARGO FACILITIES

The existing air cargo facilities currently meet the needs for the level of cargo operations that occur at SGF. The cargo building is an older building and as such a plan for maintaining the current facility as well as eventually replacing the building should be addressed in future CIP planning.

No additional air cargo facilities are required at this time.

4.6.3 AIRCRAFT MAINTENANCE FACILITIES

Currently, aircraft maintenance facilities for commercial aircraft are located on the airfield. American Eagle provides maintenance on their own aircraft and are also contracted to repair other airlines that may require maintenance either while at the airport or due to a diversion.

Based aircraft and business aircraft user surveys identified a demand for GA aircraft maintenance services. Therefore, it is recommended that some degree of study should be conducted by the airport on the feasibility of attracting an aircraft maintenance provider.

4.7 AIRPORT SUPPORT FACILITIES

4.7.1 AIRCRAFT RESCUE AND FIRE FIGHTING

Aircraft Rescue and Fire Fighting (ARFF) services adequately meet the requirements dictated for FAR 139 certificated airports. During a review by the FAA Runway Safety Action Team (RSAT), it was identified that a more direct ARFF response road could be constructed to give quicker access to Runway 14/32. This was constructed during the rehabilitation of Runway 14/32.

If a parallel runway to Runway 2/20 is ever constructed, ARFF response will be required to evaluate the ability of ARFF vehicles to respond within the required time.

4.7.2 AIRPORT MAINTENANCE FACILITIES

Field maintenance facilities are found to be adequate and meet the daily needs of the airport. A building for snow removal equipment (SRE) and other field maintenance vehicle storage and maintenance exists on the northwest side of Runway 2/20. Additional equipment is stored in an unused bay at the new ARFF station east of the terminal which was constructed with local funds.

No additional vehicle storage requirements are required at this time.

4.8 FUEL STORAGE REQUIREMENTS

Fuel storage for both GA and Commercial operations adequately meet the needs of the airport users. To support the new terminal, a corresponding fuel farm was also installed. This allowed for efficient fueling at the commercial passenger terminal. The original fuel farm is now dedicated to the demands of GA aircraft.

With the addition of the new tanks constructed with the Midfield Terminal, there are no additional fuel tanks required to meet the anticipated demand.

4.9 DEICING FACILITIES

Deicing of aircraft is essential in climates such as Springfield's, due to the propensity of frost, ice, and snow to accumulate on aircraft surfaces. Ice buildup diminishes the aerodynamic qualities of aircraft and can result in loss of lift and stability. There are two types of deicing fluid that are applied to aircraft at SGF. These include:

Type I – Type I is a mix of Propylene Glycol and water, typically at a 50% ratio, which is heated and used to remove accumulated ice and snow from an aircraft. This fluid type is typically used during precipitation events, or in the morning following a snow event or the development of frost. Type I fluid is what is known as a *deicing* mixture.

Type IV – Type IV is a partially thickened version of undiluted Propylene Glycol that is sprayed on aircraft after they have been deiced, but prior to departure to inhibit the additional accumulation of ice. This fluid "sticks" to the flight surfaces until subjected to aerodynamic sheering forces on takeoff which remove the fluid to expose a clean, non-iced aircraft. Type IV fluid is commonly called an *anti-icing mixture*.

The deicing of aircraft at SGF is performed by the individual airlines and air cargo carriers. Presently, passenger airline deicing occurs at the gate and the deicing fluid is sucked into a vacuum truck and emptied into a tanker trailer for ultimate disposal to Springfield's Publicly Owned Treatment Works (POTW), which is run by the City's Public Works Sanitary Services department.

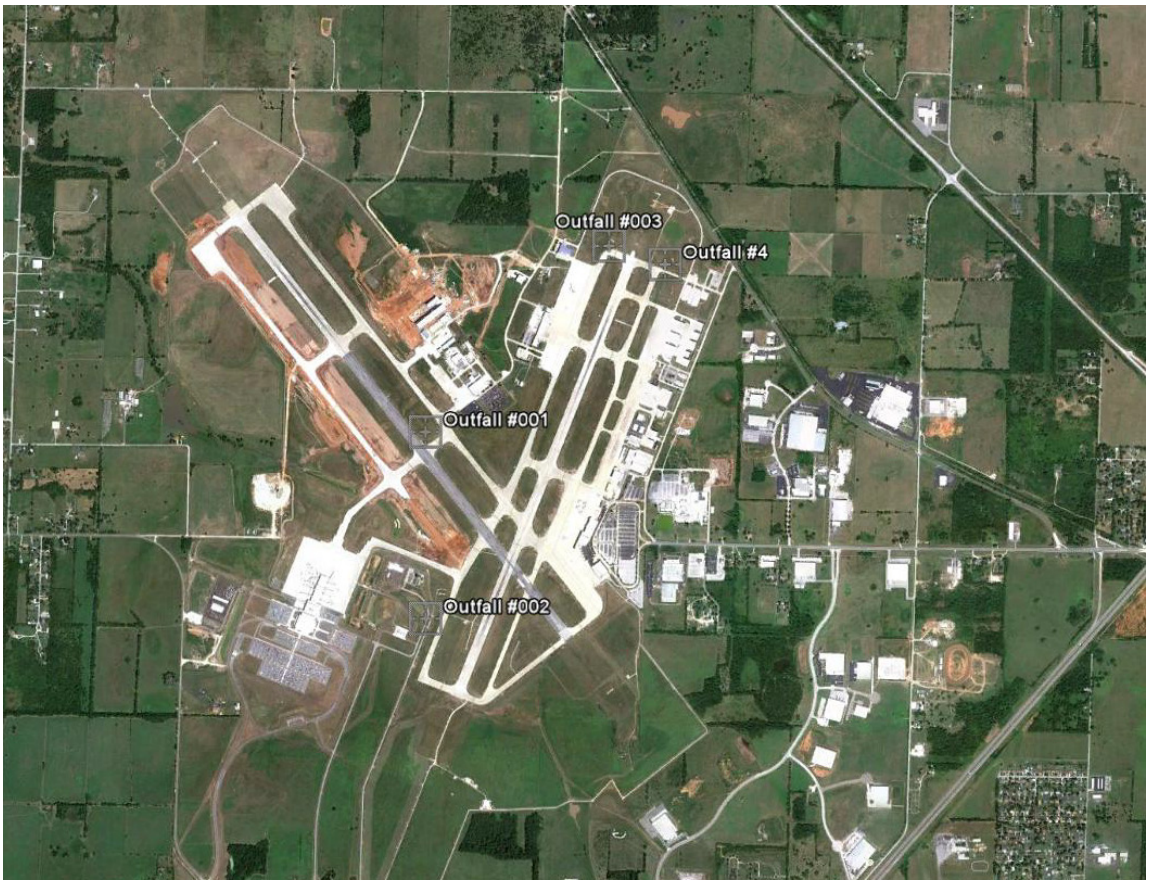
4.9.1 PROPERTIES OF DEICING FLUID

Propylene Glycol, the primary fluid used in aircraft deicing, is not considered a toxic chemical. The concern with releases of fluid into public waterways is derived from the fluid's use of dissolved oxygen in water to breakdown the organic material. The resulting reduction in available dissolved oxygen for fish and other aquatic life can be dangerous for the ecosystem if the quantities are not managed. Typically, airports will have an allowable spent fluid release quantity, providing the water leaving the airport does not exceed a specified concentration, which is measured through Biochemical Oxygen Demand (BOD) and Chemical Oxygen Demand (COD).

4.9.2 DEICING CAPTURING REGULATION

The airport is currently operating under an industrial wastewater permit issued by the State under the National Pollution Discharge Elimination System (NPDES). With this permit, the airport is in compliance with the Missouri Clean Water Law[41] and Federal Water Pollution Act[42]. The permit requires quarterly sampling of water at four outfall locations on the airport, which are depicted in **Figure 4-16.** The current NPDES permit allows a daily maximum BOD discharge of 20 milligrams per liter (mg/L) and a monthly average of 10 mg/L at each of the four outfall locations.

FIGURE 4-16 - NPDES OUTFALL LOCATIONS



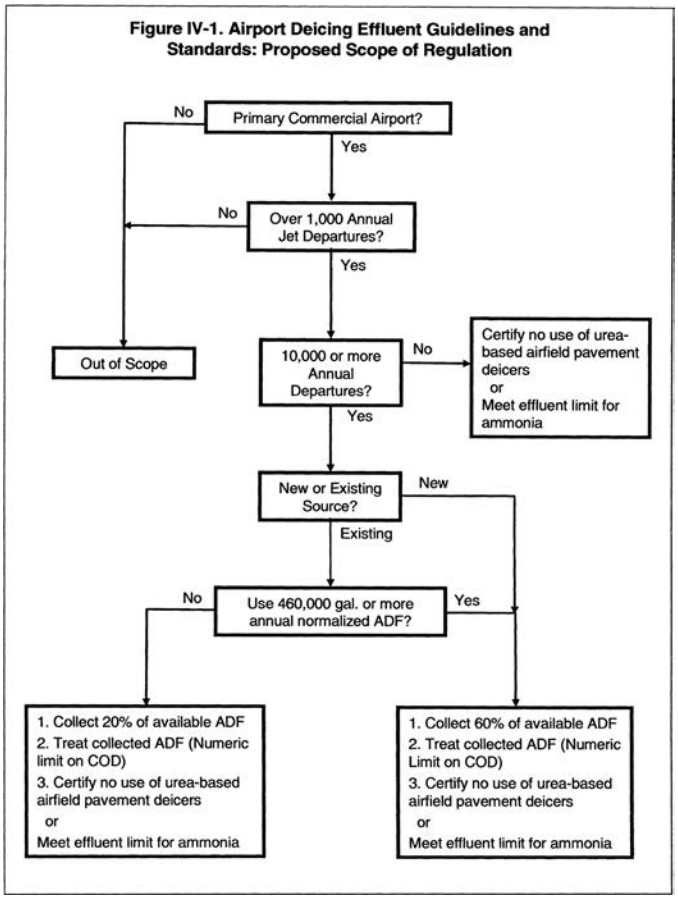
Source: Jviation, Inc.

On August 28, 2009, the EPA issued their proposed rule 40 CFR 449, entitled *Effluent Limitation Guidelines and New Source Performance Standards for the Airport Deicing Category,* in the Federal Register. Due to pressure from airports and industry organizations, the EPA extended the comment period on the proposed rule from December 28, 2009 until February 26, 2010. The EPA is currently anticipating a final rule in January 2012.

[41] Missouri Clean Water Law, Chapter 664 R.S. Mo. As amended
[42] Federal Water Pollution Control Act, Public Law 92-500, 92nd Congress as amended

As proposed, the rule would require that airports over a certain size, as determined by the number of operations, collect either 20% or 60% of Aircraft Deicing Fluid (ADF), depending on the total amount of gallons dispensed per year. The flow chart presented in **Figure 4-17** further defines the process of determining whether, and to what extent, an airport is required to collect ADF under the proposed rule.

FIGURE 4-17 - PROPOSED EPA ELG SCOPE



Source: U.S. Environmental Protection Agency

By following the flow chart, it appears that if the rule is implemented as proposed, SGF would be required to capture 20% of its ADF (greater than 10,000 total operations, greater than 1,000 jet operations, less than 460,000 gallons of undiluted ADF). Deicing activities currently occur at the commercial apron, the GA apron, and the cargo apron. The airport presently collects ADF though the use of a Glycol Recovery Vehicle (GRV) on the apron areas surrounding the commercial gates. Other deicing fluids are diluted from runoff, before entering, and when within the stormwater conveyance systems at the airport.

In the 2010-2011 deicing season, the airport dispensed 9,638.7 gallons of virgin deicing fluid. This fluid is then diluted at 50% and applied to aircraft, resulting in 19,277.4 gallons of total deicing fluid applied to aircraft. 20% of this figure results in a minimum of 3,855.5 gallons that would have had to have been collected should the rule have been in effect. Although the current amount of fluid

collected may meet or exceed the required 20%, verification and monitoring of that required quantity will be required with the proposed rule. The construction of a deice pad will allow greater concentration of fluid to be captured at a reduced cost, on smaller ground area and subsequent dilution would occur.

4.9.3 DEICE PAD DESIGN

As previously discussed, centralization of deicing activities in a single location allows the concentrations of captured fluid to be greater in relation to the quantity of melted snow and water runoff that accompanies the deicing fluid. With less overall quantity of fluid being captured, less long-term operating costs are required in the treatment of that water.

Centralized deicing pads must be sized to adequately accommodate the mix of aircraft types anticipated to use the pad and must have the capacity to not cause extensive delays during peak periods. The FAA has issued an advisory circular, AC 5300-14B, *Design of Aircraft Deicing Facilities*, to ensure that deicing facilities across the country are designed and constructed according to a similar set of standards. The advisory circular discusses the overall layout of pads, the separation standards between aircraft, the safety zones required for equipment staging, marking, lighting, and other factors that affect the planning and design for deice pads.

Properly locating a deicing pad is essential to ensure that it is utilized to the maximum extent. The pad must be located at a site on the airfield that allows aircraft to reach different runway ends, without causing unnecessary taxiing. Additionally, the "holdover" time, which is the time that an aircraft can go from when it is anti-iced to when it departs, must be considered.

Alternative locations and configurations for centralized deicing locations are examined in the Alternatives Chapter of the master plan.

4.9.4 GENERAL DESIGN ASSUMPTIONS

With an ARC of D-IV, the passenger airlines are routinely utilizing regional jets and narrowbody aircraft with wingspans in the II and III category. In order to maximize the throughput of the deicing pad while minimizing space requirements, it is recommended that the pad be marked for the Group III aircraft category, while allowing for Group IV by overlapping on two positions.

According to the forecasts presented in **Chapter 3**, *Aviation Activity Forecasts*, the current peak hour demand is for seven aircraft, while in the long run the peak hour tops out at 10 aircraft. It would not be practical to design a pad based on the assumption that all aircraft will be at the pad at the same time. Instead, actual departure times will vary throughout the peak hour. On average, it takes 10-15 minutes to deice a narrowbody aircraft, and less time for regional jets. With this in mind, two narrowbody positions should be able to meet anticipated demand in most cases.

4.10 UTILITIES

Utilities provide the airport with potable water, sanitary sewer, fiber optics and phone, electric, storm water, and natural gas. Currently, all of the existing utilities are adequate to meet the existing demand. The utilities need to be accessed to accommodate the requirements of any future development at the airport (i.e. hangar development, apron expansions, new facility, facility expansion, etc.). Each utility will be further evaluated throughout the recommended developments and improvement for the airport in **Chapter 5**, *Alternatives*.

5.0 ALTERNATIVES ANALYSIS

5.1 INTRODUCTION

There are several areas at Springfield-Branson National Airport (SGF) that can be developed or improved to accommodate future aviation needs, as described in **Chapter 4,** *Facility Requirements*. These development projects will increase operational capacity and safety for SGF. Alternatives for these key areas have been closely examined to determine the most efficient cost-effective development approach. Each area has several alternatives that are described in more detail in the following sections.

The key development areas evaluated include:

- Extension of Runway 2/20
- General Aviation (GA) Apron Expansion
- GA Development Location
- Aircraft Deice Pads

5.2 EVALUATION CRITERIA

The evaluation criteria for the alternatives are:

- Safety – Provides adequate safety for the intended aircraft and operations.
- Operational – The ability to accommodate current and forecasted aircraft, passengers, and vehicles in a safe and efficient manner.
- Environmental – Development that provides for minimal environmental impact.
- Compatible Land Use – the compatible use of adjacent land or residences that are affected by the airport improvements.
- Financial – An estimate of costs to provide a basis for comparison of each alternative.

5.3 RUNWAY 2/20 EXTENSION

5.3.1 OVERVIEW

As discussed in **Section 2.2.1**, Runway 2/20 is 7,003 feet long, with Runway 2 being designated as a precision instrument runway and Runway 20 designated as non-precision instrument runway. During the summer months this runway, at its current length, does not efficiently serve all airport operators. Therefore, if the weather or closure of Runway 14/32 dictates the use of Runway 2/20, weight restrictions may be enacted. These weight restrictions can result in either the reduction of fuel, luggage/cargo, or passengers. To offset these weight restrictions and maintain a satisfactory level of safety, an extension of the runway is recommended.

Three alternatives have been evaluated for an extension of Runway 2/20. These include no extension, a 1,000 foot extension on the south end (Runway 2), and a 1,000 foot extension on the north end (Runway 20). The two extension options both involve a 1,000 foot extension for a total length of 8,003 feet.

5.3.2 Assumptions

1. Runway 2/20 will remain designed for Airport Reference Code (ARC) D-IV.
2. Parallel Taxiways U and N will need to be extended accordingly with the runway.
3. Runway alternatives assume full-length usability in both directions. No declared distances (displaced threshold) alternatives were evaluated.
4. Small parcels of public land will either need to be purchased or restricted through the use of an avigation easement.

5.3.3 Alternative 1 – Maintain Current Runway Length

This alternative maintains the current 7,003 foot runway length. Runway 14/32 provides 8,000 feet of available takeoff and impacts to operators would occur when weather and closures require the use of Runway 2/20.

5.3.3.1 Safety Criteria

- Provides adequate safety for design aircraft.
- Safe operations are dependent on the pilot command adjusting usable load to safely operate on the available runway length according to FAR 139.

5.3.3.2 Operational Criteria

- Accommodates 100% of airplanes weighing less than 12,500 pounds.
- Accommodates 100% of airplanes weighing 12,500 pounds up to 60,000 pounds.
- During the closure of Runway 14/32 (8,000 feet) from April 1, 2011 through November 29, 2011 airlines reported the following impacts when utilizing Runway 2/20:
- Allegiant Airlines were required to make 29 fuel stops in Wichita Kansas to refuel. These stops represented 6 percent of the 473 flights that occurred during this period. These fuel stops occurred over 22 days or 9 percent of the 243 days the runway was closed.
- Allegiant Airlines operates MD-80 aircraft from SGF. With 1,350 annual operations this aircraft is considered a critical aircraft.
- Delta Airlines reduced passenger capacity on days over 90˚F.
- United Airlines shifted operations to aircraft that could operate on Runway 2/20 more efficiently.

5.3.3.3 Environmental Criteria

- No additional environmental concerns.

5.3.3.4 Compatible Land Use

- No additional land use concerns.

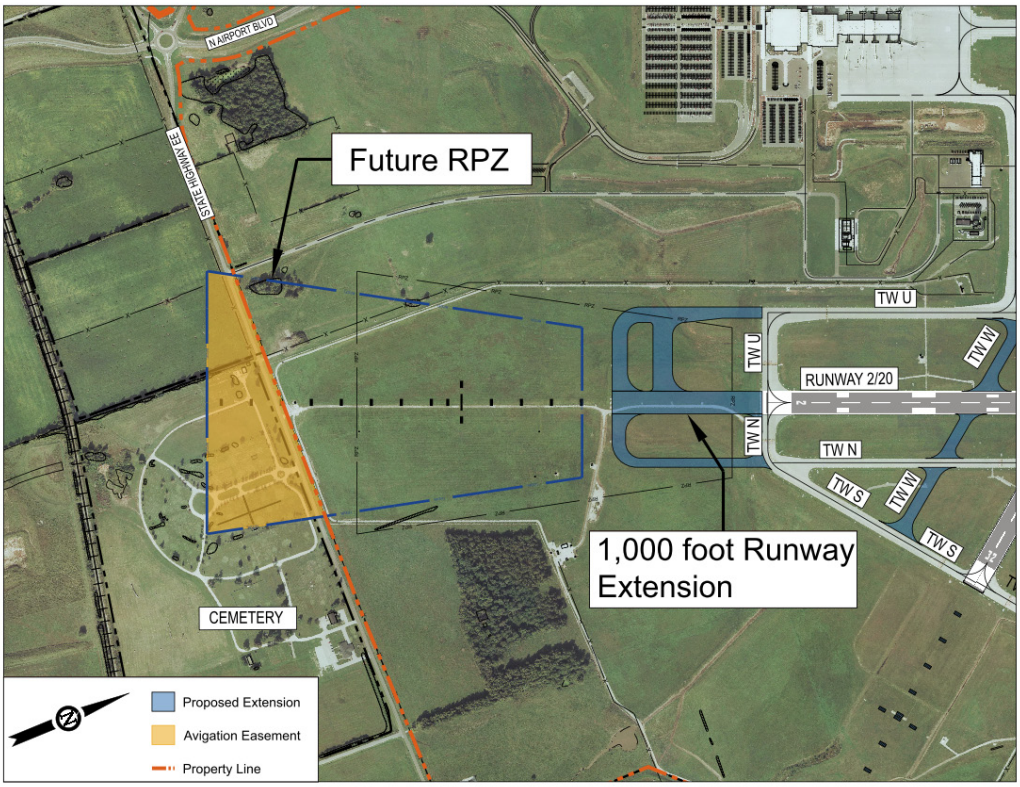
5.3.3.5 Financial Criteria

- No additional cost.

5.3.4 ALTERNATIVE 2 – 1,000 FOOT EXTENSION TO THE SOUTH

This alternative allows for a 1,000 foot extension of the south end of Runway 2/20 for a total length of 8,003 feet, as shown in **Figure 5-1**. The threshold of the extended runway will be located close to the Midfield Terminal which will allow for a shortened taxi time for commercial aircraft. The majority of the Runway Protection Zone (RPZ) will also be on airport property allowing for airport control over land use. The remaining land within the RPZ will need to be controlled through an avigation easement or fee simple, as appropriate. The approach lighting system could impact currently unused land in an adjacent cemetery and the installation will need to be coordinated with the owner. Examination of a different type of approach lighting system found that alternative lighting systems would require increasing the IFR minimums for aircraft arriving to Runway 2. This is not ideal as Runway 2 is a primary runway for arriving aircraft in IFR conditions. Relocation of the existing Instrument Landing System (ILS) would also be required. The cost for this alternative would be approximately $11 million.

FIGURE 5-1 – RUNWAY EXTENSION - ALTERNATIVE 2



Source: Jviation, Inc.

5.3.4.1 Safety Criteria

- Provides adequate safety for design aircraft.
- Safe operations are dependent on the pilot command adjusting usable load to safely operate on the available runway length according to FAR 139.

5.3.4.2 Operational Criteria

- Accommodates 100% of airplanes weighing less than 12,500 pounds.
- Accommodates 100% of airplanes weighing 12,500 pounds up to 60,000 pounds.
- With a 1,000 foot extension Runway 2/20 adequately meets the requirements of the MD-80 aircraft to operate to current destinations.
- Extension of the runway introduces trees that penetrate the Approach Surface for Runway 2 and the Departure Surface for Runway 20. At a minimum these trees would be required to be shortened.
- Threshold in close proximity to existing Midfield Terminal.

5.3.4.3 Environmental Criteria

- Per FAA Order 1050.1E, *Environmental Impacts: Policies and Procedures*, section 401k, (3), a major runway extension is an action that would normally require an EA.
- Impacts the White Chapel Memorial Gardens Cemetery have the potential to create significant social controversy that would be addressed in the EA but may warrant additional environmental study.

5.3.4.4 Compatible Land Use Criteria

- Requires acquisition of land or control through avigation easement of 17 acres of land. Purchase of this land has the potential to change the existing land use.
- 17 acres of land comprised of two land owners.
- Majority of privately owned land, 13 acres, is located on the existing White Chapel Memorial Gardens public cemetery and is operated by Dignity Memorial.
- Portions of the approach lighting system would be required to be installed on cemetery land.
- Investigation into different approach light systems found that alternative light systems required increasing the Instrument Flight Rules (IFR) minimums for Runway 2.
- RPZ remains inside the Airport Overlay District.

- Approach is protected by the designation of an Airport Zone, a special overlay zone which protects the flight paths at SGF mandated under Missouri Revised Statute 305.400-305.405.

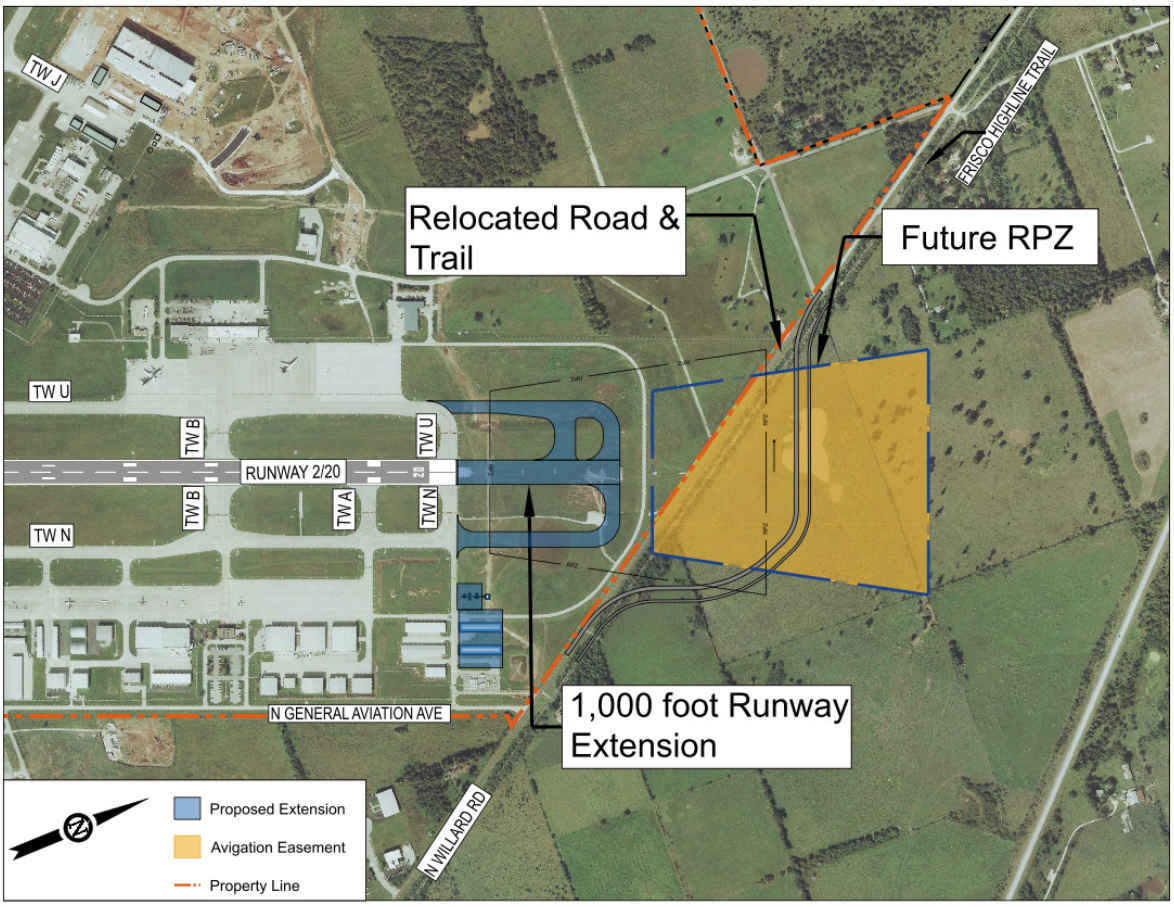
5.3.4.5 Financial Criteria

- Construction and design will cost approximately $11 million, assuming there will not be a requirement for additional environmental study.

5.3.5 ALTERNATIVE 3 – 1,000 FOOT EXTENSION TO THE NORTH

This alternative allows for a 1,000 foot extension of the north end of Runway 2/20, as shown in **Figure 5-2**. Additional land purchase or control through avigation easement will also be necessary to protect the RPZ associated with the extended runway. This alternative allows for the runway to be extended with the least amount of impact to a portion of the existing ILS equipment. Extending the north runway end benefits both the Cargo and main GA Aprons, providing efficient taxi time for the corresponding users. The runway will extend closer to the adjacent N. Willard Road and Frisco Highline Trail, and would require them to be relocated. The trail is protected under the Federal Rails to Trails program and will require additional coordination with the railroad company as they retain final rights to the control of the trail. The cost for this alternative would be approximately $15 million.

FIGURE 5-2 – RUNWAY EXTENSION - ALTERNATIVE 3



Source: Jviation, Inc.

5.3.5.1 Safety Criteria

- Provides adequate safety for design aircraft.
- Safe operations are dependent on the pilot command adjusting usable load to safely operate on the available runway length according to FAR 139.

5.3.5.2 Operational Criteria

- Accommodates 100% of airplanes weighing less than 12,500 pounds.
- Accommodates 100% of airplanes weighing 12,500 lbs up to 60,000 pounds.
- With a 1,000 foot extension Runway 2/20 adequately meets the requirements of the MD-80 aircraft to operate to its current destinations.

5.3.5.3 Environmental Criteria

- Per FAA Order 1050.1E, *Environmental Impacts: Policies and Procedures*, section 401k, (3), a major runway extension is an action that would normally require an EA.
- **Secondary Induced Impacts** – The runway extension has the potential to change surface transportation and public trails with the realignment of N. Willard Road and Frisco Highline Trail. These impacts would be evaluated in the runway extension EA.
- **Floodplains and Wetlands** – From preliminary research is appears both floodplains and wetlands may exist in the proposed area for the runway extension. The significance of the impacts as well as mitigation measures would be discussed in the runway extension EA.

5.3.5.4 Compatible Land Use Criteria

- Requires acquisition, or control through avigation easement, of 43 acres of land. Purchase of this land has the potential to change the existing land use.
- 30 additional acres of land will be needed for the relocation of the Frisco Highline Trail and N. Willard Road relocation.
- With the extension of the runway portions of the RPZ will be extended outside of the existing Airport Overlay District.
- Approach is protected by the designation of an Airport Zone, a special overlay zone which protects the flight paths at SGF mandated under Missouri Revised Statute 305.400-305.405.
- 3,500 feet of N. Willard Road and Frisco Highline Trail would be relocated to remain clear of Part 77 surfaces for Runway 2/20.
- Relocating the Frisco Highline Canal would require coordination with the Burlington Northern Railroad, who maintains the rights to the land.

5.3.5.5 Financial Criteria

- Construction and design will cost approximately $15 million.

5.3.6 Recommended Alternative

Table 5-1 summarizes the runway extension alternatives for Runway 2/20. Alternative 2 – 1,000 Foot Extension to the South, is recommended.

TABLE 5-1 - RUNWAY 2/20 EXTENSION COMPARISON MATRIX

	Alternative 1 – Maintain Current Length	**Alternative 2 – 1,000 Foot Extension to the South**	**Alternative 3 – 1,000 Foot Extension to the North**
Safety	• Provides adequate safety for design aircraft • Safe operations are dependent on the pilot command adjusting usable load to safely operate on the available runway length according to FAR 139		
Operational	• Adequately meets demands of aircraft weighing less than 12,500 pounds • Adequately meets demands of aircraft weighing between 12,500 and 60,000 pounds • Does not adequately meet the demands of aircraft weighing greater than 60,000 pounds	• Adequately meets demands of aircraft weighing less than 12,500 pounds • Adequately meets demands of aircraft weighing between 12,500 and 60,000 pounds • Adequately meets the demands of aircraft weighing over 60,000 pounds	
Environmental	• No additional concerns	• Requires an EA • Impacts to White Chapel Memorial Garden Cemetery may warrant additional environmental study	• Requires an EA • Wetland, floodplain, and Frisco Highline Trail impacts
Compatible Land Use	No additional concerns	17 Acres – 2 Landowners	• 43 Acres – 1 Landowner • Relocate N. Willard Road & Frisco Highline Trail • Relocate Frisco Highline Trail
Financial	-	$11M	$15M
		Recommended Alternative	

5.3.7 PREFERRED ALTERNATIVE

The preferred Runway Extension Alternative as chosen by the Technical Committee on January 24, 2012 is Alternative 2, 1,000' extension to the south, for a total runway length of 8,003 feet.

5.4 GA APRON EXPANSION

5.4.1 OVERVIEW

As discussed in **Section 4.5.1**, the apron has enough room to adequately accommodate aircraft movement and long-term parking. There is a need for short-term transient aircraft parking, and, space for a GA deice pad. Additionally, there is an opportunity to realign Taxiway N between Taxiways B and C. This realignment would remove the existing jog put in place to provide adequate separation due to the original location of the threshold for Runway 2. With the runway extended the jog is no

longer needed. The realignment would allow for additional GA Apron expansion on the north edge of the apron and would also create a consistent parallel taxiway, thereby increasing the level of safety for aircraft taxiing on Taxiway N. Two alternatives were evaluated to address the realignment of Taxiway N and the expansion of the GA Apron.

5.4.2 Assumptions

1. All facilities will be designed to Aircraft Design Group (ADG) IV requirements.
2. Portions of the GA Apron Expansion Alternatives are predicated on the realignment of Taxiway N and the subsequent shift of the Taxiway Safety Area and Object Free Area.

5.4.3 Alternative 1 – Maintain Current GA Apron

This alternative would be to maintain the GA Apron in its current configuration. This would also include leaving Taxiway N in its current configuration between Taxiways B and C. The benefit would be a cost savings as shifting Taxiway N and expanding the apron would require a significant capital investment. However, the shift in Taxiway N will remain which has been identified as an area that often causes confusion for pilots taxiing and is a possible safety concern as it is not a standard parallel taxiway.

5.4.3.1 Safety Criteria

- The shift in Taxiway N has been identified as an area that often confuses pilots through discussions with the FAA Air Traffic Control Tower.

5.4.3.2 Operational Criteria

- There is a surplus in based aircraft tiedown apron space of 15,500 square yards by 2020 and 14,800 square yards by 2030.
- There is a surplus in transient aircraft tiedown apron space of 25,000 square yards by 2020 and 21,000 square yards by 2030.
- Currently 55 tiedown positions exist for based aircraft and 10 for transient aircraft. Both exceed the required amount in the 20-year planning period.
- Limits expansion of aircraft storage facilities to the west.
- Limits potential aircraft deice pad locations.

5.4.3.3 Environmental Criteria

- No additional environmental concerns.

5.4.3.4 Compatible Land Use Criteria

- Will not alter on or off-airport land use.

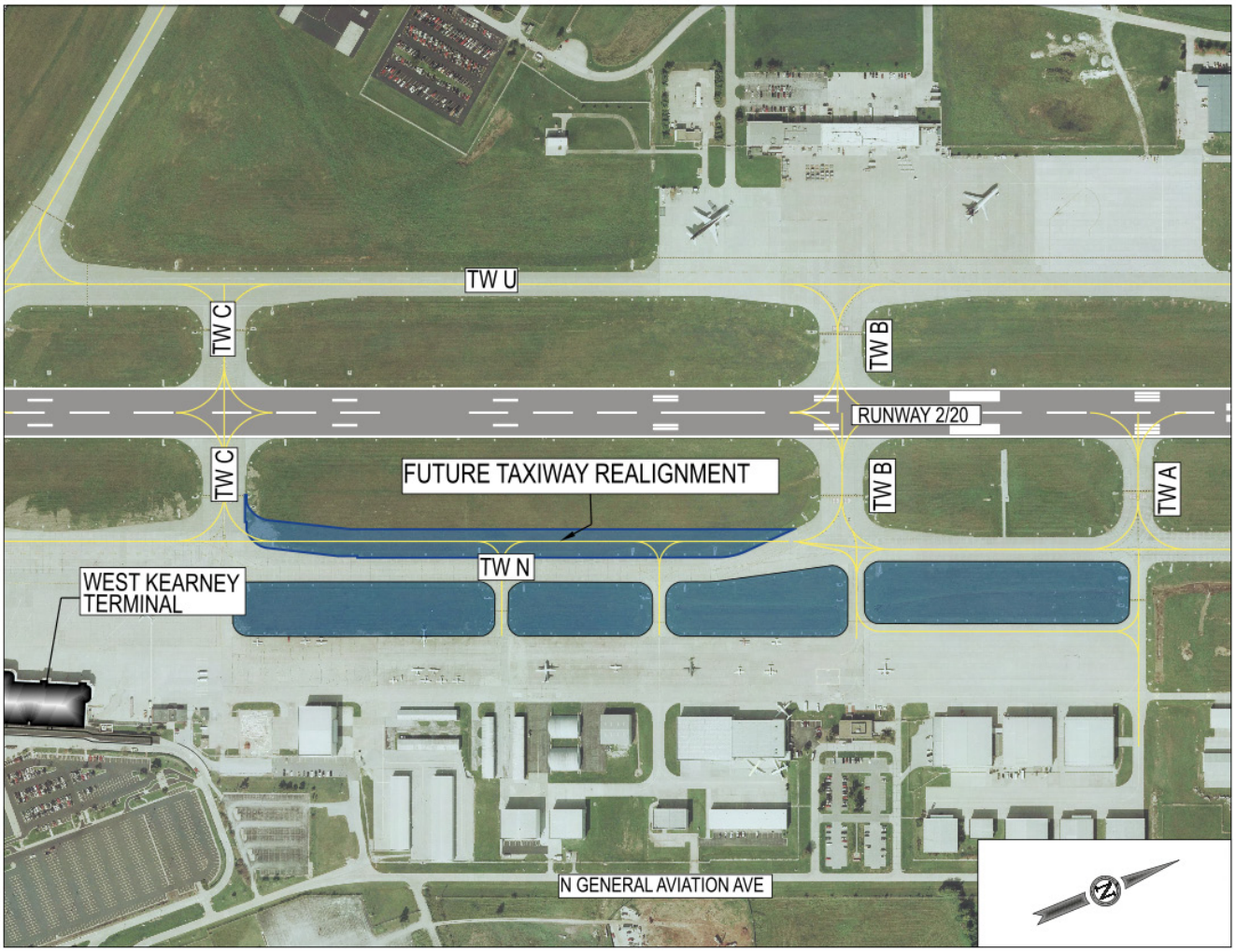
5.4.3.5 Financial Criteria

- No additional financial concerns.

5.4.4 ALTERNATIVE 2 – GA APRON EXPANSION

This alternative would involve an expansion of the GA Apron between Taxiways A and C, as depicted in **Figure 5-3**. This expansion could be constructed in a phased manner which would add an additional 52,740 square yards of pavement at full build out. This space could be used for the expansion of existing transient aircraft parking and could also accommodate a dedicated space for GA aircraft deicing. By expanding the GA Apron to the west, additional hangar development could also be facilitated by using existing apron on the east edge of the GA Apron. The expansion of the GA Apron would extend the portion of Taxiway N that is an apron edge taxiway. This could increase the risk of aircraft entering the controlled movement area without clearance from Air Traffic Control Tower (ATCT). The cost for this alternative would be approximately $11 million.

FIGURE 5-3 - GA APRON EXPANSION – ALTERNATIVE 2



Source: Jviation, Inc.

5.4.4.1 Safety Criteria

- Eliminates the shift in Taxiway N.
- Expands the existing apron edge taxiway located on Taxiway N.

5.4.4.2 Operational Criteria

- Creates additional 53,000 square yards apron which can be used for the following:
- Aircraft Parking
- Aircraft Deice
- Aircraft Hangar Storage

5.4.4.3 Environmental Criteria

- It is not anticipated that there will be any significant environmental impacts as a result of the GA apron expansion.

5.4.4.4 Compatible Land Use Criteria

- Will not alter on or off-airport land use.

5.4.4.5 Financial Criteria

- Construction and design will cost approximately $11 million.

5.4.5 RECOMMENDED ALTERNATIVE

Table 5-2 summarizes the apron expansion alternatives. A phased implementation of Alternative 2 – GA Apron Expansion, is recommended.

TABLE 5-2 - APRON EXPANSION COMPARISON MATRIX

	Alternative 1 – Maintain Current GA Apron	**Alternative 2 – GA Apron Expansion**
Safety	TW N shift confusing to pilots	• Remove TW N Shift • Expands existing apron
Operational	• 55 tiedowns for based aircraft • 10 tiedowns for transient aircraft • Limits expansion for aircraft storage to the west • Limits potential deice pad locations	Additional 53,000 SY of apron
Environmental	No additional concerns	No significant impact
Compatible Land Use	Will not alter land use	
Financial	-	$11M
		Recommended Alternative

5.4.6 PREFERRED ALTERNATIVE

The preferred GA Apron Extension Alternative as chosen by the Technical Committee on January 24, 2012 is a phased implementation of Alternative 2, GA Apron Expansion and Removal of shift in Taxiway N.

5.5 GA DEVELOPMENT

5.5.1 OVERVIEW

As discussed in **Section 2.5.3,** hangar availability is nearly at capacity. There is limited space for additional hangar development and only two airport owned hangars available for lease, with a wait list for T-Hangar aircraft shelters. Therefore, there is a need for additional hangar development. The current location for GA hangars is constrained with only one area available to lease for the purpose of private hangar development. In order to expand and build additional hangars and aircraft shelters, a new location will need to be designated.

It should also be noted that the demand for general aviation facilities in the Springfield area was documented as part of a Master Plan and Environmental Assessment completed in 2001 for the proposed Air Park South Airport. At that time, the Springfield Branson National Airport had a waiting list of 82 aircraft that provided justification for a new general aviation airport. A land acquisition program was initiated to construct a runway capable of accommodating the local fleet of general aviation aircraft including small corporate jets. The land acquisition program was ultimately abandoned due to high land values awarded during the condemnation process. The sale of federal and state aviation funded Air Park South property will be used to develop general aviation facilities at Springfield Branson National Airport.

As discussed in **Section 4.5.3**, there currently is a shortfall in hangar storage space for the amount of aircraft now based at SGF. Additionally, while down from the 82 aircraft wait list identified in 2001, there is still high demand for hangar storage with an existing wait list of 36 aircraft. This shortfall will continue to grow over the 20 year planning period, with a shortfall of approximately 89,000 square feet increasing to 191,000 square feet through 2030. Therefore, new hangar space is required to adequately accommodate based aircraft at a reasonable level of service. Of importance for GA users are affordability, accessibility, and freedom from those security regulations that exist for commercial operators. Five alternatives have been evaluated for a new GA development location. These locations utilize airport owned land that is currently vacant, as well as one option that involves redeveloping the current GA Apron area and adjacent West Kearney Terminal.

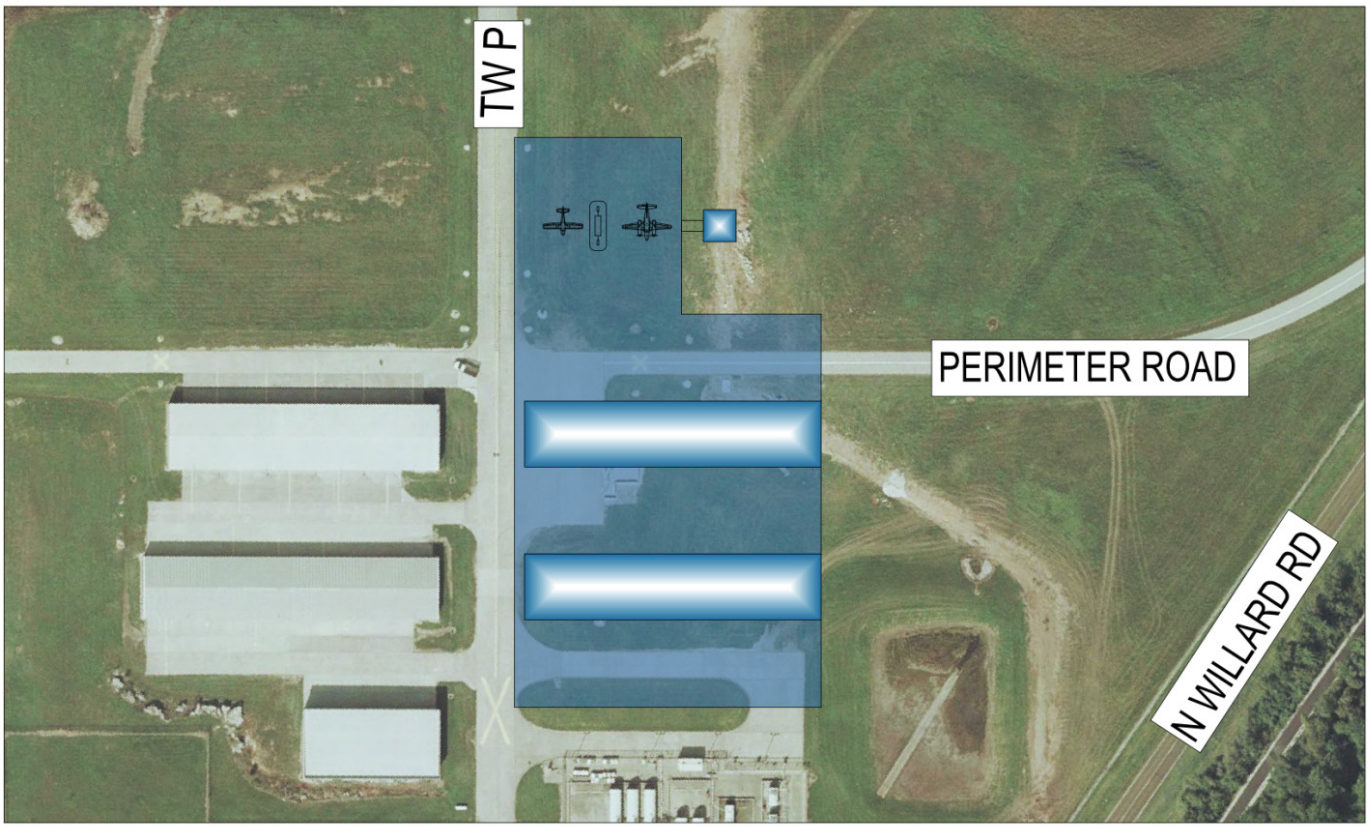
5.5.2 ASSUMPTIONS

1. All facilities will be designed to meet ADG II and III requirements depending on hangar size and type.

2. Major construction for the GA development area will be conducted using funds from the sale of the closed Airpark South Airport in Ozark, Missouri.

3. All alternatives include future expansion of the T-Hangar facility on the north GA Apron which includes relocation of the self-serve fuel farm, shown in **Figure 5-4**.

FIGURE 5-4 - NORTH GA T-HANGAR FACILITY



Source: Jviation, Inc.

5.5.3 ALTERNATIVE 1 – EXISTING GA DEVELOPMENT AND EXPANDED T-HANGAR FACILITY

This alternative would involve maintaining the existing GA hangar facilities with the exception of expanding the T-Hangars on the north GA apron. This would provide a cost savings in that the only additional infrastructure required would be for the north T-Hangars and the self-serve fuel farm relocation. However, there is still a capacity issue with existing aircraft storage bordering on full capacity. This will only be compounded by the anticipated future growth of based aircraft which would require additional hangar space beyond the space provided by expanding the north T-Hangar facility. Additionally, there is the matter of recouping the loss of regional GA facilities through the sale of the now closed Airpark South Airport. The city plans to sell the land once occupied by the airport and use the funds generated to expand existing GA facilities at SGF. Additionally, the sale of land at Airpark South is obligated by FAA and MoDOT Grant Assurances, which limits how the funds can be spent. The cost for this alternative would be approximately $3 million.

5.5.3.1 Safety Criteria

- Provides adequate level of safety for intended aircraft.

5.5.3.2 Operational Criteria

- Currently there are 36 stalls for aircraft parking owned by the airport. There is a wait list for T-Hangar storage and there are 2 hangars available for lease.
- It is forecasted that by 2020 there is a deficit of 89,000 square feet of hangar space, increasing to 191,000 square feet by 2030.
- Provides 32,400 square feet of hangar storage.
- Deficits of 56,600 square feet in 2020 and 158,600 square feet in 2030 remain.
- Relocation of the Self-Serve Fuel Farm will be required.

5.5.3.3 Environmental Criteria

- It is not anticipated that there will be any significant environmental impacts as a result of Alternative 1 – Existing GA development & expanded T-Hangar Facility.

5.5.3.4 Compatible Land Use Criteria

- Does not alter on or off-airport land use.

5.5.3.5 Financial Criteria

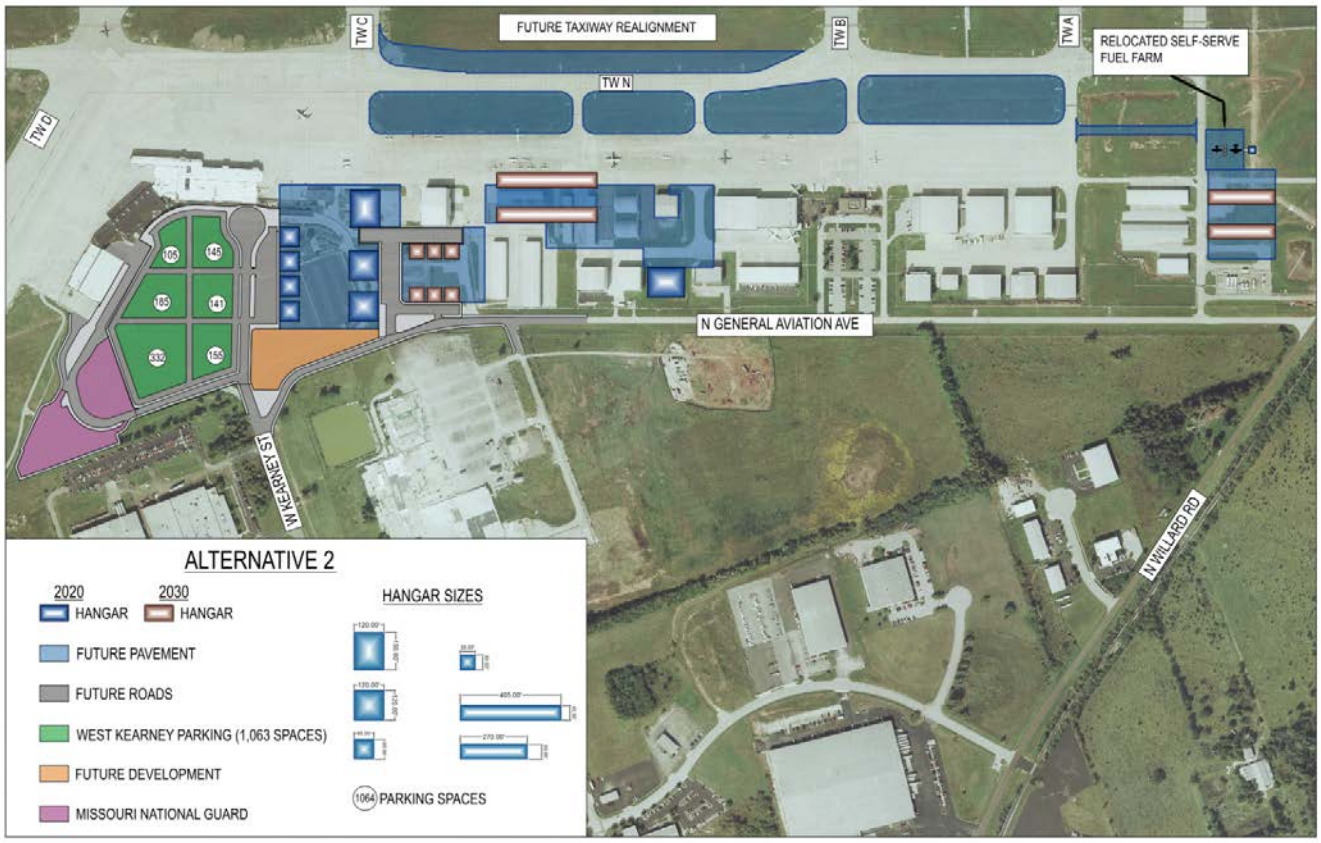
- Design and construction will cost approximately $3 million.

5.5.4 ALTERNATIVE 2 – WEST KEARNEY AND GA APRON REDEVELOPMENT

This alternative involves redevelopment of portions of the existing GA Apron and West Kearney Terminal complex, **Figure 5-5**. This location repurposes portions of the West Kearney Terminal apron and parking lot along with reconfiguring existing hangar space that is nearing the end of its service life. The redevelopment could be done in phases as demand in aircraft storage increases. Repurposing the existing West Kearney apron and parking also incorporates land that is not currently utilized and left predominantly vacant. It should be noted that a portion of the parking lot must be maintained for current and future parking for Expedia and the Missouri National Guard personnel, per current lease requirements.

This location has a potential for 17 acres of development at full build out and could be done in phases. This alternative provides aircraft storage for the various types of aircraft that make up the GA community. Consideration was also given to providing affordable hangar storage options, with the goal to keep costs as low as possible for the GA community. These affordable hangar options may include T-Hangar storage or shade hangar storage, which provide overhead protection only. The cost for this alternative would be approximately $12 million. With the expansion of the north T-Hangar facility the total cost would be $15 million.

FIGURE 5-5 - GA DEVELOPMENT - ALTERNATIVE 2



Source: Jviation, Inc.

5.5.4.1 Safety Criteria

- Provides adequate level of safety for intended aircraft.
- Apron reconfiguration eliminates existing taxilane separation issues.

5.5.4.2 Operational Criteria

- Redevelops 17 acres of land.
- Currently there are 36 stalls for aircraft parking owned by the airport. There is a wait list for T-Hangar storage and there are 2 hangars available for lease.
- It is forecasted that by 2020 there is a deficit of 89,000 square feet of hangar space, increasing to 191,000 square feet by 2030.
- Provides 90,000 square feet of hangar storage by 2020 and increases to 193,000 square feet of hangar storage at full build out in 2030.
- Provides varying hangar sizes.
- Provides affordable hangar storage options through T-Hangars/Covered Patio Shelters.
- Maintains parking requirement for Expedia and Missouri Army National Guard in West Kearney parking lot.
- Reconfigures portion of West Kearney parking lot and adjacent apron to General Aviation related uses including parking for new aircraft hangars.

5.5.4.3 Environmental Criteria

- It is not anticipated that there will be any significant environmental impacts as a result of Alternative 2 – West Kearney and GA Apron Redevelopment.

5.5.4.4 Compatible Land Use Criteria

- Will not alter on or off-airport land use.
- Development remains within Airport Overlay District.

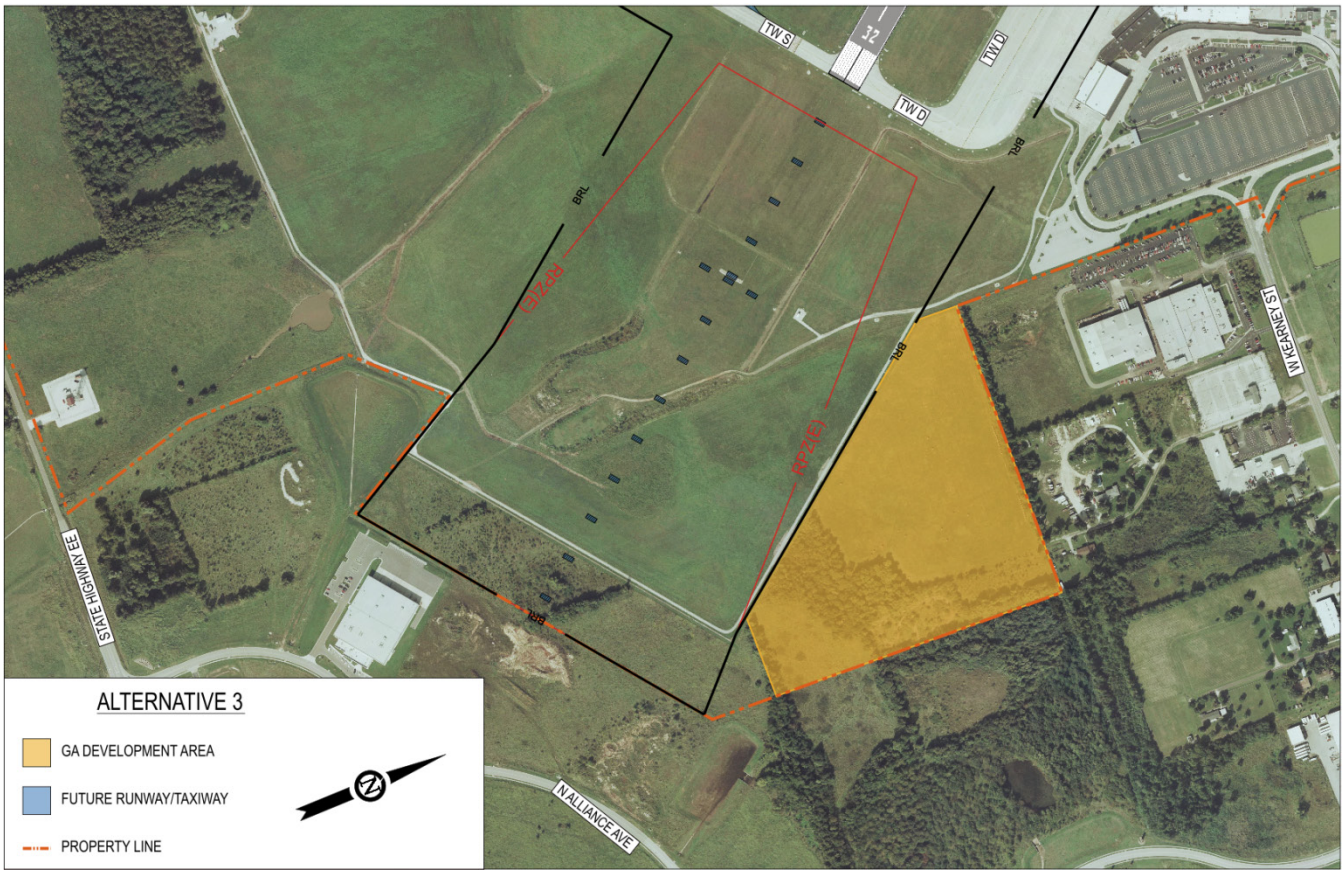
5.5.4.5 Financial Criteria

- Design and construction for GA Redevelopment will cost approximately $12 million. Total cost with expansion of the north T-Hangar facility is approximately $15 million.

5.5.5 ALTERNATIVE 3 – GA DEVELOPMENT NORTHEAST OF RUNWAY 32 THRESHOLD

This alternative would create a GA Development site located on the east airfield just east of the current West Kearney Complex, depicted in **Figure 5-6.** In order to provide aircraft access to this development site, Taxiway D would need to be extended to the east. Service equipment can access this site through the use of the existing perimeter road. This site is located closer to the existing GA facilities as opposed to those proposed in Alternatives 4 and 5. However, there is still a significant separation from the existing GA Apron which could cause an issue with resources and equipment servicing both areas.

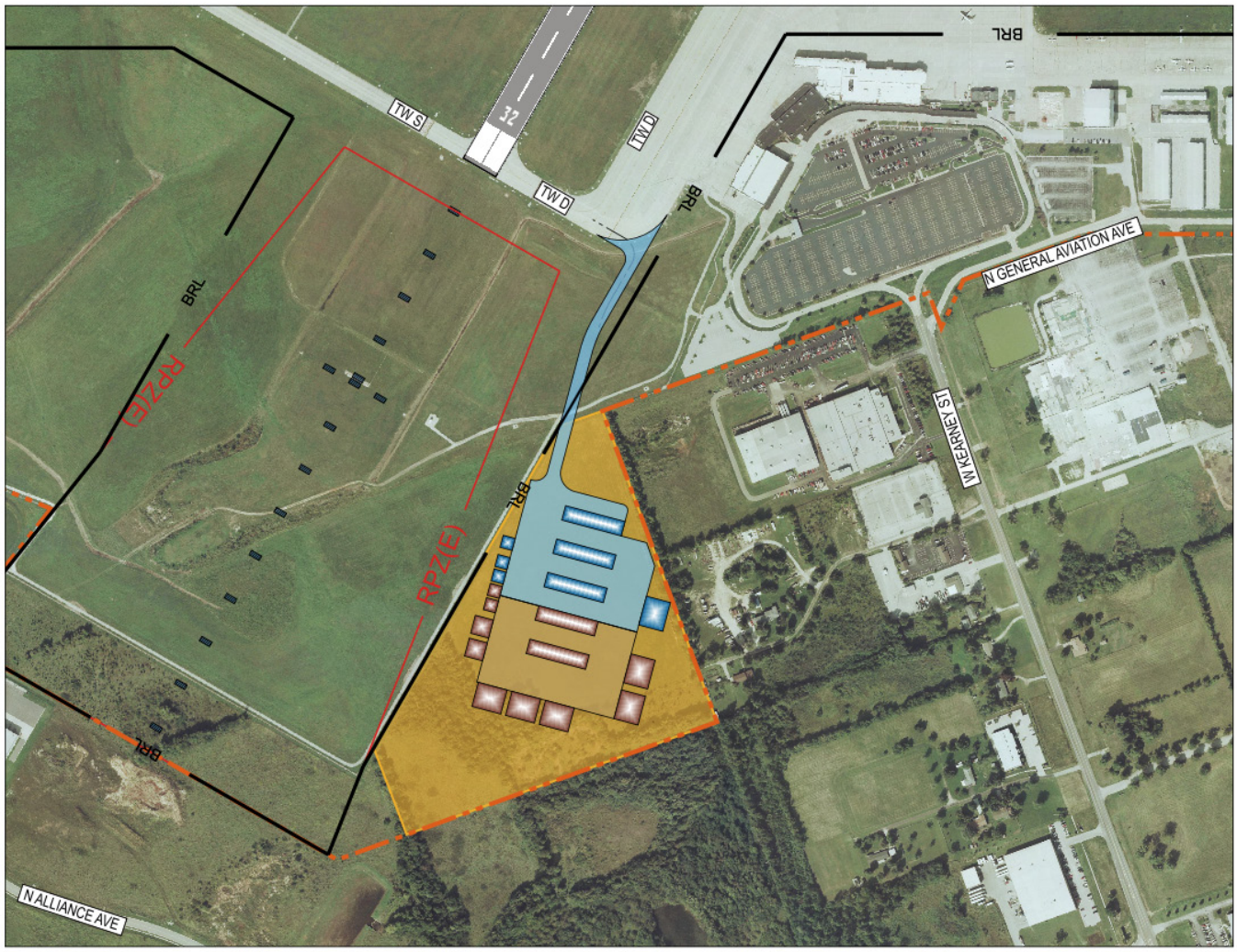
FIGURE 5-6 - GA DEVELOPMENT - ALTERNATIVE 3



Source: Jviation, Inc.

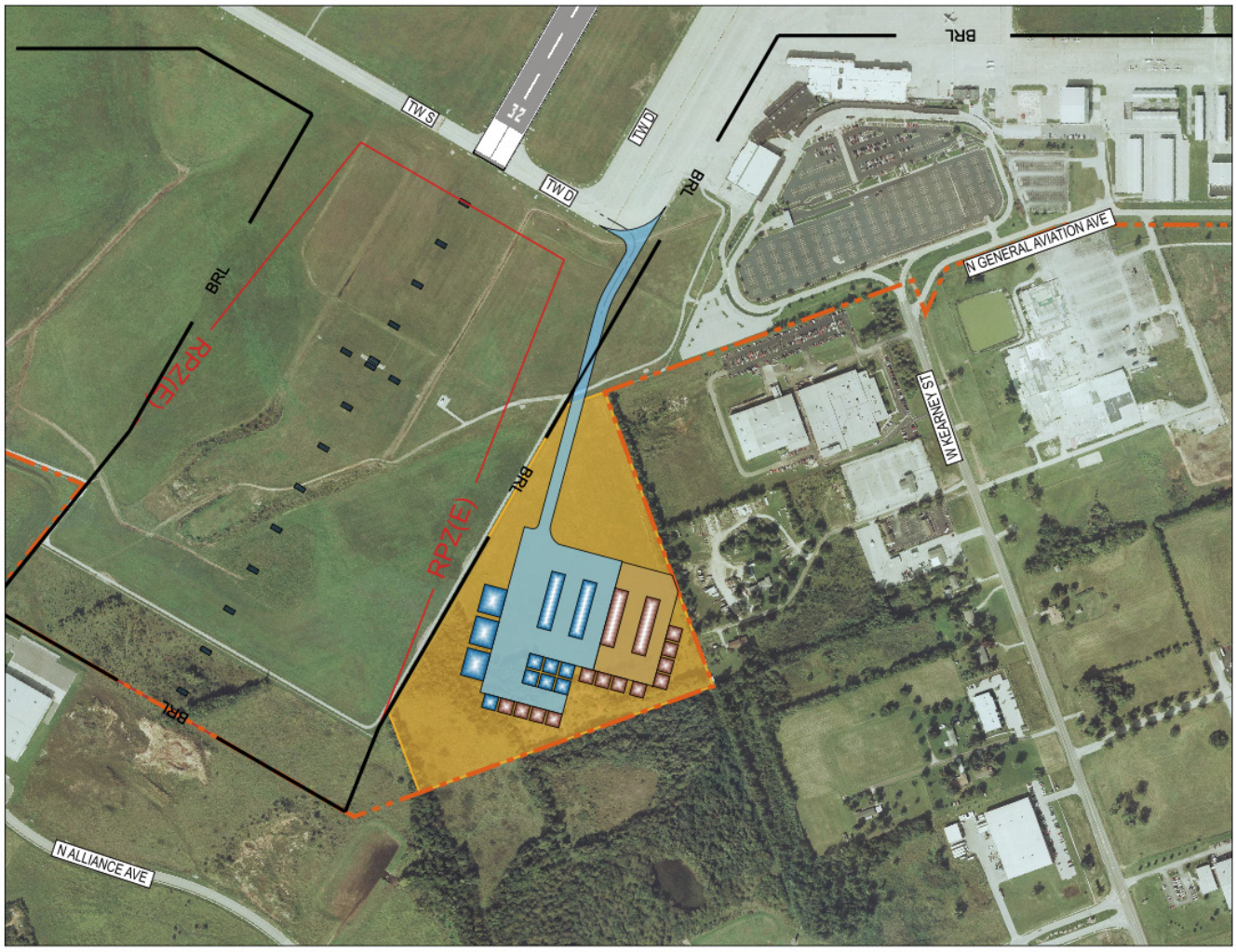
This site allows for a flexible development plan and can accommodate varying layouts for development, depicted in **Figure 5-7 and Figure 5-8**. This site has a potential for 28 acres of development. Access roads and infrastructure would also have to be extended to the area, as the closest major roadways are N. Alliance Avenue to the east and W. Kearney Street to the north. Additionally, there is an old go-kart track located on the east edge of the proposed development site that would have to be removed and any environmental contaminant mitigated. The cost for this alternative would be approximately $12 million. With the expansion of the north T-Hangar facility the total cost would be $15 million.

FIGURE 5-7 - GA DEVELOPMENT ALTERNATIVE 3 OPTION 1



Source: Jviation, Inc.

FIGURE 5-8 - GA DEVELOPMENT ALTERNATIVE 3 OPTION 2



Source: Jviation, Inc.

5.5.5.1 Safety Criteria

- Service vehicles would utilize existing airport perimeter roads, increasing the amount of vehicles that use these roads.

5.5.5.2 Operational Criteria

- Provides 28 acres for development.
- Currently there are 36 stalls for aircraft parking owned by the airport. There is a wait list for T-Hangar storage and there are 2 hangars available for lease.
- It is forecasted that by 2020 there is a deficit of 89,000 square feet of hangar space, increasing to 191,000 square feet by 2030.
- Provides a maximum of 96,000 square feet of hangar space by 2020 and increases to a maximum of 202,000 square feet of hangar by 2030.

- May require additional fuel farm.
- Places constraints on existing staffing for fueling and aircraft service.

5.5.5.3 Environmental Criteria

- It is not anticipated that there will be any significant environmental impacts as a result of Alternative 3 – GA Development Northeast of Runway 32 Threshold.

5.5.5.4 Compatible Land Use Criteria

- Will not alter on airport land use.
- Access to the site is limited and the addition of infrastructure and roadway access may impact neighboring land.
- Development remains within Airport Overlay District.

5.5.5.5 Financial Criteria

- Design and construction for the new GA development will cost approximately $12 million. Total cost with the expansion of the north T-Hangar facility is approximately $15 million

5.5.6 ALTERNATIVE 4 – GA DEVELOPMENT SOUTHEAST OF RUNWAY 32 THRESHOLD

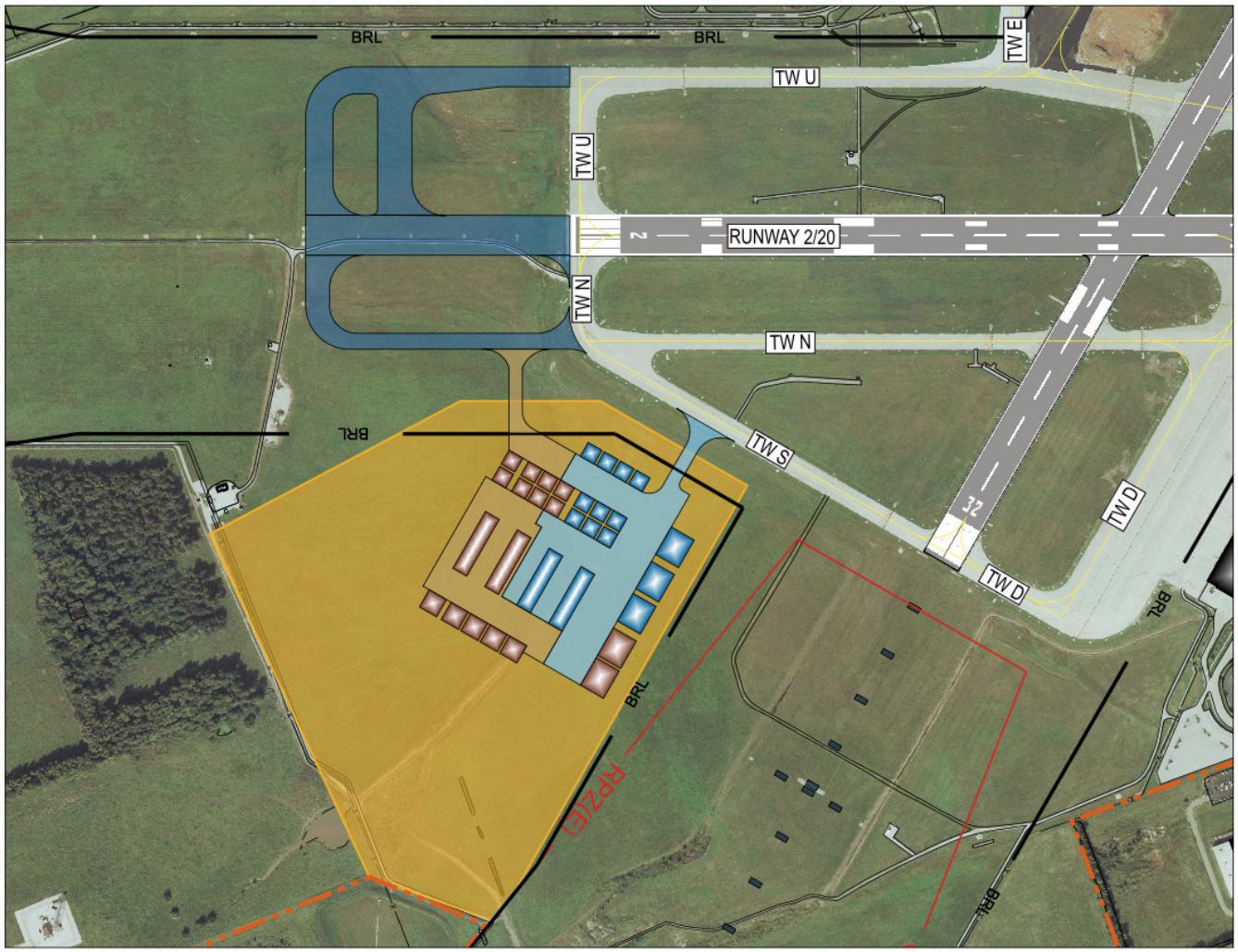
This alternative would create a GA Development site located on the southeast corner of the airport. This location would sit between the thresholds of Runway 2 and Runway 32, depicted in **Figure 5-9**. Aircraft can access the airport movement area through the use of Taxiway S. This site is located adjacent to a major arterial road in State Highway EE and also has airside access through the current airport perimeter road. The site is separate from the current GA Apron and associated facilities and would require support vehicles to utilize the perimeter road to service aircraft. This could create a staffing and time issue as the service area is no longer centralized. Development in this area may impact Airport Surveillance Radar (ASR) line of site which potentially may require the modification or relocation of the facility.

FIGURE 5-9 - GA DEVELOPMENT LOCATION ALTERNATIVE 4

Source: Jviation, Inc.

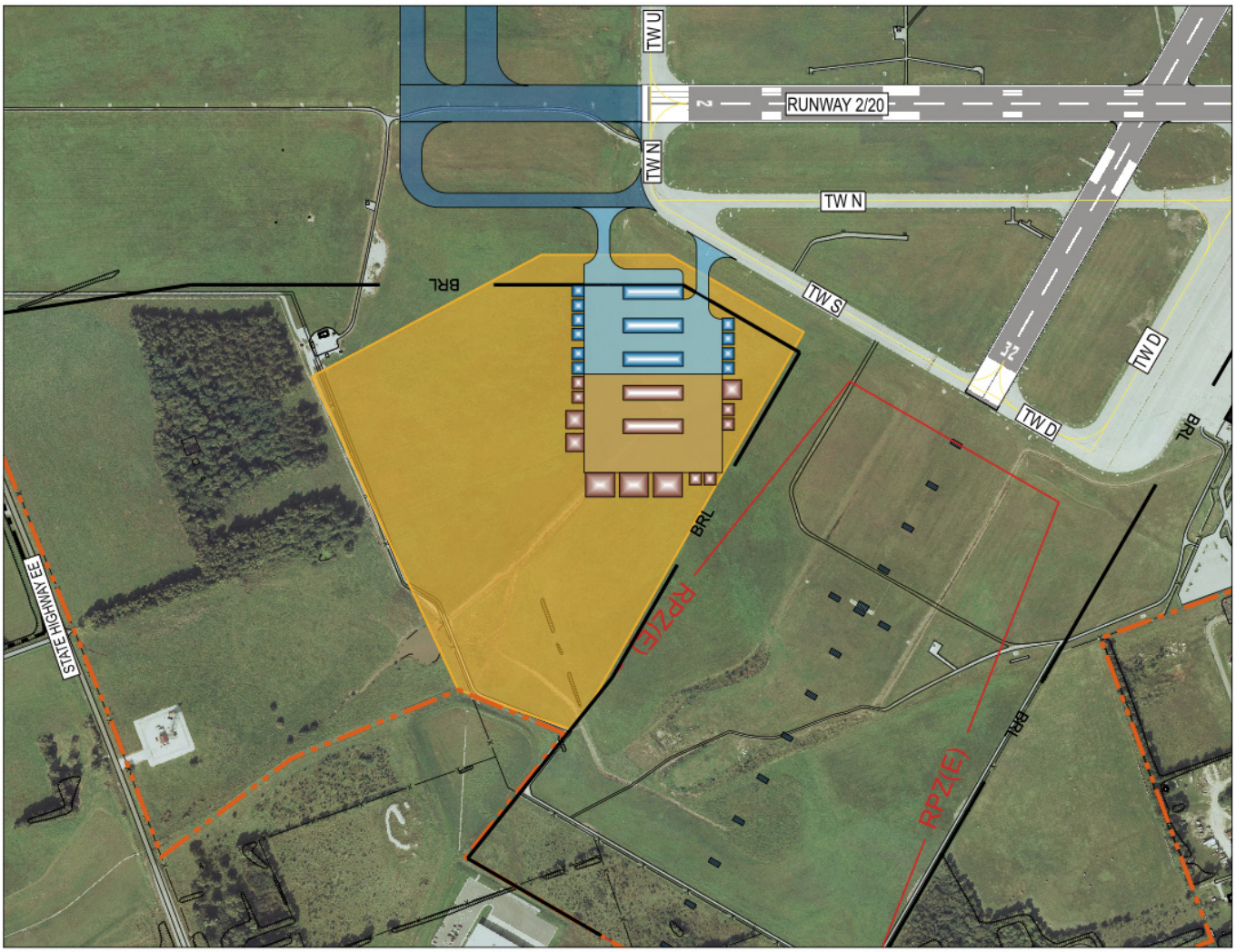
This site does allow for a flexible development plan and can accommodate varying layouts for development, depicted in **Figure 5-10 and Figure 5-11**. This site provides 51 acres for box hangar and T-Hangar aircraft shelters which can be constructed in a phased manner. The cost for this alternative would be approximately $15 million. With the expansion of the north T-Hangar facility the total cost would be $18 million.

FIGURE 5-10 - GA DEVELOPMENT - ALTERNATIVE 4 OPTION 1



Source: Jviation, Inc.

FIGURE 5-11 - GA DEVELOPMENT - ALTERNATIVE 4 OPTION 2



Source: Jviation, Inc.

5.5.6.1 Safety Criteria

- Service vehicles would utilize existing airport perimeter roads, increasing the amount of vehicles that use these roads.

5.5.6.2 Operational Criteria

- Provides 51 acres for development.
- Currently there are 36 stalls for aircraft parking owned by the airport. There is a wait list for T-Hangar storage and there are 2 hangars available for lease.
- It is forecasted that by 2020 there is a deficit of 89,000 square feet of hangar space, increasing to 191,000 square feet by 2030.
- Provides a maximum of 102,000 square feet of hangar space by 2020 and increases to a maximum of 202,000 square feet of hangar by 2030.

- Remains clear of existing FAA Antenna Farm.
- There is a potential for impacts to the Airport Surveillance Radar (ASR) based on line of sight and potential reflectivity from hangar structures. Any impacts would have to be mitigated which may include relocation of the ASR.
- May require additional fuel farm.
- Places constraints on existing staffing for fueling and aircraft service.

5.5.6.3 Environmental Criteria

- It is not anticipated that there will be any significant environmental impacts as a result of Alternative 4 – GA Development Southeast of Runway 32 Threshold.

5.5.6.4 Compatible Land Use Criteria

- Will not alter on airport land use.
- Access to the site utilizes existing airport property.
- Development remains within Airport Overlay District.

5.5.6.5 Financial Criteria

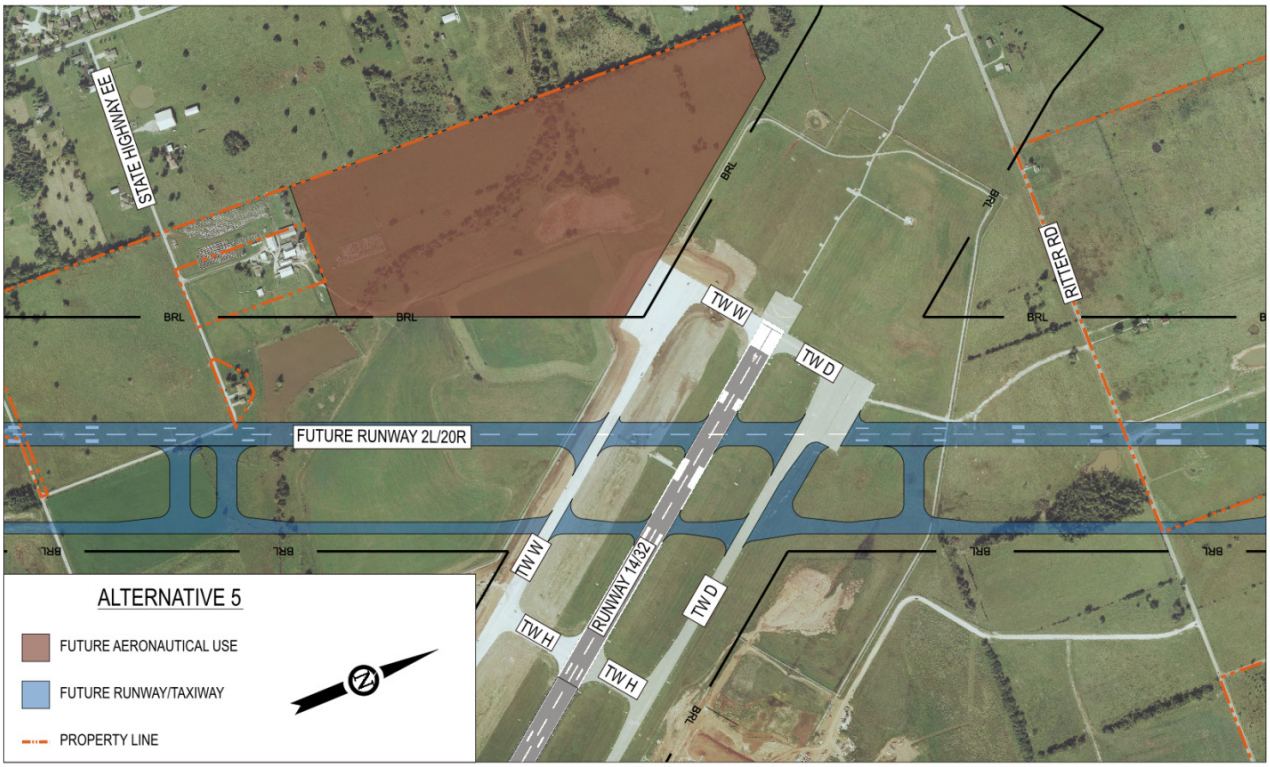
- Design and Construction for the GA Redevelopment will cost approximately $15 million. Total cost with expansion of the north T-Hangar facility is approximately $18 million.

5.5.7 ALTERNATIVE 5 – WEST AIRFIELD GA DEVELOPMENT

This alternative would create a GA Development site located on the west airfield adjacent to Taxiway W and the threshold for Runway 14, depicted in **Figure 5-12**. This location provides immediate access to the existing airport movement area and could tie into the pavement. This location is separated from the existing GA Apron with no immediate on-airport access available for service vehicles. In order to adequately service aircraft at this location, a dedicated fuel farm and support staff would be required. The time needed to reach this area, using existing roadways, would create a significant time constraint as well as a requirement for personnel to obtain and maintain commercial driver's licenses, as public roads would be required to access the development.

This site has a potential for 78 acres for development, which would accommodate varying layouts and a phased development. Access to the site could be obtained through the use of County Road 103. There are private homes in the vicinity of this location, so consideration and coordination would need to be given to these residents to identify and mitigate any negative impacts. Infrastructure in this area would be difficult as it has been determined that approximately 3 feet below the surface a large deposit of bedrock exists. Mitigation would drive up the cost of development in this area. This location will be designated for aeronautical and non-aeronautical usage.

FIGURE 5-12 - GA DEVELOPMENT AREA - ALTERNATIVE 5



Source: Jviation, Inc.

5.5.7.1 Safety Criteria

- Provides adequate level of safety for intended aircraft.
- Service vehicles would be required to utilize public roadways.

5.5.7.2 Operational Criteria

- Provides 78 acres for development.
- Places constraints on existing staffing for fueling and aircraft service.
- Will require additional fuel farm.

5.5.7.3 Environmental Criteria

- Any potential impact to private homes may create significant social impacts that would require the completion of an EA or additional environmental study.

5.5.7.4 Compatible Land Use Criteria

- Will not alter on airport land use.
- Access to the site is limited and the addition of infrastructure and roadway access may impact neighboring lands.
- Development remains within Airport Overlay District.
- It is recommended that this land be designated for future airport use only.

5.5.7.5 Financial Criteria

- Cost is dependent on the specific design, which will be determined at the time of development.

5.5.8 RECOMMENDED ALTERNATIVE

Table 5-3 summarizes the GA Development Alternatives. Alternative 2 – West Kearney and GA Apron Redevelopment, is recommended.

TABLE 5-3 – GENERAL AVIATION DEVELOPMENT COMPARISON MATRIX

	Alternative 1 – Existing GA Development and expanded T-Hangar Facility	**Alternative 2 – West Kearney and GA Apron Redevelopment**	**Alternative 3– GA Development Northeast of Runway 32 Threshold**	**Alternative 4– GA Development Southeast of Runway 32 Threshold**	**Alternative5 – West Airfield GA Development**
Safety	Provides adequate level of safety for intended aircraft				
		Reconfiguration eliminates taxilane separation issues	Increase vehicle usage on service roads		
Operational	• 32,400 SF of Hangar Storage	• 17 Acres • 193,000 SF of Hangar Storage • Maintains parking for Expedia and MONG	• 28 Acres • 202,000 SF of Hangar Storage • May require additional fuel farm • Constraints on existing staffing	• 51 Acres • 202,000 SF of Hangar Storage • May require additional fuel farm • Constraints on existing staffing	• 78 Acres • Additional fuel farm • Constraints on existing staffing
	Relocate Self-Serve Fuel Farm and expand north T-Hangar Facility				
Environmental	No significant environmental impacts				May impact nearby homes, requiring additional environmental study
Compatible Land Use	Will not alter on or off-airport land use				
Financial	$3M	$15M	$15M	$18M	Dependent on design

Recommended Alternative

Source: Jviation, Inc.

5.5.9 PREFERRED ALTERNATIVE

The preferred General Aviation Development Alternative as chosen by the Technical Committee on January 24, 2012 is Alternative 2, West Kearney and GA Apron Redevelopment.

5.6 AIRCRAFT DEICE PADS

5.6.1 OVERVIEW

Currently deicing occurs on the Commercial, Cargo, and GA Aprons at SGF. For aircraft deicing on the Commercial Apron, a system is in place where the storm runoff from the apron is segregated from the main storm drainage system through the use of plugs. After deicing operations are complete, the storm water is then collected via a Glycol Recovery Vehicle (GRV) and disposed of properly.

A centralized deicing pad is recommended as it reduces the volume of deicing waste and makes collection more efficient. Centralized deicing also allows for the most highly contaminated runoff to be collected initially with minimal exposure to precipitation. Collected runoff may be treated and disposed of off-site through a third-party contract, on-site through a treatment facility, or recovered through the collection of glycol from the runoff which may be recycled. Recovery is most commonly used for runoff containing glycol concentrations greater than 5% which is more achievable with centralized deicing pads; however, recovery is typically a costly process. By minimizing the amount of fluid and runoff generated from deicing, ongoing operational costs can be greatly reduced since fewer disposals are required. Additionally, centralized deicing allows for an accurate account of deicing runoff collection which enables the airport to easily report and meet regulatory requirements.

From a period of 2006 through 2010 SGF dispensed approximately 17,000 gals of mixed glycol solution per year. As described in **Section 4.9,** it is recommended that deicing should be conducted in a centralized manner so that the maximum capacity of deice fluid can be collected and mitigated from contaminating the storm drainage system. Centralized deice pad alternatives are broken up into three separate areas to correspond with the Commercial, GA, and Cargo Aprons. Additionally, the feasibility of apron specific locations will be examined to determine the need and necessity of each.

5.6.2 ASSUMPTIONS

1. Deice pads constructed to criteria in FAA Advisory Circular, 150/5300-14B, *Design of Aircraft Deicing Facilities.*

2. Deice pads will maintain necessary spacing based on aircraft type.

3. Deice pads alternatives utilize containment systems for deice runoff.

5.6.3 COMMERCIAL APRON DEICE PAD

5.6.3.1 Alternative 1 – Maintain Existing Commercial Deicing Operations

This alternative would be to maintain the existing commercial deicing operations occurring on the Commercial Apron. The existing system that is in place to collect deice runoff would be maintained. There would be no additional costs to construct a dedicated deice pad and the associated collection system. Additionally, the airport would still have to monitor impacts of aircraft on the storm drainage system and plan for corrective action if levels of contaminant were to increase to unacceptable levels. Deicing on the Commercial Apron could also have the potential to create congestion and/or safety concerns for both aircraft and ground personnel.

5.6.3.1.1 Safety Criteria

- Aircraft deicing on active apron.
- Glycol on an active apron can pose as a safety risk for people and equipment operating on the apron. Glycol can cause people to slip and fall and the material can be tracked indoors and around other portions of the airport.

5.6.3.1.2 Operational Criteria

- Aircraft deicing at the gate allows airlines to use existing staff to perform deice duties.
- Glycol is recovered through the use of a Glycol Recovery Vehicle.

5.6.3.1.3 Environmental Criteria

- The existing deicing operations do not ensure the most efficient and accurate collection of all deicing fluids which leaves the potential for stormwater contamination.

5.6.3.1.4 Compatible Land Use Criteria

- Will not alter on or off airport land use.

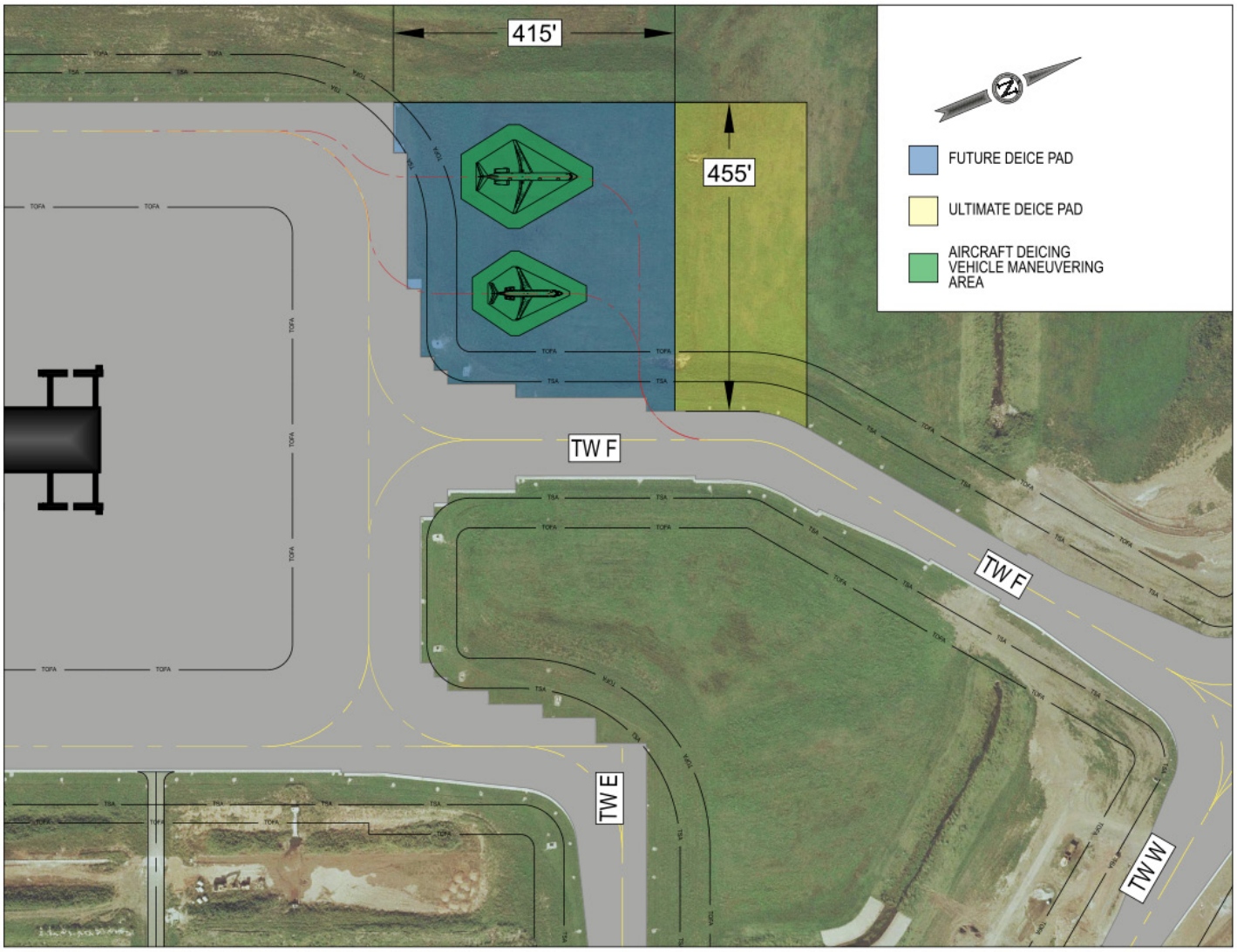
5.6.3.1.5 Financial Criteria

- No additional financial concerns.

5.6.3.2 Alternative 2 – Deice Pad Located West of Taxiway F

This alternative would construct a deice pad for commercial aircraft on the north edge of the Commercial Apron adjacent to the west edge of Taxiway F, depicted in **Figure 5-13.** This location allows for two ADG III aircraft to deice side by side. There is space for future expansion which can be done in a phased manner. The layout can accommodate either medium or large aircraft, or a mix of both. With a dedicated deice pad, containment is minimized to a single area and a significant amount of runoff can be collected and segregated from the storm drainage system. This location can double as an overflow parking area for periods of peak operations or aircraft remaining overnight. The initial cost for this alternative would be approximately $5 million.

FIGURE 5-13 – COMMERCIAL DEICE PAD – ALTERNATIVE 2



Source: Jviation, Inc.

5.6.3.2.1 Safety Criteria

- Allows for aircraft to deice away from active apron areas.

5.6.3.2.2 Operational Criteria

- Ability to expand as necessary to accommodate growth in aircraft operations (expansion could be done in phased manner).
- Provides 17,000 square yards for deicing with initial phase. 28,000 square yards, in total, planned to allow for future terminal expansion.
- Allows MD-80 (ADG III) and CRJ-200/700 (ADG II) aircraft to deice side by side.
- Location can double as overflow parking for aircraft during periods of peak operation or aircraft remaining overnight.
- As the terminal expands, deice pad shifts to the north.
- Morning departure bank may require more than 2 aircraft to deice at a time, possibly causing delays.

5.6.3.2.3 Environmental Criteria

- A dedicated deice pad allows for containment to be minimized to one single area and a large amount of runoff can be collected and kept away from the storm drainage system.
- Must comply with the National Pollutant Discharge Elimination System (NPDES) permits or other federal, state, or local permits.

5.6.3.2.4 Compatible Land Use Criteria

- Will not alter on or off airport land use.

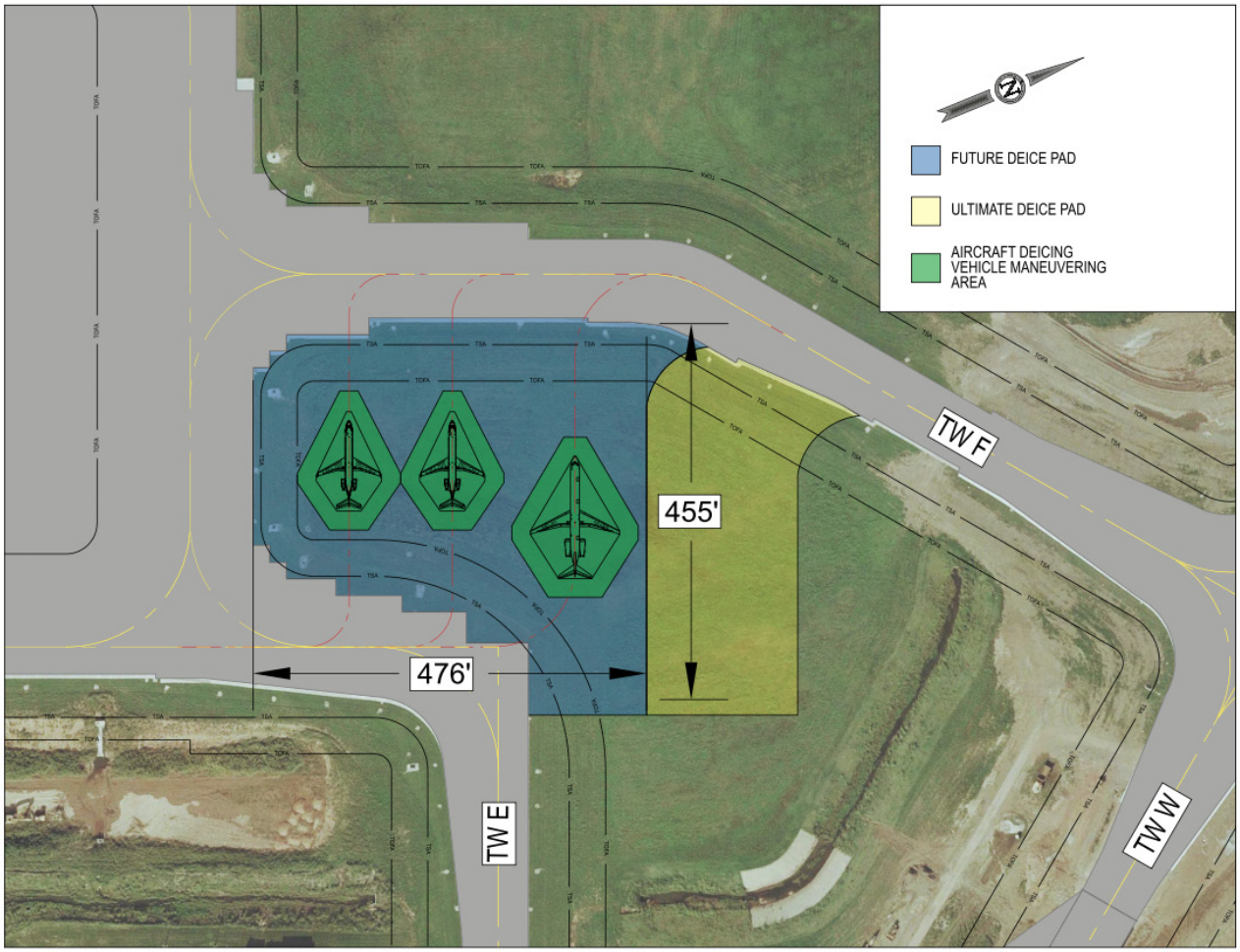
5.6.3.2.5 Financial Criteria

- Design and construction will cost approximately $5 million.

5.6.3.3 Alternative 3 – Deice Pad between Taxiways F and E

This alternative would involve constructing a deice pad for commercial aircraft in the unused land located to the north of the Commercial Apron between Taxiways F and E, as depicted in **Figure 5-14**. This location allows for both ADG II and III aircraft to deice simultaneously and would allow up to a maximum of three side-by-side deice operations. There is room to expand as necessary to accommodate growth in aircraft operations, and expansion could be done in a phased manner. This location also utilizes a space that would otherwise be left unused as the use is limited due to its proximity to frequent aircraft operations. Deice containment is minimized to a small footprint and glycol is recovered through a containment system, thus reducing the amount of contaminant entering the storm drainage system. This space can also be used for aircraft parking during times of peak operations or aircraft remaining overnight. With proper design, this pad could become concourse apron expansion when additional gates are necessary. The initial cost for this alternative would be approximately $6 million.

FIGURE 5-14 – COMMERCIAL DEICE PAD – ALTERNATIVE 3



Source: Jviation, Inc.

5.6.3.3.1 Safety Criteria

- Allows for aircraft to deice away from active apron areas.

5.6.3.3.2 Operational Criteria

- Ability to expand as necessary to accommodate growth in aircraft operations (expansion could be done in phased manner).
- Provides 18,000 square yards for deicing with initial phase. 39,000 square yards, in total, planned to allow for future terminal expansion.
- Allows MD-80 (ADG III) and CRJ-200/700 (ADG II) aircraft to deice simultaneously.
- Could allow up to a max of three side by side deicing operations.
- Location can double as overflow parking for aircraft during periods of peak operation or aircraft remaining overnight.
- As the terminal expands, deice pad shifts to the north.

5.6.3.3.3 Environmental Criteria

- A dedicated deice pad allows for containment to be minimized to one single area and a large amount of runoff can be collected and kept away from the storm drainage system.
- Must comply with the National Pollutant Discharge Elimination System (NPDES) permits or other federal, state, or local permits.

5.6.3.3.4 Compatible Land Use Criteria

- Will not alter on or off airport land use.

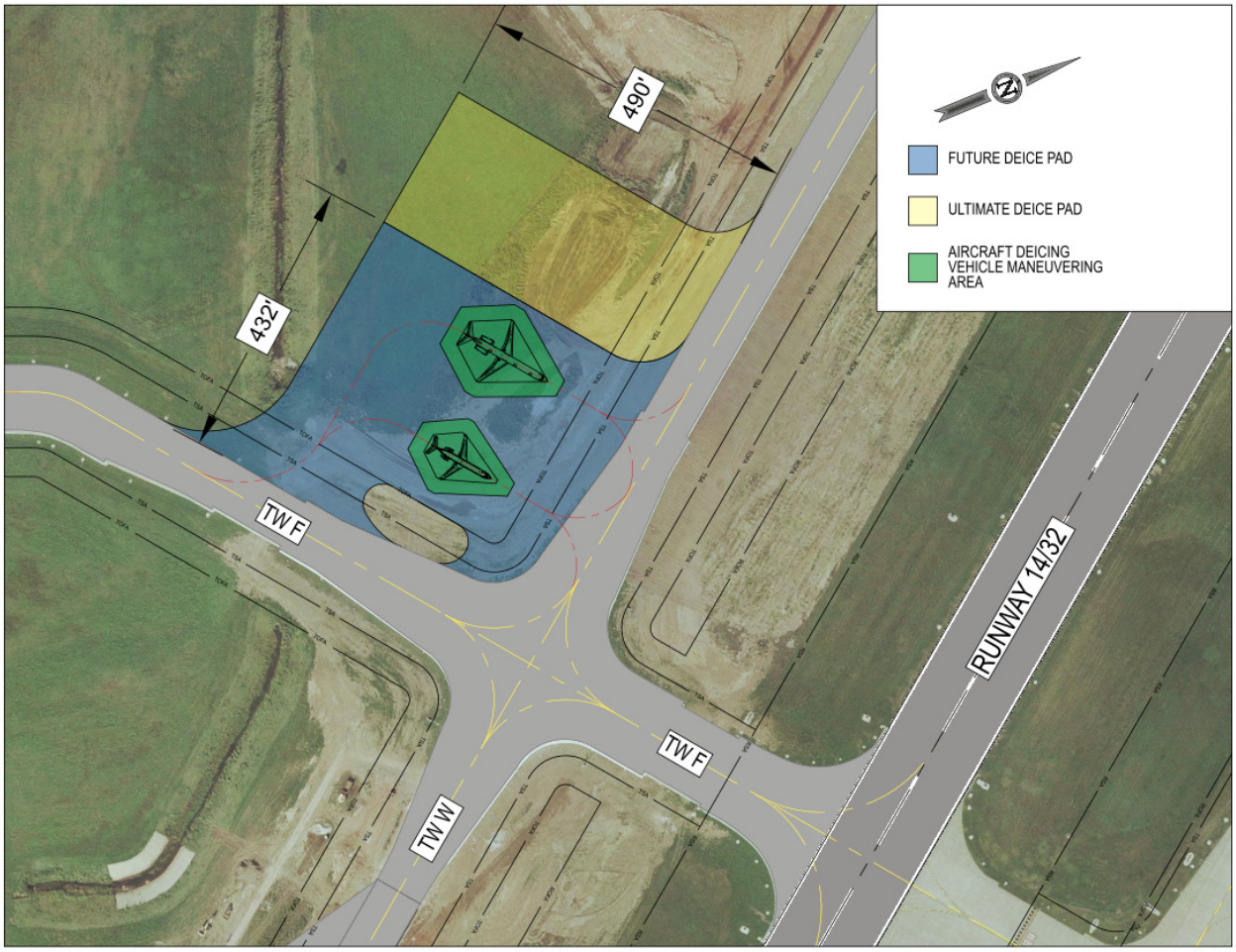
5.6.3.3.5 Financial Criteria

- Design and construction will cost approximately $6 million.

5.6.3.4 Alternative 4 – Deice Pad at Southwest Intersection of Taxiway F and W

This alternative involves constructing a commercial deice pad at the southwest intersection of Taxiways W and F, depicted in **Figure 5-15**. This location accommodates side-by-side deicing of ADG III aircraft. There is room to expand to accommodate future growth in aircraft operations, which can be conducted in a phased manner. This location is further away from the Commercial Terminal and would require aircraft to contact the ATCT before taxiing to the deicing pad. This location does provide for a shortened period of time between applications of deice fluid and aircraft takeoff. This alternative creates a dedicated deice pad, minimizing the containment area and utilizes a system for capturing deice runoff before it reaches the main storm drainage system. This space can be used for aircraft parking during times of peak operations or aircraft remaining overnight. However, due its position inside the airfield movement area, coordination with ATCT will be needed to reposition aircraft. The initial cost for this alternative would be approximately $6 million.

FIGURE 5-15 – COMMERCIAL DEICE PAD – ALTERNATIVE 4



Source: Jviation, Inc.

5.6.3.4.1 Safety Criteria

- Allows for aircraft to deice away for active apron areas.

5.6.3.4.2 Operational Criteria

- Ability to expand as necessary to accommodate growth in aircraft operations (expansion could be done in phased manner).
- Provides 23,000 square yards for deicing with initial phase. Expands to 36,000 square yards at full build out.
- Allows for two ADG III aircraft to deice side-by-side.
- Location is distant from the Commercial Terminal, and its position inside the airfield movement area requires coordination with ATCT.
- Puts constraints on airline staffing to accommodate deice operations.

5.6.3.4.3 Environmental Criteria

- A dedicated deice pad allows for containment to be minimized to one single area and a large amount of runoff can be collected and kept away from the storm drainage system.
- Must comply with the National Pollutant Discharge Elimination System (NPDES) permits or other federal, state, or local permits.

5.6.3.4.4 Compatible Land Use Criteria

- Will not alter on or off airport land use.

5.6.3.4.5 Financial Criteria

- Design and construction will cost approximately $6 million.

5.6.3.5 Recommended Alternative

Table 5-4 summarizes the Commercial Apron Deice Pads alternatives. Alternative 1 - Maintain Existing Commercial Deicing Operations, is recommended. If future implementation of Effluent Limitation Guidelines requires additional collection, Alternative 3 – Deice Pad between Taxiways F and E, is recommended.

TABLE 5-4 – COMMERICAL APRON DEICE PADS COMPARISON MATRIX

	Alternative 1 – Maintain Existing Commercial Deicing Operations	**Alternative 2 – Deice Pad Located West of Taxiway F**	**Alternative 3 – Deice Pad Between Taxiways F and E**	**Alternative 4 – Deice Pad at Southwest Intersection of Taxiway F and W**
Safety	Deicing on active apron	Deicing away from active apron		
Operational	• Deicing at gate allows airlines to use existing staff • Glycol is recovered by a Glycol Recovery Vehicle	• 17,000 SY apron • 28,000 SY apron at full build out • Simultaneous deicing of MD-80 (ADG III) and CRJ-200/700 aircraft • Possible delays during morning departure banks	• 18,000 SY apron • 39,000 SY apron at full build out • Simultaneous deicing of MD-80 (ADG III) and CRJ-200/700 aircraft	• 23,000 SY apron • 36,000 SF apron at full build out • Simultaneous deicing of MD-80 (ADG III) and CRJ-200/700 aircraft • Places constraints on airline staffing to accommodate deice operations
		• Accommodates future terminal expansion		
Environmental	• Does not ensure the most efficient and accurate collection of deicing fluids, potential for stormwater contamination	• Dedicated deice pad minimizes contamination to single area • Runoff is collected		
Compatible Land Use	Will not alter on or off airport land use			
Financial	-	$5M	$6M	$6M
	Recommended Alternative			

Source: Jviation, Inc.

5.6.3.6 Preferred Alternative

The preferred General Aviation Development Alternative as chosen by the Technical Committee on January 24, 2012 is Alternative 1, Maintain Existing Commercial Deicing Operations. If proposed Effluent Limitation Guidelines require additional collection, Alternative 3, Deice Pad between Taxiways F and E is the preferred alternative.

5.6.4 GA DEICE PAD

5.6.4.1 Alternative 1 – Maintain Existing GA Deicing Operations

This alternative would be to maintain the existing GA deicing operations on the GA Apron. There is no system to capture and separate deice runoff from the storm drainage system. However, there would be no additional costs to construct a dedicated deice pad and associated collection system. The airport would still have to monitor impacts of deicing on the storm drainage system and plan for corrective action if levels of contaminant were to increase to unacceptable levels. If needed the airport GRV, or an additional GRV, could remove contaminants left on the apron.

5.6.4.1.1 Safety Criteria

- Aircraft deicing on active apron.

5.6.4.1.2 Operational Criteria

- Allows General Aviation users to maintain existing deice practices.
- General Aviation deice is not used as much as with commercial operators.
- The use of a Glycol Recovery Vehicle could be used in place of a deice pad with a containment system.

5.6.4.1.3 Environmental Criteria

- The existing deicing operations do not ensure the most efficient and accurate collection of all deicing fluids which leaves the potential for stormwater contamination.

5.6.4.1.4 Compatible Land Use

- Will not alter on or off airport land use.

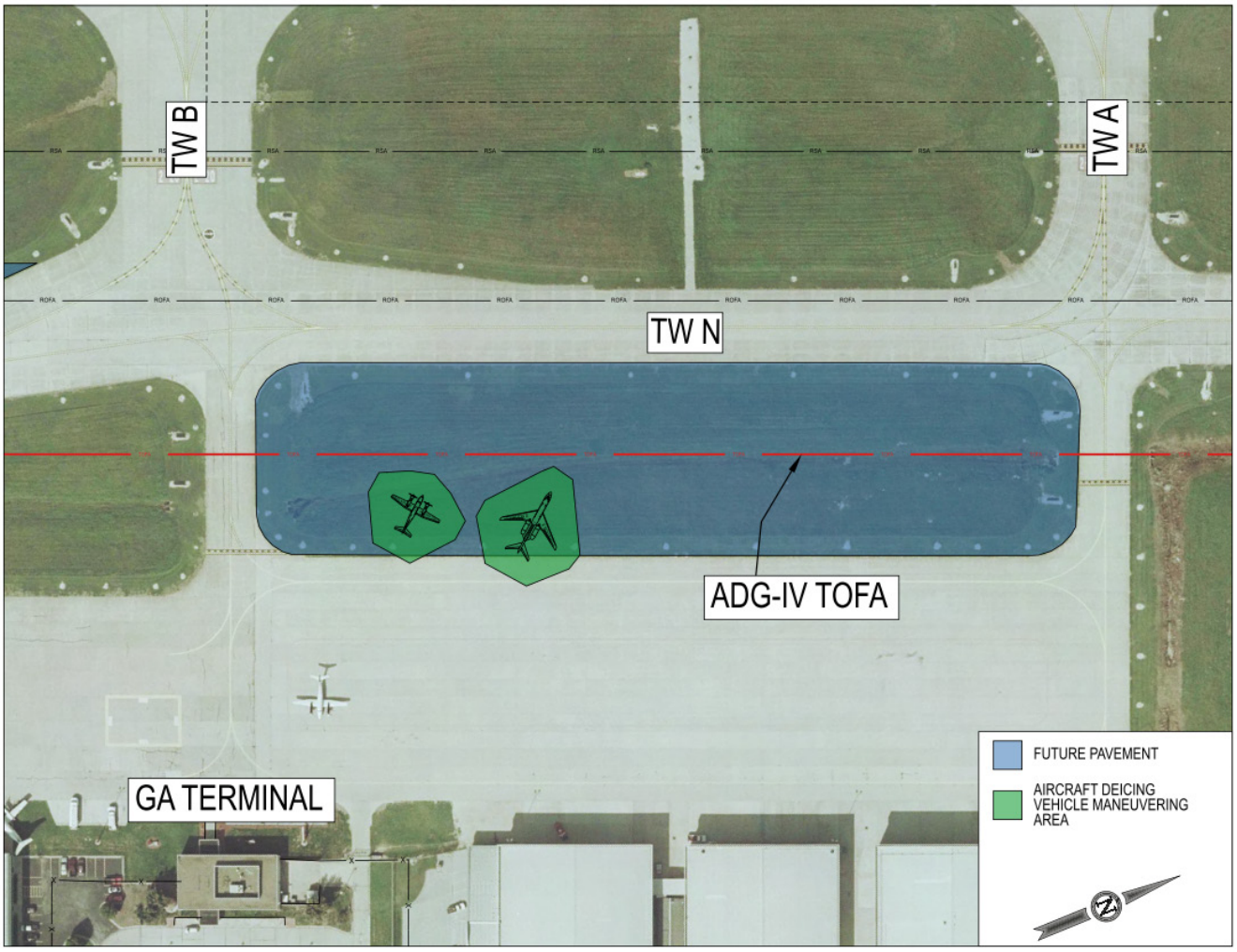
5.6.4.1.5 Financial Criteria

- No additional financial concerns.

5.6.4.2 Alternative 2 – Deice Pad North of Intersection of Taxiway B and Taxiway N

This alternative would build a deice pad on the west edge of the existing GA Apron north of Taxiway B and east of Taxiway N, depicted in **Figure 5-16.** A small portion of the existing GA Apron would be used along with new pavement that would come from filling in the infield between Taxiway N and the apron. This space would accommodate up to two ADG II aircraft deicing side by side. The deice pad would be in close proximity to the existing GA Terminal. This location is adjacent to the existing transient aircraft parking, and there is the potential for airport users to come in contact with deicing fluid as they walk on the apron towards their aircraft. This location also creates a longer time between application of deice fluid and takeoff, when departing from Runways 2, 14, and 32. For aircraft departing on Runway 20, the time is much shorter due to the close proximity to the runway threshold. The cost for this alternative would be approximately $4 million.

FIGURE 5-16 – GA DEICING PAD – ALTERNATIVE 2



Source: Jviation, Inc.

5.6.4.2.1 Safety Criteria

- Allows for aircraft to deice away from active apron areas.

5.6.4.2.2 Operational Criteria

- Allows for two ADG II aircraft to deice side by side.
- Close proximity to the existing GA Terminal.
- Location results in a longer taxi time between applications of deice fluid and takeoff, when departing Runways 2, 14, and 32.
- Aircraft departing on Runway 20 the time is much shorter, due to the close proximity to the runway threshold.
- Requires approximately 5,200 square yards of apron space for deice pad location.
- Location of deice pad does not impact existing transient tiedown locations.

5.6.4.2.3 Environmental Criteria

- A dedicated deice pad allows for containment to be minimized to one single area and a large amount of runoff can be collected and kept away from the storm drainage system.
- Must comply with the National Pollutant Discharge Elimination System (NPDES) permits or other federal, state, or local permits.

5.6.4.2.4 Compatible Land Use

- Will not alter on or off airport land use.

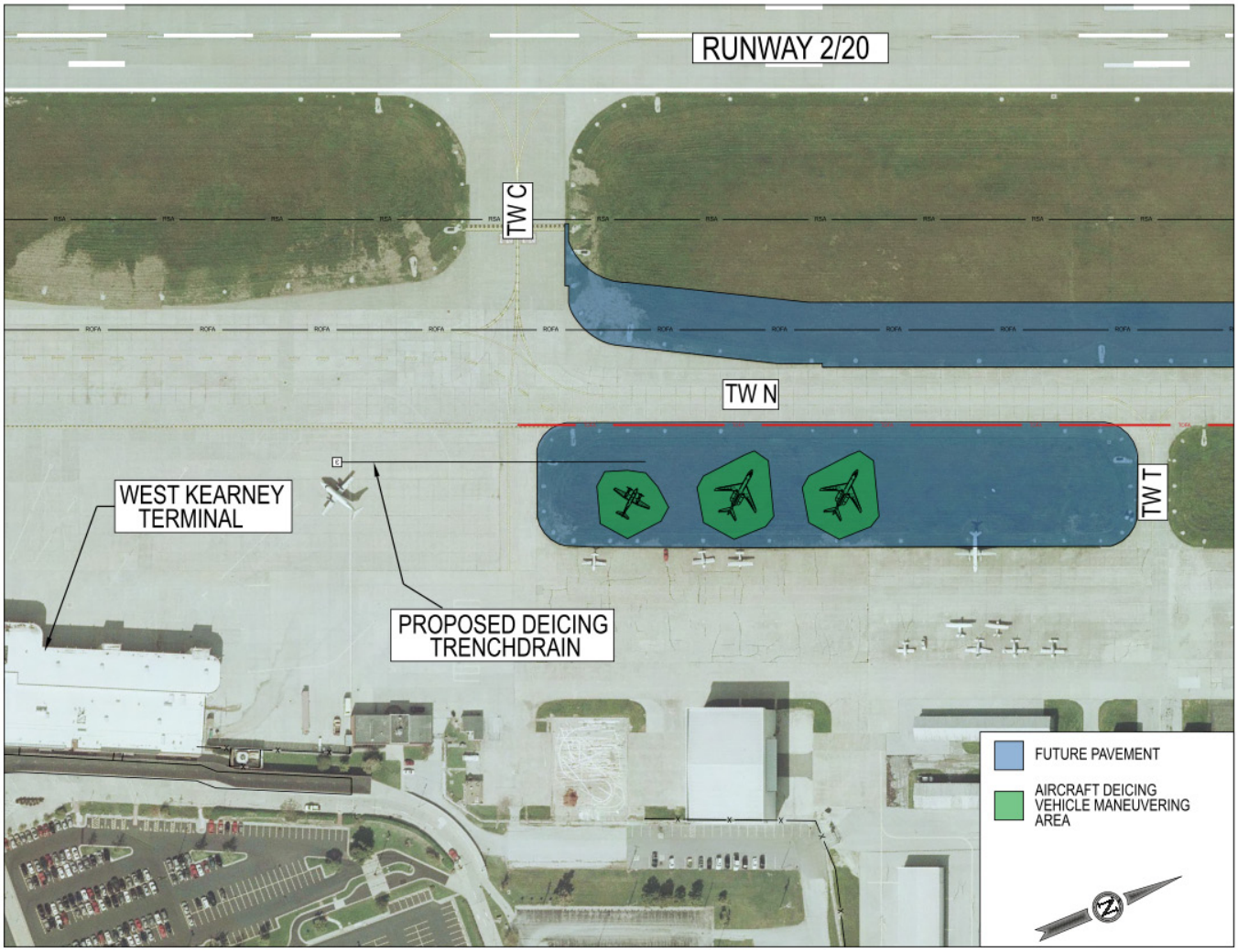
5.6.4.2.5 Financial Criteria

- Design and construction will cost approximately $4 million.

5.6.4.3 Alternative 3 – Deice Pad between Existing Taxiways T and C

This alternative would create a GA deice pad on the current infield between Taxiways T and C and east of Taxiway N, depicted in **Figure 5-17**. This alternative would provide space to deice up to three ADG III aircraft simultaneously. This alternative provides for a dedicated deice pad with an associated containment system to separate deicing fluid from the storm drainage system. The location of this pad is on the southern edge of the GA Apron and away from the existing GA Terminal. Aircraft taxiing from this location would have a longer taxi time for departures from Runway 32 but the time to taxi to Runways 2, 14, and 20 would be shorter. The cost for this alternative would be approximately $3 million.

FIGURE 5-17 – GA DEICE PAD – ALTERNATIVE 3



Source: Jviation, Inc.

5.6.4.3.1 Safety Criteria

- Allows for aircraft to deice away from active apron areas.

5.6.4.3.2 Operational Criteria

- Allows for up to three ADG III aircraft to deice side by side.
- Location results in a longer taxi time between applications of deice fluid and takeoff for Runway 32, but the time to taxi to Runways 2, 14, and 20 would be shorter.
- When deicing occurs approximately 10 tiedown spots cannot be used. Aircraft would have to be relocated or these tiedown locations would be permanently removed. As there is a surplus of tiedown locations the loss of these spots is minimized.
- Requires approximately 9,500 square yards of apron space for deice pad location.

5.6.4.3.3 Environmental Criteria

- A dedicated deice pad allows for containment to be minimized to one single area and a large amount of runoff can be collected and kept away from the storm drainage system.
- Must comply with the National Pollutant Discharge Elimination System (NPDES) permits or other federal, state, or local permits.

5.6.4.3.4 Compatible Land Use

- Will not alter on or off airport land use.

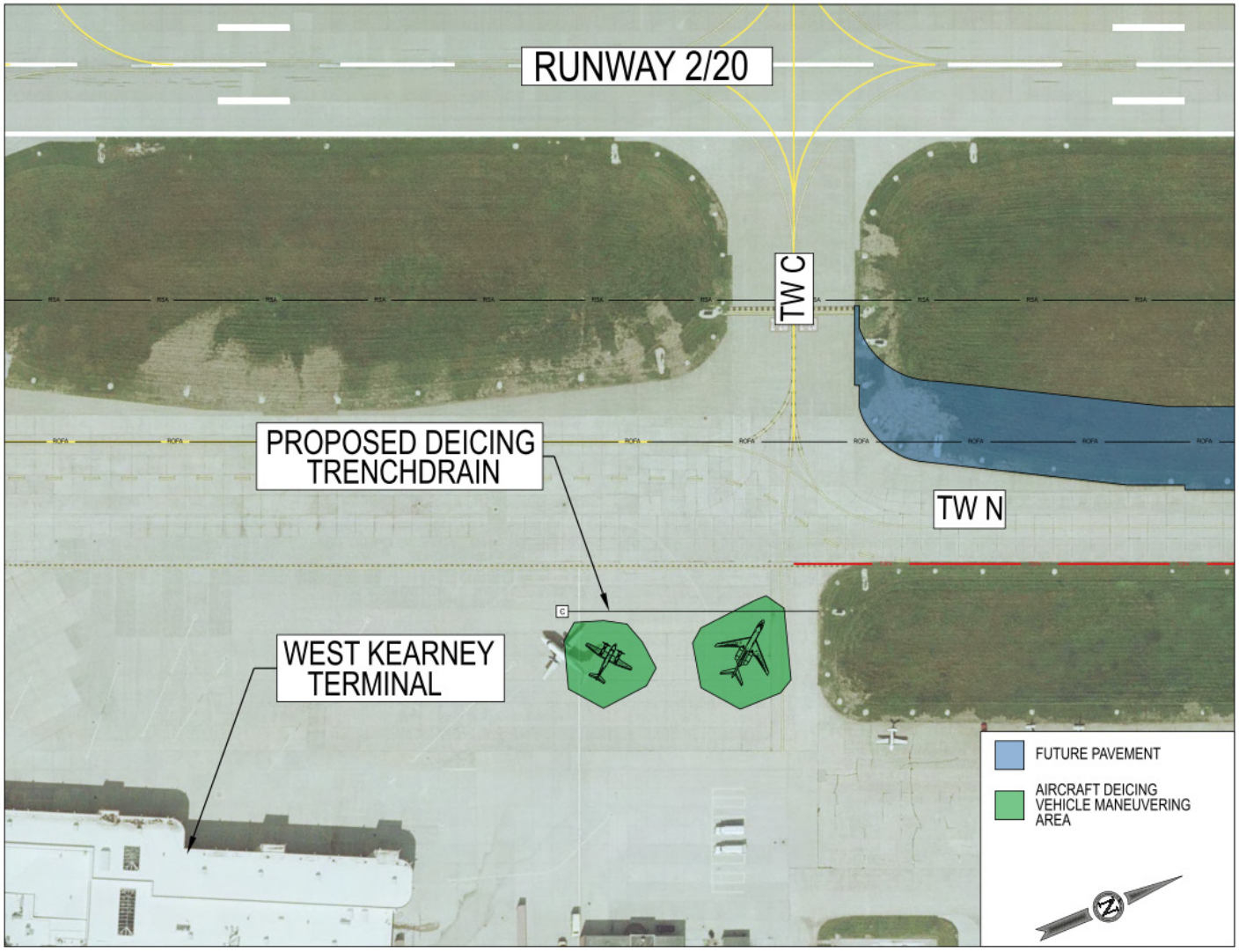
5.6.4.3.5 Financial Criteria

- Design and construction will cost approximately $3 million.

5.6.4.4 Alternative 4 – Deice Pad on North Edge of West Kearney Terminal Apron

This alternative would utilize the existing West Kearney Terminal Apron for GA aircraft deicing, depicted in **Figure 5-18**. This alternative would provide space for two ADG II aircraft to deice side-by-side, simultaneously. Additionally, this alternative utilizes space that is currently vacant and used infrequently for aircraft parking. A trench drain and associated collection system would be installed to capture deice runoff and separate contaminant from the storm drainage system. This location is on the southern edge of the existing GA Apron and separated from the GA Terminal. Aircraft deicing at this location would have a longer taxi time to Runway 32 than they would to Runways 2, 14, and 20. The cost for this alternative would be approximately $3 million.

FIGURE 5-18 – GA DEICE PAD – ALTERNATIVE 4



Source: Jviation, Inc.

5.6.4.4.1 Safety Criteria

- Aircraft deicing on active apron.

5.6.4.4.2 Operational Criteria

- Allows for up to two ADG II aircraft to deice side by side.
- Utilizes space that is currently vacant and used infrequently for aircraft parking.
- Location results in a longer taxi time between applications of deice fluid and takeoff for Runway 32, but the time to taxi to Runways 2, 14, and 20 would be shorter.
- Does not require any additional apron however it will be necessary to install a reinforced trench drain to collect the deice runoff.

5.6.4.4.3 Environmental Criteria

- A dedicated deice pad allows for containment to be minimized to one single area and a large amount of runoff can be collected and kept away from the storm drainage system.
- Must comply with the National Pollutant Discharge Elimination System (NPDES) permits or other federal, state, or local permits.

5.6.4.4.4 Compatible Land Use

- Will not alter on or off airport land use.

5.6.4.4.5 Financial Criteria

- Design and construction will cost approximately $3 million.

5.6.4.5 Recommended Alternative

Table 5-5 summarizes the GA Deice Pads alternatives. Alternative 1 - Maintain Existing GA Deicing Operations, is recommended. If future implementation of Effluent Limitation Guidelines requires additional collection, Alternative 3 – Deice Pad between Existing Taxiways T and C, is recommended.

TABLE 5-5 – GA DEICE PADS COMPARISON MATRIX

	Alternative 1 – Maintain Existing GA Deicing Operations	**Alternative 2 – Deice Pad North of Intersection of Taxiway B and Taxiway N**	**Alternative 3 – Deice Pad between Existing Taxiways T and C**	**Alternative 4 – Deice Pad on North Edge of West Kearney Terminal Apron**
Safety	Deicing on active apron	Deicing away from active apron		
Operational	Allows GA users to maintain current deice practices	• 2 ADG III side-by-side operations • Longer taxi time to Runways 2, 14, 32 • Shorter taxi time to Runway 20 • 5,200 SY of apron	• 3 ADG III side-by-side operations • Longer taxi time to Runways 32 • Shorter taxi time to Runways 2, 14, 20 • Relocate 10 tiedowns • 9,500 SY of apron	• 2 ADG III side-by-side operations • Longer taxi time to Runway 32 • Shorter taxi time to Runways 2, 14, 20 • No additional apron required
Environmental	• Does not ensure the most efficient and accurate collection of deicing fluids, potential for stormwater contamination	• Dedicated deice pad minimizes contamination to single area • Runoff is collected		
Compatible Land Use	Will not alter on or off airport land use			
Financial	-	$4M	$3M	$3M
	Recommended Alternative			

Source: Jviation, Inc.

5.6.4.6 Preferred Alternative

The preferred General Aviation Development Alternative as chosen by the Technical Committee on January 24, 2012 is Alternative 1, Maintain Existing GA Deicing Operations. If proposed Effluent Limitation Guidelines require additional collection, Alternative 3, Deice Pad between Existing Taxiways T and C, is the preferred alternative.

5.6.5 CARGO DEICE PAD

5.6.5.1 Alternative 1 – Maintain Existing Cargo Deicing Operations

This alternative would be to maintain existing cargo deice operations on the existing apron. There would be no system to capture and separate deice runoff from the storm drainage system. However, there would be no additional costs to construct a dedicated deice pad and associated collection system. The airport would still have to monitor impacts of deicing on the storm drainage system and plan for corrective action if levels of contaminant were to increase to unacceptable levels. If needed the airport GRV, or an additional GRV, could remove contaminants left on the apron.

5.6.5.1.1 Safety Criteria

- Aircraft deicing on active apron.

5.6.5.1.2 Operational Criteria

- Allows cargo users to maintain existing deice practices.
- Cargo operations at SGF occur in short duration. With operations occurring typically in the morning and again in the evening.

5.6.5.1.3 Environmental Criteria

- The existing deicing operations do not ensure the most efficient and accurate collection of all deicing fluids which leaves the potential for stormwater contamination.

5.6.5.1.4 Compatible Land Use

- Will not alter on or off airport land use.

5.6.5.1.5 Financial Criteria

- No additional financial concerns.

5.6.5.2 Alternative 2 – Apron Deice with Trench Drain

This alternative would be to maintain current deicing on the Cargo Apron with the addition of a trench drain to channel deice runoff to a collection area to keep it clear of the storm drainage system, depicted in **Figure 5-19**. This would allow the cargo operators to maintain their current cargo operations with the added benefit of capturing deice runoff. Since this will be installed on existing concrete there will be a need to reinforce the space around the trench drain and inlets, greatly increasing project costs. The cost for this alternative would be approximately $5 million.

FIGURE 5-19 – CARGO DEICE PAD – ALTERNATIVE 2

Source: Jviation, Inc.

5.6.5.2.1 Safety Criteria

- Aircraft deicing on active apron.

5.6.5.2.2 Operational Criteria

- Allows for cargo aircraft to deice at their respective parking position on the ramp.

5.6.5.2.3 Environmental Criteria

- Addition of a trench drain will allow the deice runoff to channel into a collection area to keep it clear of the storm drainage system.
- Must comply with the National Pollutant Discharge Elimination System (NPDES) permits or other federal, state, or local permits.

5.6.5.2.4 Compatible Land Use

- Will not alter on or off airport land use.

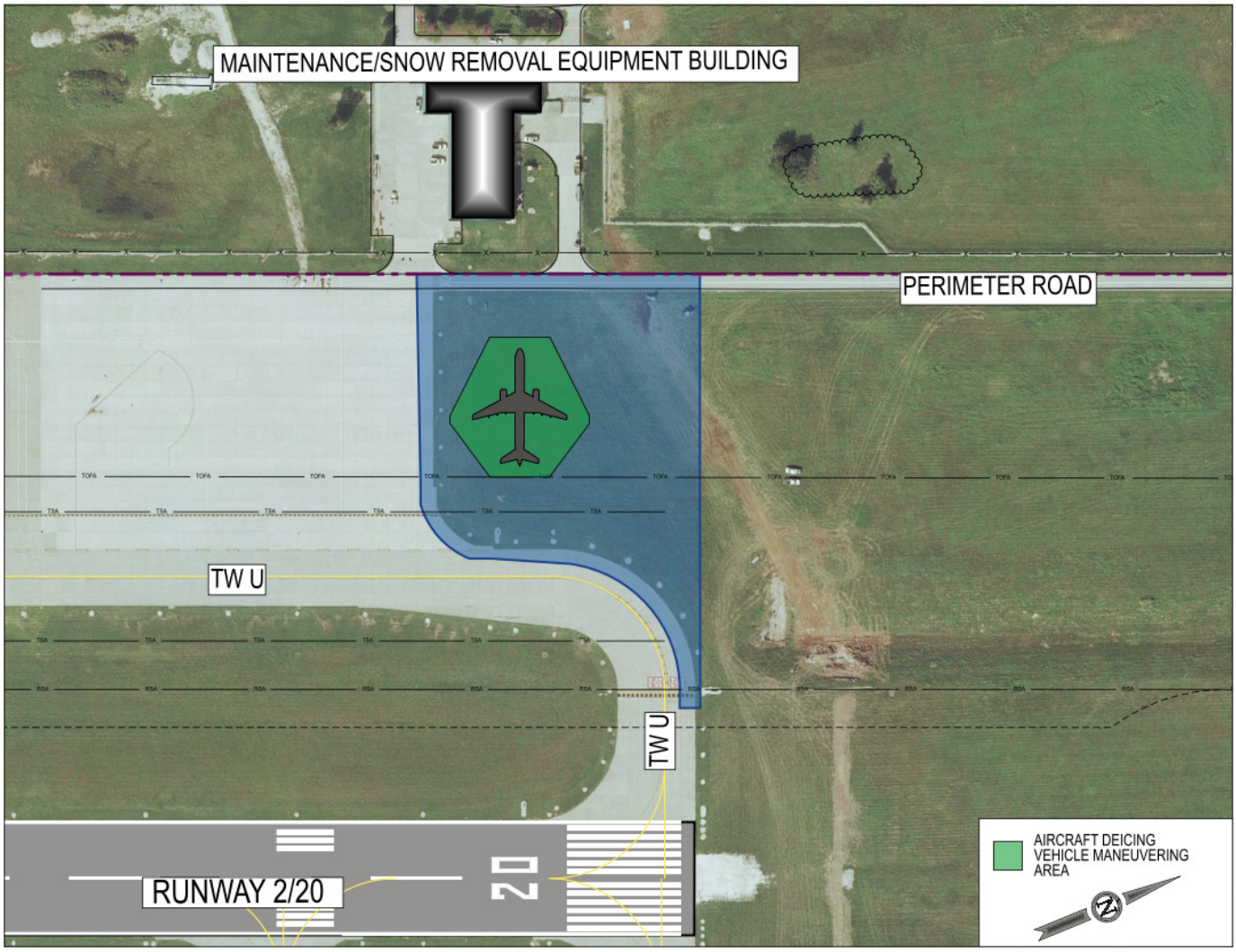
5.6.5.2.5 Financial Criteria

- Design and construction will cost approximately $5 million.

5.6.5.3 Alternative 3 – Dedicated Deice Pad

This alternative would create a dedicated deice pad located on the north end of the existing Cargo Apron, as shown in **Figure 5-20.** This alternative would allow for one ADG IV size aircraft to be deiced at a time. There would be a dedicated deice system and the deice runoff would be separated from the storm drainage system. There may be capacity issues if there is a need for more than one aircraft to deice at the same time. With the tendency for cargo operations to depart at the same time, early in the morning and again in the late afternoon, there could be periods where aircraft are waiting for deice. Additionally, the location of the deice pad could create issues for SRE operations, specifically those exiting from the north end of the SRE/Maintenance Facility located directly west of the proposed pad. The cost for this alternative would be approximately $5 million.

FIGURE 5-20 – CARGO DEICE PAD – ALTERNATIVE 3



Source: Jviation, Inc.

5.6.5.3.1 Safety Criteria

- Allows for aircraft to deice away for active apron areas.

5.6.5.3.2 Operational Criteria

- Allows for one ADG IV aircraft to deice.
- Location could result in periods where aircraft are waiting for deice as cargo operations often occur at the same time in the early morning and late afternoon.
- Location could create issues for SRE operations, specifically those exiting from the north end of the SRE/Maintenance Facility located directly west of the proposed pad.
- Requires approximately 17,000 square yards of pavement.

5.6.5.3.3 Environmental Criteria

- A dedicated deice pad allows for containment to be minimized to one single area and a large amount of runoff can be collected and kept away from the storm drainage system.
- Must comply with the National Pollutant Discharge Elimination System (NPDES) permits or other federal, state, or local permits.

5.6.5.3.4 Compatible Land Use

- Will not alter on or off airport land use.

5.6.5.3.5 Financial Criteria

- Design and construction will cost approximately $5 million.

5.6.5.4 Recommended Alternative

Table 5-6 summarizes the Cargo Deice Pad alternatives. Alternative 1 - Maintain Existing Cargo Deicing Operations, is recommended. If future implementation of Effluent Limitation Guidelines requires additional collection, Alternative 2 – Apron Deice with Trench Drain, is recommended.

TABLE 5-6 - CARGO DEICE PADS COMPARISON MATRIX

	Alternative 1 – Maintain Existing Cargo Deicing Operations	**Alternative 2 – Apron Deice with Trench Drain**	**Alternative 3 – Dedicated Deice Pad**
Safety	Deicing on active apron		Deice away from active apron
Operational	• Cargo users maintain existing deice practices	• Allows for cargo aircraft to deice at their respective parking position • Addition of reinforced concrete required	• One ADG IV aircraft to deice • Could result in delays with single deice position • Location may create issues for SRE operations • 17,000 SY of additional apron
Environmental	Does not ensure the most efficient and accurate collection of deicing fluids, potential for stormwater contamination	Trench drain directs runoff into a collection area to keep it clear of the storm drainage system	• Dedicated deice pad minimizes contamination to single area • Runoff is collected
Compatible Land Use	Will not alter on or off airport land use		
Financial	-	$5M	$5M
	Recommended Alternative		

5.6.5.5 Preferred Alternative

The preferred General Aviation Development Alternative as chosen by the Technical Committee on January 24, 2012 is Alternative 1, Maintain Existing Cargo Deicing Operations. If proposed Effluent Limitation Guidelines require additional collection, Alternative 2, Apron Deice with Trench Drain, is the preferred alternative.

6.0 ENVIRONMENTAL AND SUSTAINABILITY

There are two distinct categories of environmental impacts that are evaluated in this chapter. These include the environmental protections required through the National Environmental Policy Act (NEPA), and the voluntary analysis of sustainability that the airport chose to do as part of this Master Plan.

6.1 ENVIRONMENTAL

The consideration of environmental factors in the airport master planning process results in a thorough evaluation of the airport development alternatives, and ultimately aids in the expedition of future environmental reviews and processes. In this review for SGF, any key environmental issues associated with the preferred development alternatives will be indentified and analyzed. As SGF considers proceeding with the recommended development alternatives, SGF shall conduct the required environmental analysis.

6.1.1 NEPA REQUIREMENTS

Federal agencies are required per the National Environmental Policy Act[43] to integrate the NEPA process into their planning projects. The early integration of NEPA in project planning and development can potentially avoid future delays and conflicts due to environmental factors. This review process in a master plan can help identify future environmental review analysis levels, required permits, and other federal, state and local review process requirements.

There are three levels of NEPA review depending on the scope and potential environmental impacts of the proposed action. These include categorical exclusions (CATEX), environmental assessments (EA), and environmental impact statements (EIS).

Projects that require a CATEX level of analysis are applicable when the FAA has found from past experience with similar actions that they would not individually or combined with other actions create a significant effect on the environment and therefore do not require an EA or EIS. The FAA has prepared a list of actions that are typically categorically excluded which is used as a "quick" reference to determine if actions may be categorically excluded[44]. The CATEX is the most basic level of NEPA analysis and is typically achieved through the completion of a CATEX Checklist. In addition to the list of typically categorically excluded projects, the FAA has also developed a list of extraordinary circumstances, that if found applicable to an action, may require further analysis than that required in a CATEX. In this case, the action may move to an EA. An EA is required for:

- Actions that are not categorically excluded;
- Actions that are normally categorically excluded but involved extraordinary circumstances;
- Actions that do not typically require an EIS;
- Actions that do not create significant environmental impacts;
- Actions that may create significant impacts, but the impacts can be mitigated.

[43] U.S. Code, 1969, *The National Environmental Policy Act of 1969*, Public Law 91-190, 42 USC §§ 4321-4347
[44] Federal Aviation Administration, Order 1050.1E, *Environmental Impacts: Policies and Procedure,* Section 307 through 312

The FAA also has a list of actions that typically require an EA[45]. At the completion and approval of an EA, the FAA may issue a Finding of No Significant Impact (FONSI), which documents the FAA's determination that the action does not create potentially significant environmental impacts. The final step in an EA is the Record of Decision (ROD) which states the FAA's formal decision to implement the proposed action. If the EA does not result in a FONSI/ROD, the action moves to the highest level of NEPA analysis, an EIS.

An EIS must be prepared if the EA indicates the proposed action's environmental impacts would be greater than the allowable significance threshold and that mitigation would not reduce the impacts below that threshold. An EIS provides analysis and documentation of the significant impacts expected to result from the proposed action. As created for the CATEX and EA, the FAA has a list of actions that typically require an EIS[46]. At the completion of an EIS, the FAA will prepare a ROD stating the FAA's decision on the action.

Both the EA and the EIS are valid for three years after the completion of the draft. If the draft has not been submitted to the approving official within three years of the draft's completion date, a re-evaluation of the draft will be completed by the FAA to determine if the draft is still valid.

6.1.2 Environmental Analysis for Proposed Projects

The environmental analysis for the purpose of this Master Plan is not completed to the level of detail required for an EA or EIS. Rather it is intended to provide an overview of the level of environmental analysis that is anticipated for each development project. For the purpose of this Master Plan, the significant preferred airport development projects will be evaluated to meet the requirements set forth in FAA Orders 1050.1E[47] and 5050.4B[48]. **Table 6-1** summarizes the level of environmental analysis required for each proposed project.

TABLE 6-1 – SUMMARY OF ENVIRONMETAL REVIEW FOR PROPOSED PROJECTS

Project	Environmental Analysis
Runway 2/20 Extension	EA
GA Apron Expansion	CATEX
GA Development	CATEX
Cargo Apron Expansion	CATEX
Aircraft Deice Pads	CATEX

Source: Jviation, Inc.

6.1.2.1 Runway 2/20 Extension

The preferred alternative for the extension of Runway 2/20 is Alternative 2, as described in **Section 5.3.6**. The extension would include an additional 1,000 feet of pavement for a total

[45] Federal Aviation Administration, Order 1050.1E, *Environmental Impacts: Policies and Procedure,* Section 401
[46] Federal Aviation Administration, Order 1050.1E, *Environmental Impacts: Policies and Procedure,* Section 501
[47] Federal Aviation Administration, Order 1050.1E, *Environmental Impacts: Policies and Procedure*
[48] Federal Aviation Administration, Order 5050.4B, *National Environmental Policy Act: Implementation Instruction for Airport Actions*

runway length of 8,003 feet. The extension would allow the airport to accommodate aircraft weighing over 60,000 pounds where the existing runway does not.

FAA Order 1050.1E, Section 401, includes major runway extensions in the list of actions that normally require an EA; as such, it is assumed that an EA would need to be completed prior to the construction of the Runway Extension. It is anticipated that the EA would specifically address potential impacts to the White Chapel Memorial Garden Cemetery.

6.1.2.2 GA Apron Expansion

As described in **Section 5.4.6** the GA Apron Expansion would involve an expansion of the GA Apron between Taxiways A and C and add an additional 53,000 square yards of pavement at full build out. The new space could potentially serve dual purposes as a transient aircraft parking lot as well as a dedicated space for GA aircraft deicing. FAA Order 1050.1E Section 310 lists actions that normally require the completion of a CATEX. Section 310e includes "construction or repair of a runway that is existing or taxiway, apron, loading ramps, or safety runway area…" As such, it is assumed that a CATEX would need to be completed before the construction of the GA Apron Expansion. Specific environmental impacts are not anticipated with the GA Apron Expansion.

6.1.2.3 GA Development

The GA Development, as described in **Section 5.5.8**, will help ease the demand for more hangar space. The preferred alternative is Alternative 2, West Kearney and GA Apron Development. This alternative would increase safety with the elimination of taxilane separation issues.

FAA Order 1050.1E Section 310f states that the following action would normally be categorically excluded "Federal financial assistance, licensing, Airport Layout Plan (ALP) approval, or FAA construction or limited expansion of accessory on-site structures, including storage buildings, garages, small parking areas, signs, fences, and other essentially similar minor development items". If the FAA finds the proposed GA development to be considered a "minor development item", it is assumed a CATEX will need to be completed before construction commences. It is not anticipated that any specific environmental concerns would be associated with the proposed GA Development.

6.1.2.4 Cargo Apron Expansion

The expansion of the Cargo Apron is recommended to support the construction of an aircraft deicing pad and future airport development north of the existing cargo building as described in **Section 4.6.1**.

FAA Order 1050.1E Section 310 lists actions that normally require the completion of a CATEX. Section 310e includes "construction or repair of a runway that is existing or taxiway, apron, loading ramps, or safety runway area…" As such, it is assumed that a CATEX would

need to be completed before the construction of the Cargo Apron Expansion. The CATEX will specifically address the potential for impacts to the sinkholes and federally threatened Ozark cavefish possibly located in the vicinity. Coordination with the United States Department of Interior – Fish and Wildlife Services and the Missouri Department of Conservation were completed as identified in **Appendix D**.

6.1.2.5 Aircraft Deice Pads

Currently there are no dedicated deicing pads at SGF, which complicates the containment and collection of deicing fluid. The construction of dedicated deicing pads for commercial, GA, and cargo operations would enhance the airport's ability to manage deicing operations and fluid collection. The preferred deicing pads are described in detail in **Section 5.6.3** and recommend maintaining the existing deicing operations. However, if the effluent limitations guidelines were to change the collection requirements at SGF, each deicing area would be assessed in relation to the alternatives identified in **Section 5.6.3**.

FAA Order 1050.1E Section 310 lists actions that normally require the completion of a CATEX. Section 310d includes "the installation of de-icing/anti-icing facilities that comply with National Pollutant Discharge Elimination System (NPDES) permits or other permits protecting the quality of receiving water, and for which related water detention or retention facilities are designed not to attract wildlife hazards to aviation, as defined in FAA AC 150-5200-33". From this, it is understood that the construction of the deicing pads would require the completion of a CATEX assuming the airport maintains a current NPDES permit and the associated containment ponds would not act as wildlife attractants.

6.2 AGENCY COORDINATION

In addition to this brief analysis; applicable local, state, and federal agencies were contacted and asked for comments regarding the significant development projects. The results of this coordination effort can be found in **Appendix D**. The agency comments received are summarized in **Table 6-2**. The Missouri Department of Conservation, Missouri Department of Natural Resources, U.S. Army Corp of Engineers, and the U.S. Fish and Wildlife Service all requested additional coordination as the proposed projects move towards construction.

TABLE 6-2 – AGENCY COORDINATION RECORD

Agency	Response Status
Missouri Department of Conservation Attn: Mr. Shannon Cave P.O. Box 180 Jefferson City, MO 65102-0180	• Sent letter dated February 22, 2012 • Received response letter – March 1, 2012 • Concern was expressed with the proposed development projects potentially within the vicinity of areas that may contain the federally-listed endangered Ozark Cavefish and Missouri bladderpod and the state-listed Black tailed Jackrabbit. Best management practices were recommended and will be utilized in addition to completing further coordination prior to the commencement of the development projects.
Missouri Department of Natural Resources State Historic Preservation Office Attn: Mr. Mark A. Miles P.O. Box 176 Jefferson City, MO 65102	• Sent letter dated February 22, 2012 • Received response letter – March 2, 2012 • Determined no historical properties would be affected by the proposed projects.
U.S. Army Corps of Engineers Kansas City District Truman Regulatory Satellite Office 15837 Truman Road Warsaw, MO 65355	• Sent letter dated February 22, 2012 • Received response letter – March 6, 2012 • Concerns expressed towards projects that may involve the placement of dredged and fill material into wetlands and other water. Further coordination and permits may be required prior to the commencement of development projects.
U.S. Fish & Wildlife Service Columbia Field Office Attn: Mr. Charles Scott 101 Park De Ville Drive #A Columbia, MO 65203-0007	• Sent letter dated February 22, 2012 • Received response letter – March 22, 2012 • Concern was expressed towards development projects that may potentially affect the federally threatened Ozark cavefish. It was recommended that the *Management Recommendations for Construction Projects Affecting Missouri Karst Habitat* and Best *Management Practices – Ozark cavefish*, developed by the Missouri Department of Conservation be implemented. Both will be utilized in addition to completing further agency coordination at the commencement of the development projects.
U.S. Department of Agriculture, NRCS Attn: Mr. Roger A. Hansen 601 Business Loop 70 West Suite 250 Columbia, MO 65203-2546	• Sent letter dated February 22, 2012 • No response received, concurrence is assumed
Missouri State Parks Southern Missouri Historic District 2901 Highway 61 Festus, MO 63028	• Sent letter dated February 22, 2012 • No response received, concurrence is assumed
City of Springfield Building Development 840 Boonville Avenue Springfield, MO 65802	• Sent letter dated February 22, 2012 • No response received, concurrence is assumed
Greene County Planning Department Planning & Zoning 940 N. Boonville Ave Springfield, MO 65802	• Sent letter dated February 22, 2012 • No response received, concurrence is assumed
Missouri Department of Health and Senior Services 912 Wildwood P.O. Box 570 Jefferson City, Missouri 65102	• Sent letter dated February 22, 2012 • No response received, concurrence is assumed

Source: Jviation, Inc.

6.3 SUSTAINABILITY

The Sustainable Master Plan Pilot Program was introduced by the FAA in 2010. The program was initiated to enhance sustainability as a core objective to airports throughout the country. Ten airports were chosen to partake in the Pilot Program; however, airports such as SGF voluntarily implemented "sustainability" into the update of their Master Plan.

Sustainability can be defined as "*the ability to meet the needs of the present without compromising the ability of future generations to meet their own needs*". For the purpose of this Master Plan, sustainability is the ideas, actions and process's implemented to reduce the overall impact the airport has on the local, regional, and total environment. The economic benefits and consequences of the sustainable initiatives are of most importance to the airport and will be considered. The airport can reduce its impact on the environment by using water, energy, land, and materials efficiently, protecting the health and improving the productivity of the employees and passengers, and by reducing waste and pollution. The sustainability categories are presented in the following sections, present the achievements of the airport, and offers recommendations or future goals for the airport to strive for.

6.3.1 SUSTAINABILITY INVENTORY

Several national and international initiatives offer guidance on how to measure the amount of sustainability achieved in any industry, such as airports and aviation. Two primary guidance sources were consulted throughout this Master Plan, the Leadership in Energy and Environmental Design (LEED) and Sustainable Airport Manual (SAM) produced by the City of Chicago. Both documents suggest the inventory of sustainable initiatives be divided into environmental enhancement categories such as:

1. Local Sustainability Initiatives
2. Stormwater
3. Sustainable Sites
4. Water Efficiency
5. Energy Efficiency
6. Materials and Resources
7. Emissions

Each of the categories has been evaluated for industry goals and, if possible, what SGF has done to take steps in achieving the goals of each category.

6.3.2 LOCAL SUSTAINABILITY INITIATIVES

The City of Springfield has developed the "Partnership for Sustainability", an initiative which offers members the opportunity to contribute to environmental and sustainable solutions such as: air and water quality, recycling, and reducing the overall impact to the environment. "GreenOzarks", another program, created through the "Partnership for Sustainability" has a mission of "determining how the community can become a center of excellence in sustainability".

Together "GreenOzarks" and the "Partnership for Sustainability" are committed to working with one another and the community on developing sustainable practices, working towards improving environmental health, economic health, and social health. To reach these goals, the partnership has an advisory council composed of environmental, economic and social experts tasked to ensure the needs of the community are met. Furthermore, the partnership has defined six strategies to promote the sustainable development, which include:

- A clearinghouse for information, events, opportunities, sources – local, state, national, global
- Determining the optimal way to disseminate information and provide education
- Assessing and identifying indicators and measures to insure accountability of efforts
- Optimizing efforts by facilitating, coordinating and identifying collaborative opportunities
- Providing a venue where successes and challenges for developing best practices and sustainability plans can be shared and exchanged
- Developing a community sustainability plan

6.3.3 WATER QUALITY

The quality of water is commonly associated with stormwater, which is generally considered runoff generated from precipitation events such as rain and snowmelt that flows over the land and impervious surfaces without being absorbed into the ground. Stormwater runoff is an environmental concern as it collects debris, chemicals (de-icing chemicals are of specific concern at airports), sediments and other pollutants that may contaminate water quality. The second concern of stormwater is the general volume of runoff water which can erode and flood areas.

6.3.3.1 Accomplishments

SGF requires erosion control measures be implemented in construction projects to include silt fences and tracking pads. The products used in projects are required to be clean earth (free of organic matter, manmade rubble, and contaminated or hazardous waste). The construction documents also specify the type of landscape material and amount of fertilizer that can be used. Together, all these strategies reduce the amount of sedimentation and hazardous materials in the stormwater runoff that would have the potential to enter the natural waters of the Rainer Branch stream that the airport drains into.

Detention ponds have been constructed on the airfield to aid in the reduction of runoff off airport property, and to collect runoff which reduces erosion and allows for natural filtration of the water before it continues to the Rainer Branch stream.

SGF completed a *Plan of Operation Glycol Runoff Management System* report in 2009. The report evaluated the current facilities and what could be done to capture and prevent contaminated stormwater runoff from aircraft de-icing operations. The results of this report will be used to assist in the permanent solutions that arise from this master planning effort.

The airport does not currently have deicing pads or designated deicing areas. The commercial airlines deicing operations take place on the air carrier apron, the GA deicing occurs in the GA area, while the air cargo aircraft deicing takes place on the cargo apron.

During times of year when de-icing operations are not active, stormwater from the terminal apron drains into the storm sewer system through trench drains and concrete storm sewer pipes. The storm sewer system then discharges into a detention pond located on the east side of the apron, which then drains into a losing stream that flows north off airport property. This process is efficient when deicing fluid contamination is not an issue with the stormwater; however, if large quantities or deicing fluid are present, the process may not be environmentally sufficient.

Airport management is aware of the potential contamination issues and has initiated several solutions until a permanent deicing solution can be constructed. The airport purchased an inflatable plug used to stop the flow between the storm sewer system and the detention pond. The deicing fluid runoff can be collected and held in the storm sewer system, which reduces and possibly eliminates contamination to drain outside the contained area. The plug can be installed before deicing season starts and removed to allow the natural stormwater runoff process in the warm seasons.

The airport also acquired an Elgin Glycol Recovery Vehicle (GRV) to assist in collecting the de-icing fluid runoff. The GRV uses a vacuum and water spray to pick up left over deicing fluid after an aircraft has been sprayed. The GRV also has the ability to suck the retained deicing runoff from the storm sewer system. Two 10,000 gallon storage tanks will be staged for the GRV to pump the collected deicing fluid into, after which it will be hauled to the City of Springfield wastewater treatment facility for treatment.

6.3.3.2 Potential Recommendations

There are three main way to preserve water quality and reduce stormwater runoff, including (1) limit the amount of impervious surfaces, (2) collect and reuse stormwater, and (3) implement low-impact strategies. The amount of impervious surfaces can be reduced through building designs with a smaller footprint leaving more open space, placing plants and vegetation between paved areas to catch runoff, and applying permeable pavement to the parking lots, roadways, and walkways.

The collection of stormwater can reduce runoff and can be reused through irrigation and/or reused in the building. Cisterns, barrels, and storage tanks can all be used to collect rainwater (also called rainwater harvesting).

Finally, many low-impact strategies to reduce stormwater can be employed. Some popular ideas include:

- Vegetated roofs or "Green Roofs"
- Rain gardens, and or planted areas
- Curb breaks, bioswales, and vegetated filters to naturally filter water
- Retention ponds to store excess water

6.3.4 SUSTAINABLE SITES

Sustainable development, the management and operation of land and buildings, can reduce the impacts development may have on the environment. The location of development should be carefully evaluated in relation to the whole ecosystem of the region.

6.3.4.1 Accomplishments

Landscape Design to Reduce Heat Islands

Heat Islands are the difference in temperature between developed and undeveloped areas. The Heat Island effect is created when the developed areas have a higher temperature than the undeveloped, commonly rural areas. The developed areas traditionally have a higher temperature as they are darker, including pavements, rooftops, roads and other dark surfaces which are heated up by the sunlight and increase the overall temperature of the area. The Heat Island effect is not a large concern for the airport as it is located outside of the urban city boundaries and has a considerable amount of open space throughout the property. However, the airport has applied various approaches to reduce the absorption of solar heat thus reducing the potential for the heat island effect.

A majority of the pavement at the airport is light colored portland cement concrete, including most runways, all taxiways, all aprons, and all sidewalks. Also, the roof of the new terminal is covered in a light colored membrane to reflect solar heat and reduce the potential for the heat island effect.

Brownfield Redevelopment

Brownfield sites are those sites that have or potentially contain hazardous substance, pollutants, or contaminants. The development of brownfield sites and areas that may have environmental contamination reduces the demand for undeveloped and Greenfield land.

The airport is planning to develop on the Litton-ITD site, a remedial investigation site located on the eastern side of the airport near the existing hangars. The site is currently in the remediation phase and is being monitored for hazardous materials. After the site has been cleared of pollutants and hazardous substances, the site will be developed for additional hangar space. The use of the once hazardous land eliminates the need to purchase and/or develop in previously undeveloped land.

Light Pollution Reduction

Light pollution from a developed area, such as an airport, can create a nuisance to the surrounding areas. The reduction of light pollution from a building or site can reduce sky-glow allowing for the night sky to be visible, improve the visibility at night with less glare, and reduce the impacts to night environments.

Light pollution is a concern to areas in the vicinity of any airport. SGF is reducing the amount of light pollution it emits to the local community through automatic controlled lighting. The automatic lighting turns lights off when they aren't needed which reduces light pollution and decreases energy consumption needed to power lights.

6.3.4.2 Potential Recommendations

Landscape Design to Reduce Heat Islands

As mentioned, the Heat Island effect is not a large concern at most airports as they are typically set away from city centers and usually have a large amount of open space. However, there are several strategies that airports can adopt to reduce any heat island effect that may occur:

- Minimize the development footprint
- Green roofs and green walls
- White roofs and shading
- Minimize paved surfaces
- Use light colored/high-albedo (i.e. reflective rather than absorptive) materials for pavements, roadways, parking lots, sidewalks and plazas.
- Undercover/underground parking
- Open-grid pavement

Brownfield Redevelopment

Brownfield sites not only reduce the demand for undeveloped and Greenfield land they may also produce tax incentives and property cost savings.

The airport may consider future development on land found to be a brownfield or has the potential to contain hazardous materials or pollutants. It should be noted that additional site remediation plans may be required before development can occur which can potentially increase development costs.

Light Pollution Reduction

Light pollution at the airport may be further reduced by adjusting the angle of interior lighting to reduce the amount of light escaping through windows and lighting only exterior areas required by FAA Regulations, airline and airport operational requirements, security, safety, and comfort.

6.3.5 WATER EFFICIENCY

The use of water efficiently can help protect the natural water supplies, aquifers, and renewable fresh water. The goal of water efficiency is to reduce the total need for water in a building and landscaping, reduce the amount of municipal water use, and reduce the need for treatment of waste water. The two main consumers of water are irrigation for landscaping and indoor water use.

6.3.5.1 Accomplishments

SGF has taken considerable steps towards reducing water usage with the completion of the new terminal. The new terminal boasts water efficient fixtures and practices both interiorly and exteriorly.

Landscape and Irrigation

Water usage for irrigation can be reduced and/or eliminated through many simple and innovative landscaping and irrigation methods. Landscape design not only reduces the amount of water used it can also reduce the cost of water bills; lessen energy use for pumping and treatment of water; and reduce mowing, therefore using less energy and generating less air pollution, all while lowering maintenance costs.

The outdoor landscaping plan at SGF implemented over 50% U.S. native plants, which naturally require less water, fertilizer, and maintenance. They are also less intrusive and harmful to the natural habitat of the airport as the imported plant species. The landscaping plan also specified that all plant and tree beds be mulched three inches deep. This practice reduces water evaporation, thus reducing water usage. Finally, a Rain-Clik Rain sensor was installed to detect precipitation and turn the water system off.

Indoor Water Use

Indoor water use can be easily reduced through the use of efficient plumbing fixtures. The interior of the terminal employs the use of hands-free, motion sensor activated, and water efficient faucets and toilets. The bathroom faucets are Sloan Optima sensor activated faucets, model EAF-100-P-ISM. This model had a flow rate of 2.2 gallons per minute, which is considered a low-flow fixture. Both the sensor activator and low flow rate help to reduce water consumption through bathroom faucets. The bathroom toilets are equipped with Sloan Optima sensor activated flushometers, model 115/11/ES-S. The sensors reduce water consumption, maintenance and operation costs in addition to being more sanitary.

6.3.5.2 Potential Recommendations

Landscape and Irrigation

The amount of water needed for irrigation can depend heavily on landscaping and irrigation methods. Water efficient landscape design may include strategies such as native and adaptive plants that require less water and fertilizer; xeriscaping, a landscaping design that doesn't use any water; increased use of mulching to keep roots moist; and reduction of turf-like grasses that use large quantities of water.

The type of irrigation can make a significant difference in the amount of water used. Drip irrigation is one of the most efficient and commonly used types of efficient irrigation. It delivers the water directly to the plant which minimizes the amount of water used. Scheduling and/or timed watering allows for watering to occur at the coolest part of the day which reduces the amount of evaporation. Soil moisture sensors and weather sensors can also help reduce un-needed watering throughout wet periods.

All the water used for irrigation comes from a municipal water source. The use of municipal water is costly and depletes the potable water and natural water sources. Rainwater collection or "rainwater harvesting" can reduce the amount of municipal water used for landscaping. Rainwater can be collected in cisterns, barrels, or storage tanks and then used for irrigation of landscaping. This practice can also reduce stormwater runoff off of airport property and the potential for contamination of water quality.

Indoor Water Use

Efficient plumbing fixtures can greatly influence the amount of indoor water use. Dual-flush and high-efficiency toilets are both efficient replacements for older toilets that may use up to eight gallons of water per flush. Dual-flush toilets have the option of half or full flush to reduce water, and the high-efficiency toilets use only 1.28 gallons of water per flush. Other options include waterless urinals and composting toilet systems. In addition to efficient toilets, low-flow faucets with motion sensors can further reduce water usage. Traditional faucets use approximately 2.75 gallons of water per minute (gpm), while the new efficient models use only 1.5 gpm.

Stormwater and wastewater collection, treatment and reuse are yet another way to reduce the amount of municipal and natural water use. Water collected and treated can be reused for flushing toilets, irrigation and cooling towers.

6.3.6 ENERGY EFFICIENCY

Efficient energy use reduces the consumption of energy and fossil fuels which can be attributed to global warming and increased air pollution. Numerous strategies utilize modern equipment and management practices to reduce the use of energy, which commonly also reduces utility costs.

6.3.6.1 Achievements

Lighting Design

The design and management of lighting plays an important role in the overall usage of energy. Lighting both uses energy to power the lights and when cooling to balance the heat emitted by the lights themselves. The lighting system at SGF is controlled with a Douglas lighting control system that makes it possible to manage when the lights are on and off in relation to the time of day. The parking lot lighting system is also equipped with sensors to turn the lights on and off with the sunset and sunrise. Both lighting systems have the ability to greatly reduce the amount of energy consumed through the building and parking lot lights. The terminal utilizes curtain walls, or non-structural glass walls. These allow the terminal to take advantage of natural daylight which reduces the need for artificial light. The walls can also reduce the heating and cooling costs of the terminal.

Heating and Cooling

The Heating, Ventilation, and Air Conditioning (HVAC) systems consume a generous amount of energy. This can be reduced by using the HVAC equipment properly, purchasing efficient equipment, and appropriately insulating the building.

The new terminal building's roof is composed of single-ply EPDM CSPE membrane on polyisolyanurate tapered insulation. The membrane is UV resistant which eliminates the need for an extra layer of tar, thus reducing extra material and energy consumed through the application process. The membrane is a light colored material which reflects light and reduces energy consumption and cost for cooling. Furthermore, the membrane is applied in large segments which reduces the potential for leaks and maintains a more efficient seal to the building. The tapered design of the roof allows for proper drainage of water and snow while increasing the energy efficiency of the building with a low slope roof.

Other Energy Reductions

The baggage conveyor system at SGF was constructed in an energy efficient manner. It operates efficiently through the use of an electronic eye that detects whether a bag is on the belt or not. If no bags are present, the belt doesn't run; thus offer additional energy savings to the airport.

6.3.6.2 Potential Recommendations

Lighting Design

The overall use of energy can be influenced by lighting design and management. For example, the type of light bulb used is a simple tactic to reduce energy use. The most commonly used light is the incandescent lamp which uses more electricity and energy than the more modern lamps such as the compact fluorescents, fluorescent lamps, high-intensity discharge lamps, and light-emitting diodes (LEDs). Lighting controls and management are yet another strategy to reduce lighting energy consumption. Photosensors, timers, occupancy sensors, and advanced controls all automatically adjust the lighting levels to match the surroundings so that daylighting can be used and lights are turned off when the buildings aren't occupied.

Heating and Cooling

The HVAC system can consume a generous amount of energy; however, the more efficient the system and buildings are, the less energy is required. Building automation systems monitor and regulate the systems in the building which optimizes how the systems work and can help ensure systems such as the HVAC are working efficiently as possible. Maintenance can play a key part, it allows equipment to run at its best, for example purchasing efficient air filters and regularly changing them allow systems to work with lower air resistance flowing through the filters and provides better air quality overall.

Natural ventilation, if in an appropriate climate, can be an efficient partner with the HVAC system. It can allow for fresh air without any energy consumption.

Renewable Energy Use

Renewable energy comes from natural resources such as sunlight, wind, water, biofuel, and geothermal heat. These resources are not only renewable but are an environmentally friendly alternative to the traditional energy sources.

Solar power, one of the most popular and commonly used renewable energy sources, is differentiated as passive or active, depending on how the sunlight is captured, converted, and distributed. Passive solar relates to the techniques such as building orientation, selecting building materials that collect or disperse the sun's heat to aid in heating in the winter and cooling in the summer. Active solar relates to technologies that have the ability to convert solar energy into electricity that can power systems and/or be stored for future use.

6.3.7 MATERIALS AND RESOURCES

The use of sustainable materials and resources can greatly reduce the impact construction and development has on the environment. Three primary ways to build sustainably are: reduce waste, use sustainable materials, and implement a sustainable purchasing program.

6.3.7.1 Accomplishments

Recycling

One of the most common and simple approaches to sustainable use of materials and resources is to implement a recycling program. Some of the most ordinary items to be recycled are: paper, corrugated cardboard, glass, plastics, and metals. At SGF, one of the most noticeable waste management practices is a recycling program implemented throughout the terminal. The airport collects for recycling; paper and aluminum cans.

Waste Management

Reuse is a key practice to reduce waste as fewer materials if any are used. Reuse of existing buildings reduces the need for new materials, saves on cost and energy of new construction, and reduces development and urban sprawl. Another strategy of reuse is through the use of salvaged materials. By using salvaged materials waste is diverted from landfills and the demand for virgin materials is reduced.

The construction of the new terminal initiated many sustainable practices. A lease was signed with Expedia for an operations center of approximately 300 employees in the West Kearney Complex. This eliminated the need for Expedia to build a new call center, which would create a demand for resources and consume a large quantity of energy throughout the construction process. In addition, a substantial portion of the West Kearney Complex was leased to the National Guard for armory operations.

Sustainable Materials

Sustainable materials, which are materials that have proven to be less detrimental to the environment and are endorsed by authorities such as the Environmental Protection Agency (EPA) can significantly improve the overall sustainability of a project or building. Some of the prominent sustainable materials include: certified wood (The Forest Stewardship Council (FSC)), items made from recycled materials such as steel and fly ash, Green Label Plus (for carpets, cushions, and adhesives), Energy Star (energy efficient appliances), and Green-e (companies that generate power from renewable resources).

The new terminal applied sustainable practices throughout its own construction. The terminal used sustainable materials, such as Green Label Plus Carpet and energy efficient lighting and window designs.

6.3.7.2 Potential Recommendations

Waste Management

The amount of waste created during construction and occupancy can be reduced through: construction waste management; source reduction; less material used in total; and implementing recycling.

Management of construction waste includes the recycling of construction and demolition debris. Commonly debris is hauled to landfills, when it could be reused, reducing the demand for virgin materials. Reuse and recycling of the debris can have a cost benefit as well as the need for haulers would be eliminated, which also reduces emissions from the heavy equipment. Commingled recycling can aid in the construction waste recycling process, as all the waste can be collected in one container and then hauled to facility that separates it. This strategy takes less time and thought which improves the participation of busy construction workers.

Source reduction has potentially the greatest ability to reduce waste as it is implemented in the beginning design phase of a construction project. Source reduction and sustainable purchasing can go hand in hand as sustainable products have a reduced effect on the environment and create less waste initially. The design phase can also employ that less materials over all should be used throughout the project.

Sustainable Materials

As mentioned, the design phase of a construction and development project can be the most beneficial to a sustainable building with the inclusion of sustainable materials. Furthermore, a sustainable purchasing plan can be implemented which will continue the sustainable philosophy throughout the buildings life.

6.3.8 EMISSIONS

Emissions are one of the greatest concerns associated with airports. Airport emissions come from a variety of sources including aircraft, airport vehicles, passenger and employee vehicles and construction equipment. The type of aircraft used is regulated and controlled by each individual airline; however, the airport can implement sustainable ideas and regulations to promote and require sustainable vehicle usage.

6.3.8.1 Accomplishments

Aircraft idling at the airport gates produce a large amount of emissions while burning a lot of energy. Equipment such as Ground Power Units (GPU), 400 HZ power hookups, and Preconditioned Air (PCA) offer alternatives for the aircraft to use rather than idling the aircraft at the gates.

SGF promotes the reduction of emissions through the use of GPUs and 400 HZ power hookups. The airlines can use the alternate power sources to replace running aircraft engines which produce a large quantity of emissions. The airport also offers airlines the option of using PCA which again eliminates the need for the engines to be running to sustain the air conditioning as the PCA forces ambient air through the aircraft ventilations system. The PCA not only reduces emissions, but also reduces aircraft noise and fuel consumption.

6.3.8.2 Potential Recommendations

An airport can reduce airport owned vehicle emissions through the purchase and use of energy efficient vehicles, hybrid vehicles, and alternatively fueled vehicles. They can also encourage passengers, employees and rental car companies to use sustainable vehicles through preferred parking and incentives for the use of sustainable vehicles. Though the type of aircraft used decided by the airline, the airport can again offer incentives for sustainable aircraft usage and provide low emission power options.

The construction process is one of the most emission intensive processes at an airport. Heavy, diesel run trucks and equipment are used for long periods of time throughout each construction project. An airport can institute sustainable construction processes through construction documents. The type of equipment used such as low emission and gas or alternative powered vehicles can greatly reduce the emissions of the construction vehicles.

7.0 FINANCIAL PLANS

This chapter analyzes the financial feasibility of the phased Master Plan Capital Improvement Program (CIP). Specifically, this chapter examines the financial structure of SGF and proposes a financial plan that identifies potential sources of funding for the Master Plan CIP. This chapter also assesses the impacts on operating funds of undertaking the proposed Master Plan CIP.

Capital improvement projects at SGF will be undertaken when demand warrants, rather than in accordance with a projected schedule developed in advance in the Master Plan. Further, the actual financing of capital expenditures will be a function of the airport's financial circumstances at the time of project implementation. For example, a project would not be undertaken if the capital needs for a project stand to negatively impact the airport's financial position. For example, passenger facility charges and/or federal grants available at that particular time are insufficient to meet project costs.

The assumptions and analyses prepared for the Master Plan must be reviewed in the context of their primary purpose, which is to examine whether there is a reasonable expectation that the recommended capital improvements will be financially feasible and implementable. Based upon these analyses, which include certain timing and financing assumptions, the recommended Master Plan CIP is projected to be financially feasible within the financial structure of SGF as a self-sufficient enterprise fund of the City of Springfield. SGF has historically been financially self-sufficient and the Master Plan CIP contained herein is not projected to negatively impact SGF's financial operation.

SGF contributes to the economic strength of the City of Springfield and the State of Missouri. It is estimated that employment and activities at SGF employ nearly 2,000 workers and contribute approximately $163 million to the local and state economy. SGF is third in the State of Missouri for its economic contributions, following commercial service airports in St. Louis and Kansas City.

To present the results of these analyses, this chapter is organized as follows:

- Airport Financial Structure
- Master Plan CIP Phasing and Cost
- Master Plan CIP Funding
- Debt Service
- Operating Expenses
- Nonairline Revenue
- Airline Revenue
- Cash Flow and Coverage Calculation
- Findings

7.1 AIRPORT FINANCIAL STRUCTURE

SGF is owned and operated by the City of Springfield and is managed by an 11 member administrative board appointed by the City Manager and confirmed by City Council. SGF is an enterprise fund of the City of Springfield. Typically, an enterprise fund is used to present governmental activities where a fee is charged to external customers for goods that are sold or services that are rendered. Usually these activities are either financed by debt that is secured solely by a pledge of the revenues of that activity, or by law. SGF records its financial data on an accrual basis in accordance with Generally Accepted Accounting Principles (GAAP). As an enterprise fund of the City of Springfield, SGF is financially self-sustaining and does not receive any support in the form of City of Springfield tax dollars for its operating costs. However, SGF has historically received grants from the FAA to fund its capital costs and likely that SGF will continue to receive grants from federal or other resources for its capital program.

The financial information presented in this chapter is in terms of the City's fiscal year (FY), which begins July 1st each year.

7.2 MASTER PLAN CIP PHASING AND COST

The phasing plan and cost estimates, based on a planning level of detail, were prepared to illustrate the timing and relative magnitude of the Master Plan CIP expenditures.

Approximately $118.9 million in phased capital improvements and grant reimbursements for already completed projects are projected at the SGF through FY 2032. **Table 7-1** lists the capital improvements projects that are recommended as part of this Master Plan effort.

7.3 MASTER PLAN CIP FUNDING

Section 7.2 of this chapter summarized the staged future Master Plan CIP identified herein. These future capital expenditures were then categorized according to potential funding sources, with the airport-responsible projects (i.e., versus tenant funded projects) being the only focus of the feasibility analyses. **Table 7-2** contains Master Plan CIP, as presented above inflated for year of expenditure. In addition, the projected funding plan is also presented. A description of estimated funding sources for these projects is presented in greater detail in the following paragraphs.

7.3.1 FEDERAL GRANTS

In the past, federal grants have played a central role in the funding of the SGF's capital expenditures. This is expected to continue in the future. Historically, most airfield projects have been eligible for 95 percent Airport Improvement Program (AIP) participation and noise projects have been eligible at 80 percent federal participation; however, recent legislation reduced the federal participation for non-noise projects from 95 percent to 90 percent. It is

assumed that 90 percent participation for non-noise, AIP-eligible projects will continue in the future. As shown in **Table 7-2**, the Master Plan CIP contains approximately $109.9 million in project costs to be funded by federal grants.

TABLE 7-1 – CAPITAL IMPROVEMENT PROGRAM

Title	Target Completion Year [1]	Project Cost
Phase I Development (2013-2017)		
General Aviation Apron Phase I - Environmental/Design	2013	$400,000
General Aviation Apron Phase I - Construction	2013	5,500,000
Pavement Condition Study	2013	200,000
Terminal Building Debt Service Reimbursement	2013	3,000,000
Replace Fence	2013	250,000
Replace/Rehabilitate Airport Beacon	2013	60,000
General Aviation Complex Improvements	2013	250,000
General Aviation Apron Phase II - Construction	2014	5,000,000
Terminal Building Debt Service Reimbursement	2014	3,000,000
Construct Taxiway to Fuel Facility	2014	1,000,000
Construct Apron for Glycol Collection	2015	6,000,000
Acquire Snow Removal Equipment	2015	1,000,000
Terminal Building Debt Service Reimbursement	2015	3,000,000
Construct Glycol Containment Facility	2016	5,000,000
Construct Taxiway W	2016	2,700,000
Rehabilitate Service Road	2016	500,000
Extend Runway 2/20 8,000 ft	2016	11,000,000
Terminal Building Debt Service Reimbursement	2016	3,000,000
Rehabiitate and Widen Taxiway N	2017	10,000,000
Construct Apron for Glycol Collection	2017	3,000,000
Terminal Building Debt Service Reimbursement	2017	3,000,000
Phase I Subtotal		**$66,860,000**
Phase II Development (2018-2022)		
Terminal Building Debt Service Reimbursement	2018	$3,000,000
Terminal Building Debt Service Reimbursement	2019	3,000,000
Terminal Building Debt Service Reimbursement	2020	3,000,000
Terminal Building Debt Service Reimbursement	2021	3,000,000
Air Carrier Apron Expansion	2022	5,500,000
Expand Terminal Building	2022	10,000,000
Rehabilitate Runway 2/20	2022	8,000,000
Remark Hold Positions and Relocate Signage	2022	50,000
Terminal Building Debt Service Reimbursement	2022	3,000,000
Phase II Subtotal		**$38,550,000**
Phase III Development (2023-2032)		
Terminal Building Debt Service Reimbursement	2023	$3,000,000
Terminal Building Debt Service Reimbursement	2024	3,000,000
Replace ARFF Vehicle	2025	4,500,000
Terminal Building Debt Service Reimbursement	2025	3,000,000
Phase III Subtotal		**$13,500,000**
Total Capital Improvement Program Costs		***$118,910,000***

Sources: Jviation; Compiled by Parsons Brinckerhoff

TABLE 7-2 - CAPITAL IMPROVMENT PROGRAM AND FUNDING SOURCES

Title	Target Completion Year	Project Cost (2012$)	Allowances [1]	Total Project Cost	FUNDING SOURCES: Federal % Share	Federal Amount	PFCs % Share	PFCs Amount	State % Share	State Amount	Airport Reserves % Share	Airport Reserves Amount
Phase I Development (2013-2017)												
General Aviation Apron Phase I - Environmental/Design	2013	$400,000	$15,000	$415,000	0.0%	$0	0.0%	$0	90.0%	$373,500	10.0%	$41,500
General Aviation Apron Phase I - Construction	2013	5,500,000	206,250	5,706,250	71.8%	4,098,125	0.0%	0	18.2%	1,037,500	10.0%	570,625
Pavement Condition Study	2013	200,000	7,500	207,500	90.0%	186,750	0.0%	0	0.0%	0	10.0%	20,750
Terminal Building Debt Service Reimbursement	2013	3,000,000	0	3,000,000	90.0%	2,700,000	0.0%	0	0.0%	0	10.0%	300,000
Replace Fence	2013	250,000	9,375	259,375	90.0%	233,438	0.0%	0	0.0%	0	10.0%	25,938
Replace/Rehabilitate Airport Beacon	2013	60,000	2,250	62,250	90.0%	56,025	0.0%	0	0.0%	0	10.0%	6,225
General Aviation Complex Improvements	2013	250,000	9,375	259,375	0.0%	0	0.0%	0	0.0%	0	100.0%	259,375
General Aviation Apron Phase II - Construction	2014	5,000,000	380,625	5,380,625	90.0%	4,842,563	0.0%	0	0.0%	0	10.0%	538,063
Terminal Building Debt Service Reimbursement	2014	3,000,000	0	3,000,000	90.0%	2,700,000	0.0%	0	0.0%	0	10.0%	300,000
Construct Taxiway to Fuel Facility	2014	1,000,000	76,125	1,076,125	90.0%	968,513	0.0%	0	0.0%	0	10.0%	107,613
Construct Apron for Glycol Collection	2015	6,000,000	695,453	6,695,453	90.0%	6,025,907	0.0%	0	0.0%	0	10.0%	669,545
Acquire Snow Removal Equipment	2015	1,000,000	115,909	1,115,909	90.0%	1,004,318	0.0%	0	0.0%	0	10.0%	111,591
Terminal Building Debt Service Reimbursement	2015	3,000,000	0	3,000,000	90.0%	2,700,000	0.0%	0	0.0%	0	10.0%	300,000
Construct Glycol Containment Facility	2016	5,000,000	784,430	5,784,430	90.0%	5,205,987	0.0%	0	0.0%	0	10.0%	578,443
Construct Taxiway W	2016	2,700,000	423,592	3,123,592	90.0%	2,811,233	0.0%	0	0.0%	0	10.0%	312,359
Rehabilitate Service Road	2016	500,000	78,443	578,443	0.0%	0	0.0%	0	0.0%	0	100.0%	578,443
Extend Runway 2/20 8,000 ft	2016	11,000,000	1,725,746	12,725,746	90.0%	11,453,172	0.0%	0	0.0%	0	10.0%	1,272,575
Terminal Building Debt Service Reimbursement	2016	3,000,000	0	3,000,000	90.0%	2,700,000	0.0%	0	0.0%	0	10.0%	300,000
Rehabiitate and Widen Taxiway N	2017	10,000,000	1,990,926	11,990,926	90.0%	10,791,833	0.0%	0	0.0%	0	10.0%	1,199,093
Construct Apron for Glycol Collection	2017	3,000,000	597,278	3,597,278	90.0%	3,237,550	0.0%	0	0.0%	0	10.0%	359,728
Terminal Building Debt Service Reimbursement	2017	3,000,000	0	3,000,000	90.0%	2,700,000	0.0%	0	0.0%	0	10.0%	300,000
Phase I Subtotal		**$66,860,000**	**$7,118,276**	**$73,978,276**		**$64,415,413**		**$0**		**$1,411,000**		**$8,151,864**
Phase II Development (2018-2022)												
Terminal Building Debt Service Reimbursement	2018	$3,000,000	$0	$3,000,000	90.0%	$2,700,000	0.0%	$0	0.0%	$0	10.0%	$300,000
Terminal Building Debt Service Reimbursement	2019	3,000,000	0	3,000,000	90.0%	2,700,000	0.0%	0	0.0%	0	10.0%	300,000
Terminal Building Debt Service Reimbursement	2020	3,000,000	0	3,000,000	90.0%	2,700,000	0.0%	0	0.0%	0	10.0%	300,000
Terminal Building Debt Service Reimbursement	2021	3,000,000	0	3,000,000	90.0%	2,700,000	0.0%	0	0.0%	0	10.0%	300,000
Air Carrier Apron Expansion	2022	5,500,000	2,364,425	7,864,425	90.0%	7,077,983	0.0%	0	0.0%	0	10.0%	786,443
Expand Terminal Building	2022	10,000,000	4,298,955	14,298,955	0.0%	0	65.0%	9,294,321	0.0%	0	35.0%	5,004,634
Rehabilitate Runway 2/20	2022	8,000,000	3,439,164	11,439,164	90.0%	10,295,247	0.0%	0	0.0%	0	10.0%	1,143,916
Remark Hold Positions and Relocate Signage	2022	50,000	21,495	71,495	90.0%	64,345	0.0%	0	0.0%	0	10.0%	7,149
Terminal Building Debt Service Reimbursement	2022	3,000,000	0	3,000,000	90.0%	2,700,000	0.0%	0	0.0%	0	10.0%	300,000
Phase II Subtotal		**$38,550,000**	**$10,124,038**	**$48,674,038**		**$30,937,575**		**$9,294,321**		**$0**		**$8,442,143**
Phase III Development (2023-2032)												
Terminal Building Debt Service Reimbursement	2023	$3,000,000	$0	$3,000,000	90.0%	$2,700,000	0.0%	$0	0.0%	$0	10.0%	$300,000
Terminal Building Debt Service Reimbursement	2024	$3,000,000	$0	$3,000,000	90.0%	2,700,000	0.0%	0	0.0%	0	10.0%	300,000
Replace ARFF Vehide	2025	$4,500,000	$2,635,502	$7,135,502	90.0%	6,421,952	0.0%	0	0.0%	0	10.0%	713,550
Terminal Building Debt Service Reimbursement	2025	$3,000,000	$0	$3,000,000	90.0%	2,700,000	0.0%	0	0.0%	0	10.0%	300,000
Phase III Subtotal		**$13,500,000**	**$2,635,502**	**$16,135,502**		**$14,521,952**		**$0**		**$0**		**$1,613,550**
Total Capital Improvement Program Costs		***$118,910,000***	***$19,877,817***	***$138,787,817***		***$109,874,940***		***$9,294,321***		***$1,411,000***		***$18,207,557***

[1] Indudes costs for project, mobilization, implementation,, and construction contingencies for non reimbursements.

Sources: Jviation; Compiled by Parsons Brinckerhoff

The federal funding for these projects is provided by either entitlement grants or discretionary grants. Federal grants-in-aid classified as entitlement grants are apportioned annually to airports based upon the amount of activity at an airport. Passenger entitlements grants are distributed based on the number of passengers and cargo entitlement grants are distributed based upon an airport's share of the total amount of landed weight of all cargo aircraft at qualifying airports.

Historically, the FAA has been committed to providing for funding for projects at SGF as evidenced by the significant discretionary funding provided for the recently completed midfield terminal complex project. Historical levels of AIP entitlement and discretionary funding awarded to SGF for 2002 through 2011 are presented in **Table 7-4**. As shown in **Table 7-4**, SGF currently receives approximately $3 million annually in passenger and cargo entitlement grants.

TABLE 7-3 – HISTORICAL AIP GRANTS

Year	Entitlements [1]	Discretionary	TOTAL
2002	$2,773,346	$3,427,861	$6,201,207
2003	$2,751,106	$4,200,000	$6,951,106
2004	$2,581,311	$4,200,000	$6,781,311
2005	$2,581,109	$6,401,470	$8,982,579
2006	$2,784,443	$7,870,000	$10,654,443
2007	$3,188,221	$5,000,000	$8,188,221
2008	$3,227,167	$7,130,000	$10,357,167
2009	$3,281,785	$660,560	$3,942,345
2010	$3,029,763	$4,756,738	$7,786,501
2011	$3,052,874	$4,412,287	$7,465,161

[1] Includes passenger and cargo entitlements.

Source: SGF Records; Compiled by Parsons Brinckerhoff

The level of passenger entitlement grants is assumed to increase in the future based on the forecasted activity levels presented in Chapter 3.0 (Activity Forecasts) and the amount of cargo entitlements is assumed to remain constant throughout the projection period at $250,000 per year. The anticipated passenger and cargo entitlement grants through 2024 are already committed to repay a portion of the project costs associated with the recently completed midfield terminal building project. Entitlement grants are applied first to the assumed federal share of project costs with the remaining share of project costs assumed to be provided by discretionary grants. **Table 7-5** presents the estimated annual passenger and cargo entitlements projected to be received by SGF during the projection period.

It is difficult to predict the actual levels of AIP discretionary grants that may be received by SGF. Historically, SGF has received discretionary grants in order to make improvements that were viewed as priority projects by the FAA. If discretionary grants are not received to fund portions of the Master Plan CIP, SGF must re-evaluate the phasing of projects, or secure

other funding sources. Over the length of the forecast, federal requirements to fund the CIP exceed the entitlement receipts by $36.6 million. This analysis assumes that any federal grant requirement that cannot be funded by passenger and cargo entitlement grants will be funded with discretionary grants.

7.3.2 STATE FUNDS

The Missouri Department of Transportation (MoDOT) administers a CIP grant program to assist eligible sponsors in the planning, purchase, construction or improvement of public use airports. Funding comes from the State of Missouri's aviation trust fund through a portion of the sales tax on jet fuel sold within Missouri and a 9 cent per gallon tax on aviation gasoline. State CIP funds are issued on a cost sharing grant basis of 90 percent State and 10 percent local. The program is open to all publicly-owned airports as well as those privately-owned airports that are designated by the FAA as a reliever airport. As shown in **Table 7-2**, it is expected that approximately $1.4 million in project costs are projected to be funded with State funds.

In addition to a state grant program, MoDOT also offers loans to public entities for non-highway travel programs through the Statewide Transportation Assistance Revolving (STAR) Fund. The STAR fund was authorized by the Missouri General Assembly in 1997, and can assist in the planning, acquisition, development and construction of facilities for projects. To qualify, the local district engineer must endorse projects in cooperation with MoDOT's Multimodal Team, which evaluates STAR applications and provides a recommendation to the Missouri Highways and Transportation Commission (MHTC) for approval.

TABLE 7-4 - ANTICIPATED FEDERAL ENTITLEMENT FUNDING

Year		Passenger Entitlements	Cargo Entitlements	Annual Amount	Cumulative Amount
Budget	2013	$3,029,433	$250,000	$3,279,433	$3,279,433
Projected	2014	$3,088,514	$250,000	$3,338,514	$6,617,947
Projected	2015	$3,149,838	$250,000	$3,399,838	$10,017,784
Projected	2016	$3,212,790	$250,000	$3,462,790	$13,480,574
Projected	2017	$3,277,415	$250,000	$3,527,415	$17,007,989
Projected	2018	$3,343,757	$250,000	$3,593,757	$20,601,746
Projected	2019	$3,387,965	$250,000	$3,637,965	$24,239,711
Projected	2020	$3,405,533	$250,000	$3,655,533	$27,895,244
Projected	2021	$3,423,571	$250,000	$3,673,571	$31,568,815
Projected	2022	$3,442,090	$250,000	$3,692,090	$35,260,905
Projected	2023	$3,461,103	$250,000	$3,711,103	$38,972,008
Projected	2024	$3,480,624	$250,000	$3,730,624	$42,702,632
Projected	2025	$3,500,666	$250,000	$3,750,666	$46,453,298
Projected	2026	$3,521,244	$250,000	$3,771,244	$50,224,542
Projected	2027	$3,542,371	$250,000	$3,792,371	$54,016,912
Projected	2028	$3,564,062	$250,000	$3,814,062	$57,830,974
Projected	2029	$3,586,332	$250,000	$3,836,332	$61,667,305
Projected	2030	$3,609,197	$250,000	$3,859,197	$65,526,502
Projected	2031	$3,632,672	$250,000	$3,882,672	$69,409,174
Projected	2032	$3,656,774	$250,000	$3,906,774	$73,315,948

Source: Parsons Brinckerhoff

7.3.3 PRIVATE FUNDS

Certain projects in the Master Plan CIP may not be eligible for federal participation and have been identified as projects to be funded with other sources. These sources may include third-party developers or grants from sources other than the FAA. These projects might include projects that are not eligible for AIP funds such as hangars, automobile parking facilities, as well as other non-aeronautical developments such as hotels, restaurants, and educational facilities.

7.3.4 LOCAL FUNDS

The balance of project costs (i.e., after consideration of federal grants) must be funded using local funds. Historically, these funds have been comprised of PFCs, state, airport resources, or other funds. The remainder of this section discusses these funding sources and the assumptions used in applying these funds to the Master Plan CIP funding plan.

- ***Passenger Facility Charges*** - In 1990, the U.S. Congress passed the Aviation System Capacity Act (Act). This Act permitted public agencies controlling commercial service airports to apply to the FAA for approval to collect a PFC at levels of $1.00, $2.00, or $3.00 per enplaned passenger. In 2000, the Act was amended under Wendell H. Ford Aviation Investment and Reform Act for the 21st Century (AIR-21). Public agencies are currently permitted to apply to impose a PFC at the previously approved levels, as well as $4.00 or $4.50 as a result of the enactment of AIR-21. As a trade-off for imposing a

PFC, there is a reduction in the amount of AIP entitlement grants at large and medium hub airports. This reduction is 50 percent for airports imposing a $1.00, $2.00, or $3.00 PFC and 75 percent for airports imposing a $4.00 or $4.50 PFC. Since SGF is a primary non-hub airport, this reduction is not applicable.
On August 30, 1993, the FAA issued the initial PFC approval that authorized the City to initiate its PFC program at SGF to impose and use a $3.00 PFC. Since that time, the City has submitted and received approval for several PFC applications and has increased the amount of the PFC imposed to $4.50 per enplaned passenger. Currently, the City has the authority to collect approximately $95 million in PFCs. As of September 30, 2011, the City had collected approximately $7.1 million in PFCs (including interest income) with approximately $88 million remaining to be collected, with an estimated charge expiration date of January 1, 2036.

Table 7-5 presents the calculation of PFC revenue estimated to be received at the $4.50 level for the projection period of FY 2013 through FY 2032. With FAA approval, PFCs can be used to fund the projects contained in this analysis either concurrently or after the PFCs for currently approved projects have been collected.

- ***Airport Reserves*** – Airport enterprise fund earnings, reserves and accumulated cash balances are assumed to fund the balance of project costs after any federal, PFCs, or other funds are applied. This practice is expected to continue in the future and is assumed for this analysis. The local share of the Master Plan CIP is approximately $18.2 million during the projection period. As previously mentioned, to the extent that sufficient funds are not available, the phasing of certain projects would be adjusted to meet the availability of funds.

TABLE 7-5 - ANTICIPATED PFC COLLEECTIONS

Year		Annual Collections	Cumulative Collections
Prior Collections [1]			$8,480,133
Budget	2013	$1,808,979	$10,289,112
Projected	2014	$1,856,491	$12,145,603
Projected	2015	$1,905,807	$14,051,410
Projected	2016	$1,956,433	$16,007,844
Projected	2017	$2,008,404	$18,016,248
Projected	2018	$2,061,756	$20,078,004
Projected	2019	$2,116,524	$22,194,528
Projected	2020	$2,173,037	$24,367,566
Projected	2021	$2,231,059	$26,598,625
Projected	2022	$2,290,630	$28,889,256
Projected	2023	$2,351,792	$31,241,048
Projected	2024	$2,414,587	$33,655,635
Projected	2025	$2,479,059	$36,134,694
Projected	2026	$2,545,252	$38,679,945
Projected	2027	$2,613,212	$41,293,157
Projected	2028	$2,682,987	$43,976,144
Projected	2029	$2,754,625	$46,730,769
Projected	2030	$2,828,176	$49,558,944
Projected	2031	$2,903,690	$52,462,635
Projected	2032	$2,981,221	$55,443,856

[1] Estimated based on prior PFC collections through June 30, 2011 and estimated activity for FY 2012.

Source: Parsons Brinckerhoff

7.3.5 FINANCING PLAN

The assumed financing plan for the Master Plan CIP and the ongoing capital projects contained in this analysis includes the requirement to issue bonds to fund certain projects in the CIP. The terms of these bond issuances are similar to currently outstanding bond issuances. This includes a 30-year term, interest rates of approximately 5 percent, and capitalizing interest during construction. These bonds are projected to be issued in FY 2022 and will be used to finance PFC-eligible and the local portion of the terminal and terminal apron expansion projects identified during Phase II. A portion of the debt service associated with each of these bond issuances is assumed to be PFC-eligible. However, due to the outstanding bonds currently issued for the recently completed midfield terminal project, PFCs will likely not be available to fund the eligible debt service for this anticipated future bond issuance. The associated debt service with this bond issuance is estimated to be approximately $980,000 annually beginning in FY 2022.

7.4 DEBT SERVICE

The financing plan for the Master Plan CIP requires the issuance of bonds. In addition, the airport currently has two outstanding bond issuances. One of the outstanding bond issuances is for the rental car quick turn-around (QTA) facility. A customer facility charge is collected by the rental car companies to provide the revenue to support these bonds; therefore, the debt service is not considered in this analysis. The other bond issuances supported the construction of the midfield terminal complex and the debt service associated with those bonds is included in the financial analyses presented herein.

Table 7-6 presents the debt service requirements for FY 2013 through FY 2032 of the outstanding debt issuances, as well as the additional debt service required to finance portions of the Master Plan CIP.

TABLE 7-6 - BOND DEBT SERVICE

	Budget 2013	Projected 2014	Projected 2015	Projected 2016	Projected 2017	Projected 2018	Projected 2019	Projected 2020	Projected 2021	Projected 2022
Outstanding Bonds	$6,121,360	$6,166,360	$6,203,860	$6,238,736	$6,280,485	$6,318,610	$6,357,735	$6,402,235	$6,441,610	$6,485,360
Future bonds	0	0	0	0	0	0	0	0	0	980,000
	$6,121,360	$6,166,360	$6,203,860	$6,238,736	$6,280,485	$6,318,610	$6,357,735	$6,402,235	$6,441,610	$7,465,360
	Projected 2023	**Projected 2024**	**Projected 2025**	**Projected 2026**	**Projected 2027**	**Projected 2028**	**Projected 2029**	**Projected 2030**	**Projected 2031**	**Projected 2032**
Outstanding Bonds	$6,527,860	$6,582,732	$6,630,267	$4,878,515	$4,454,874	$4,489,759	$4,532,477	$4,572,575	$4,613,930	$4,656,040
Future bonds	980,000	980,000	980,000	980,000	980,000	980,000	980,000	980,000	980,000	980,000
	$7,507,860	$7,562,732	$7,610,267	$5,858,515	$5,434,874	$5,469,759	$5,512,477	$5,552,575	$5,593,930	$5,636,040

Sources: SGF Records (Outstanding Bonds); Parsons Brinckerhoff (Future Bonds)

7.5 OPERATING EXPENSES

Estimates of future operating expenses are based upon a review of historical trends, the anticipated effect of inflation, staffing requirements, activity fluctuations and the estimated impacts of facility improvements and expansions. SGF operating expenses are assigned to categories and cost centers, which are presented in the following bullets.

Categories:

- Personnel (includes salaries and wages, overtime, and fringe benefits)
- Supplies and Services (includes maintenance, supplies, utilities, insurance, and marketing) Cost Centers:
- Airfield Operations
- Aviation Services
- Terminal Operations
- West Kearney Complex
- Administration

Table 7-7 presents estimated operating expenses for SGF for budget 2013, and projected 2014 through 2032. Total operating expenses are budgeted to be approximately $8.3 million in 2013 and are projected to increase to approximately $12.9 million in 2032, which reflects an average annual growth rate of approximately 2.6 percent.

The assumptions used to prepare the operating expense projections presented in **Table 7-7** are discussed in the following bullets.

- The budgeted FY 2013 operating expenses reflect the amounts presented in the SGF's FY 2013 Annual Operating Budget.
- Based on a review of historical growth trends, operating expenses are expected to increase annually with inflation.
- Terminal operations expenses are projected to increase in FY 2022 as a result of the completion of the gate additions contained in the Master Plan CIP by the incremental increase in square feet resulting from the additional gates.

TABLE 7-7 - OPERATING EXPENSES

	Budget 2013	Projected 2014	Projected 2015	Projected 2016	Projected 2017	Projected 2018	Projected 2019	Projected 2020	Projected 2021	Projected 2022
Summary by Line Item										
Personnel	$5,250,000	$5,381,250	$5,515,781	$5,653,676	$5,795,018	$5,939,893	$6,088,390	$6,240,600	$6,396,615	$6,695,998
Supplies & Services	$2,975,000	$3,049,375	$3,125,609	$3,203,750	$3,283,843	$3,365,939	$3,450,088	$3,536,340	$3,624,749	$3,832,985
Total Operating Expenses	$8,225,000	$8,430,625	$8,641,391	$8,857,425	$9,078,861	$9,305,833	$9,538,478	$9,776,940	$10,021,364	$10,528,983
Summary by Cost Center										
Airfield Operations	$1,615,000	$1,655,375	$1,696,759	$1,739,178	$1,782,658	$1,827,224	$1,872,905	$1,919,727	$1,967,721	$2,016,914
Aviation Services	1,525,000	1,563,125	1,602,203	1,642,258	1,683,315	1,725,398	1,768,532	1,812,746	1,858,064	1,904,516
Terminal Operations	2,518,000	2,580,950	2,645,474	2,711,611	2,779,401	2,848,886	2,920,108	2,993,111	3,067,938	3,401,722
West Kearney Complex	403,000	413,075	423,402	433,987	444,837	455,958	467,356	479,040	491,016	503,292
Ground Services	488,000	500,200	512,705	525,523	538,661	552,127	565,930	580,079	594,581	609,445
Administration	1,676,000	1,717,900	1,760,848	1,804,869	1,849,990	1,896,240	1,943,646	1,992,237	2,042,043	2,093,094
Total Operating Expenses	$8,225,000	$8,430,625	$8,641,391	$8,857,425	$9,078,861	$9,305,833	$9,538,478	$9,776,940	$10,021,364	$10,528,983

	Projected 2023	Projected 2024	Projected 2025	Projected 2026	Projected 2027	Projected 2028	Projected 2029	Projected 2030	Projected 2031	Projected 2032
Summary by Line Item										
Personnel	$6,863,398	$7,034,983	$7,210,857	$7,391,128	$7,575,907	$7,765,304	$7,959,437	$8,158,423	$8,362,383	$8,571,443
Supplies & Services	3,928,810	4,027,030	4,127,706	4,230,898	4,336,671	4,445,088	4,556,215	4,670,120	4,786,873	4,906,545
Total Operating Expenses	$10,792,207	$11,062,013	$11,338,563	$11,622,027	$11,912,578	$12,210,392	$12,515,652	$12,828,543	$13,149,257	$13,477,988
Summary by Cost Center										
Airfield Operations	$2,067,337	$2,119,020	$2,171,995	$2,226,295	$2,281,953	$2,339,002	$2,397,477	$2,457,413	$2,518,849	$2,581,820
Aviation Services	1,952,129	2,000,932	2,050,955	2,102,229	2,154,785	2,208,655	2,263,871	2,320,468	2,378,480	2,437,942
Terminal Operations	3,486,765	3,573,934	3,663,282	3,754,864	3,848,736	3,944,954	4,043,578	4,144,668	4,248,284	4,354,492
West Kearney Complex	515,874	528,771	541,990	555,540	569,428	583,664	598,256	613,212	628,542	644,256
Ground Services	624,681	640,298	656,306	672,713	689,531	706,770	724,439	742,550	761,113	780,141
Administration	2,145,422	2,199,057	2,254,034	2,310,385	2,368,144	2,427,348	2,488,031	2,550,232	2,613,988	2,679,338
Total Operating Expenses	$10,792,207	$11,062,013	$11,338,563	$11,622,027	$11,912,578	$12,210,392	$12,515,652	$12,828,543	$13,149,257	$13,477,988

Sources: SGF Records (2013); Parsons Brinckerhoff (2014-2032)

7.6 NONAIRLINE REVENUE

Estimates of future SGF nonairline revenues are based upon a review of historical trends, the anticipated effect of inflation, projected future activity levels, and the estimated impacts of the facility improvements and expansions. SGF has a diverse revenue base with nonairline revenues comprising approximately 80 percent of total revenue budgeted for FY 2013. **Table 7-8** presents budgeted nonairline revenues for FY 2013 and projected FY 2014 through FY 2032. Nonairline revenues are budgeted to be approximately $9.4 million in 2013 (excluding the amounts for the sale of land) and are projected to increase to approximately $19.5 million in 2032, which reflects an average annual growth rate of approximately 3.9 percent.

The assumptions used to prepare the nonairline revenue projections presented in **Table 7-8** are discussed below.

- The FY 2013 nonairline revenues reflect the amounts presented in the SGF's FY 2013 Annual Operating Budget and also includes $4 million for the sale of 235 acres of SGF property known as Air Park South.
- On average, nonairline revenues are anticipated to grow based on historical trends and lease provisions.
- Terminal concession revenues, parking and rental car revenue are projected to increase with projected enplanement growth and inflation.
- Ground services and ramp fees are projected to increase with projected air carrier operations growth and inflation.
- Land lease revenue is projected to remain constant.

TABLE 7-8 - NONAIRLINE REVENUE

	Budget 2013	Projected 2014	Projected 2015	Projected 2016	Projected 2017	Projected 2018	Projected 2019	Projected 2020	Projected 2021	Projected 2021
Parking	$2,651,000	$2,775,041	$2,905,733	$3,042,579	$3,185,870	$3,335,910	$3,493,016	$3,658,008	$3,830,794	$4,011,741
Rental Car	1,816,000	1,900,971	1,990,498	2,084,241	2,182,399	2,285,180	2,392,802	2,505,825	2,624,188	2,748,141
Fuel, Glycol, Oil Sales	1,390,000	1,446,031	1,498,608	1,553,096	1,609,566	1,668,089	1,728,740	1,792,478	1,858,565	1,927,090
Airfield Operations	727,000	735,572	745,957	756,806	768,140	779,980	792,351	808,870	826,338	844,812
Other Terminal Operations	693,000	706,860	720,997	735,417	750,125	765,128	780,431	796,039	811,960	828,199
West Kearney Complex	712,000	726,240	740,765	755,580	770,692	786,106	801,828	817,864	834,221	850,906
Other Aviation Services	581,000	599,178	616,252	633,944	652,275	671,269	690,951	711,627	733,062	755,283
Ground Services	508,000	522,444	540,756	559,709	579,327	599,632	620,649	650,374	681,523	714,164
Terminal Concessions	247,000	258,557	270,734	283,484	296,835	310,815	325,453	340,825	356,924	373,783
Revenue from the Sale of Property	4,000,000	0	0	0	0	0	0	0	0	0
Investment Earnings	75,000	76,500	78,030	79,591	81,182	82,806	84,462	86,151	87,874	89,632
Total Nonairline Revenue	$13,400,000	$9,747,395	$10,108,329	$10,484,447	$10,876,412	$11,284,915	$11,710,681	$12,168,062	$12,645,451	$13,143,751

	Projected 2023	Projected 2024	Projected 2025	Projected 2026	Projected 2027	Projected 2028	Projected 2029	Projected 2030	Projected 2031	Projected 2032
Parking	$4,201,235	$4,399,679	$4,607,498	$4,825,132	$5,053,047	$5,291,727	$5,541,680	$5,803,441	$6,077,566	$6,364,639
Rental Car	2,877,949	3,013,888	3,156,249	3,305,334	3,461,461	3,624,962	3,796,187	3,975,499	4,163,282	4,359,934
Fuel, Glycol, Oil Sales	1,998,140	2,071,811	2,148,197	2,227,400	2,309,523	2,394,674	2,482,964	2,574,509	2,669,430	2,767,851
Airfield Operations	864,348	885,009	906,859	929,967	954,406	980,252	1,007,588	1,036,500	1,067,079	1,099,421
Other Terminal Operations	844,763	861,658	878,892	896,469	914,399	932,687	951,340	970,367	989,775	1,009,570
West Kearney Complex	867,924	885,283	902,988	921,048	939,469	958,258	977,423	996,972	1,016,911	1,037,250
Other Aviation Services	778,320	802,202	826,960	852,627	879,236	906,822	935,420	965,068	995,805	1,027,670
Ground Services	748,369	784,211	821,771	861,129	902,372	945,590	990,879	1,038,336	1,088,067	1,140,179
Terminal Concessions	391,439	409,929	429,292	449,569	470,804	493,043	516,332	540,720	566,261	593,009
Revenue from the Sale of Property	0	0	0	0	0	0	0	0	0	0
Investment Earnings	91,425	93,253	95,118	97,020	98,961	100,940	102,959	105,018	107,118	109,261
Total Nonairline Revenue	$13,663,912	$14,206,923	$14,773,823	$15,365,695	$15,983,677	$16,628,955	$17,302,773	$18,006,432	$18,741,293	$19,508,781

Sources: SGF Records (2013); Parsons Brinckerhoff (2014-2032)

7.7 AIRLINE REVENUE

The City sets the rates for landing fees and terminal rentals by ordinance each year. Since the completion of the midfield terminal complex, the landing fees and terminal rentals have increased at a rate of 3 percent annually. For purposes of this analysis, this methodology is assumed to continue during the projection period.

The resulting rates for each year are multiplied by projected landed weight and projected leased terminal space to develop the airline revenue for each year. Ground handling fees per enplanement are also included as they are provided as a service to the airlines by SGF. **Table 7-9** presents a summary of the airline rates and charges from FY 2013 through FY 2032, as well as the cost per enplanement resulting from these rates.

7.8 CASH FLOW

Table 7-10 presents the airport's cash flow for the projection period by combining the revenue, operating expense, locally funded capital expenditures, debt service, grant receipts, and PFC projections developed in the previous sections.

As shown in the table, the cash flow for each year presented, with the exception of FY 2022, is positive, indicating the Master Plan CIP and ongoing capital program do not negatively impact the financial situation of the SGF, given the assumptions contained in this analysis. In addition the amount of the cash short fall for FY 2022 should be available from SGF reserves as the total of net remaining revenues for other years are greater than the shortfall in those years.

7.9 FINDINGS

Based on the analysis presented throughout the preceding sections, this section summarized the principal findings with respect to the financial implications of the Master Plan CIP and ongoing capital projects presented in this chapter. Based upon the assumptions and limitations underlying these feasibility analyses, the following findings are presented:

- The Master Plan CIP and ongoing capital projects are projected to be financially feasible with adequate cash flow and/or reserves to meet all operating requirements of SGF.
- At the same time, the estimates of required airline fees following implementation of the Master Plan CIP remain reasonable and competitive.
- The proposed improvements may be implemented with some reliance on federal discretionary grants. Should the projected level of discretionary funding not be received, consideration will be given to adjusting the phasing of the Master Plan CIP.

With regard to the findings of these analyses, it must be emphasized that the actual timing and financing of airport improvements will be based upon actual activity growth, as well as the SGF's particular financial circumstances at the time of project implementation. The analyses only serve to demonstrate that a reasonable expectation can be made that the program is feasible.

TABLE 7-9 - AIRLINE RATES & COST PER ENPLANEMENT

Year	Landing Fee (per 1,000 lbs)	Terminal Rental (per square ft.)	Ground Handling Fees (per EP)	Airline Cost per Enplanement	Airline Cost/EP 2012$
2013	$1.26	$43.25	$4.24	$8.99	$8.77
2014	$1.30	$44.55	$4.30	$9.05	$8.62
2015	$1.34	$45.89	$4.34	$9.10	$8.45
2016	$1.38	$47.27	$4.38	$9.14	$8.28
2017	$1.42	$48.69	$4.43	$9.19	$8.12
2018	$1.46	$50.15	$4.47	$9.24	$7.97
2019	$1.50	$51.65	$4.51	$9.28	$7.81
2020	$1.55	$53.20	$4.56	$9.34	$7.67
2021	$1.60	$54.80	$4.60	$9.40	$7.53
2022	$1.65	$56.44	$4.65	$10.41	$8.13
2023	$1.70	$58.13	$4.69	$10.47	$7.98
2024	$1.75	$59.87	$4.74	$10.53	$7.83
2025	$1.80	$61.67	$4.79	$10.60	$7.69
2026	$1.85	$63.52	$4.83	$10.66	$7.55
2027	$1.91	$65.43	$4.88	$10.73	$7.41
2028	$1.97	$67.39	$4.93	$10.79	$7.27
2029	$2.03	$69.41	$4.98	$10.86	$7.14
2030	$2.09	$71.49	$5.03	$10.92	$7.00
2031	$2.15	$73.63	$5.08	$10.99	$6.88
2032	$2.21	$75.84	$5.13	$11.06	$6.75

Sources: SGF; Parsons Brinckerhoff

TABLE 7-10 - AIRPORT CASH FLOW

	Budget 2013	Projected 2014	Projected 2015	Projected 2016	Projected 2017	Projected 2018	Projected 2019	Projected 2020	Projected 2021	Projected 2022
Airline Revenue	$2,500,000	$2,600,168	$2,691,483	$2,785,475	$2,882,172	$2,981,608	$3,083,813	$3,208,342	$3,337,713	$3,990,897
Nonairline Revenue	13,400,000	9,747,395	10,108,329	10,484,447	10,876,412	11,284,915	11,710,681	12,168,062	12,645,451	13,143,751
Total Revenue	$15,900,000	$12,347,563	$12,799,812	$13,269,922	$13,758,584	$14,266,523	$14,794,494	$15,376,404	$15,983,163	$17,134,648
LESS: Operating Expenses	(8,225,000)	(8,430,625)	(8,641,391)	(8,857,425)	(9,078,861)	(9,305,833)	(9,538,478)	(9,776,940)	(10,021,364)	(10,528,983)
Net Operating Cash Flow	$7,675,000	$3,916,938	$4,158,422	$4,412,496	$4,679,723	$4,960,690	$5,256,015	$5,599,464	$5,961,800	$6,605,665
LESS: Capital Expenditures	(1,224,413)	(945,675)	(1,081,136)	(3,041,820)	(1,858,820)	(300,000)	(300,000)	(300,000)	(300,000)	(7,242,143)
LESS: Debt Service	(6,121,360)	(6,166,360)	(6,203,860)	(6,238,736)	(6,280,485)	(6,318,610)	(6,357,735)	(6,402,235)	(6,441,610)	(7,465,360)
PLUS: AIP Funds Applied to Projects	3,029,433	3,088,514	3,149,838	3,212,790	3,277,415	3,343,757	3,387,965	3,405,533	3,423,571	3,442,090
PLUS: PFCs Applied to Dbt Svc	1,808,979	1,856,491	1,905,807	1,956,433	2,008,404	2,061,756	2,116,524	2,173,037	2,231,059	2,290,630
Net Cash Flow	$5,167,639	$1,749,908	$1,929,071	$301,164	$1,826,237	$3,747,593	$4,102,770	$4,475,799	$4,874,819	($2,369,117)

	Projected 2023	Projected 2024	Projected 2025	Projected 2026	Projected 2027	Projected 2028	Projected 2029	Projected 2030	Projected 2031	Projected 2032
Airline Revenue	$4,145,468	$4,305,717	$4,472,267	$4,644,772	$4,830,813	$5,023,489	$5,223,466	$5,430,926	$5,646,061	$5,869,558
Nonairline Revenue	13,663,912	14,206,923	14,773,823	15,365,695	15,983,677	16,628,955	17,302,773	18,006,432	18,741,293	19,508,781
Total Revenue	$17,809,380	$18,512,640	$19,246,090	$20,010,468	$20,814,490	$21,652,444	$22,526,239	$23,437,358	$24,387,354	$25,378,339
LESS: Operating Expenses	(10,792,207)	(11,062,013)	(11,338,563)	(11,622,027)	(11,912,578)	(12,210,392)	(12,515,652)	(12,828,543)	(13,149,257)	(13,477,988)
Net Operating Cash Flow	$7,017,172	$7,450,627	$7,907,527	$8,388,441	$8,901,912	$9,442,052	$10,010,587	$10,608,814	$11,238,097	$11,900,351
LESS: Capital Expenditures	(300,000)	(300,000)	(1,013,550)	0	0	0	0	0	0	0
LESS: Debt Service	(7,507,860)	(7,562,732)	(7,610,267)	(5,858,515)	(5,434,874)	(5,469,759)	(5,512,477)	(5,552,575)	(5,593,930)	(5,636,040)
PLUS: AIP Funds Applied to Projects	3,461,103	3,480,624	0	0	0	0	0	0	0	0
PLUS: PFCs Applied to Dbt Svc	2,351,792	2,414,587	2,479,059	2,545,252	2,613,212	2,682,987	2,754,625	2,828,176	2,903,690	2,981,221
Net Cash Flow	$5,022,208	$5,483,106	$1,762,768	$5,075,177	$6,080,250	$6,655,280	$7,252,735	$7,884,415	$8,547,857	$9,245,532

Source: Compiled by Parsons Brinckerhoff

8.0 PUBLIC INVOLVEMENT AND COORDINATION

Stakeholder participation and input was a major consideration in the study process. The goals of the public involvement plan for SGF were to:

- Gather input and feedback from a variety of groups such as airport users and tenants, local businesses, and community members;
- Provide educational opportunities to the general public regarding the Airport and its role in the community; and
- Build awareness about airport operations and Federal Aviation Administration regulations.

A substantial public involvement/outreach program encouraged information sharing among stakeholders including: City Staff, business leaders, tenants, airport users, elected and appointed officials, and the general public. Stakeholders were given the ability to provide comment before significant decisions were made. In order to facilitate information to the public, the following outreach steps were undertaken.

8.1 TECHNICAL COMMITTEE/AIRPORT BOARD MEETINGS

Throughout the Master Planning process several Technical Committee and Airport Board meetings were held. The Technical Committee was comprised of airport board members, airport tenants, Missouri National Guard personnel, as well as city and county officials. Feedback throughout the process was solicited to ensure that the master plan update met the needs of the airport and surrounding community.

TABLE 8-1 - TECHNICAL COMMITTEE/AIRPORT BOARD MEETINGS

Date	Meeting	Topic(s)
12/9/2010	Airport Board Meeting	Master Plan Process Overview
1/18/2011	Technical Committee	Inventory and Aviation Forecasts
3/17/2011	Technical Committee	Preliminary Facility Requirements
6/29/2011	Technical Committee	Preliminary Alternatives
10/11/2011	Airport Board Meeting	Master Plan Update, GA Summit Overview, and Preliminary Environmental Findings
1/24/2012	Technical Committee	Identification of Preferred Alternatives
8/7/2012	Technical Committee	Final Recommendations, Environmental Coordination, Financial Analysis

8.2 PUBLIC AWARENESS CAMPAIGN

As part of a public awareness campaign, a web page dedicated to the Master Plan Update was established on the Airport's website. It provided updates on planning activities and key decisions, as well as meeting agenda and minutes. Educational materials about the Master Plan were posted on the website throughout the process, along with copies of all public documents. Periodic press releases were issued on key activities and events. Post cards, as depicted in **Figure 8-1** , were also created and distributed throughout the community.

FIGURE 8-1 - MASTER PLAN POSTCARD

8.3 AIRPORT USER SURVEYS

To better assess the adequacy of the airport facilities and desired improvements, surveys were distributed to local aircraft owners and pilots, airport business tenants, corporate businesses, and local Springfield businesses to allow them to comment and make recommendations on desired airports improvements and rate the overall facility. The results of these surveys are further discussed in **Section 2.18**.

8.4 COMMUNITY MEETINGS

Three open house meetings were held with interactive "stations" focusing on key areas of the study to serve as learning centers. The first public meeting was held on March 17, 2011, and addressed the Inventory and Aviation Activity Forecasts chapters of this Master Plan. The second public meeting was held on June 29, 2011, and covered the Facility Requirements and Alternative Analysis chapters. Finally, a General Aviation (GA) Summit was held on October 11, 2012, to provide an update on the master plan update, introduce preliminary GA Alternatives, and obtain feedback from the GA users. Advertising for the public meetings included the internet, press releases, and print ads.

TABLE 8-2 - COMMUNITY MEETINGS

Date	Meeting	Topic(s)
March 17, 2011	Master Plan Open House – Airport Terminal	Inventory, Aviation Forecasts and Sustainability
June 29, 2011	Master Plan Open House – Library Station	Facility Requirements and Proposed Alternatives
October 11, 2011	General Aviation Summit – OzAir Hangar	Master Plan Overview, Proposed GA Alternatives, GA Feedback