



Abraham Lincoln Capital Airport Smart Airport and Regional Logistics Plan

Springfield, IL

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Table of Contents

EXECUTIVE SUMMARY 1

- Purpose 1
- Background 1
- Advanced Air Mobility 2
 - Figure ES-1 Proposed Charging and Vertiport Locations* 3
 - Table ES-1 SPI General Aviation eCTOL (Electric-Only) Forecast* 4
 - Table ES-2 Commercial eCTOL (Electric and Hydrogen) Forecast* 4
 - Table ES-3 SPI eVTOL (Electric and Hydrogen) Forecast* 4
- Electrical Roadmap 5
 - Figure ES-2 Schematic of Energy Users Across SPI by Source* 5
 - Table ES-4 2025-2054 Roadmap of Load Growth and ROM Costs for Supporting Electrical Infrastructure Projects* 7
- Aeronautical and Nonaeronautical Development 7
- Airport Commerce Park 8
 - Figure ES-3 Recommended SPI Conceptual Development Plan* 9
 - Figure ES-4 South Quadrant Conceptual Development Plan* 10
- Regional Logistics 11
- Summary 12

1. PROJECT DESCRIPTION 13

- 1.1. Data Collection 13
- 1.2. Advanced Air Mobility Plan 13
- 1.3. Asset Management System 13
- 1.4. Airport City Plan 14
 - Figure 1.1 SPI* 14
- 1.5. Stakeholder Coordination 15

2. EXISTING CONDITIONS 17

- 2.1. Overview 17
- 2.2. Airport Master Plan and Airport Layout Plan 17
 - Figure 2.1 SPI Redline ALP* 18
- 2.3. SPI Aviation Activity Forecasts 19
 - Table 2.1. SPI Demand Projections Summary* 19
- 2.4. Land Use Plans and Zoning 19
 - Figure 2.2 City of Springfield Zoning* 21
 - Figure 2.3 Sangamon County Zoning* 22
 - Figure 2.4 Sangamon County Enterprise Zones Near SPI* 23
- 2.5. Regional Comprehensive Plans 23
 - Figure 2.5 Comprehensive Plan Proposed Land Use* 25
 - Figure 2.6 Truck Routes in SATS MPA* 27
- 2.6. Facility Utility Data 28
- 2.7. Current Asset Registry and Condition Assessment 29
 - Figure 2.7 2023 Airport Pavement Condition Index Map* 30

2.8. Electrified Airport of the Future 31

2.9. Summary 32

3. ADVANCED AIR MOBILITY AND OTHER FUTURE ELECTRICAL DEMANDS 33

3.1. Introduction 33

3.2. Ground Transportation 33

3.3. Rental Cars 34

3.4. Airport and Customers 35

3.5. Ground Service Equipment 36

3.6. Energy Resilience 36

3.7. Advanced Air Mobility Transportation 37

3.8. Types of AAM Vehicles 37

Figure 3.1 Types of AAM Aircraft 38

3.9. Charging Facilities 39

3.10. Aircraft Service Requirements 40

3.11. Alternative Fuel Storage 40

Figure 3.2 GenH2 1-Ton Per Day Plant Layout 41

3.12. 2024 FAA Reauthorization Act Programs 43

3.13. SPI AAM Activity Forecast 44

Figure 3.3 Heart Aerospace ES-30 45

Figure 3.4 ZeroAvia Powertrains 46

Figure 3.5 Pipistrel Velis Electro 47

Table 3.1 SPI General Aviation eCTOL (Electric-Only) Forecast 47

Table 3.2 Commercial eCTOL (Electric and Hydrogen) Forecast 48

3.14. Industry Forecast – eVTOLs 48

Table 3.3 Entry-Into-Service Date 48

Table 3.4 SPI eVTOL (Electric and Hydrogen) Forecast 50

3.15. Peak Hour Charging Assumptions – Fast Versus Slow Chargers 50

3.16. AAM Vertihub Innovation Center 51

3.17. Vertiport Site Selection 51

Figure 3.6 Relationship and Dimension of the TLOF, FATO and Safety Area 53

3.18. Vertiport Selection Criteria 54

3.19. Initial Operational and Terminal Airspace Analysis 55

Figure 3.7 East Quadrant Initial Charging Proposed Location 57

Figure 3.8 South Quadrant Initial Charging Proposed Location 58

Figure 3.9 East Quadrant Initial Vertiport Alternative 60

3.20. On-Airport Vertiport Site Alternatives 61

Figure 3.10 North Quadrant Vertiport Alternative 62

Figure 3.11 East Quadrant Vertiport Alternative 1 64

Figure 3.12 East Quadrant Vertiport Alternative 2 65

Figure 3.13 South Quadrant Vertiport Alternative 1 67

Figure 3.14 South Quadrant Vertiport Alternative 2 68

Figure 3.15 West Quadrant Vertiport Alternative 69

3.21. Vertiport Development Steps 70

3.22. Off-Airport Site Alternatives 70

4. ELECTRICAL ROADMAP 71

4.1. Overview 71

 Table 4.1 2025–54 Roadmap of Load Growth and ROM Costs for Supporting Infrastructure Projects 73

4.2. Introduction 74

4.3. Overall Load Growth and Implications 74

 Figure 4.1 Schematic of Energy Users Across SPI by Source 75

 Table 4.2 Total Vehicle Load Growth 75

 Figure 4.2 SPI Annual Energy and Peak Demand Growth (2025–54) 76

 Table 4.3 Annual Terminal Energy Use 76

 Table 4.4 Forecasted SPI Energy Consumption (MWh) Across Buildings, Aircraft and Ground Vehicles 77

4.4. Peak Load Growth and Implications 77

 Table 4.5 Peak Load Growth (MW) by Aircraft, Ground Vehicles and Buildings (2025–54) 78

4.5. Specialized Infrastructure by Source 79

 Table 4.6 eGSE Assumptions (Commercial Aircraft) 80

 Table 4.7 eGSE Assumptions (FBO Commercial) 80

 Figure 4.3 Typical Airport eGSE Charging Station 81

 Table 4.8 eGSE Load and Infrastructure Growth 81

 Table 4.9 Electrification Assumption 83

 Table 4.10 EV Power Load Growth 83

 Table 4.11 Ground Vehicle Energy Consumption (MWh/Year) 83

 Table 4.12 Airport Ground Vehicle Fleet Assumptions 85

 Table 4.13 Car Rental Energy Assumptions 86

 Table 4.14 Stall Energy Consumption Assumptions 87

 Table 4.15 Charging Stall Use Assumptions 87

 Table 4.16 Charging Stall Assumptions 87

 Figure 4.4 Standard Vehicle Chargers 88

 Table 4.17 EV Charging Standards And Speeds 89

 Table 4.18 Battery Capacity (MWh) by Operations Category and Aircraft Type (Example OEM) 90

 Figure 4.5 Heart Aerospace Hybrid Electric Aircraft Specifications 90

 Table 4.19 SPI eVTOL (Electric and Hydrogen) Forecast 91

 Table 4.20 SPI General Aviation eCTOL (Electric-Only) Forecast 91

 Table 4.21 SPI eCTOL (electric and Hydrogen) Forecast 92

 Table 4.22 Forecasted Annual Aircraft Energy Consumption (MWh) Relative to Campus Demands 92

 Figure 4.6 eCTOL and eVTOL Energy Consumption Forecast 93

 Figure 4.7 Alternative 1 – Utility Aircraft Rapid Charging (N+1) Concept One-Line Diagram 94

 Figure 4.8 Alternative 2 – Utility to BESS Aircraft Rapid Charging (N+1) Concept One-Line Diagram 96

4.6. Electrical System 98

 Figure 4.9 Overview of Key Electrical Infrastructure at SPI 98

 Table 4.23 Key Transformers Serving SPI, FAA or Connected to PV 100

 Figure 4.10 CWLP Substation South of SPI With Spare Capacity 101

 Table 4.24 System Capacity and Upgrade Options 102

 Table 4.25 CWLP Utility Upgrade Considerations 103

4.7. Microgrid Considerations and Technologies 103

 Table 4.26 Microgrid Function Evaluation 105

4.8. Photovoltaics 108

Figure 4.11 Parcel Map of Areas Considered for Solar Corresponding to Tabulated Projection Estimate..... 109

Table 4.27 PV Production 109

Figure 4.12 PV Energy Generation Capability on Parcel 3 110

4.9. Hydrogen..... 110

 Table 4. 28 Hydrogen Generation Land Use..... 112

4.10. Nontechnical Considerations 112

4.11. Microgrid Roadmap 114

 Figure 4.13 Microgrid One-Line Diagram 116

4.12. Cost Estimate 116

 Table 4.29 Breakdown of Costs and Assumptions by Infrastructure Upgrade 117

4.13. Conclusion 117

 Table 4.30 2025–54 Roadmap of Load Growth and ROM Costs for Supporting Infrastructure Projects 119

5. AIRPORT CITIES – ON-AIRPORT DEVELOPMENT 121

5.1. Airport Layout Plan Update 121

5.2. Airport City Concept 121

 Figure 5.1 SPI Airport Layout Plan Update 122

5.3. Airport Commerce Park..... 123

 Figure 5.2 Airport Commerce Park Concept 124

 Figure 5.3 Aerial of Airport Commerce Park Area 125

5.4. Developer Outreach 126

5.5. Industry and Developer Meeting Feedback 126

5.6. Springfield Sangamon Growth Alliance-Targeted Industries 129

5.7. National Guard Synergies 129

5.8. Enterprise Zone Incentives 130

 Figure 5.4 Enterprise Zones Parcels at SPI 130

5.9. Development Opportunities 131

5.10. South Quadrant of SPI 131

 Figure 5.5 South Quadrant Development Concept 1 133

 Figure 5.6 South Quadrant Development Concept 2 135

 Figure 5.7 South Quadrant Nonaeronautical Potential Use 136

5.11. North Quadrant of SPI..... 137

 Figure 5.8 Aerial of North Quadrant of SPI 137

 Figure 5.9 North Quadrant Development Concept..... 139

5.12. East Quadrant of SPI – Terminal Area 140

 Figure 5.10 Aerial of East Quadrant at SPI..... 141

 Figure 5.11 East Quadrant Development Concept 142

5.13. West Quadrant of SPI 143

 Figure 5.12 Aerial of West Side of SPI..... 144

 Figure 5.13 West Quadrant Development Concept 145

5.14. Summary 146

 Figure 5.14 SPI Conceptual Development Plan..... 147

6. AIRPORT AND REGIONAL LOGISTICS PLAN 149

6.1. Introduction 149

Table of Contents

6.2. Inclusion in Regional Plans	149
6.3. Economic Activity Centers	150
<i>Figure 6.1 Economic Activity Centers</i>	151
6.4. Regional Available Megasites	152
<i>Figure 6.2 Springfield Region Megasites</i>	153
6.5. Regional Logistics Routes and Corridors.....	154
<i>Figure 6.3 Regional Roadway Network</i>	155
<i>Figure 6.4: Major Routes to SPI From North</i>	158
<i>Figure 6.5: Major Routes to SPI From West</i>	159
<i>Figure 6.6: Major Routes to SPI From South</i>	160
<i>Figure 6.7: Major Routes to SPI From East</i>	161
<i>Figure 6.8 Regional Railroads</i>	163
<i>Figure 6.9 Future Regional Railroads</i>	164
<i>Figure 6.10 Regional River Terminals</i>	166
6.6. Regional Transportation and Transit Plans.....	166
6.7. Regional Advanced Air Mobility (AAM)	167
<i>Figure 6.11: Areas for Proposed Vertiports</i>	169
6.8. Land Use Plans and Zoning.....	170
<i>Figure 6.12: Zoning Around SPI</i>	172
6.9. SPI Opportunities	173
APPENDIX A: ACRONYMS AND DEFINITIONS	179
ACRONYMS AND DEFINITIONS	180
APPENDIX B: BACKGROUND DATA SUPPORTING LOAD GROWTH CALCULATIONS	183
APPENDIX C: DETAILED DESCRIPTION OF KEY SPI TRANSFORMERS	185
<i>Figure C.1: Airport Terminal South-Side Transformer</i>	186
<i>Figure C.2: Airport Terminal Transformers North (U1886, Left) and Northeast (U6173, Right)</i>	187
<i>Figure C.3: U1966 FAA Airfield Lighting Vault</i>	188
<i>Figure C.4: U5724 Airport Fuel Storage and Pumping Station Distribution</i>	188
APPENDIX D: AIRPORT AUTHORITY FLEET (2024).....	190
<i>Table D-1 Airport Authority Fleet</i>	191
APPENDIX E: CONCEPTUAL PV LAYOUTS	192
APPENDIX F: SAMPLE BROKER POLICY	206

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Executive Summary

Purpose

The Abraham Lincoln Capital Airport (SPI), owned and operated by the Springfield Airport Authority (SAA), has taken steps to readily accommodate future development. This Smart Airport and Regional Logistics Plan has identified additional opportunities for SPI improvements to enhance the economic viability of the airport and its role as an economic development tool for the community. Specifically, this plan looks to:

- build on the airport's recent airport success with its solar farm
- prepare the airport to accommodate the increasing use of electric air and ground vehicles
- identify efficiency and resiliency improvements
- use the redevelopment opportunities of closed third runway land.
- increase connectivity to the community and enhance the airport's capability

These goals have been addressed through multiple tasks, including:

- data collection of existing conditions, including electricity and gas use
- energy audit of existing facilities
- establishment of an asset management tool
- identification of locations to serve advanced air mobility (AAM) aircraft at SPI
- preparation of an air cities plan to identify aeronautical and nonaeronautical development area on SPI
- development of a regional logistics plan to enhance the connection of SPI to the community
- establishment of a roadmap with strategies to meet future electrical needs at SPI
- conducting stakeholder meetings with airport and community stakeholders, as well as the development community

With a focus to better connect SPI and its development with the community, a series of stakeholder meetings were held throughout the study process. The purpose of the meetings were to share study progress updates and receive feedback. Stakeholders included airport tenants, community development leaders, and state and federal agency representatives. In addition to the stakeholders, meetings were held with industry and developer/broker representatives.

Background

SPI is a nonhub commercial-service airport served by three airlines with destinations of Chicago (and connections beyond) and Punta Gorda and, Orlando, Florida. In addition, SPI serves the general aviation community and has aircraft maintenance, repair and overhaul (MRO) operations. SPI is also home to the Illinois Air National Guard 183rd Wing. While no longer a flying unit, it continues to provide essential service with its air operations, mission support and medical groups and maintenance squadron.

To protect the aviation activity at the airport, SAA owns more than 2,400 acres. In addition to providing a buffer for its aviation operations, this land provides SPI with revenue generation opportunities. One focus of the plan has been developing a strategy to prepare SAA to take advantage of land development prospects as they arise.

To support these development opportunities, the land on SPI has been zoned for industrial use and contains enterprise zones. Also, most of the land surrounding SPI is zoned for industrial or agricultural use with some commercial and residential use. In the City of Springfield Comprehensive Plan 2017-2037, it identifies SPI as a

major public land use in the northwest metro area and states that development surrounding SPI should be compatible with the airport. SPI is also identified as an “Opportunity Area” in the comprehensive plan.

Additionally, the Springfield Area Transportation Study’s Long Range Transportation Plan calls SPI an economic activity center. Furthermore, Veterans Parkway (Illinois Route 4), adjacent to SPI, is a Class II truck route. This provides good ground access to SPI and its development opportunities. Recommendations from this planning process to prepare the region for AAM should be incorporated into the community plans at the next update.

To further enhance SPIs community connection, a landside roadway wayfinding plan has been developed. SPI can use this plan to coordinate with the Illinois Department of Transportation (IDOT) on implementing more standardized signage at the airport.

Advanced Air Mobility

AAM is an emerging sector of air transportation that includes new types of aircraft, such as electric-powered and electric Vertical Takeoff and Landing (eVTOL) for transportation of people and goods. Goals of AAM include more sustainable and cost-effective transportation with the opportunity to replace other transportation modes over shorter distances. Urban air mobility (UAM) and regional air mobility (RAM) are a subsets of AAM.

With available airfield capacity and developable land, an existing MRO on the airport and local aviation training opportunities, SPI is well-positioned to accommodate future AAM opportunities. AAM electric aircraft operations are anticipated ramp up slowly and increase over time. A standalone vertiport would be beneficial when AAM operations increase enough to impact SPI’s airfield capacity for traditional aircraft operations or begin requiring faster turnaround times.

Two types of AAM operations were considered -- general aviation, with a variety of aircraft types, and commercial services, with up to 30-seat electric/hybrid aircraft. Additionally, the Smart Airport study has addressed the supplemental fueling needs (hydrogen production and sustainable aviation fuel) that are anticipated to be needed to help power the AAM industry in the future.

General Aviation

A phased approach to accommodating general aviation AAM at SPI has been identified. Initial AAM operations are anticipated to use the runway system. Electric aircraft charging would be established between the terminal and fixed-base operator, where aircraft parking is available. As operations grow or if a standalone training facility is developed, locations for a vertiport in all quadrants of the airport were identified. Figure ES-1 depicts the proposed charging and vertiport locations.

Commercial Service

Heart Aerospace is leading the way in developing electric-hybrid aircraft for commercial service. Its focus is on a 30-seat regional aircraft. As a hybrid aircraft, it will require charging as well as fueling, potentially with sustainable aviation fuel (SAF) or, in the future, hydrogen. SPI is in the process of installing a tank capable of providing SAF.

Through this planning process, a plan has been prepared to accommodate Heart Aerospace aircraft or others like it at SPI. It is anticipated that air carriers using electric aircraft will still desire to turn the aircraft around in about 30 minutes. This represents an initial peak load of about 3 MW, growing to 9 MW in 25 years. To reliably meet this

FIGURE ES-1 PROPOSED CHARGING AND VERTIPOINT LOCATIONS

peak demand, a Battery Energy Storage System (BESS) is recommended and will be discussed further in the electrical roadmap section.

Timeframe

The timeframe for AAM aircraft entering the SPI market varies by type of aircraft. Pipistrel already has a two-seat trainer that is certified and flying. EVTOL aircraft are anticipated to enter the market in the next year or so and are projected to start operating in the Midwest after 2030. Heart Aerospace is projecting certification and entry into markets in about 2029. Thus, it is recommended that SPI monitor the market and prepare to take initial infrastructure development steps as the market begins to move toward initiating operations.

Tables ES-1, ES-2 and ES-3 summarize the AAM forecast and the projected energy needs.

TABLE ES-1 SPI GENERAL AVIATION eCTOL (ELECTRIC-ONLY) FORECAST

	2029 (Baseline)	2034 (Year 5)	2044 (Year 15)	2054 (Year 25)
GA Operations	6 per day	10 per day	14 per day	16 per day
Peak Hour Operations	1.60 per hour	2 per hour	2.60 per hour	3 per hour
Peak Hour Electrical Demand	1 MW	2 MW	3 MW	4 MW

TABLE ES-2 COMMERCIAL eCTOL (ELECTRIC AND HYDROGEN) FORECAST

	2029 (Baseline)	2034 (Year 5)	2044 (Year 15)	2054 (Year 25)
	≤19 pax ¹	19 & 30 pax	19 & 30 pax	19 & 30 pax
SPI Commercial Operations	3 per day	8 per day	13 per day	18 per day
Peak Hour Operations	1.10 per hour	1.60 per hour	2 per hour	2.40 per hour
Peak Hour Electrical Demand	3 MW	6 MW	6 MW	9. MW
Peak Hour Hydrogen Demand	60 kg	660 kg	660 kg	1,320 kg

¹PAX: passengers

TABLE ES-3 SPI eVTOL (ELECTRIC AND HYDROGEN) FORECAST

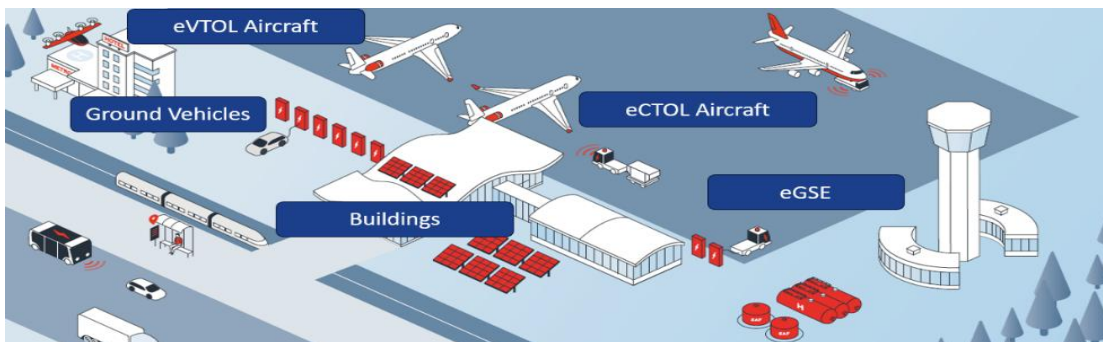
	2032 (Baseline)	2034 (Year 2)	2044 (Year 12)	2054 (Year 22)
FBO Corporate Operations	2 per day	4 per day	8 per day	11 per day
SPI Commercial Operations	3 per day	6 per day	12 per day	17 per day
Peak Hour Operations	1.10 per hour	1.50 per hour	1.80 per hour	2.30 per hour
Peak Hour Electrical Demand	1 MW	2 MW	3 MW	4 MW
Peak Hour Hydrogen Demand	100 kg	100 kg	300 kg	400 kg

Electrical Roadmap

The energy needed to support AAM is in addition to the future ground vehicle electrification power demand, as well as the baseline energy use of airport buildings. To address the future electrical demands at SPI, an electrical roadmap has been developed. Using the AAM forecasts along with forecast for electric ground vehicles as the baseline of electrical use, the future total and peak electrical demands were projected. Based upon this projection, coordination was conducted with City Water Light and Power (CWLP) to identify the utility's capacity to service the future demands at SPI. Because the AAM industry is still evolving, it is critical that SPI coordinate with CWLP at least annually on the airport's projected needs. All future planning and implementation should consider that the lead times for major energy projects are often measured in months and years. Implementation lead times will include the time required for design (typically six to 18 months), permitting (several months) and procurement (months and years). The lead times have been fluctuating for energy supply chains over the past several years, with high demand for major electrical infrastructure components such as transformers, breakers, batteries, generators and solar components. Figure ES-2 depicts the full set of projected energy users at SPI.

When contrasting future electrical demands against future on-site production capabilities, considerations have been made for the electricity generated by solar farm Phase 1, which powers some airport authority and Standard Aero buildings on the north side, and solar farm Phase 2, which will power the other airport authority-owned buildings.

FIGURE ES-2 SCHEMATIC OF ENERGY USERS ACROSS SPI BY SOURCE



The following summarizes the results of the electrical roadmap analysis.

- The future aircraft charging requirement of up to 13 megavolt-amperes (MVA) through 2054 is projected to dwarf electric vehicle and electric ground support equipment needs of 3.6 MVA. Therefore, SPI should monitor the electric needs of the larger aviation stakeholders to be prepared for infrastructure upgrades that will meet the anticipated future demands.
- CWLP's electric grid supplying SPI is reliable, with no outage greater than 1.5 hours in the past 10 years. At the high-voltage level, SPI's power comes from multiple transmission sources. At medium voltage levels, CWLP's distribution service at SPI consists of two feeders configured in a loop. This reduces the extent and duration of outages, because CWLP can better reroute power to users and isolate faults. As of June 2025, CWLP has 9 MVA of spare capacity, which can support the 5.2 MVA of new demand at SPI projected by 2033.

- CWLP identified that adding new loads at SPI will require new or upgraded transformers and feeders. Peak demand is projected to grow by a multiple of six over 30 years. With the intermittent demand and high peaking nature of the charging, the total energy use is projected grow by a factor of just four. The use of BESS can limit the need for more CWLP capacity by flattening peaks, which also lowers demand charges. Using a BESS system would allow charging from the grid over longer periods of time, preferable in off-peak times to maintain the 50% load factor that is required for CWLP to participate in the cost of the improvements. SPI should also consider managing peak demand and preserving CWLP capacity by using electricity via a microgrid controller in conjunction with battery storage that integrates networked charge management and energy-monitoring features.
- When adding BESS systems, the initial installation should include two units with one serving as a spare. In the future, as demand requires additional BESS systems, they can be added one at a time with the spare in place.
- The BESS systems would be in addition to the emergency generators that are already in place at SPI to meet critical aviation services.
- A notable outcome reflected in the roadmap is that the total new load over the next eight years is not expected to exceed the existing CWLP feeder capacity. This demand-versus-capacity consideration is even stronger if BESS is used to provide the desired system output for aircraft charging instead of a sole reliance on CWLP. The BESS system will provide instantaneous charging in 3 MVA increments for 30-minute bursts several times a day. Close coordination with CWLP and stakeholders is recommended so infrastructure availability does not delay SPI's ability to serve the projected load growth.
- In the near term, a facility-focused microgrid, primarily developed with BESS and charge management capabilities, would be most appropriate for SPI, considering the high level of reliability the airport receives from CWLP. If, however, toward the end of the 30-year forecast, the load growth expands for ultra-fast charging to support fully electric commercial aircraft, which would push the demand above 50 MVA, a new substation or utility-scale microgrid may be required.
- The additional electrical usage will increase the service and demand charge costs for SPI. Therefore, along with planning infrastructure improvements, SPI should consider how charging service revenue will be used to offset the investment and operating costs. This would require an electrical cost recovery charge that the airport can levy against the airlines and other tenants that are using energy services.

Table ES-4 summarizes the roadmap to manage load growth at SPI.

TABLE ES-4 2025-2054 ROADMAP OF LOAD GROWTH AND ROM COSTS FOR SUPPORTING ELECTRICAL INFRASTRUCTURE PROJECTS

Time	Budget	Sources of Electrical Demand	Required CWLP Capacity	Electrical Infrastructure Improvements by Budget, Time and Space
2025–33	\$4M–8.5M	<p>2028: 0.45 MVA +0.15 eGSE +0.3 shared charging for fleet, rental cars, public visitors</p> <p>2029: 3 MVA +3 eCTOL</p> <p>2032: 1 MVA +1 eVTOL</p>	<p>Maximize 12 MVA of existing feeder capacity</p> <p>CWLP indicates up to 9 MVA</p> <p>4.45 MVA added in eight-year period</p>	<p>\$3M to \$6M and up to four years for feeder upgrade or BESS project to support short-duration aircraft charging once CWLP indicates growth would exceed system capacity. Plan for BESS to require up to 0.3 acres of space. Negotiate split with CWLP for feeder upgrade. Refer to Table 4.25 in Section 4.6 to understand the implications of the feeder versus BESS decision.</p> <p>Vehicle chargers: Plan \$1M to \$2.5M and two years for new eGSE and general vehicle charging. Chargers to consume wall or floor space for electrical equipment or existing parking stall space.</p>
2034–43	\$6M–13.5M	<p>2034: 4.75 MVA total +3 eCTOL +1 eVTOL +0.75 for eGSE (0.15), fleet EVs (0.15), rentals (0.15) and public (0.3)</p>	<p>>12 MVA</p> <p>Likely requires feeder upgrade</p>	<p>\$2M to \$5M for feeder. Negotiate split with CWLP for feeder upgrade based on forecasted use. Refer to Table 4.25 in Section 4.6 to understand the implications of the feeder versus BESS project.</p> <p>\$3M to \$6M for additional BESS project</p> <p>EVSE: Plan \$1M to \$2.5M to expand charging infrastructure.</p>
2044–54	\$2M–5M (Feeder)	<p>2044: 1 MVA +1 eCTOL</p> <p>2054: 4 MVA +3 eCTOL +1 eVTOL +0.45 (0.15 each) for fleet EVs, rentals and public</p>	<p>19 MVA new load from 3 MVA baseline feeder capacity usage in 2025. 22 MVA capacity used (19 MVA new + 3 MVA baseline)</p> <p>Exceeds 12 MVA CWLP capacity by up to 10 MVA, depending on BESS options selected</p>	<p>Plan \$1.5M to \$2.5M and two years for first 0.3 MW of capacity for vehicle charging. Add second round of charging once first-round utilization is reaching saturation.</p> <p>Up to 30 acres required for solar, if offsetting new usage is a goal. Cost to be determined at the time of installation.</p>

Note: eVTOL = electric vertical takeoff and landing; eCTOL = electric conventional takeoff and landing; EVSE = electric vehicle supply equipment; MW = megawatt

Aeronautical and Nonaeronautical Development

An Airport City is a concept that identifies that an airport has the potential to be the catalyst for other ancillary development somewhat similar to a downtown business district. The catalyst for the development is the airport’s direct access to the national airspace system, employment base, commercial passengers, aviation support and direct aviation related commerce.

The airport's airfield is the center or primary area of the airport city and includes airfield facilities such as the runways and taxiways and tenants that benefit from and depend on access to the airfield. Building off the primary on-airfield area is the secondary off-airport area, which benefits from the on airport tenants and is on the off-airfield portion of the airport property, i.e. nonaeronautical development on airport property. The final area comprises the airport's support industries, also benefit from the synergies generated at the airport.

To develop the airport city concept analysis, the available development areas on SPI were assessed, along with the existing development on SPI, with the goal of identifying and reserving areas of airport parcels for aeronautical and nonaeronautical development. **Figure ES-3** shows the resulting development plan.

Airport Commerce Park

SPI has been working toward development in the south quadrant of the airport, known as the Airport Commerce Park. **Figure ES-4** provides a conceptual plan for the commerce park. This layout is anticipated to be further refined as development opportunities are evaluated. To assist in marketing this site, SPI was able to add the site to the Illinois Economic Development Corporations's Vetted Sites list during this planning process.

Attractive features of the South Commerce Park include:

- Access to the following utilities:
 - a 12-inch sewer line along Camp Lincoln Road with a capacity of over 1 million gallons per day (Camp Lincoln Road is south of Airport Commerce Park and is the intersection proposed for a traffic signal.)
 - broadband cable along Illinois Route 29, east of the airport
 - telephone lines along Pulliam and Wilbur roads
 - a 6-inch gas line
 - water through CWLP via a 12-inch line through the site, with the capacity to meet fire suppression regulations
 - electricity with CWLP along Illinois Route 29 and to the east side of Aviation Lane, with the capacity to serve additional users
 - Ameren Illinois natural gas service along Wilbur Road
- cleared land with more than 80 acres with a +/- 4 feet elevation change.
- planned traffic signal at Wilber Road and Veterans Parkway (Illinois Route 4) when development occurs

In addition, portions of SPI including some of the Airport Commerce Park are within an enterprise zone, with the potential to expand the zone with a development commitment. There is also potential to establish a foreign trade zone (FTZ), potentially using a subzone tied to the FTZ in Decatur, Illinois. Another potential consideration brought out in the smart airport plan is capitalizing on the tremendous roadway, rail and water-based Illinois logistics with the establishment of an "inland port" near the SPI facility.

FIGURE ES-3 RECOMMENDED SPI CONCEPTUAL DEVELOPMENT PLAN

FIGURE ES-4 SOUTH QUADRANT CONCEPTUAL DEVELOPMENT PLAN

Executive Summary

As part of the study process, a meeting was held with the Springfield/Sangamon County development community. Input from this study process assisted in identifying some additional development tools for SPI to consider, including:

- Update its marketing brochure for the available aeronautical and nonaeronautical properties based on the study.
- Hire a national broker with aviation/aerospace development expertise to supplement local broker(s). This is particularly important for having national brand awareness for SPI for potential aeronautical business relocations, MRO opportunities and air cargo growth opportunities.
- Establish a development model for SPI that would include how the review/approval process would work and the expected timing for approval, establish parameters and policy for brokerage and agent fees, detail which incentives can be applied to certain kinds of prospective developments and highlight parcels that can be fast-tracked through the local approval process.
- Scope out and implement a Springfield regional logistics study that would focus on the movement of air- and ground-based cargo in the region and provide a starting point for the tracking and development of cargo movement in the region. The study should be supported in every way by the local planning and development community.
- Apply for grant(s) and begin to position SPI as a site for AAM as a test bed, an AAM MRO site and a training and technology center for Illinois. At the writing of this summary, SPI is submitting an application to be included in the Federal Aviation Administration's eVTOL pilot program.
- Continue progress with SPI as a leader in renewable energy production, which provides a significant low-cost energy environment for the economic development initiatives of the airport authority.
- Continue working closely with the Springfield-Sangamon Growth Alliance to establish more long-term local partnerships with development stakeholders, including periodic meetings focusing on specific airport property development needs.
- Continue working to improve the community's understanding that SPI is one of its most significant economic development transportation assets.
- Continue working with the city and county for building airport-synergistic development near the airport and avoiding additional incompatible development.

Regional Logistics

From a regional perspective, there are five areas in which SPI can provide synergistic opportunities with and for the community:

- develop Airport Commerce Park (as discussed above)
- explore inland port potential (as discussed above)
- support the upcoming regional AAM industry growth and implementation initiatives
- strongly consider being a site for hydrogen fuel production when the time is right
- enhance roadway and wayfinding connectivity with the community

Regional AAM Support

Ensure that SPI planning for AAM is included in regional plans. SPI staff should continue to participate in the various planning processes that will help the AAM industry flourish without local obstacles. It is also important that development at the airport is reflected in the regional planning documents. The growth and implementation of AAM transportation activity has significant regional implications. From this perspective, it is important that all regional planning initiatives support a regional AAM network..

The development of the AAM industry has the potential to increase passenger and cargo access to SPI. This access is anticipated to come from an AAM vertiport network within the metro area and the Central Illinois region. The study identified potential vertiport locations with the local community as depicted on Figure ES- 5. As the AAM industry develops and becomes mature, it is important that additional regional connections are developed. For the shorter-range AAM aircraft, connections such as Jacksonville, Lincoln, Taylorville and Litchfield should be considered. For AAM aircraft with a 250–350-mile range, connections with Chicago, Indianapolis, St. Louis, Louisville and Milwaukee should be considered. It is important to note that, while planning is important, SPI will need to work directly with the various regional airlines who will operate AAM aircraft to and from the longer-range markets. It is anticipated that the AAM industry could provide a significant commercial passenger movement upside for SPI as it moves toward maturity over the next 10-15 years.

Hydrogen Fuel Production

While initial AAM vehicles are being developed using electrical power, developers are also exploring the use of hydrogen. Hybrid AAM aircraft using hydrogen fuel cells, paired with electrical engines, will greatly increase the useful range of these aircraft, making them much more commercially viable in the long run. Other transportation sectors are also considering a future of hydrogen as a viable and clean fuel. As regional demand increases in the ground cargo logistics and rail sectors, producing hydrogen on-site may present a viable alternative revenue opportunity for SPI. Early hydrogen aviation demand forecasts indicate small aircraft may require up to 60 kg of hydrogen to refuel, while future large aircraft may require at least 600 kg. Commercially available on-site production facilities start at around 1 ton (1,000 kg) per day with the potential to scale up as needed. While initial aeronautical demand will not require 1 ton per day, it is conceivable that aviation demand may meet or exceed that amount in the next 10 to 20 years. Therefore, SPI has reserved a location for potential hydrogen production. SPI should continually assess the hydrogen aviation and landside commercial development demands to determine the timing of committing to on-site production versus simply installing on-site storage capacity for hydrogen.

Enhance Roadway and Wayfinding Connectivity with the Community

SPI benefits from the Springfield region’s robust ground transportation system with two Class II truck routes adjacent to SPI. This connectivity provides good access for travelers to SPI as well as access for the Airport Commerce Park. Using the wayfinding study from this process, SPI staff will work with IDOT to further enhance the signage on the primary routes to SPI from each side of the Springfield region. Because of the importance that SPI synergistically offers to the entire regional transportation system, it is recommended that all regional and economic development planning interests work to continually enhance the short- and longer-term connections with other transportation modes.

Summary

This Smart Airport and Regional Logistics Plan will provide SPI with an important tool to plan for its future to support AAM and other advanced technology aircraft. It has also provided an opportunity to further educate and communicate the economic development potential at SPI. Because AAM and other advanced technologies are still under development, the goal of this plan is to provide a flexible roadmap for SPI to follow in order to be positioned for and able to easily implement the needed improvements in a timely fashion to take advantage of the great economic development opportunities that these new technologies will offer. Timeliness of infrastructure development will be important if SPI is to seize these future opportunities.

1. Project Description

Hanson Professional Services Inc. (Hanson) and our team members conducted the Smart Airport and Regional Logistics Planning Project to produce a plan that includes current industry best practices for establishing Abraham Lincoln Capital Airport (SPI) as a “smart airport” of the future. This project considers and provides a means of implementation for improving the economic viability of the airport and its environs through the accommodation of new technologies, providing the baseline activities to enhance high-tech employment, establishing regional surface transportation synergies with the airport and improving the commercial/industrial development potential of the airport and surrounding communities. This plan brings together existing transportation, logistics and asset inventory data as well as existing planning information from the full range of state, local and regional planning sources.

1.1. Data Collection

The first element of this project has involved collecting available air and surface transportation, regional logistics and economic development plans and asset inventory data and identifying emerging technologies. Existing airport data has been collected, reviewed and organized for availability and reference throughout the project. The data summaries in this report briefly describe the conditions of airport assets and serves as a baseline for analysis and the remaining planning development elements of this project.

Throughout the remaining elements of this project, these data are further analyzed and coordinated to develop implementable plans for the airport and the region. The smart airport plan will support local land use decisions while enhancing multimodal transportation connectivity. The completed plan can be used to inform and improve local and regional transportation plans.

1.2. Advanced Air Mobility Plan

To reduce greenhouse gas emissions, there has been an increasing use of electricity, preferably from renewable sources, to power infrastructure and transportation. This has increased demands on the electrical grid. At an airport, in addition to electrical building infrastructure, electric aircraft and personal and rental electric vehicles may be present, as well as electrically powered ground service equipment. In addition, advanced air mobility (AAM) aircraft are under development, many of which are anticipated to be electrically powered.

SPI has developed a photovoltaic system to power some airport infrastructure and a tenant (see Figure 1.1). This is an example of an independent, renewable energy system. Opportunities to build on this experience with renewable energy will be part of this study. To support the transition to additional electrical vehicles and building demands, this study includes an energy audit of the terminal and safety building to identify opportunities to increase the efficiency of these facilities. This plan includes an electrical roadmap with a 30-year outlook and analysis of microgrid elements. The consideration of fuel storage to include sustainable aviation fuel (SAF) and hydrogen are also be a part of the analysis.

1.3. Asset Management System

An asset management system is being implemented to provide a tool for smarter, more economical management of the airport infrastructure. The focus of the asset management system is on the airside and landside pavement, stormwater and facets of the terminal building, including the roof; heating, ventilating and air conditioning (HVAC); baggage claim system; elevator and jet bridges.

1.4. Airport City Plan

The airport city concept is a recognition that, similar to a downtown area, the airport can be a center for development and economic activity. Runway 18/36 was recently decommissioned and removed at SPI because continued maintenance was not eligible for federal funding assistance in accordance with the justification criteria required in FAA Order 5100.38D, Airport Improvement Program Handbook issued September 30, 2014. The removal of this runway reduces infrastructure maintenance requirements for SPI and opens additional developable land. Potential aeronautical and nonaeronautical uses will be considered for this and other areas of the airport. Figure 1.1 depicts SPI, including the removed runway and Phase 1 solar photovoltaic array.

FIGURE 1.1 SPI



Source: Google Earth, Image 2024 Airbus, image date Feb. 24, 2024, accessed April 23, 2024.

1.5. Stakeholder Coordination

SPI is part of the regional economic and transportation system. Therefore, an important element of this study is coordination with airport and community stakeholders. Multiple stakeholder meetings have been held with the regional stakeholders as well as industry stakeholders and the development community.

The SPI Smart Airport and Regional Logistics Planning Project includes:

- an airport asset management plan
- an AAM plan, including electrical service requirements
- an aviation and nonaviation industrial development airport cities plan
- an airport and regional logistics plan

The final deliverable documents include implementable plans for each of the four primary planning categories, recommended best practices, recommended technology improvements, marketing plans and recommended necessary capital improvements. The plans, collected data, analyses and recommended best practices will be available for SPI and the Illinois Department of Transportation (IDOT) to use for any public transportation improvement purpose.

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2. Existing Conditions

2.1. Overview

Established in 1947 to continue the rich Springfield heritage of having commercial air service since 1928, Abraham Lincoln Capital Airport (SPI) is owned and operated by the Springfield Airport Authority (SAA) and serves as a gateway to the state capital and the many regional logistics, economic development and recreational opportunities. The SAA has maintained the airport facilities with proactive, sustainable methods to provide reliable, continuous air service. This document summarizes the conditions of existing airport assets to serve as a baseline for analysis and planning development elements of this project.

To plan for the future, consideration must be given to all aspects of the airport, including:

- airport planning efforts
- aviation activity forecasts
- land use plans and zoning
- regional plans
- facility utility data
- asset registry and condition assessment
- green energy and sustainability initiatives
- evaluation of future electric vehicle needs

This document is not intended to be comprehensive; however, it is a critical step to inform the remainder of the project to produce an actionable plan for SAA to increase the economic viability of SPI and its environs, including improving energy resiliency to support future development opportunities.

2.2. Airport Master Plan and Airport Layout Plan

An airport master plan is a comprehensive study of the airport and typically describes short-, medium- and long-term plans for airport development. The completed planning documents provide guidelines for the incremental development of an airport based on a region's present and future aviation needs. An airport layout plan (ALP) is typically completed as a product of the master planning process. An ALP is a set of drawings that provides a graphic representation of the airport sponsor's long-term development plan for an airport. The ALP shows the details on the major components of the airport, including runways, taxiways, aprons, hangar areas as well as safety areas and other FAA design standards. As a stipulation of FAA grant assurances, airport sponsors are required to keep their ALP document up to date, showing existing and proposed conditions at the airport.

The SAA, as the airport sponsor, proactively keeps the ALP updated to meet the grant assurances and continue to be eligible for federal grant funding for airport development. The SAA last completed a full master plan study in 1987 and has maintained subsequent ALP updates as developments occur. At the time of this report, most recent ALP update was one reviewed and approved by the FAA in 2023, reflecting the most recent changes of the removal of Runway 18/36 and the installation of a solar farm. Under a separate contract with a different consultant, the SAA is updating the entire ALP drawing set. **Figure 2.1** represents the 2023 redline ALP for SPI.

Existing Conditions

2.3. SPI Aviation Activity Forecasts

An aviation forecast update was prepared for SPI in May 2024. It considered all types of existing aviation uses at SPI. **Table 2.1** is a summary of the preferred forecast from this analysis. These activity levels will provide a guide for considering future aviation and energy demands at SPI. This forecast only considers existing types of aviation use and does not address AAM. Development of AAM forecast scenarios are part of this project for the purpose of projecting potential operational demands.

TABLE 2.1. SPI DEMAND PROJECTIONS

YEAR	COMMERCIAL ENPLANEMENTS	COMMERCIAL OPERATIONS	GENERAL AVIATION OPERATIONS	MILITARY OPERATIONS	BASED AIRCRAFT
2023 (Base Year)	50,505	816	13,176	4,136	94
2024 (+1)	62,650	1,000	13,270	4,136	95
2025 (+2)	54,415	922	13,364	4,136	96
2026 (+3)	54,928	927	13,459	4,136	97
2027 (+4)	57,181	932	13,555	4,136	98
2028 (+5)	59,070	934	13,652	4,136	99
2029 (+6)	61,153	938	13,749	4,136	100
2030 (+7)	64,306	958	13,847	4,136	101
2031 (+8)	64,799	962	13,945	4,136	102
2032 (+9)	64,719	965	14,045	4,136	103
2033 (+10)	64,721	968	14,145	4,136	104
2034 (+11)	64,656	968	14,245	4,136	105
2035 (+12)	64,929	971	14,347	4,136	106
2036 (+13)	65,147	973	14,449	4,136	107
2037 (+14)	65,009	975	14,552	4,136	108
2038 (+15)	69,149	1,062	14,655	4,136	109
2039 (+16)	70,091	1,089	14,760	4,136	110
2040 (+17)	74,587	1,199	14,865	4,136	111
2041 (+18)	81,544	1,345	14,971	4,136	112
2042 (+19)	81,611	1,346	15,077	4,136	113
2043 (+20)	81,678	1,347	15,185	4,136	114
CAGR	2.4%	2.5%	0.71%	0.0%	0.97%

Source: FAA, SPI, CMT Analysis (2024)

2.4. Land Use Plans and Zoning

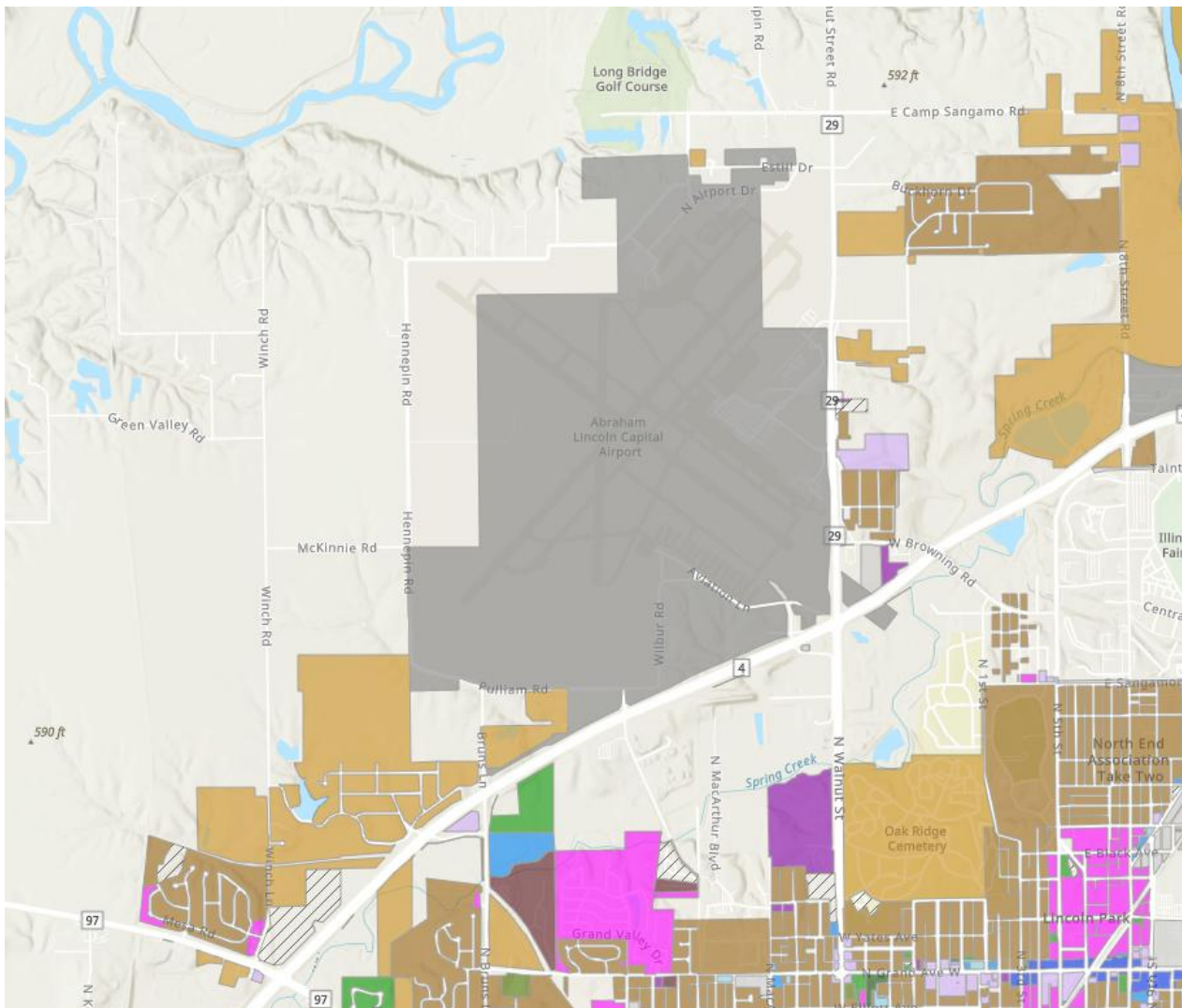
As a component of the FAA requirements for the master plan and ALP process, the SAA has developed an airport land use drawing to identify aeronautical and nonaeronautical development opportunities. This drawing combines on- and off-airport land uses, including the existing/future approach surface and runway protection zone; aviation easements; general aviation/corporate development; aviation-related development; redevelopment; and agricultural, commercial and residential development. The current airport land use drawing was approved by the FAA in 2003. Some identified expansion developments have been executed over the last 21 years in accordance with this plan. The SAA is updating this drawing as part of its ongoing ALP update.

Local land use zoning ordinances are effective tools that airports and local governments can use to proactively protect the airspace surrounding the airport while enabling and promoting economic development opportunities. The SAA owns more than 2,400 acres of land, including airside and landside property. SPI is in Springfield, and the area surrounding SPI is a combination of areas in Springfield and in Sangamon County. In conjunction with

the city of Springfield and Sangamon County authorities, the land immediately surrounding the airport is zoned as Heavy Industrial District (I-2). The city of Springfield defines this designation as a district designed to accommodate the essential heavy industrial uses, which involve more objectionable influences and hazards and normally generate a great deal of automobile and freight traffic. This designation also restricts any new residences or commercial establishments within the defined district area.

Sangamon County I-2 is a general business district. Permitted uses in the I-2 district are uses permitted in the I-1 restricted business district. Dwelling units and lodging rooms are not permitted, except for a single watchman's quarters. Manufactured homes are a permissible watchman's quarters. It includes any establishment engaged in the production, processing, cleaning, servicing, testing, repair or storage of materials, goods or products, provided that the operations conform with the performance standards and other general requirements applicable to this district, as well as air freight terminals, fertilizer manufacturing, railroad classification yards, freight terminals, switching yards, roundhouses, repair shops and warehouses. **Figures 2.2 and 2.3** depict the zoning surrounding SPI.

FIGURE 2.2 CITY OF SPRINGFIELD ZONING

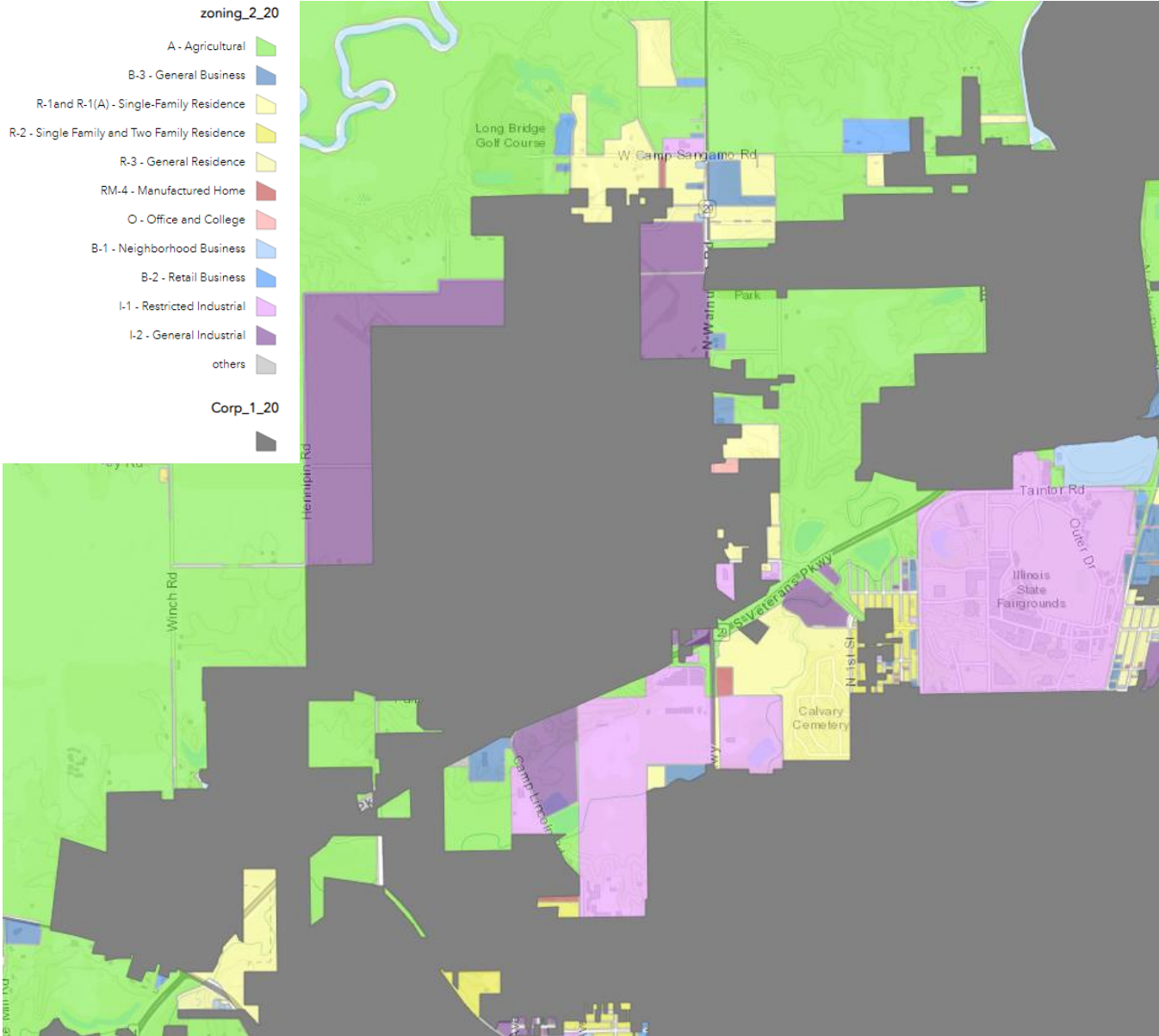


<https://maps.springfield.il.us/portal/apps/webappviewer/index.html?id=48be9212a12d455196401ebf44e4213a>,
 accessed Nov. 20, 2025.

Springfield Zoning Areas

- R-1 Single-Family Residence District
- R-2 Single-Family and Duplex Residence District
- R-3(a) General Residence District
- R-3(b) General Residence District
- R-4 Mobile Home and Trailer Park Residential District
- R-5(a) General Residence and Office District
- R-5(b) General Residence and Office District
- R-5(c) Office District
- OFF Office District
- S-1 Neighborhood Commercial and Office District
- S-2 Community Shopping and Office District
- S-3 Central Shopping District
- B-1 Highway Business Service District
- B-2 General Business Service District
- I-1 Light Industrial District
- I-2 Heavy Industrial District
- H-1 Historic Zoning District
- H-2 Historic Zoning District
- H-3 Historic Zoning District
- PUD Planned Unit Development
- PED Planned Experimental Development
- Mixed Zoning

FIGURE 2.3 SANGAMON COUNTY ZONING



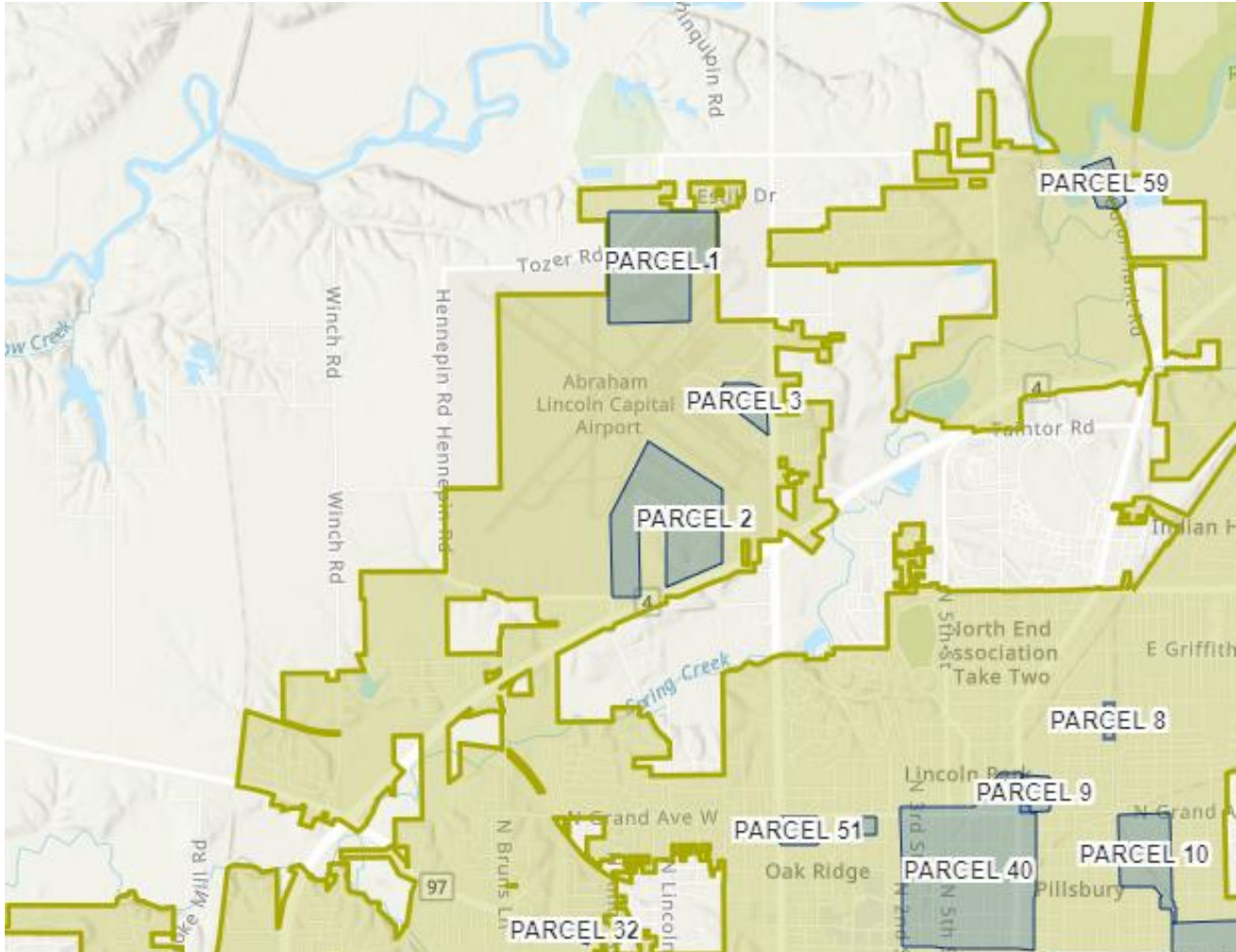
[Sangamon County Zoning \(arcgis.com\)](https://arcgis.com), accessed April 12, 2024.

Portions of this land are also identified as enterprise zones, which are state and local partnerships jointly administered by the Illinois Department of Commerce and Economic Opportunity, Sangamon County and the city of Springfield to offer a strategic mix of local and state incentives to help retain, expand and attract businesses to Sangamon County and the city of Springfield. Enterprise zone incentives may include a combination of building material sales tax exemptions, investment tax credits, utility tax exemptions, manufacturing machinery and equipment sales tax exemptions, as well as city or county property tax abatements. These dynamic incentives can be used by SAA to help promote shovel-ready economic development opportunities near the airport. In general, the general aviation/corporate development, aviation-related development and redevelopment areas on the current airport land use drawing are consistent with enterprise zones identified by the city of Springfield and

Existing Conditions

Sangamon County. **Figure 2.4** depicts the enterprise zones at SPI. If there is commitment to additional development areas outside the enterprise zones, SSA can initiate the process to expand the zones on SPI.

FIGURE 2.4 SANGAMON COUNTY ENTERPRISE ZONES NEAR SPI



[Enterprise Zones \(springfield.il.us\)](https://springfield.il.us), accessed April 12, 2024.

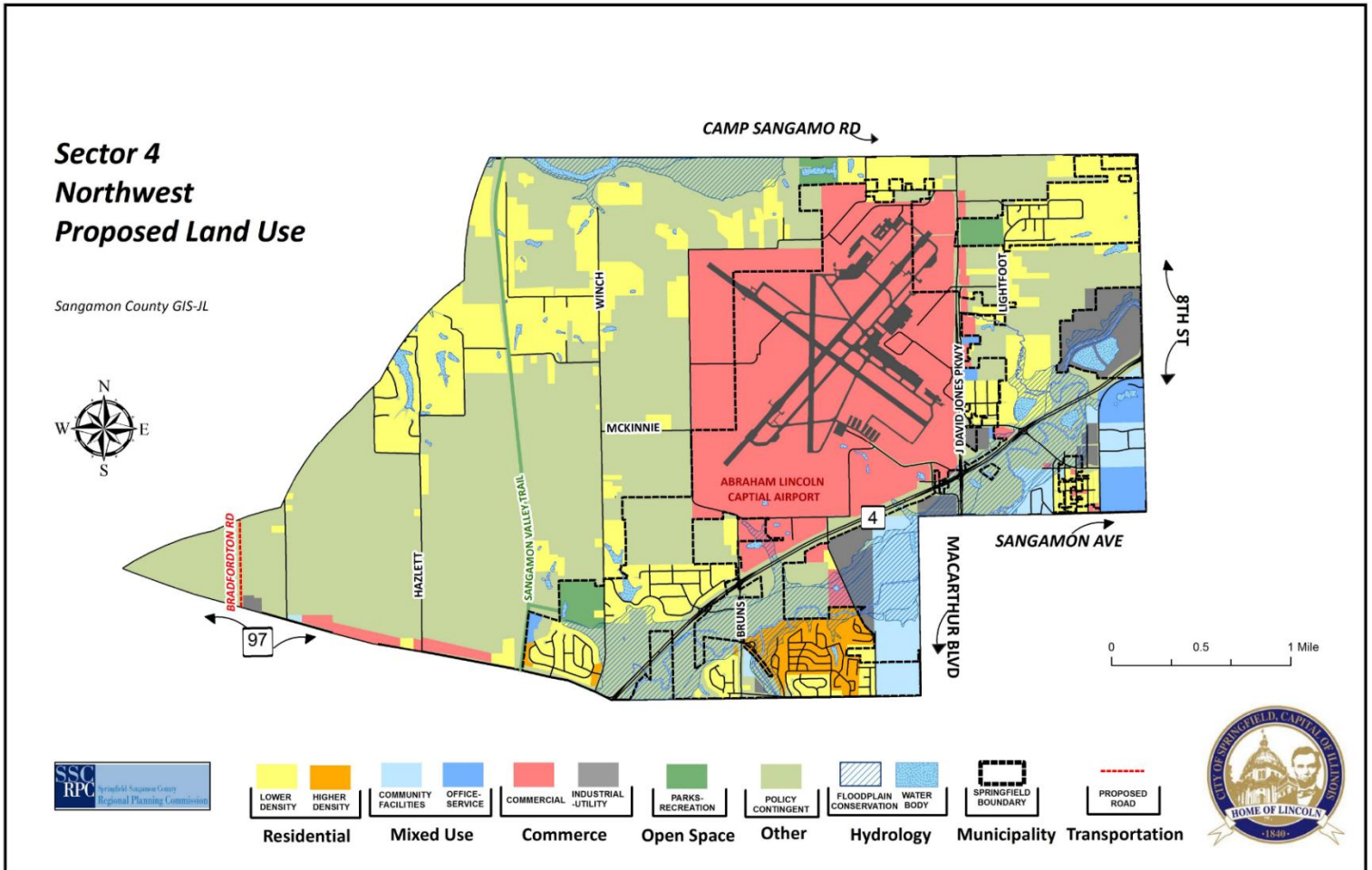
2.5. Regional Comprehensive Plans

The FAA recommends establishing long-term cooperative consultation between the airport sponsor and local, regional and state governments and planning organizations with land use, zoning and surface access responsibilities to improve consistency between community and airport planning. This collaboration educates local planners and citizens and helps gain local agreement and support for future airport projects. Ensuring that synergies exist between the airport sponsor's medium- and long-term goals and regional planner's objectives for future development opportunities help improve land use compatibility around the airport. By incorporating airport expansion and development opportunities into regional land use and transportation plans, the airport and industry stakeholders can mutually benefit and maximize community impact.

This local and regional collaboration is made more important with the advancement of AAM technologies. As FAA certification nears for passenger or cargo service using electric vertical takeoff and landing as well as other, similar urban air mobility concept vehicles, proactive regional planning will be key to accommodating these future users. Advanced planning for a connection between the airport and existing and planned intermodal hubs will enable community access and benefits as the technologies develop.

The City of Springfield Comprehensive Plan 2017-2037 was developed with the vision to forge a new legacy for Springfield. Informed by the first comprehensive plan adopted by the city in 1924, and building on the heritage as Abraham Lincoln's hometown, this new comprehensive plan intends to take into account the desires of present residents and the demands of the future. The plan considers area-specific land use policy recommendations and identifies SPI as in the Land Use Sector 4: Northwest Area, as shown in **Figure 2.5**. The plan identifies potential opportunities and challenges for development near the airport. Some of the opportunities identified include providing public transit services to SPI, as well as potential commercial use development areas immediately adjacent to SPI that are under the SAA's ownership. Some of the potential challenges include the Spring Creek floodplain area immediately to the south of SPI, as well as limited sewer and water service capacity to the west and north. In general, the plan recommends that the SAA-owned property be considered an opportunity area for on-site commercial and industrial development, specifically identifying the SAA's commerce park area in the south quadrant that could potentially accommodate future freight/cargo warehousing and sorting facilities. The plan also discusses the SAA's efforts to actively evaluate new commercial passenger service opportunities as they become available. Through the stakeholder engagement on this project, the findings from this study should be coordinated so that they can be incorporated into future comprehensive plan updates.

FIGURE 2.5 COMPREHENSIVE PLAN PROPOSED LAND USE

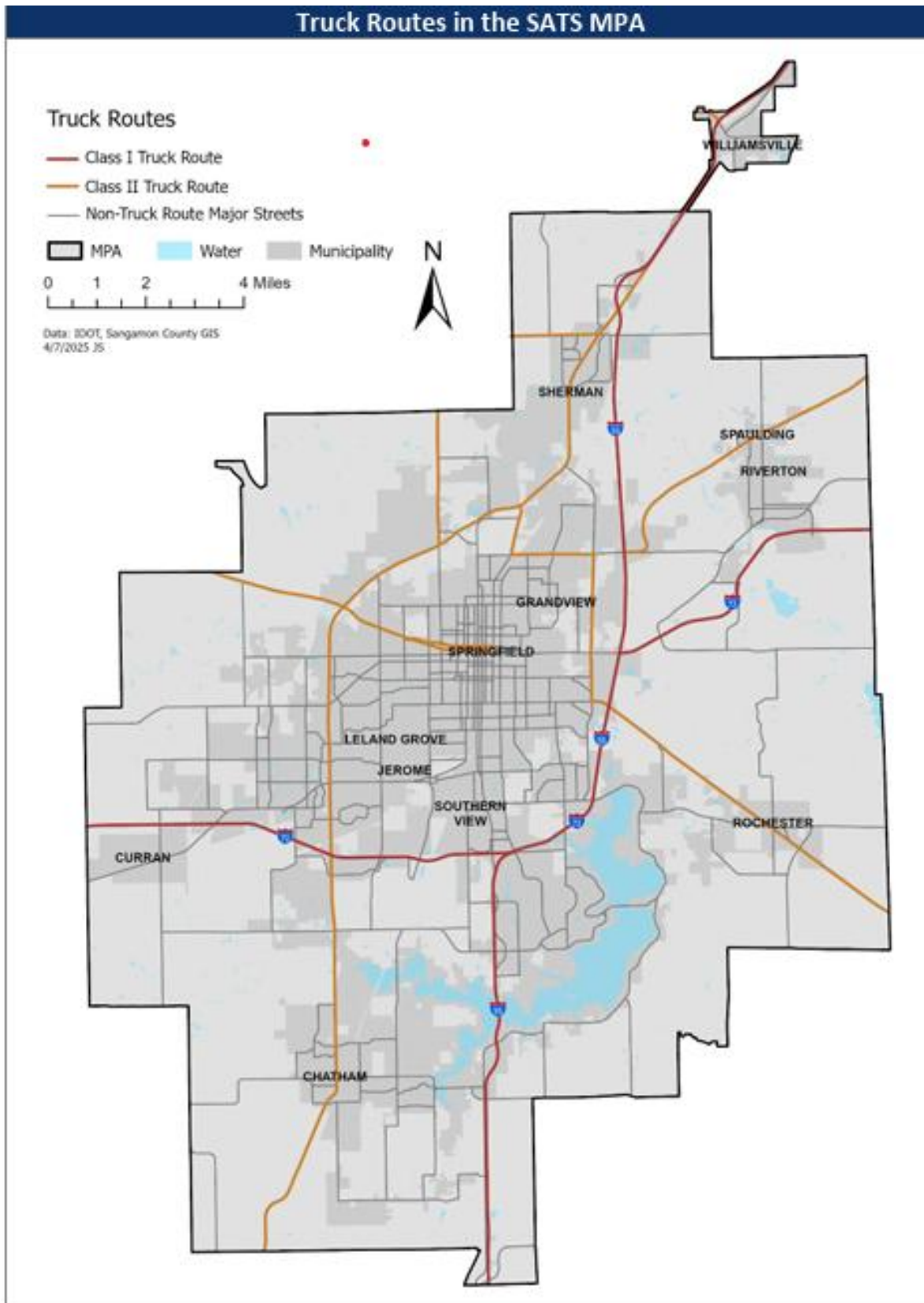


Source: <https://www.springfield.il.us/Businesses/PARTIFINALADOPTEDSPFCOMPLANMASTEROct1017.pdf>, Page 51, accessed April 17, 2024.

Since 1964, the Springfield Area Transportation Study (SATS) has been the formally recognized metropolitan planning organization for the Springfield urbanized area and serves as the policymaking body responsible for prioritizing transportation initiatives in the greater Springfield urbanized area and fulfills the requirements of federal transportation planning regulations for the area to maintain eligibility for federal highway and transit funds administered through IDOT. SATS comprises local and regional agencies that serve as voting members, including IDOT, Sangamon County, the city of Springfield, the village of Chatham, Sangamon Mass Transit District (SMTD) and the Springfield-Sangamon County Regional Planning Commission (SSRPC). The SAA is a nonvoting technical advisor to the SATS voting members. Every five years, SATS produces the regional Long Range Transportation Plan (LRTP), which outlines various multimodal strategies and capital investments to occur on a 25-year planning timeline. As a result of the collaborative effort of the regional stakeholder agencies and jurisdictions, the plan assesses the current condition and future needs of the transportation network and provides project and policy recommendations to provide a safe, reliable and efficient system for all users. Any updates identified through this study should be incorporated into the next update.

The 2050 LRTP, which is the most recent plan, was adopted June 12, 2025. This plan serves two primary functions: recording the region's collective vision and goals for its transportation system and guiding the project prioritization and expenditure of federal transportation funding. This LRTP identifies transportation needs, financial resources and project and programming priorities for the region through 2050, as well as addresses and meets all Moving Ahead for Progress in the 21st Century Act of 2012 and Fixing America's Surface Transportation Act of 2015 planning requirements, as provided by the Federal Highway Administration and Federal Transit Administration. The SATS identified eight Economic Activity Centers (EAC) in the Metropolitan Planning Area (MPA) that function as or have capacity to become hubs for economic activity and job opportunities. The approximately 150-acre SPI Airport Commerce Park in the south quadrant of the airport is an EAC with the potential to accommodate improved freight/cargo warehousing and sorting facility development. Although there is a brief mention of current capacity and passenger flight data at SPI in the LRTP, including the Airport Commerce Park development opportunities, there are only a couple of projects on the secondary illustrative roads and bridges that would impact regional access near the airport. One is the reconfiguration of Tozer Road north of the airport between Estill Drive and Hennepin Road. This long-term project would realign the road around the Runway 13/31 runway protection zone on the northwest side of the airport. Another long-term project identified in the LRTP is the reconstruction of Chatham Road/Bruns Lane from Wabash Avenue to Veterans Parkway. This project would not impact the airport directly but could improve access to the airport from the south and possibly provide additional transit and multimodal connection opportunities to the airport. The plan also notes that the SMTD route redesign in 2018 provided public transit service to SPI, but service was discontinued due to low ridership. The LRTP also identified truck routes. SPI is located along Class I truck routes, as depicted on **Figure 2.6**, which is an asset to support development at the airport.

FIGURE 2.6 TRUCK ROUTES IN SATS MPA



The SSCRPC also collaborated to develop the Sangamon County Regional Strategic Plan 2014. The mission of this plan was to create a compelling vision for the region's long-term growth and development that builds on significant assets and the opportunities the region offers for strengthening its economic vitality and overall quality of life. Throughout the planning process, the SSCRPC worked to evaluate practical implementation strategies meant to enhance and improve the region's transportation system, land use patterns, incorporated and unincorporated areas, parks and open space network to become part of a collaborative planning effort among all the region's municipalities and other local units of government. While SPI is not identified in this plan, there is much consideration given to the need for freight, rail and transit-oriented, multimodal developments to improve regional network efficiencies. The plan also encourages the development of new forms of transportation within the region, including new trails and pedestrian networks, complete streets policies and alternative multimodal solutions that help lower the cost of travel for all stakeholders and residents. It is readily conceivable to envision how SPI can be a strategic partner in freight and passenger multimodal regional solutions, including AAM.

2.6. Facility Utility Data

Utility service is important to support additional development at SPI. The following utilities are at SPI:

- City Water, Light and Power – Springfield's electrical and water
- City of Springfield Public Works and Sangamon County Water Reclamation District – sanitary service
- Ameren Illinois – electrical and natural gas
- Comcast – internet
- AT&T - telephone

City Water, Light and Power

City Water, Light and Power (CWLP) is a department of the city of Springfield. It is the largest municipal utility in Illinois. CWLP participates in limited net metering, which allows customers to interconnect their renewable energy systems to the grid and receive a return for the power they provide to the grid. The SPI solar photovoltaic system has a net metering connection to CWLP.

Springfield's Office of Public Works and Sangamon County Water Reclamation District

The city of Springfield's Office of Public Works Sewer Division operates and maintains nearly 150 miles of combined sewers and 400 miles of separate sanitary sewers within city limits. Flows from the sewer collection system are transported to wastewater treatment facilities operated and maintained by the Sangamon County Water Reclamation District. All sewers near SPI that are not within the Springfield city limits are maintained and operated by the Sangamon County Water Reclamation District. There is a 12-inch sewer line along Camp Lincoln Road serving the airport area. Prior to 2016, the Sangamon County Water Reclamation District was known as the Springfield Metro Sanitary District.

Electric

SPI has more than 60 CWLP electric meters on the airport property. The facility being served drives the associated rate plan for the meter. The facilities on SPI are on business rate plans based on the usage for the meter (e.g., terminal facilities versus T-hangar facilities). CWLP uses seasonal rate adjustments with higher summer rates from May 15 to September 14. They also use a fuel adjustment based on the changing costs of coal, fuel oil, natural gas, fuel transportation and handling the operation of the scrubbers. The use of the fuel adjustment allows the utility to adjust from the base electric rates without changing the basic rate schedules. There is also a state utility tax that is 5% of the bill or \$0.0032 per kilowatt-hour, whichever is lower. Most

Existing Conditions

business customers, including SPI, also incur a demand charge based on the highest average kilowatt draw in any 15-minute period during the month.

Water

CWLP provides water service and invoices for sanitary sewer for other agencies. The water rate is based on whether the facility is inside or outside the city and billed based on usage. There is also a fire protection line service that is billed at a flat rate for the business properties to which it applies.

Ameren Illinois

Ameren Illinois is a regulated electric and gas delivery company. SPI is within Ameren Illinois Rate Zone II. All electric customers can choose their supplier, and nonresidential gas customers can choose their supplier. While the monthly bill comes from Ameren Illinois, it includes the supply and delivery charges and associated taxes and fees. There are a few facilities on SPI with service from Ameren Illinois. The natural gas service at SPI is through Ameren Illinois as well.

SPI Solar Photovoltaic System

SPI developed an airport-owned, 2.88-megawatt, six-array solar photovoltaic net metering system. It is a combination of roof- and ground-mounted arrays. The ribbon-cutting to celebrate the operational startup was held June 26, 2023. The system used a mix of state and federal incentives to increase its financial viability and used a private developer and financier. The system provides energy security and operational savings. It is designed so that 90% of the power generated is used on-airport, powering three airport accounts and three tenant accounts to provide cost-effective, renewable energy at attractive stable electrical rates as an incentive to remain at SPI. The provision of power to a tenant and the operational savings for the airport provide the cash flow to pay off the development loan.

The solar arrays are on a parcel that is otherwise hard to develop. The electrical connections between the system grid and buildings were cost-effective to develop.

SPI will energize the Phase 2 solar photovoltaic aggregate net metering system by mid-2026. This system will supply at least 1.44 megawatts. This system is sized to offset the electrical power use in the remaining Airport Authority owned buildings.

2.7. Current Asset Registry and Condition Assessment

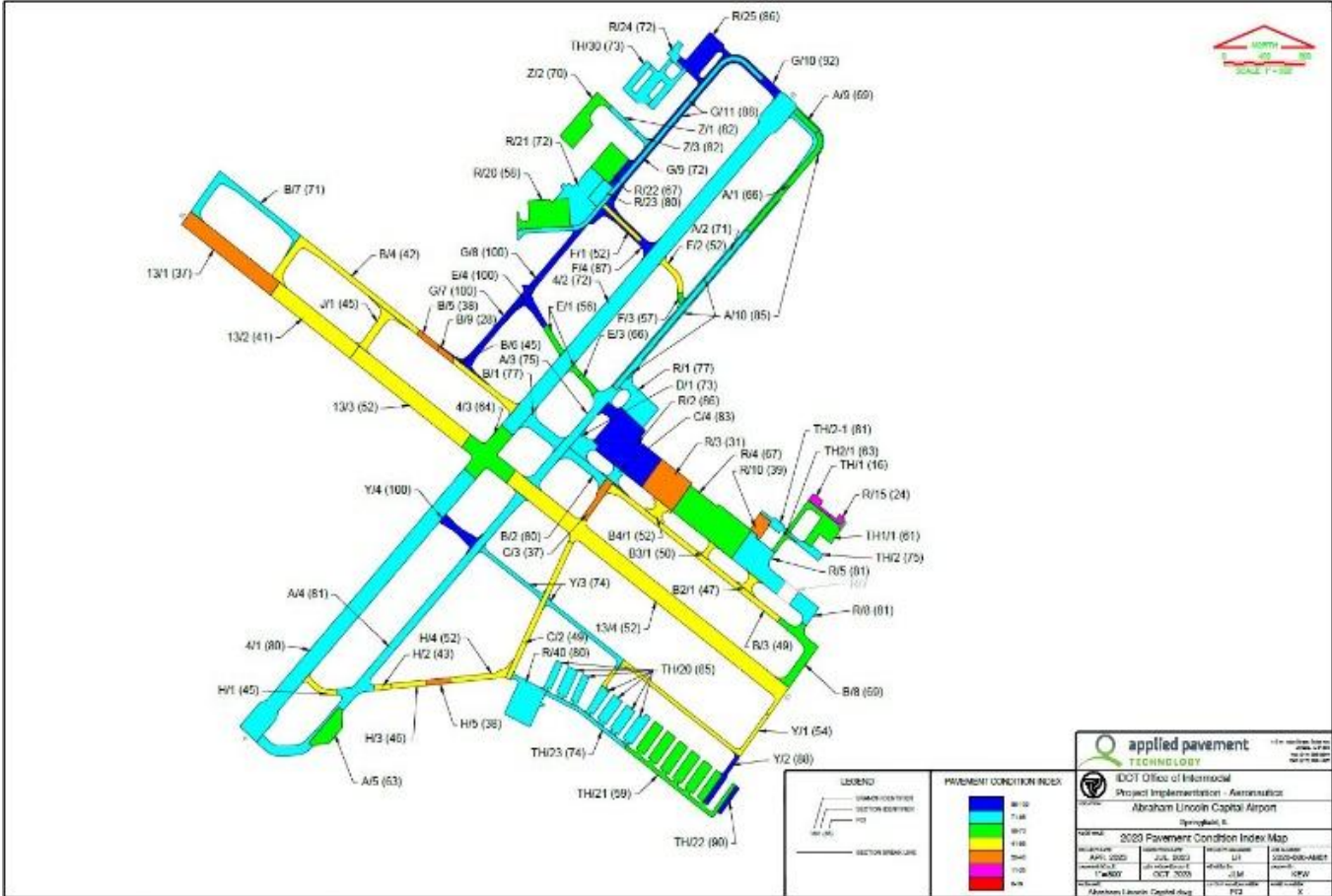
As part of the project, an asset management system is being developed for SPI. The system will provide performance models using criticality and risk factors to define the decision rules or the asset in the system. The airfield, terminal building, terminal landside and safety buildings are included with the asset management system scope of work. The systems included are airside and landside pavements, stormwater, roofing, HVAC, baggage handling, elevator and jet bridges. As part of establishing the system, the repair history data and will be reviewed to develop treatment models for the assets. The purpose of the assessment management system is to assist SPI in minimizing life-cycle costs and recommend budget strategies to achieve target performance levels.

Airside and Landside Pavements

The FAA Airport Improvement Program (AIP) was established by the Airport and Airway Improvement Act of 1982 to provide funding to airports on a priority-needed basis. The initial legislation was repealed and recodified in 1994 as Title 49 § 47101. The act establishes two primary thresholds for projects to meet to receive AIP funding:

eligibility and justification. Eligibility primarily refers to what types of projects can be funded (e.g., airport planning; airport development, including safety, security and capacity; noise compatibility planning; and noise compatibility projects). Justification primarily refers to whether the project advances an AIP policy, meets an actual need and contains an appropriate scope. One justification test used by the FAA for airfield pavement projects is the pavement condition index (PCI) threshold. The PCI method, as established by ASTM D5340: Standard Test Method for Airport Pavement Condition Index Surveys, produces a numerical indicator that reflects the structural integrity and surface operational condition of a pavement. The PCI values range from 0 to 100, where 0 indicates a failed pavement and 100 is a new pavement. A breakdown of the airside PCI assessments collected by IDOT in 2023 is shown in **Figure 2.7**. As part of the existing conditions assessment of the airport, Hanson determined PCI ratings for airport-owned landside pavements to be incorporated into the asset management system.

FIGURE 2.7 2023 AIRPORT PAVEMENT CONDITION INDEX MAP



Airport Storm Sewer Assets

There is a system of storm sewers on SPI to manage the stormwater flow. The record drawings were reviewed to gather the installation date, size and material data for the stormwater system.

Terminal Equipment

The terminal equipment category encompasses the roofing system, HVAC systems, baggage handling system, elevator and jet bridges.

2.8. Electrified Airport of the Future

With the increasing use of electric vehicles for personal transportation, ground service equipment, the development of electric aircraft, as well as a push to decarbonize airport operations, SPI will prepare for an increased electrification of vehicles and buildings as part of this study. To support the increased electrification, a 30-year electrical roadmap will be developed as part of the AAM plan development portion of the study. In addition to addressing AAM, the increasing electrical demand of other modes and facilities will be identified, because this baseline use is an important consideration in the overall energy plan for SPI.

Electrified Buildings

The energy audit of the terminal and safety building being conducted as a part of this study will identify opportunities to increase the efficiency of these buildings. It will also identify what equipment is electrical and what uses fossil fuels. Any proposed shifts from fossil fuels will be taken into account when considering future electrical demands.

Personal Electric Vehicles

As the availability and use of electric vehicles for personal transportation grows, an increasing number of passengers are anticipated to be driving electric vehicles to the airport. The public charging and refueling infrastructure for electric vehicles is still being developed. A strategy for the level of service, if any, to be provided by SPI for personal vehicles will be identified in coordination with SPI staff to determine future electrical demands.

SSA may also consider replacing some of its vehicle fleet with electric vehicles. A replacement strategy will be identified in coordination with SPI staff to determine future electrical demands on the airport. It is anticipated that as SSA transitions fleet vehicles to electric vehicles, the ability to charge the vehicles at SPI will be an important part of this transition. The number and speed of the charging stations to be provided at SPI will drive the electrical demand to support this infrastructure.

Rental car companies are starting to offer electric vehicles. Coordination occurred with an SPI rental car representative to develop an estimated demand for charging electric rental cars at SPI to be included in the future electrical demand. This scenario includes the number and speed of chargers and the location.

Ground Service Equipment

Airlines are starting to shift to electric ground service equipment. A projection for electric ground service equipment and the required charging capability at SPI will be identified for use in the future electrical demand projections.

Electric Aircraft

A variety of types of electric aircraft are under development. Data is being gathered from the original equipment manufacturers of electrical aircraft to develop electric aircraft use scenarios for SPI. These use scenarios consider regular use as well as transient and repair service operations at SPI. The next chapter focuses on electric and other AAM aircraft and their demands, as well as projections for electric personal, airport and rental cars and building facilities.

2.9. Summary

SPI has good facilities in place to serve its current users. This chapter summarizes the data collection effort that serves as the foundation for the analyses in this study. The SPI Smart Airport and Regional Logistic Plan provides the opportunity for SPI to look ahead to be ready to serve new technologies, as well as increase the airport's economic activity and regional impact.

3. Advanced Air Mobility and Other Future Electrical Demands

3.1. Introduction

The effort to reduce carbon emissions from transportation sources has led to transitioning vehicles to electrical power. In addition, advanced air mobility (AAM) is in development. AAM includes urban air mobility (UAM), which is the transportation of people and goods at lower altitudes in cities and suburbs, as well as regional air mobility (RAM), which expands the UAM concept over larger areas. Many of the AAM vehicles under development or certification use distributed electrical propulsion systems. Distributed propulsion uses multiple small propulsors. Distributed electrical propulsion systems use electricity from a stored primary power source for the aircraft. Many of the AAM aircraft are being designed for vertical takeoff and landing (VTOL) to improve the point-to-point customer experience by increasing the potential takeoff and landing sites. When electrically powered, these aircraft are referred to as eVTOLs. To improve the range of electrical aircraft, other alternate power sources, including hydrogen and sustainable aviation fuel (SAF), are under research and development, which will be described later in this document. The use of alternate power sources for more traditional aircraft designs is also under development.

With the anticipated increased use of electrical vehicles for transportation, electrical demands at airports are expected to rise. These increasing demands will come from electric ground service equipment (eGSE) and airport and passenger electric vehicles (EVs) in the near term and are expected to come from electrically powered AAM aircraft in the short to medium term. To prepare Abraham Lincoln Capital Airport (SPI) to support these increasing demands, the first step is to identify likely demands.

This document identifies potential scenarios for the following areas of increased electrical demand:

- airport fleet vehicles
- ground service equipment
- rental cars
- tenant vehicles
- electric aircraft

3.2. Ground Transportation

While electric AAM may make more headlines, at least in the aviation industry, the transition to electric ground transportation is already occurring for airport and passenger vehicles. EVs are charged using EV service equipment, chargers that operate at varying speeds, as summarized below.¹ For most EVs, to maximize battery life, the charge should be kept between 20 and 80% and only be fully charged when the range is needed for a trip. The following are typical charging systems for ground vehicles.

Level 1 charging – typically uses a residential 120-volt (V) alternating current (AC) outlet. It takes 40 to 50-plus hours to charge a battery electric vehicle (BEV) to 80% from empty. It takes five to six hours to charge a plug-in hybrid electric vehicle (PHEV). Level 1 charges provide 2 to 5 miles of range per hour of charging.

Level 2 charging – provides higher-rate AC charging using 240V residential or 208V commercial electrical service. These chargers are used for home, workplace and public charging. Level 2 chargers can charge a BEV to 80% from empty in four to 10 hours and PHEV in one to two hours. Level 2 chargers provide 10 to 20 miles of range per hour of charging.

¹ <https://www.transportation.gov/rural/ev/toolkit/ev-basics/charging-speeds>, accessed May 1, 2024.

Direct current (DC) fast charging (also known as Level 3) – typically provided in public-use locations, especially along transportation corridors. DC fast charges provide 180 to 240 miles of range per hour of charging.

In an airport application, it is assumed that only Level 2 or DC fast charging will apply. To prepare SPI for the additional use of EVs, the development of the charging infrastructure is important. It needs to be in a convenient location, with access to ample electricity. In addition to planning the charging infrastructure, the EV charging protocols, or how the vehicle communicates with the charger, need to be planned. The potential electrical ground vehicles are reviewed in the following sections.

The three key charging protocols are:

- open charge point protocol – communication between charging stations and management systems
- open charge point interface – promotes interoperability between refueling networks for simpler access for EV operators
- the International Organization for Standardization’s ISO 15188:2001: Project Management Guidelines for Terminology Standardization – communication between the vehicle and charging stations

Airport Fleet Vehicles

SPI has a fleet of 23 airport-owned vehicles. These vehicles range from trucks for maintaining the airfield to SUVs. As they need to be replaced, the vehicles most likely to transition to hybrid or electric would be those that are similar to personal vehicles: the SUVs. Seven of the vehicles in the fleet are SUVs and one is a transit van. A number of the vehicles in the fleet are for field maintenance. Electric mowing equipment and tractors are beginning to enter the market. To allow SPI to transition to EVs as part of a replacement program, charging stations would need to be provided at SPI. The candidate locations for the charging station(s) are the public safety building, field maintenance building and terminal complex. The electrical master plan will consider a mix of Level 2 and DC fast chargers. The DC fast chargers would allow equipment to be charged with minimal downtime. It is anticipated that the Level 2 charger may be used for charging equipment overnight. It is anticipated that a transition to airport-owned EVs will happen over the next three to 10 years as vehicles are replaced and the EVs have longer reliability histories for SPI to consult when making replacement decisions.

The larger trucks that are part of the fleet at SPI are likely to remain primarily fossil-fueled, especially those that are less common in the general fleet and more specific to airfield use. For those types of vehicles, it is anticipated to take longer before electrical options become available.

3.3. Rental Cars

Rental car company Hertz made headlines in 2021 when it ordered 100,000 Teslas. However, Hertz is now looking to reduce its EV fleet by 30,000 vehicles.² The challenge, in part, has been vehicle depreciation. Also, drivers unfamiliar with EVs may be less comfortable renting an EV, especially because charging can be a challenge — more so if the driver is not familiar with the community. EV vehicles are also a challenge for rental car companies due to the time it takes to charge an EV, potentially extending turnaround times.

EVs are still anticipated to enter rental car fleets as the overall use of EVs increases and more drivers desire to rent EVs. Thus, it is anticipated that within five years, rental car companies at SPI will need to have vehicle

² <https://www.autoweek.com/news/a60635964/hertz-rental-ev-losses/>, accessed May 1, 2024.

charging capability. It is anticipated that rental car companies will need to use DC fast chargers for quick turnarounds.

The peak demand time for rental car companies is typically just before and after flights as passengers are dropping off or picking up rental cars. The two parent brands at SPI have a combined fleet of about 40 vehicles. However, not all need service at the same time.

For forecast purposes, it is assumed that as EVs enter the rental car fleets, some will be present at SPI. They may come from other markets on a one-way rental. Initially, it is anticipated that a shared fast charger with at least two connections could be installed to serve or be accessible to the rental car companies. This charger would be anticipated to be installed in the next three years. As more passenger vehicles transition to electric, it is anticipated that each rental car company will desire its own charging facilities. While there are five rental brands at SPI, there are two parent companies. In the long term, a dedicated fast charger for each rental car parent company should be planned.

3.4. Airport and Customers

EV sales rose 60% from 2022 to 2023.³ Illinois had 54 registered EVs per 10,000 residents in 2022³. While Illinois is not among the top 10 states for EVs per resident, the adoption rate is increasing, and it is higher than all its surrounding states. As personal use of EVs increases, more SPI passengers will drive EVs to the airport. It is anticipated that SPI will want to offer EV charging as a customer service. This charging should be structured to be at least revenue neutral and preferably revenue-generating. Just as fossil fuel vehicle drivers pay to fill their vehicles, EV drivers should also expect to pay to fill their vehicles.

The peak arrival at SPI is an Allegiant Air or Breeze Airways passenger flight. An Allegiant A320 can hold up to 177 passengers. The Breeze A220 has 126-137 seats. Allegiant had an average load factor of 83.4% for the first quarter of 2024.⁴ At an estimated two passengers per vehicle, this results in about 73 vehicles. As of May 15, 2025, there were 1,326 EVs⁵ registered in Sangamon County, up from 955 EVs⁶ in May 2024. This is out of 120,207 vehicle plates⁷ as of June 6, 2025, accounting for about 1%, up from 0.8% in 2024, and the number of EVs is projected to grow. The charging service could be a station available to anyone in the general public. If an SPI customer needs to charge before departing the airport, the driver could stop at the charging station. For a charging station, DC fast chargers would be deployed. This type of charging station would provide customer service to airport users, and by being open to the public, it would make it more financially viable. It could be planned to allow for expansion as EV use grows. This service area could be the first planned charging station, and any airport tenants could use it.

Another option that could be considered, especially as EV use grows, is a valet parking service. As part of the service, the valet company would make sure the vehicle was charged for the passenger's return. For a valet service, DC or a mix of Level 2 and DC fast chargers could be deployed.

³ <https://www.marketwatch.com/guides/insurance-services/electric-vehicle-statistics-2024/#toc-who-is-adopting-evs>, accessed May 1, 2024.

⁴ <https://newsroom.allegiantair.com/press-releases/press-release-details/2024/ALLEGiant-TRAVEL-COMPANY-FIRST-QUARTER-2024-FINANCIAL-RESULTS/default.aspx>, accessed May 20, 2024.

⁵ <https://www.ilsos.gov/departments/vehicles/statistics/electric/2025/electric051525.pdf>, access June 9, 2025.

⁶ <https://www.ilsos.gov/departments/vehicles/statistics/electric/2024/electric051524.pdf>, accessed May 20, 2024.

⁷ Illinois Secretary of State, Active Registration Counts, Sangamon County <https://www.ilsos.gov/departments/vehicles/statistics/lpcountycounts/COUNTY084.PDF>, accessed May June 9, 2025..

In addition to commercial service passengers, SPI also has customers who rent hangar space. The potential to provide charging infrastructure in parking areas serving the hangars should be considered. If there is a primary charging area for the airport and other customers, it may be less necessary or a long-term addition. Businesses at SPI, such as the fixed-base operator (FBO) and maintenance and repair service, may also need to install chargers.

Recommendation

As an initial step toward serving electric passenger-type ground vehicles, it is recommended that the airport install a fast-charging station. This station could be installed in the corner of the terminal parking lot. It should be available to any user, including someone off the street. This initial charging station could meet the needs of rental cars, the traveling public or airport staff. The airport should monitor the demand at the charging station to identify if an airport use needs additional charging capacity. At that time, additional capacity could be added where it is most needed.

3.5. Ground Service Equipment

SPI is serviced by Allegiant, Breeze and American Airlines. SSA provides contract ground service for these airlines. To provide this service, the airport has 33 pieces of GSE, about 1/3 of which are powered. The others are carts pulled by powered equipment. Some of the equipment has projected retirements. For the equipment with retirement dates, they range from 2025 to 2045.

All the airlines serving SPI track their sustainability. American has a net zero emissions by 2050 goal with a 45% reduction in greenhouse gas emission intensity by 2035.⁸ Breeze's A220 aircraft serves its routes while minimizing its carbon footprint of aircraft of that size. Allegiant has⁹ been focused on reducing fuel consumption and was 12% more efficient than the industry average in 2021. As part of the airlines' sustainability goals, it is anticipated that they will request their aircraft be serviced by zero-emissions GSE. As such it is anticipated that within the next 10 years, SSA will transition its GSE to electric-powered. This transition could be accelerated as grant funding becomes available to assist in the transition.

Because the GSE generally operates at the terminal, the charging location(s) should be close. It is typically most effective to have centralized charging for GSE. Potential charging station locations will be planned close to the terminal where the equipment is used. It is anticipated that this will use DC fast chargers. Some improvements to the SPI baggage handling facilities is being contemplated, and the charging infrastructure could be incorporated into the project, because it would be desirable to at least have some shelter above the equipment.

Recommendation

It is recommended to plan GSE charging near the baggage handling area of the terminal. It would require fast chargers, with several charging locations so multiple pieces of equipment can be charged between flights.

3.6. Energy Resilience

In addition to meeting new user demands, SSA is also interested in its energy resilience and that of the Illinois Air National Guard's 183rd Wing at SPI. It is envisioned that energy resilience could be developed through additional solar arrays coupled with Battery Energy Storage Systems (BESS). The technologies that generate energy close to where it is used are known as distributed energy resources. BESS would allow SPI to store the energy when it

⁸ <https://news.aa.com/esg/climate-change/pathway-to-net-zero/>, accessed May 1, 2024.

⁹ <https://esgnews.com/allegiant-releases-inaugural-esg-report/>, accessed May 1, 2024.

can be generated for later use. Another benefit of BESS would be the ability for SPI to assist in meeting its peak demand to aid in controlling its energy costs. Ideally, the BESS would be charged from renewable energy, but it could be charged from the grid during lower demand, if insufficient solar energy is available. BESS have been evolving and are increasingly being installed at airports. When installing a BESS, an airport must address potential risks, such as fire and data security.

For the 183rd Wing, improved energy resiliency supports its mission and the operational stability of the base. The 183rd would be interested in connecting to a renewable energy BESS, similar to how it presently connects to the grid. The energy management plan working paper provides additional details on providing the energy needed to service SPI and its users as well as energy resiliency.

3.7. Advanced Air Mobility Transportation

A new era of aviation technologies is quickly approaching. Propelled by the need to reduce greenhouse gas emissions and implement cleaner forms of transportation, AAM is poised to provide versatile, sustainable solutions for the future of air travel. As with any new technology, and particularly for new modes of transportation, building public trust through open and transparent education is critical to its long-term success and market impact.

The use of eVTOL, electric Conventional Takeoff and Landing (eCTOL) and hybrid (hydrogen/electric/fossil fuel) commercial aircraft is anticipated to scale up as an emerging low-cost green and sustainable transportation option over the next two to five years in the United States. Preparing to accommodate these new technologies will greatly enhance the airport's ability to grow air passenger and air cargo markets. This document identifies and evaluates an AAM plan to establish a vertiport site at the airport, informed by electrical and AAM operational activity forecasts and following FAA design guidance.

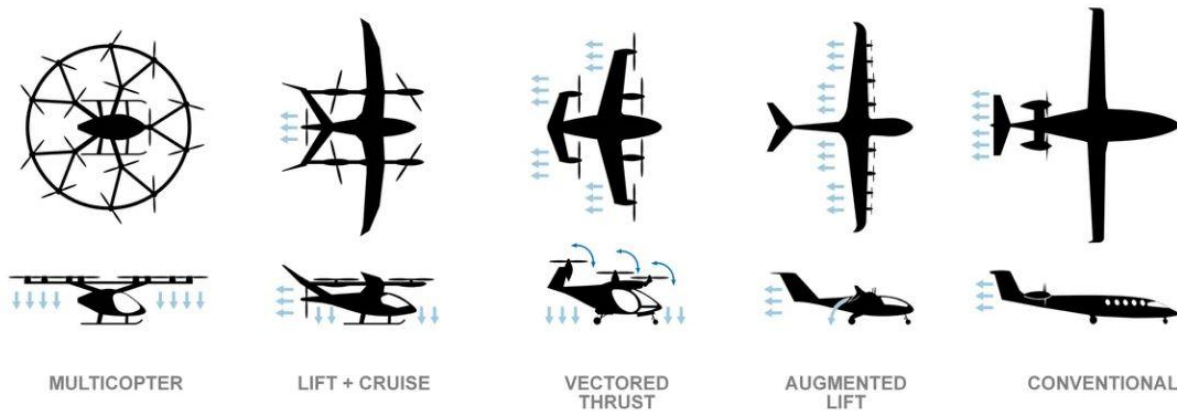
Preparing to accommodate AAM will allow SPI to take advantage of its central location to Chicago, St. Louis and Indianapolis as well as capitalize on SPI's potential for low energy costs. The plan will give AAM manufacturers, developers, operators and aircraft maintenance providers an airport with planned infrastructure that will allow for a speed to market new business accommodation location or relocation decisions while offering Springfield access to high-tech, green and sustainable technology benefits. An associated marketing plan and collateral material will be developed to allow SPI to go directly to the manufacturers, airlines and operations and maintenance providers to find viable, long-term partners.

With many types of AAM vehicles under development and seeking FAA certification, it is important to explore the varying vehicle types, necessary charging facilities, service requirements, alternative fuel needs and FAA design guidance.

3.8. Types of AAM Vehicles

With over 1,000 AAM vehicles in various stages of concept design, prototype or production¹ by over 350 companies worldwide², the AAM market is robust and racing toward the ultimate prize of FAA aircraft certification. The simplest way to understand this market is to consider the varying aircraft types in broad groups of performance and agility. There are five primary groups of aircraft types that appear to be the most viable and market ready: multicopter, lift and cruise, vectored thrust, augmented lift and conventional fixed wing. **Figure 3.1** depicts these primary groups of AAM aircraft types.

FIGURE 3.1 TYPES OF AAM AIRCRAFT



Source: Hanson Professional Services Inc.

Multicopter is most similar to the conventional helicopter concept. In most prototypes and production aircraft of this style, the vehicle features smaller rotors above the cockpit in a circular configuration. This type of aircraft can be manned by an on-board pilot or remotely controlled. The primary functionality includes vertical takeoff, landing and hovering maneuverability, in addition to horizontal movements after liftoff. The potential uses of this class of AAM include urban and short-range passenger intermodal connections, in addition to a more environmentally friendly option to conventional helicopters used in the emergency response, healthcare and law enforcement fields.

Lift and cruise aircraft features a mixture of conventional helicopter and conventional general aviation fixed-wing aircraft capabilities. This type of aircraft is designed with top-mounted rotors as well as a conventional fixed-wing structure and propeller(s). This provides the versatility to lift off and land vertically, similar to the multicopter and conventional helicopter, while being able to switch to conventional fixed-wing horizontal flight when at cruise altitude. Many advantages can be realized with this design, including reduced energy use while at cruise altitude, because the rotors can be turned off, as well as potentially longer-range capabilities and an operational versatility of landing at a vertiport or using a runway.

Vectored thrust aircraft is closely related to the lift and cruise aircraft and offers many of the same operational advantages. This type of aircraft introduces the versatility of tilt vectored fans that can be used for vertical takeoff and landing as well as vectored fans at cruise altitude. This style maintains the vertical flight advantages of conventional helicopters with the fixed-wing and propeller range distance.

Augmented lift electric aircraft types offer primarily regional and long-range capabilities. Using multiple tilt-rotor configurations with a fixed-wing airframe provides the ability for the aircraft to reduce energy consumption on takeoff and landing operations.

Conventional aircraft can be designed or retrofitted with energy-efficient electrical or alternative fuel-powered rotors or engines. In addition to electrical, experimentation and testing is being conducted for the use of hydrogen

and other SAF-powered aircraft to reduce carbon footprint and emissions to support a more sustainable and environmentally friendly aviation industry while at the same time improving aircraft range capabilities. .

3.9. Charging Facilities

The availability and reliability of electrical charging capacity is crucial to the AAM market's viability and performance. Charging facilities and the capacity needed should be considered to support eVTOL aircraft primarily operating at an airport or a dedicated vertiport location on the airport, as well as conventional electric and alternative fuel aircraft operating at the main terminal using the existing jet bridge access points, or associated ground loading points. This is in addition to the electrical demand to support airside GSE as well as landside operations.

While the electric AAM market is still being developed, preliminary analysis and studies provide guidance for airports to begin planning and installation to be prepared for the aircraft as they come to the market.

For urban and regional eVTOL aircraft, a recent National Renewable Energy Laboratory (NREL) study recommends that vertiports plan for 1 megawatt (MW), and potentially higher, to align the market speed of deployment with utility upgrade timelines. Additionally, it was found that a significant factor impacting site cost is the distance between the electrical panel and charger. Because greater distances usually include more construction, trenching and digging to bring power to the location, the study recommends siting the vertiport close to existing transformers and, ideally, using three-phase power.

Similarly, early studies indicate airports supporting electric aviation aircraft and electric landside vehicles may need between 1 and 10 MW fast charging capacity. To support electric conventional aircraft alone, eCTOL developer Heart Aerospace recommends an 800V DC high-voltage battery source with 2 to 3 MW charging power per airplane to fulfill a turnaround time demand of 30 minutes.

Many variables to be considered include the number of chargers and stands needed to support the electric aircraft operations and turnaround time demands, utility grid capacity and on-site generation capacity, as well as maintenance repair and overhaul (MRO) demands. Preliminary indications show that ultimate electrical demand could easily exceed 1 MW per vertiport, and when considering electric conventional aircraft as well as GSE and landside operations demand, it is advisable to plan for at least 10 MW future demand in addition to existing electrical use.

It is further recommended that airports be connected to at least a 1 kilovolt (kV) grid for the direct plug-in charging of electric airplanes to avoid causing disturbances or high current demand on the local and national power grid. However, alternative charging options can be considered to offset the potential direct draw from the power grid, including BESS that store electricity from the grid or from local power production, such as solar. The industry is evaluating swappable batteries that can replace used batteries from the airplane. However, none of the leading original equipment manufacturers (OEMs) are considering battery swapping.

Recommendation

SPI should provide electric aircraft charging for general aviation and air carrier aircraft. The location and service requirements will be discussed in more detail in Section 3.13.

3.10. Aircraft Service Requirements

Specially skilled mechanics are required for eVTOL and eCTOL aircraft maintenance to comply with safety standards for electric and hybrid propulsion systems. Specific maintenance requirements are not fully known and will vary based on the aircraft type. SPI should be prepared to accommodate the availability of an FBO or other on-site aircraft service capabilities to ensure the safety of operations. Additionally, hazard safety training will be required for airport personnel and AAM operators involved in aircraft fueling as part of the increased electrical capacities and alternative fuel storage handling for AAM aircraft. The AAM operators will be required to have hazardous material manuals accepted by the FAA and operation specifications that permit or prohibit accepting, handling and transporting of hazardous material.

3.11. Alternative Fuel Storage

Per the United States 2021 Aviation Climate Action Plan, the U.S. Department of Transportation and FAA have set out to achieve net-zero greenhouse gas (GHG) emissions from the U.S. aviation sector by 2050. Per the FAA, this ambitious but achievable action plan will create a sustainable aviation system that the U.S. is committed to. Using alternative fuels in the development of more efficient aircraft and engine technologies while delivering substantial noise and emissions reduction benefits are key to accomplishing this goal. In addition to being primarily electric, many emerging AAM aircraft use SAF or hydrogen fuel alternatives. Reducing the use and industry reliance on fossil fuels, such as 100LL and Jet A, have the potential to slash emissions by up to 100%.

Sustainable Aviation Fuel Storage

SAF is produced from renewable and waste feedstock and can provide a substantial impact in the FAA's effort to reduce GHG. SAF can be used safely in today's fleet of jet aircraft, without modification, and are produced from wastes, residues, biomass, sugar, oils and gaseous sources of carbon. While SAF is not readily available today to completely replace 100LL or Jet A fuels, SPI can begin taking steps to provide storage capacity at the airport to meet the future demand as the industry rapidly transitions.

SPI has three Jet A fuel tanks and three 100LL avgas fuel tanks in addition to three regular unleaded gasoline tanks.¹⁰ Of the three Jet A tanks, there is a 25,000-gallon aboveground storage tank (AST) and 15,000-gallon underground storage tank (UST) owned by the airport authority, along with a 12,000-gallon AST owned by IDOT's Division of Aeronautics. Similarly, of the three 100LL avgas tanks, there is a 3,000-gallon AST and 12,000-gallon UST owned by the airport authority, along with a 12,000-gallon AST owned by IDOT's Division of Aeronautics. The airport authority-owned tanks are at the south quadrant fuel farm near the T-hangars, while the IDOT-owned tanks are in the north quadrant near the IDOT hangars. While the airport authority owns and operates the fuel tanks at the south quadrant fuel farm, the authority sells the fuel to users, including Stellar Aviation (the FBO), T-hangar tenants, airlines and transient aircraft.

As recent as August 2024, the FAA announced a nearly \$300 million investment in SAF research and development to help expedite the commercial availability of SAF in the U.S. In August 2024, the FAA announced an investment of over \$240 million for projects that produce, transport, blend or store sustainable aviation fuel (SAF) and for scoping studies related to SAF infrastructure needs. SAF storage can be readily accomplished by installing a new fuel storage tank or converting a fuel storage tank. SPI is in the planning and design phase for a project to install a 25,000-gallon storage tank that could be dedicated SAF at the south quadrant fuel farm near the T-hangars. This will allow SPI to purchase commercially available SAF from an off-site supplier and store in an on-site, aboveground fuel storage tank for use by all airport users. Future expansion could include additional

¹⁰ 2022 SPI Storm Water Pollution Prevention Plan

tanks or blending Jet A with SAF in the existing tanks as the industry transitions depending on demand for SAF by users at SPI.

SAF Recommendation

SPI should continue its plans to install a tank for SAF.

Hydrogen: Production and Storage

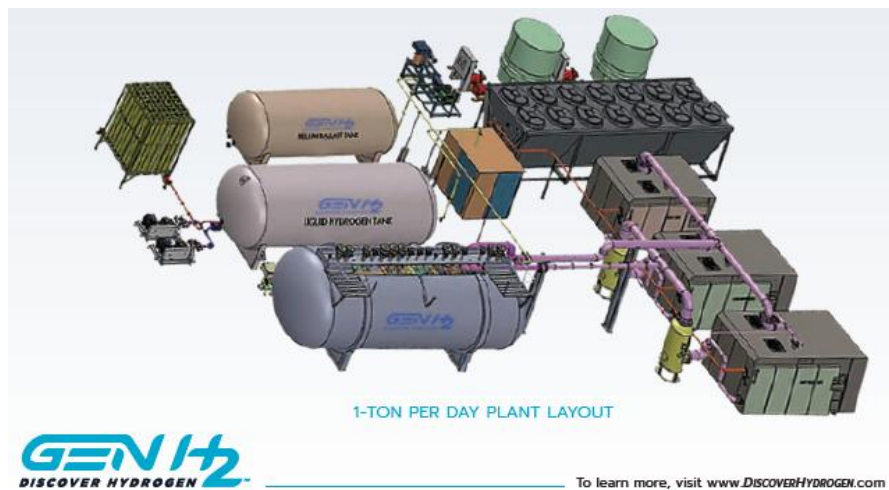
With recent historical investments in new and novel technologies to help sustain the aviation industry's transition from fossil fuel dependency, hydrogen technologies have emerged as a possible solution. With the high-energy density providing increased electrical energy potential processed by fuel cells compared to their relative weight, hydrogen is emerging as a potential long-term solution for powering larger aircraft and increasing the range of eVTOLs. For comparison, the energy found in 1 kilogram (kg) of hydrogen equates to that found in 3 kg of jet fuel (kerosene).¹¹

The main challenge today is the availability of hydrogen at a commercial scale. The ultimate market demand may lead to hydrogen pipelines directly supplying large commercial hub airports; however, those pipelines do not exist. Key tax incentives and research investments are advancing the industry, but commercial scale production is not ready for market distribution.

Researching the leading manufacturers of hydrogen fuel cell-powered aircraft and hydrogen production indicates that on-site production may be cost-effective and advantageous to SPI in the medium and long term. While on-site hydrogen storage technology, comparable in size and scale to the fossil fuel tanks at the airport, is readily available, the commercial market is not yet capable of supplying on-site storage and the speed at which this market develops should be monitored.

However, producing hydrogen on-site for use at SPI could be accomplished through electrolysis using clean, filtered water. Green hydrogen production would need to be fed from an expanded on-site solar farm, although hydrogen production could also be powered via the electrical grid. Manufacturers, such as GenH2, are bringing on-site production solutions to market with associated dispensing solutions that could be scaled down to fit immediate use at SPI, including ground service vehicles as well as aircraft, as depicted in **Figure 3.2**. As demand increases, the production site could expand. If constructed

FIGURE 3.2 GENH2 1-TON PER DAY PLANT LAYOUT



Source: GenH2.

¹¹ <https://nap.nationalacademies.org/catalog/26512/preparing-your-airport-for-electric-aircraft-and-hydrogen-technologies>, accessed Sept. 20, 2024.

before 2033, this green production of hydrogen could qualify for tax incentives of up to \$3 per kg of hydrogen produced through the U.S. Department of Energy's Clean Hydrogen Production Tax Credit.

As regional demand increases in the ground cargo logistics and rail sectors, producing hydrogen on-site may present a viable revenue opportunity for SPI. Early hydrogen aviation demand forecasts indicate small aircraft may require up to 60 kg of hydrogen to refuel, while future large aircraft may require at least 600 kg.

Commercially available on-site production facilities start at around 1 ton (1,000 kg) per day and scale up. While initial aeronautical demand will not require 1 ton per day, it is conceivable that aviation demand may meet or exceed that amount in the next 10 to 20 years. Therefore, it is recommended that SPI identify a potential location for hydrogen production and monitor the hydrogen aviation and landside commercial developments to determine the timing to commit to on-site production versus installing on-site storage capacity.

There are various site design concepts and layouts on the market. While it is advisable to reserve enough space for a future on-site hydrogen production facility, SPI may consider starting with the installation of on-site storage tanks and purchasing the liquid hydrogen from an off-site, commercial supplier. This is similar to what SPI does today with avgas and jet fuel. As demand increases and if on-site production is needed, a 1-ton-per-day, on-site production facility can be sited in an approximately 70-by-70-foot area. This would include the facilities for liquefaction hydrogen production, storage and dispensing.

Ensuring safety is critical to operating and handling hydrogen storage and production. While the FAA does not have guidance for proponents that want to install hydrogen storage or production on an airport, in collaboration with the NREL, the FAA is researching hydrogen infrastructure standards. Industry standards, such as National Fire Protection Association (NFPA) 2: Hydrogen Technologies Guide and other research reports are important resources to guide design and installation. For example, it is recommended in Sandia National Laboratories' report, Technical Justifications for Liquid Hydrogen Exposure Distances – SAND2023-12548, that setback distances ranging from 26 to 49 feet, depending on tank operating pressure and typical pipe inner diameter, be used to provide an acceptable level of safety around a hydrogen storage or production facility. However, research indicates that the NFPA 2 code allows for up to 50% reduction in setback distances with the proper installation of a fire wall around the site. Additional active mitigation measures like automatic shutoff valves are also highly recommended but may not qualify for a setback distance reduction. Conservatively, SPI should reserve an area of approximately 150 feet by 150 feet (22,500 square feet) to account for the 1-ton-per-day, on-site production infrastructure, approximate setback distances and additional area for future expansion, while recognizing that additional setback area may be required based on local requirements.

While there may not be a current aeronautical demand, it is advisable for the airport to identify and reserve areas that would be ideal for an on-site hydrogen production and refueling facility. Available areas in the north, west, and south quadrants provide the most readily available and ideal potential sites. The characteristics of an ideal site are proximity to a potable water line with sufficient capacity, proximity to an energy source, preferably solar power generation for a green energy source, and proximity to emergency response. An additional desired site feature includes landside accessibility for possible resale to landside customers.

An evaluation of the available sites and specific characteristics includes:

Accessibility

- The north and south quadrants are most ideal for an airside- and landside-accessible refueling station.

- The west quadrant does not provide adequate landside accessibility.

Utility service

- The south quadrant features a 12-inch potable water line, while the north and west quadrants feature a 10-inch potable water line.
- The south quadrant has limited capacity for solar array expansion.
- The north quadrant has the closest proximity to the airport solar array, but the current and Phase 2 solar are committed to other uses, so additional solar would need to be developed for hydrogen production.
- The north quadrant has additional undeveloped acreage for solar array expansion in proximity to the solar arrays.
- The north quadrant has the closest proximity to aircraft emergency response.
- The west quadrant has additional undeveloped acreage ideal for solar array expansion.

Recommendation

Given the size of the water service and the opportunity for airside and landside refueling access, the south quadrant would be a beneficial location for a hydrogen production and refueling facility. Balancing the needs of any future tenants who may develop the south quadrant's Airport Commerce Park, SPI should reserve a 22,500-square-foot (approximately 0.52-acre) area near the parking lot and general aviation aircraft apron in the south quadrant for future on-site hydrogen production and refueling. This location will be incorporated into planning for on-airport development covered in the next chapter.

3.12. 2024 FAA Reauthorization Act Programs

The 2024 FAA Reauthorization Act provided much-needed direction for the FAA and airports across the country to invest in emerging aviation technologies, including alternative fueling infrastructure and vertiport development. The FAA is in the process of fully interpreting and implementing various sections of the act; however, some important guidance is available. Section 702(2)(F): Energy Supply, Redundancy, and Microgrids; Section 702(2)(G): Fueling Systems; Section 745: Electric Aircraft Infrastructure Pilot Program; and Section 953: Application of NEPA (National Environmental Policy Act) Categorical Exclusions for Vertiport Projects are among the most applicable sections with regard to alternative fuels and vertiport development. Section 1019: Hydrogen Aviation Strategy and Section 1109: FAA Leadership in Hydrogen Aviation are important sections that provide vision and guidance for expanded FAA initiatives to research hydrogen as an aviation fuel source and establish guidance for implementation across the U.S. aviation industry.

In the Reauthorization Program Guidance Letter (R-PGL) 25-02: AIP Discretionary Set Aside issued by the FAA's Office of Airports Planning and Programming on April 4, 2025, the FAA explains and implements provisions in the FAA Reauthorization Act of 2024, including sections 702(2)(F) and 702(2)(G). These sections clarify and establish eligibility for smart glass, renewable energy generation and storage infrastructure, projects that meet current and future electrical demand and the construction or acquisition of certain airport-owned infrastructure or equipment for the on-airport distribution or storage of unleaded aviation gasoline for piston-driven aircraft and hydrogen fueling systems.

Therefore, under these sections, SPI could pursue FAA funding for the acquisition and installation of electrical generators, renewable energy generation and storage infrastructure, the separation of the airport's main power supply from its redundant power supply and the construction or modification of airport facilities to install a microgrid. Additionally, under the newly established eligibility for construction or acquisition of hydrogen fueling systems, the revenue-generating and airside needs test requirements that normally apply to AIP eligibility do not

apply to covered infrastructure or equipment. These sections could significantly assist SPI with the construction and installation of electrical supply equipment and hydrogen fueling equipment to be ready to service eVTOL aircraft at SPI. Finally, because there may be shifting priorities under federal administration transition, SPI should stay abreast of notices of funding to best align with grant funding opportunities.

The FAA issued preliminary guidance for the implementation of Section 745 in R-PGL 25-06: Planning and Project Eligibility in May 2025. Section 745 instructs the FAA to establish a pilot program to allow up to 10 airport sponsors to use FAA funds for “(1) activities associated with the acquisition, by purchase or lease, operation, and installation of equipment to support the operations of electric aircraft” and “(2) the construction or modification of infrastructure to facilitate the delivery of power or services necessary for the use of electric aircraft, including— (A) on airport utility upgrades; and (B) associated design costs.” The R-PGL clarifies that “a public-use airport is eligible for pilot program funding if the proposed project would support: i. Electric aircraft operators at such airport, or using such airport; or ii. Electric aircraft operators planning to operate at such airport with an associated agreement in place.” Further, the R-PGL details that an interested airport should include the projects on the Airports Capital Improvement Plan (ACIP) and “any new infrastructure or fixed equipment must be depicted on the airport layout plan and submitted for FAA review along with an approved airspace case.” Lastly, the R-PGL indicates that additional information on the program is forthcoming.

Official FAA guidance for Section 953 has not been issued. Section 953 instructs the FAA to “apply any applicable categorical exclusions in accordance with the National Environmental Policy Act of 1969” when considering a proposed vertiport project’s environmental impacts on an airport. This should significantly expedite vertiport developments through the environmental review process and help the industry prepare for eVTOL operations as the aircraft are certified.

3.13. SPI AAM Activity Forecast

In 2025, eVTOL, eCTOL and electric short takeoff and landing (eSTOL) aircraft in the U.S. are still in the certification phase, so any forecasts are projections of how the industry could evolve. One of the more detailed projections is from Aviation Week & Space Technology in June 2025. It projects the following deliveries and correlating in-service fleet (ISF) forecast. The life expectancy of the vehicles is expected to be influenced by advances in technology, high utilization rates and quick turnaround operations. This results in an initial anticipated life cycle of five years, extending to 10 years. This life cycle will require a higher turnover and fleet replacement than experienced with traditional aircraft.¹² Therefore, the ISF is lower than deliveries in the future years because of expected vehicle retirements.

Across the worldwide fleet, the following is forecasted:

- 2030 – eVTOL deliveries: 600 vehicles, ISF: 600 vehicles; eCTOL/eSTOL deliveries: 200 vehicles, ISF: 200 vehicles
- 2040 – eVTOL deliveries: 7,000 vehicles, ISF: 5,500 vehicles; eCTOL/eSTOL deliveries: 1,750 vehicles, ISF: 1,750 vehicles
- 2050 – eVTOL deliveries: 22,000 vehicles, ISF: 14,500 vehicles; eCTOL/eSTOL deliveries: 6,000 vehicles, ISF: 4,400 vehicles

¹² Illinois Aviation Advanced Air Mobility System Plan, Chapter 2. AAM Industry Forecast Analysis, <https://www.ilaviation.com/wp-content/uploads/2025/04/IL-AAM-System-Plan-Chapter-2-Forecasts-DRAFT-Website.pdf>, accessed June 9, 2025.

Hybrid-Electric and Electric-Only CTOL Operations and Forecast

Hybrid-Electric – Heart Aerospace

As with eVTOL aircraft, eCTOL aircraft are being developed as replacements for the airline regional commuter fleet. One of the promising technologies in this category is the Heart Aerospace ES-30, which has a 200-kilometer all-electric range and an 800-kilometer hybrid configuration range. Preliminary design configurations use two independent systems, with two fully electric inboard motors and the two SAF outboard motors to function as on-aircraft turbines to extend the eCTOL stage haul lengths. The Heart ES-30 will carry 30 passengers; its type certification by the FAA is expected in 2028. The ES-30 is shown in **Figure 3.3**.

The Heart aircraft has received attention for its potential role in the system as well as advanced orders by regional airlines around the world and by Mesa Airlines and United Airlines in the United States. As of early 2024, Mesa and United have 100 aircraft preorders (a total of 200) established with Heart.

The significance of the preorders for SPI is that the ES-30 offers the right technology for connecting SPI to Chicago and St. Louis. Mesa provides third-party flight services for United Express and DHL. The potential for Mesa flying for United Express and offering direct connections to Chicago and St. Louis with the Heart aircraft after 2028 is very real. This connection would be stronger if SPI were able to be one of the first airports to offer the necessary electrical charging infrastructure as well as certified MRO services for eCTOL aircraft.

FIGURE 3.3 HEART AEROSPACE ES-30



Source: Heart Aerospace, 2025.

The ground infrastructure needs for accommodating future aircraft like the ES-30 are electrical charging supply and a battery thermal management unit. The minimum requirement for fixed or mobile charging stations is at least 800V DC at 2 to 3 MW. The battery thermal management unit provides important functions, including conditioning of batteries on extreme cold and hot days, as well as cooling during fast charging. Additionally, the availability of a fast-charging MCS connector type is preferred, allowing up to approximately 3.75 MW during fast charging.

Hydrogen-Electric - ZeroAvia

In addition to the eCTOL from Heart, another solution is being developed that will retrofit aircraft power plants using hydrogen fuel cell technology to extend stage haul lengths for aircraft and make them more commercially viable. A leading producer in this market is ZeroAvia, which is focused on using hydrogen fuel cell technology that produces electricity that can directly power the electrical engines.

ZeroAvia is developing its ZA600 engine, a 600-kilowatt (kW) hydrogen-electric powertrain for 10- to 20-seat regional turboprops. In November 2025, ZeroAvia was awarded design organization approval (DOA) by the United Kingdom's Civil Aviation Authority, a critical milestone on its path to certifying a hydrogen-electric engine

intended for Part 23 aircraft. This first generation will be fueled by gaseous hydrogen tanks and capable of carrying passengers up to 300 nautical miles (NM). It is also developing the ZA2000, a 2 to 5 MW modular hydrogen-electric powertrain for 40- to 80-seat regional turboprops, by 2027. This second generation will be fueled by liquid hydrogen tanks and capable of carrying passengers up to 1,000 NM. It is also working on the ZA2000RJ, a 5-plus MW hydrogen-electric powertrain for up to 90-seat regional jets, by 2029. All these zero-emission engines will be capable of replacing fossil-fuel powered engines on aircraft, as shown in **Figure 3.4**.

Many airlines have purchase order agreements with ZeroAvia. In 2021, United signed an agreement to order 50 ZA2000RJ engines, with an option for 50 more. In 2022, American signed a memorandum of understanding with ZeroAvia to order 100 ZA2000RJ engines for its regional jet fleet. Additional carriers like Alaska Airlines, Ecojet and Air Cahana have also signed preorder agreements.

SPI management has expressed an interest in providing SAF and hydrogen storage capabilities on-site in the short term. This direction could bring hybrid eCTOL operations to SPI sooner than would be expected in a similar market without upgraded infrastructure.

The early adoption of battery-performance-boosting fuel infrastructure is part of the consideration in this report regarding the forecast for the arrival of these aircraft at SPI. The development of support infrastructure for Heart aircraft at SPI would allow these operations to be accommodated sooner.

Forecasting operations for a technology that is in testing and not commercially active is challenging. As a guideline for developing a conceptual forecast, the following information and assumptions are employed:

- As of 2024, United and Mesa have large preorders (200) for the Heart aircraft.
- These aircraft will be used to connect smaller markets such as SPI to larger-hub airports such as St. Louis, Indianapolis and, more significantly, Chicago. SPI is geographically located very well for these aircraft to serve the regional hubs.
- SPI has undertaken this study to be able to develop the necessary support infrastructure, (electrical capacity, hydrogen storage and SAF storage) just prior to the operational arrival of the Heart technology.
- SPI management will work with Standard Aero (the MRO provider) to provide the requisite service for the eCTOL fleet, which will open opportunities for remain overnight aircraft operations and thereby boost the number of potential commercial operations over time.
- As of 2024, Heart is forecasting its ES-30 to enter service in 2028.
- Aviation Week & Space Technology magazine is forecasting 500 eCTOL in the service fleet by 2030, with 2,500 and 5,500 aircraft in service in 2040 and 2050¹³, respectively.

FIGURE 3.4 ZEROAVIA POWERTRAINS



Source: ZeroAvia.

¹³ Aviation Week & Space Technology, July 2024.

Electric-Only – Pipistrel

In addition to commercial, charter and FBO operations, light sport aircraft (LSA) general aviation is an anticipated future market for electric-only aircraft at SPI. Multiple manufacturers, including Pipistrel, Diamond Aircraft and BETA Technologies are developing and producing fully electric LSA general aviation aircraft. Specifically, the two-seat Pipistrel Velis Electro aircraft shown in **Figure 3.5** is ideal for student pilot training and can use a DC GB/T 20234 connector, which is compatible with BETA chargers and other similar ground vehicle charging stations. Pipistrel recommends a single-phase 240 volts alternating current (VAC) socket for overnight charging or a three-phase 380 VAC connection for fast charging. It is recommended that SPI consider providing at least two electric aircraft charging stations near the FBO ramp to accommodate transient and based electric-only LSA users. These chargers would likely initially serve eVTOLs and LSA general aviation users. However, once eVTOL demand necessitates a dedicated vertiport, these chargers would be maintained to continue to serve the LSA general aviation users. Depending on how the chargers will be used and the fee structure, the airport or FBO could install the chargers.

FIGURE 3.5 PIPISTREL VELIS ELECTRO



Source: Pipistrel.

The size of the aircraft is anticipated to drive the electrical demands. Also, the commercial service and general aviation areas at SPI are in different locations. Therefore, the forecast for the typically smaller general aviation aircraft has been separated from the commercial service aircraft. Projecting potential general aviation uses and the likelihood for eCTOL activity at SPI, the general aviation eCTOL activity forecast for SPI is summarized in **Table 3.1**. This includes eSTOL as they would use the runway system.

TABLE 3.1 SPI GENERAL AVIATION eCTOL (ELECTRIC-ONLY) FORECAST

	2029 (Baseline)	2034 (Year 5)	2044 (Year 15)	2054 (Year 25)
GA Operations	6 per day	10 per day	14 per day	16 per day
Peak Hour Operations	1.60 per hour	2 per hour	2.60 per hour	3 per hour
Peak Hour Electrical Demand	1 MW	2 MW	3 MW	4 MW

Given the numerous airline preorders and the broad assumptions for eCTOL commercial service activity at SPI and in the SPI region, the eCTOL commercial service activity forecast for SPI is summarized in **Table 3.2**.

TABLE 3.2 COMMERCIAL eCTOL (ELECTRIC AND HYDROGEN) FORECAST

	2029 (Baseline)	2034 (Year 5)	2044 (Year 15)	2054 (Year 25)
	≤19 pax ¹	19 & 30 pax	19 & 30 pax	19 & 30 pax
SPI Commercial Operations	3 per day	8 per day	13 per day	18 per day
Peak Hour Operations	1.10 per hour	1.60 per hour	2 per hour	2.40 per hour
Peak Hour Electrical Demand	3 MW	6 MW	6 MW	9 MW
Peak Hour Hydrogen Demand	60 kg	660 kg	660 kg	1,320 kg

¹PAX: passengers

3.14. Industry Forecast – eVTOLs

The AAM industry has moved forward very quickly in the last five years. In 2025 Joby and Archer are entering the type inspection authorization for their eVTOL, a critical step toward type certification, potentially in 2026. BETA and Lilium eVTOL aircraft certifications are also in the certification process. The January 2025 entry-into-service forecast for the primary eVTOL OEMs, as compiled by Aviation Week & Space Technology, is shown in **Table 3.3**. At least some of these schedules are sliding as identified in more recent updates from these companies.

Since 2018, these company-projected, entry-into-service dates tied to type certification have slipped from their original forecasts primarily due to the complexities associated with certification. Entry-into-service dates may continue to slip, but the OEMs have a more straightforward path to certification, with the FAA and European Union Aviation Safety Agency (EASA) finalizing the certification process requirements.

When forecasting eVTOL activity, operational numbers and use cases, it is important to also consider the ramp-up of eVTOL production by the various OEMs after certification has been achieved. The ramp up of aircraft production over time for a new technology will also limit how soon certain markets will see eVTOL activity.

As detailed in Section 3.13, the June 2025 Aviation Week & Space Technology AAM newsletter forecasted 600 commercial in-service fleet of eVTOL aircraft and 200 commercial in-service fleet of eCTOL aircraft by 2030. This is a 25% reduction from the forecasted 800 eVTOL aircraft in 2024, primarily due to the difficult year for the AAM market in Europe with multiple OEMs being bought out or needing additional investments as well as the slower than expected certification process in U.S. market. However, the new, more straightforward direction of the type certification process from the FAA and EASA announced at the Paris Air Show in June 2025 should help to stabilize the U.S. and European AAM markets going forward.

AAM eVTOL Activity Forecast

Given the above industry forecast, an activity forecast for SPI was prepared using some assumptions. It is assumed that the primary eVTOL operations for SPI and in the metro area will be medical cargo support, corporate passengers and last-mile cargo delivery for SPI and the Springfield region. Considering the relatively

TABLE 3.3 ENTRY-INTO-SERVICE DATE

Entry-Into-Service Forecast	
OEM	Service Entry Year
Joby	2025
Archer	2025
BETA	2026
Vertical	2028
EVE	2027
Volocopter (Wanfeng)	2026

low concentration of eVTOL aircraft (600) by 2030, it would be reasonable to assume that eVTOL operations in the SPI market would begin after 2030, most likely in the early 2030s.

It is also assumed that when the eVTOL market begins to move toward maturity, most likely after 2045, SPI will have the benefit of a hub-and-spoke network of vertiports and vertistops in the Springfield region that will work together synergistically in moving people and goods in a network of five to 10 regional locations.

Considering the range of eVTOL aircraft through battery improvements or the use of hybrid technology, SPI is envisioned to potentially support regional operations from the metropolitan areas of St. Louis, Chicago, Indianapolis and Louisville, Kentucky.

Battery-Electric eVTOLs

All the leading eVTOL OEMs in **Table 3.3** are developing battery-electric, powered-lift aircraft using multirotor configurations with varying capabilities for transition to fixed-wing operations during flight. All OEMs are working independently toward FAA certifications. However, multiple tests and reviews indicate that battery-electric aircraft will have limited range due to the size and weight demands of the on-board batteries that power the rotors. A November 2018 report summarizing the findings of a study performed by NASA confirms that “current battery technology creates a barrier in the near term ... as battery weight and extensive recharging times would be needed for these operations.” Further, the study finds “advancements in battery technology, as well as use of hybrid eVTOLs, could significantly reduce this barrier in the longer term.” Research and testing consistently indicates that battery-electric eVTOLs will be most useful in urban passenger use scenarios due to these distance and turnaround time limitations.

Hydrogen-Electric eVTOLs

While many of the leading eVTOL OEMs are focusing on developing battery-electric aircraft, some OEMs are researching and testing hybrid-electric eVTOLs. Notably, in July 2024, Joby Aviation successfully flight-tested a hydrogen-electric aircraft with significantly improved range capabilities.¹⁴ The eVTOL test aircraft was retrofitted with a liquid hydrogen tank and fuel cell. The electric rotors were powered by the batteries and fuel cell, which also recharged the battery in the background. The test flight was 561 miles. Comparatively, the electric-battery-only aircraft had never been flown farther than about 100 miles. The test flight is a powerful demonstration and lends viability to hydrogen and other fuel sources being used with battery-electric power to increase range and possibly reduce turnaround time for eVTOL aircraft.

Given the aircraft delivery forecast in Table 3.2, and the broad assumptions for eVTOL activity at SPI and in the SPI region, the eVTOL activity forecast for SPI is summarized in **Table 3.4**. While there may be some personal use GA operations by eVTOL, especially in the early years these operations are anticipated to be predominately charter or corporate. The commercial operations would be operators using the eVTOLs to shuttle passengers around the region and to the airport. These could be middle or last mile operations by the airlines for passengers or cargo.

¹⁴ <https://www.jobyaviation.com/news/joby-demonstrates-potential-regional-journeys-landmark-hydrogen-electric-flight/>

TABLE 3.4 SPI eVTOL (ELECTRIC AND HYDROGEN) FORECAST

	2032 (Baseline)	2034 (Year 2)	2044 (Year 12)	2054 (Year 22)
FBO Corporate Operations	2 per day	4 per day	8 per day	11 per day
SPI Commercial Operations	3 per day	6 per day	12 per day	17 per day
Peak Hour Operations	1.10 per hour	1.50 per hour	1.80 per hour	2.30 per hour
Peak Hour Electrical Demand	1 MW	2 MW	3 MW	4 MW
Peak Hour Hydrogen Demand	100 kg	100 kg	300 kg	400 kg

This operational activity would most likely be spread throughout the day. Initially, it is anticipated that the activity would be handled with charging capabilities on the apron between the terminal and FBO. As activity increases such that a separate vertiport facility is advantageous, a fully certified vertiport would be developed. It is anticipated that as the eVTOL market moves toward maturity after 2035, SPI commercial operations will continue to outpace daily operations of FBO corporate/general aviation activity providing regional connections. Additionally, as the market moves toward maturity, it is anticipated that there may be an opportunity to use AAM to connect commercial passengers in the Springfield metropolitan region to SPI rather than using ground transportation.

3.15. Peak Hour Charging Assumptions – Fast Versus Slow Chargers

The conceptual forecasts for eVTOLs and eCTOLs need to be considered as a whole regarding the number and location of the charging stations, plus the potential to charge batteries for BESS at night during low volume/demand activity with a minimal additional peak electrical demand load.

Electric Aircraft Charging Recommendation

The general demand and capacity assumptions and charging unit requirements for these aircraft are as follows:

- FBO eVTOL operations are expected to be random during the day and evening. For these operations, a DC fast charging station like BETA’s Charge Cube is anticipated to be adequate through 2044.
- SPI eVTOL operations are assumed to start by using the chargers at the FBO. As activity grows, additional charging capability will need to be added at the FBO or at a dedicated vertiport location.
- SPI airline eCTOL operations will require one fast charge unit and one hardstand parking location until around 2034, when two fast charge units and two hardstand parking locations will be required. A third would be anticipated by 2054.
- The airline eCTOL charging could be provided from a mixed location but may be provided by a charge cart that could add flexibility to parking locations.
- In reviewing the electrical demands, for planning purposes, the increase in peak hour demand is anticipated to occur in 3 MW increments. SPI may need to add demand management software so that when a commercial service aircraft is being charged, the necessary power is available. This may decrease the available power for charging ground vehicles during that period.

While not being planned now, if future eVTOLs could have battery plug-in-and-go batteries that will allow for batteries charged at night and in nonpeak hour to be used, this could reduce the peak loads. Because of the size, configuration and location of the eCTOL batteries, this battery plug-in-and-go operation is not anticipated to be available for eCTOLs.

3.16. AAM Vertihub Innovation Center

Workforce training is critical to the scaling and expansion of new smart technologies in the aviation industry and ensuring the safety of the traveling public, on the ground and in the air, as these AAM technologies develop. Multiple tenants at SPI provide pilot and maintenance technician training for traditional fixed-wing aircraft. There is a vision for SPI to use these assets to accommodate an AAM vertihub innovation center at the airport as well as allocate space for the collateral infrastructure needed to support this new technology.

The proposed AAM vertihub would be a site for eVTOL vehicles operating throughout the Midwest, developed with infrastructure to provide MRO operations, parking and charging for long-haul eVTOL operations. The innovation center would be a training center for eVTOL pilots, operators and mechanics. This center is envisioned to expand academic and economic development workforce training partnerships to train and safely implement AAM technologies in Central Illinois.

A potential partner for this program is Lincoln Land Community College, an airport tenant that offers aviation maintenance training. Additionally, the Southern Illinois University School of Aviation could be partner to provide pilot training for the safe operation of eVTOL aircraft. Other potential on-airport industry partners include StandardAero, a leading aircraft engine and component repair services company, and the 183rd Wing, which could assist in the determination of required infrastructure needs, charging facilities and aircraft services. The 183rd's industry expertise would realize a strategic mutual benefit with the AAM vertihub innovation center, because it could help guide the overall project and program development and, in turn, benefit from the availability of a readily trained workforce. Additional partnerships with current and future airline operators would also be a vital component of the AAM vertihub innovation center.

3.17. Vertiport Site Selection

With the new eVTOL aircraft types quickly approaching FAA certification, it is important that airports inventory their facilities and identify existing or future sites on the airport to accommodate these new aircraft. Through this project, SPI is proactively evaluating its existing sites to accommodate these new aircraft. Potential sites are being considered for initial operations in near term as well as identifying a preferred site for long-term AAM use.

This section overviews the design standards that will be used to guide site selection. An evaluation of the initial preliminary operational and terminal airspace analysis will also inform the identification of up to three potential on-airport site alternatives. Through this process, a preferred on-airport vertiport site will be identified and included on the updated SPI airport layout plan drawing. This analysis will also consider the evaluation of potential off-airport sites for regional mobility connection points.

Design Standards and General Concepts

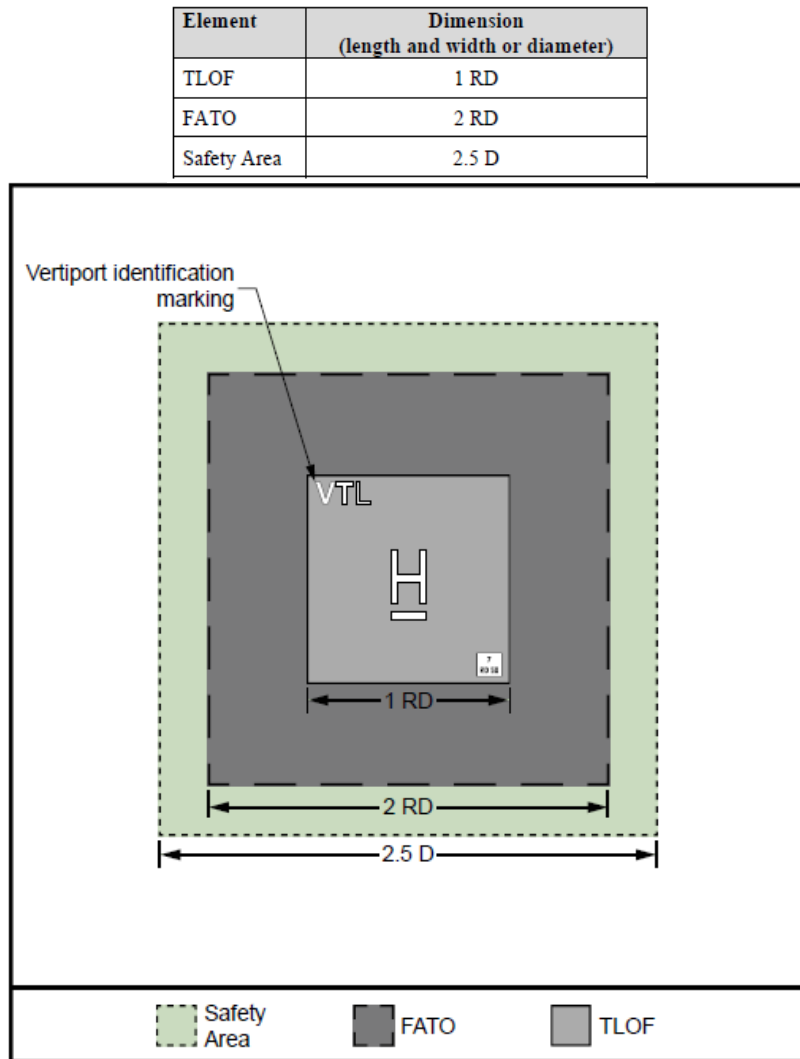
FAA vertiport design standards are still under development; however, FAA Engineering Brief (EB) 105A: Vertiport Design was published in December 2024 and provides interim guidance for the design of vertiports for aircraft with VTOL capabilities. The EB defines a vertiport as a type of heliport, transitioning this EB to be supplemental guidance to FAA Advisory Circular (AC) 150/5390-2: Heliport Design.

The general layout can be circular, square or rectangular, based on the controlling dimension (D) and rotor diameter (RD) of the design eVTOL aircraft. As defined by EB 105A, the D is "the diameter of the smallest circle enclosing the entire eVTOL aircraft projection on a horizontal plane, including all possible configurations with rotors/propellers turning, if applicable." The RD is defined as "the largest length of all the rotors from tip to tip" and must incorporate all landing gear and surface touch points. The touchdown and liftoff area (TLOF) is required to

be 1 RD, while the final approach and takeoff area (FATO) is required to be 2 RD, with the ultimate safety area being 2.5 D.

These dimensions should be applied in diameter or width, respective to circular or square/rectangular layout. At a minimum, the TLOF must be paved, preferably concrete, while the FATO can be paved or turfed and graded to provide positive drainage off and away from the TLOF. Any associated edge lighting should be in the safety area and below the TLOF's elevation. **Figure 3.6** depicts the vertiport design surface dimensions.

FIGURE 3.6 RELATIONSHIP AND DIMENSION OF THE TLOF, FATO AND SAFETY AREA



Source: FAA EB 105A, Figure 2.1.

As this emerging industry has progressed, three primary AAM operational concepts have been refined for preferred operational efficiency. Some of these concept layouts are compatible with an existing operational airport, while others are ideal for off-airport sites.

The **vertihub** concept is ideal for MRO services as well as passenger service AAM. This layout concept would be the most compatible concept type on an existing airport or constructed as a standalone service center. Facilities could include single or multiple TLOF, hangar space for service repair, a control center for crewed and uncrewed vehicle operations and terminal facilities for passenger access.

A **vertiport** concept is commonly referred to urban air mobility (UAM). This layout can be on- or off-airport. Off-airport concepts could be a TLOF constructed on the roof of an urban high-rise residential or office building or on top of a parking garage in an urban area. Whether on- or off-airport, a vertiport should include eVTOL vehicle

charging facilities. This concept is most readily compatible as a middle-mile service connection point to and from the conventional airport for passenger service operations.

The **vertistop** layout is a unique concept that combines a bus stop or neighborhood park-and-ride layout with aviation vehicle uses. The infrastructure needs are minimal, requiring no charging capabilities — just space for passenger loading and unloading. This concept would be ideal for neighborhood connection points to and from an airport for passenger service operations in a less congested suburban setting. This concept is readily applicable to middle-mile service operations; however it is not likely compatible on an existing airport.

These ultimate buildout concepts help demonstrate the wide range of operational diversity that AAM aircraft offer and will bring to market as operations mature. However, as indicated in FAA EB 105A, eVTOLs can operate on airports without interfering with airplane traffic and operations. The short-term eVTOL operations could include using existing airport infrastructure as a TLOF while operationally shadowing the existing runway approach and departure protected surfaces on arrival and departure. However, as airplane and/or eVTOL traffic volume increases, separate vertiport facilities and approach/departure procedures may be needed.

3.18. Vertiport Selection Criteria

This section addresses the potential infrastructure required to support eVTOL operations at SPI.

Takeoff and Landing Area

eVTOL aircraft can use existing runways at an airport. However, if eVTOL operations are impacting the capacity of runway operations or need a separate area for more efficient operations, then a separate designated site should be identified. This site should follow the FAA design standards on vertiport design to accommodate the critical eVTOL aircraft forecasted to use the site.

Passenger Accessibility

Airside and landside passenger access is a critical consideration in the ultimate siting and location of an on-airport vertiport. Airside considerations include a connection to the terminal for commercial passenger transfer and the proximity to the FBO for a connection to and from private charter operations or FBO services. Many commercial airlines, including United, American and Delta, are in preplanning stages with various leading OEMs for middle-mile service. This service is anticipated to use eVTOL aircraft to offer direct transfer to and from long-haul commercial flights, increasing accessibility and revenue streams for airlines and better door-to-door service for passengers. Further consideration is needed to fully plan for a connection to and from secured or unsecured airside operations. Landside access for passenger drop-off and parking capacity should also be evaluated to determine the preferred vertiport site at the airport.

Electric Charging Infrastructure

Access to sufficient electrical supply is crucial in the selection of a vertiport site. Per the previously mentioned NREL study, the eVTOL OEMs surveyed for the study indicated DC peak charging power ranges from 300 kW to 1 MW. Market research suggests assuming an approximately 500 kW capacity per charging station. Therefore, a vertiport configuration with up to five charging stations would pull an electrical demand of nearly 2.5 to 3 MW. This basis point should be scaled up or down, depending on turnaround time demand and the number of parking stalls with associated chargers.

It should be recognized that the temperature of the battery after a flight will be hot, and safety precautions should be taken. Accordingly, as noted in the NREL study, the surveyed OEMs are considering ground-based liquid cooling during eVTOL charging. However, none of the OEM respondents are considering battery swapping.

Maintenance, Repair, and Overhaul

Maintenance on eVTOL aircraft will require specially skilled mechanics to comply with safety standards to support the all-electric propulsion system. If space is available, it would be beneficial for flight operators to have an MRO facility on-site at SPI. SPI is well-equipped to serve eVTOL and eCTOL aircraft in the future, with a full-service MRO tenant on-site in addition to an on-site MRO student training program.

Environmental and Noise Analysis

Section 953 of the 2024 FAA Reauthorization Act includes guidance for NEPA review of vertiport projects. The section requires that “the Administrator shall ... apply any applicable categorical exclusions” and “take steps to establish additional categorical exclusions, as appropriate, for vertiports on an airport” in accordance with NEPA.

In general, on-airport vertiport siting considerations should also avoid adverse wetland and native species habitat impacts as well as firefighting operational response capabilities. Additionally, it is widely assumed that AAM aircraft will be quieter with reduced GHG. However, more research is needed to determine the planning noise contours associated with AAM aircraft use to and from the airport. While the overall decibel level may be less, the higher pitch frequency may be more noticeable than conventional aircraft noise. Limiting the overflight of residential areas should be considered to avoid adverse noise impacts from AAM aircraft operations.

Battery Recycling

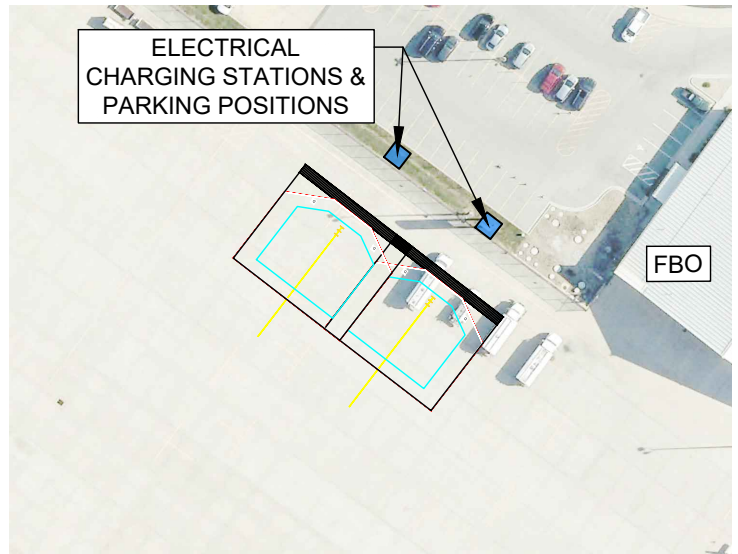
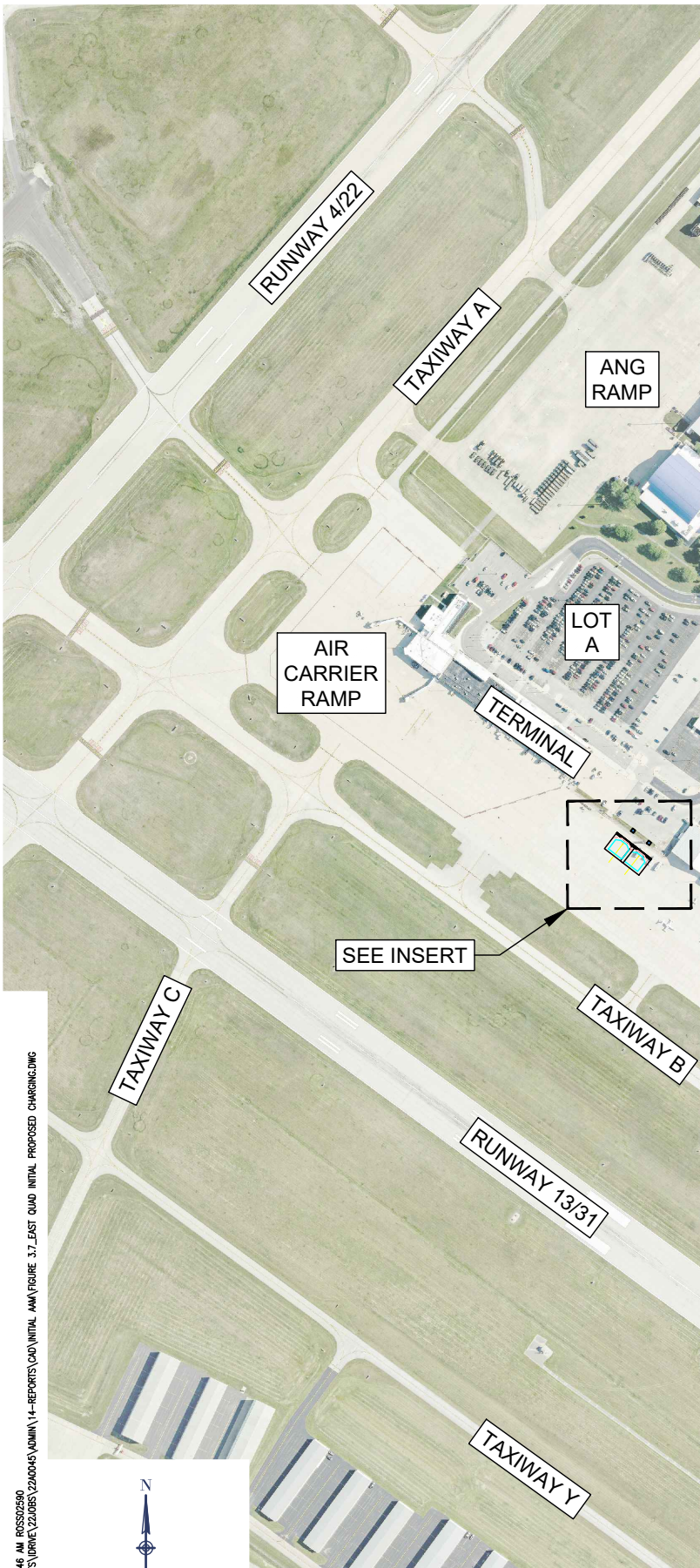
The main power source for eVTOL aircraft is lithium batteries. The useful life of the lithium batteries will be determined based on flight time. Because the flight routes could differ with each eVTOL aircraft, having the capability to service or recycle batteries on-site could be considered. Similar to service and parts repairs for fossil fuel-powered aircraft, this service will be the responsibility of the aircraft operator and may include coordination with an MRO service. While SPI staff will not be responsible to perform this work, SPI could support the development of the infrastructure for on-site MRO, FBO and commercial operators' services.

3.19. Initial Operational and Terminal Airspace Analysis

In accordance with FAA EB 105A, eVTOL aircraft operations can occur on existing airport infrastructure. SPI has adequate runways for landing and takeoff, aprons for parking, etc., to accommodate the initial use of eVTOL aircraft operations while maintaining the safety, efficiency and utility of the airport. Because the initial eVTOL operations will likely follow the published runway approaches and hover taxi or ground taxi to designated parking areas, these operations can be readily accommodated with a designated parking area and the installation of fast charging stations.

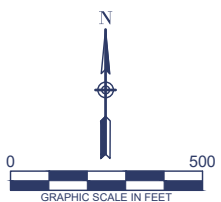
As depicted in **Figure 3.7**, initial eVTOL aircraft operations can be accommodated on the general aviation apron space between the commercial service terminal building and FBO operator Stellar Aviation's building. The airspace features of this location are ideal because it provides adequate space for eVTOL parking and charging while allowing for aircraft maneuverability around the parked eVTOL aircraft. This location allows for the installation of electric charging stations along the apron edge with the existing electrical duct in the turf swale adjacent to the apron. Finally, the landside features of this location provide proximity to the commercial service terminal and FBO for ease of access by commercial, charter or general aviation passengers.

A similar layout could be configured in the south quadrant, as shown in **Figure 3.8**. This location could serve private or corporate tenants based out of the south T-hangars but would not offer the service of the terminal area. This location can be readily adapted with the installation of electric charging stations along the apron edge.



INSET
SCALE: 1" = 100'

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\\HANSO\ADMIN\14-REPORTS\CAD\INITIAL_AAA\FIGURE_3.7_EAST_QUAD_INITIAL_PROPOSED_CHARGING.DWG



AIR CARRIER RAMP

LOT A

LOT B

LOT C

TERMINAL

CAPITAL AIRPORT DR.

HIGHWAY 29

FBO

SEE INSERT

TAXIWAY B

RUNWAY 13/31

TAXIWAY C

TAXIWAY Y

TAXIWAY Y1

LEGEND

- AIRPORT PROPERTY BOUNDARY
- PROPOSED AIRFIELD PAVEMENT



SMART AIRPORT AND REGIONAL LOGISTICS PLANNING PROJECT

EAST QUADRANT INITIAL CHARGING PROPOSED LOCATION

DRAWN BY: JA
REVIEWED BY: SZ

FIGURE 3.7



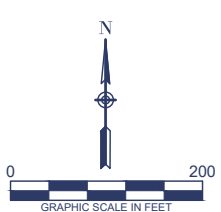
JUN 18, 2025 11:47 AM ROSS02590 \\HANSON\DOM\OPS\JORVE\224065\224065\ADMIN\14-REPORTS\CAD\INITIAL AMA\FIGURE 3.8_SOUTH QUAD INITIAL CHARGING PROPOSED LOCATION.DWG

As previously noted, the initial eVTOL operations will likely follow the published runway approaches and hover taxi or ground taxi to the designated parking areas. However, a collocated vertipad will likely be necessary as operational demand increases over the next 10 to 15 years. As depicted in **Figure 3.9**, there is sufficient apron space to site an interim vertipad on the existing apron at more than 840 feet from the Runway 13/31 centerline and more than 1,830 feet from the Runway 4/22 centerline.

The minimum FAA vertiport design standards require a distance of at least 700 feet from the centerline for runways that accommodate airplanes over 300,000 pounds. This initial vertipad could be marked on the existing apron in the nonmovement area of the airport, allowing SPI to publish the new landing area to the FAA's 5010 form and request instrument flight rules (IFR) to be built to the vertipad location to enhance the safety and efficiency of operations. However, this vertipad location would create some operational challenges near the airport's busy commercial apron and would not be ideal for constructing vertipad lighting. Installing vertipad lighting to accommodate nighttime landing operations would require reconstructing portions of the apron and installing expensive in-pavement lighting. In addition to the apron remarking that would also be required, this solution would be neither economically viable nor operationally efficient.



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 \\HANSON\DOM\OPS\WORKE\22\005\220045\ADMIN\14-REPORTS\CAD\INITIAL_AAA\FIGURE_3.9_EAST_QUAD_INITIAL_VERTIPOINT_ALTERNATIVE.DWG



3.20. On-Airport Vertiport Site Alternatives

SPI should reserve space for a standalone vertiport to accommodate eVTOL operations as the volume increases. There are multiple locations around SPI that are viable to accommodate and sustain long-term eVTOL operations.

Two areas were reviewed in the north quadrant; however, one of the areas that is north of the IDOT hangars and east of Standard Aero, is reserved for existing tenant and/or solar array expansion, so it was eliminated from consideration.

North Quadrant Alternative

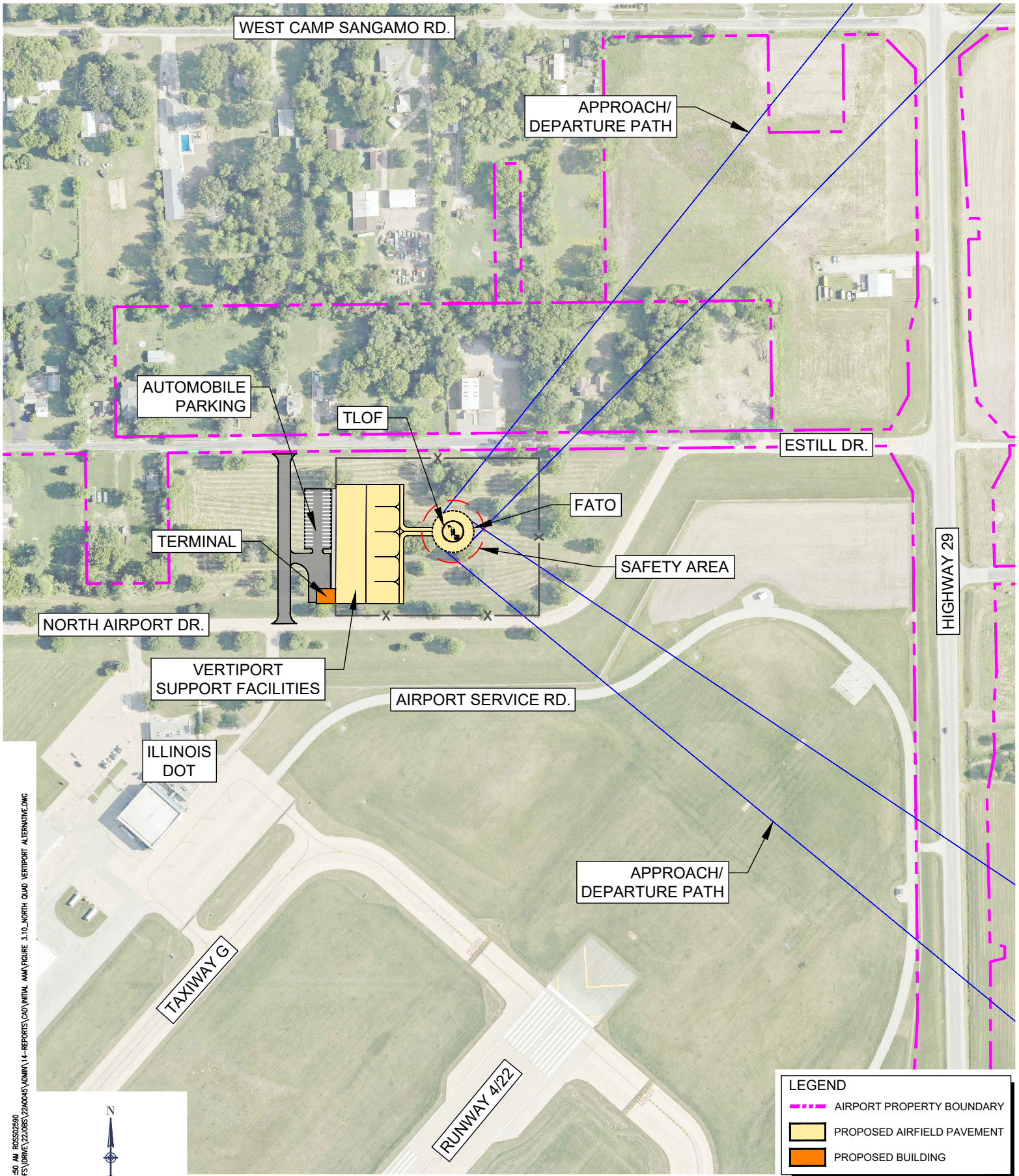
Figure 3.10 depicts the north quadrant alternative. This location is a long-term future site between Estill Drive and North Airport Drive. This site is on airport property; the airport has been acquiring the primarily residential property north of the airport as opportunity allows. While North Airport Drive is between this site and the airfield, the future airport layout plan (ALP) includes the removal of portions of North Airport Drive from Estill Drive to the office complex entrance of IDOT's Division of Aeronautics, which would allow for a connection to the airfield. The ALP also includes a proposed relocation of Estill Drive to accommodate a Runway 4-22 extension.

Advantages of this site:

- developing airport property to provide an additional front door to the airport
- expanding the solar array close by could provide for ready access to clean, renewable energy to power the electric aircraft charging stations and customer parking
- the standalone vertiport could operate independently of the terminal area and would be convenient for private charter operations
- the approach path from the southeast and northeast avoids overflight of the 183rd Wing
- a northwest approach is also possible during necessary wind conditions and would not conflict with existing runway flight paths or introduce aircraft noise over residential noise-sensitive areas

Disadvantages of this site:

- lacks initial direct airside connection
- if a connection to the terminal area is needed, a shuttle service would be needed



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 \\HANSON\DOM\OPS\ORVE\224065\224065\ADMIN\14-REPORTS\CAD\INITIAL_AAA\FIGURE_3.10_NORTH_QUAD_VERTIPORT_ALTERNATIVE.DWG

East Quadrant Alternative 1

Figure 3.11 depicts Alternative 1 for the east quadrant. This layout is in the old terminal T-hangar area. This vacant space could be used to accommodate eVTOL operations.

Advantages of this site:

- close to the main commercial terminal and FBO services
- positioned near the main airport entrance, for convenient access by local transportation
- airside connection
- available parking in the eastern terminal area parking lot
- walkable distance to the terminal to provide convenient transfer between the vertiport terminal and the main commercial service terminal
- walkable distance to the FBO
- availability of two approach/departure paths for eVTOL aircraft paralleling the magnetic runway 13/31 and 4/22 directions that provide direct access from downtown
- parking and other amenities that could support a training operation

Disadvantages of this site:

- vertiport would occupy space that could be used for other purposes, such as additional larger hangar development
- there is not a separation of at least 2,500 feet to accommodate parallel simultaneous approaches to the runway and vertiport
- site will likely require trenching and underground work to run the necessary electrical duct for eVTOL aircraft charging stations, increasing the cost

East Quadrant Alternative 2

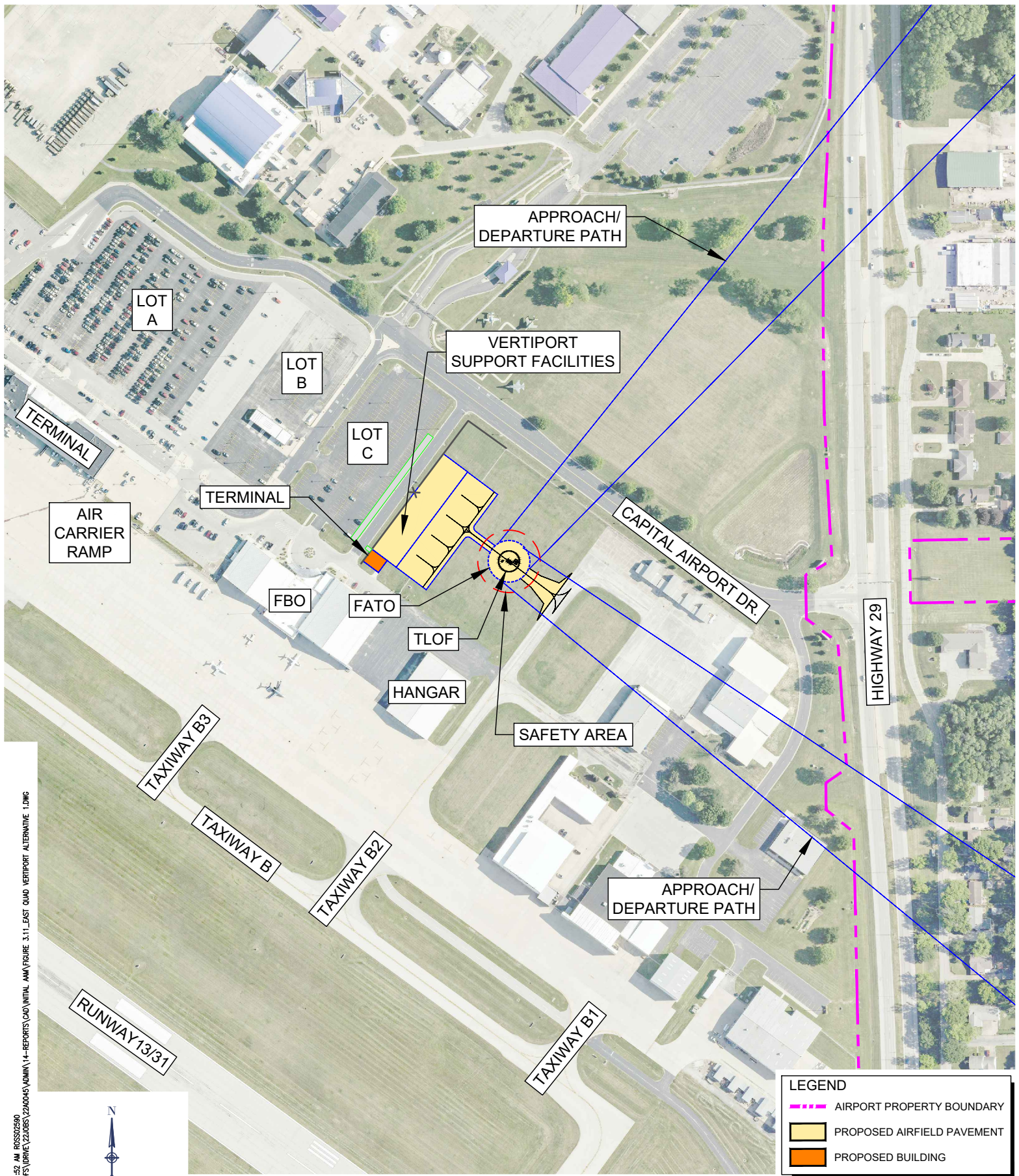
An additional site was reviewed on the east side of the airport, as shown on **Figure 3.12**. It has a couple of advantages, but the disadvantages outweigh them. Because of its disadvantages, this site was eliminated from consideration.

Advantages of this site:

- located on the north terminal apron, so it would have direct airside connection; as such, it would allow for efficient aircraft rescue and firefighting emergency response, as well as ground service and maintenance access

Disadvantages of this site:

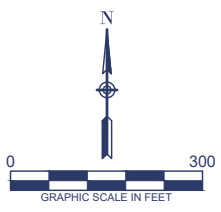
- the vertiport would take up the aircraft Gate 1 parking area, limiting fixed-wing aircraft access
- while close to the terminal, it is on the secured side of the terminal; passengers would have to be routed to enter the terminal on the landside to proceed through screening for their connecting flights
- limited approach/departure paths and a lack of separation for simultaneous parallel runway approaches

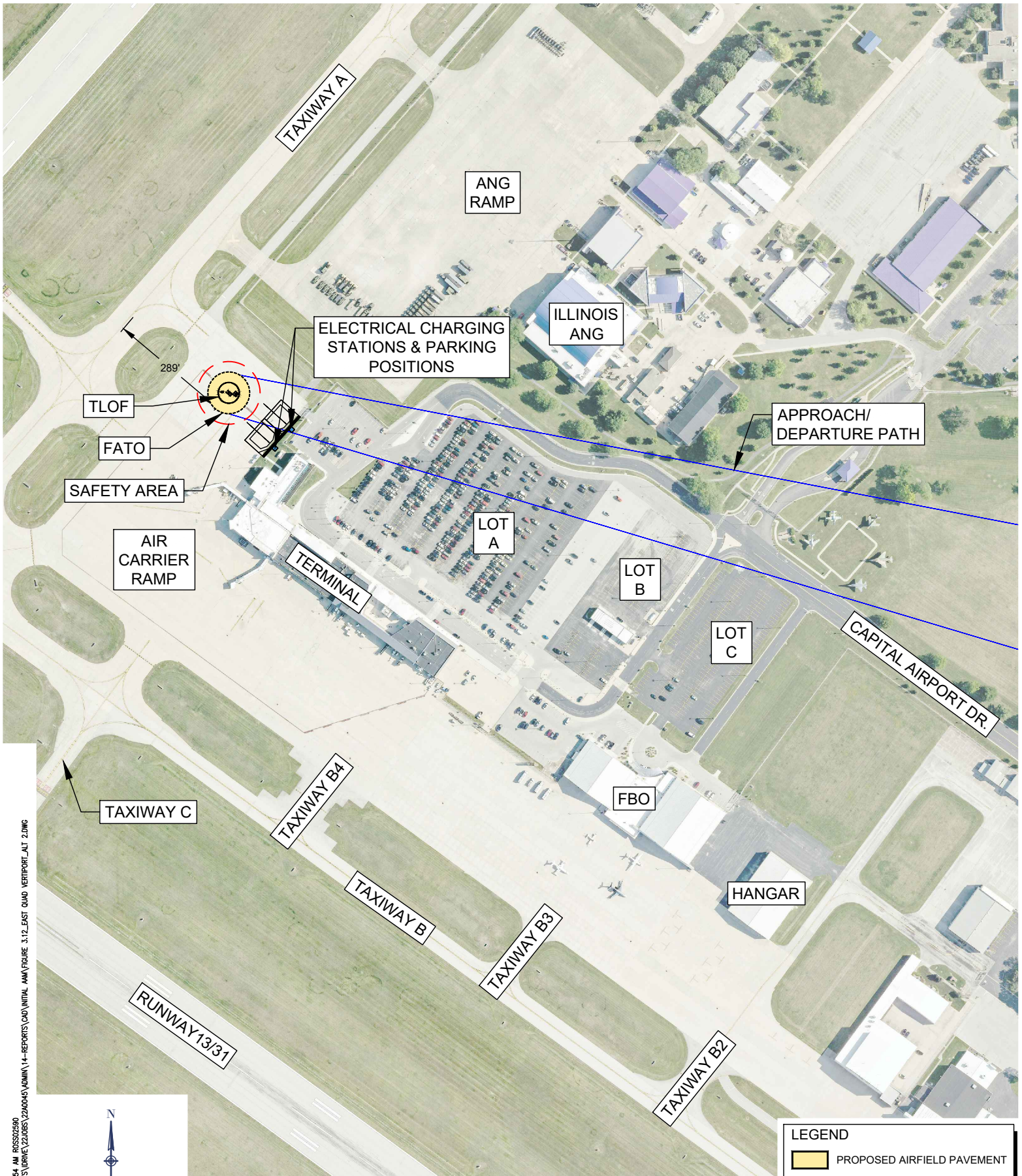


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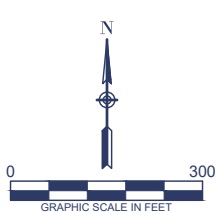
- AIRPORT PROPERTY BOUNDARY
- PROPOSED AIRFIELD PAVEMENT
- PROPOSED BUILDING

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LEGEND	
	PROPOSED AIRFIELD PAVEMENT

South Quadrant Alternative 1

The south quadrant was identified as a potential initial location for charging infrastructure. With the recent removal of Runway 18/36, more SPI-owned land in the southern area of the airport is available for future development. Space could be available for a vertiport landing pad and support facilities. A concept layout is shown in **Figure 3.13**.

Advantages of this site:

- convenient airside and landside access
- approach/departure paths to and from the southeast and southwest directions, which provide convenient and efficient access to and from the downtown Springfield business district
- location is near existing electrical service transformers
- space available to accommodate an AAM training facility
- potential use by future Air Commerce Park tenants

Disadvantages of this site:

- separated from the commercial service terminal and FBO; access would require shuttle service
- could displace other potential development opportunities

South Quadrant Alternative 2

A second south alternative shifted to the southeast was also evaluated. It has similar advantages and disadvantage as South Alternative 11, but provides more space for other aeronautical development. This concept layout is shown in **Figure 3.14**. It is preferred due to the flexibility it offers for other aeronautical development in the south quadrant.

West Quadrant Alternatives

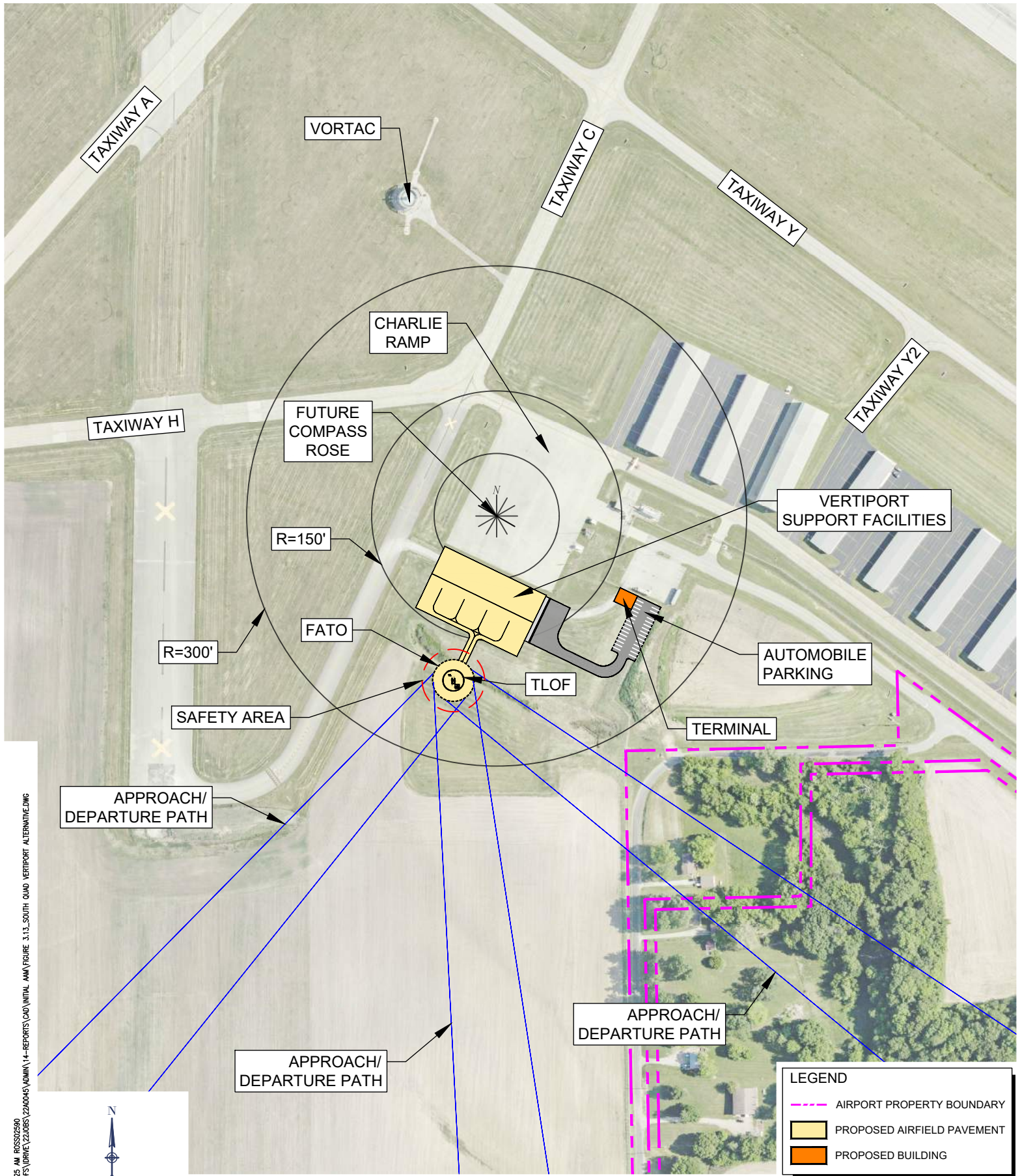
A standalone vertiport could also be developed on the west side of the airport. However, because this portion of the airport is the least developed and farthest from the terminal and FBO, it would rank lower than the sites previously discussed. **Figure 3.15** depicts a west side vertiport.

Advantages of this site:

- space available to accommodate an AAM training facility
- best suited for a standalone facility, such as for training that does not need taxiway access
- approach/departure paths to and from the southwest and northwest directions, which provide convenient and efficient access to and from the downtown Springfield business district

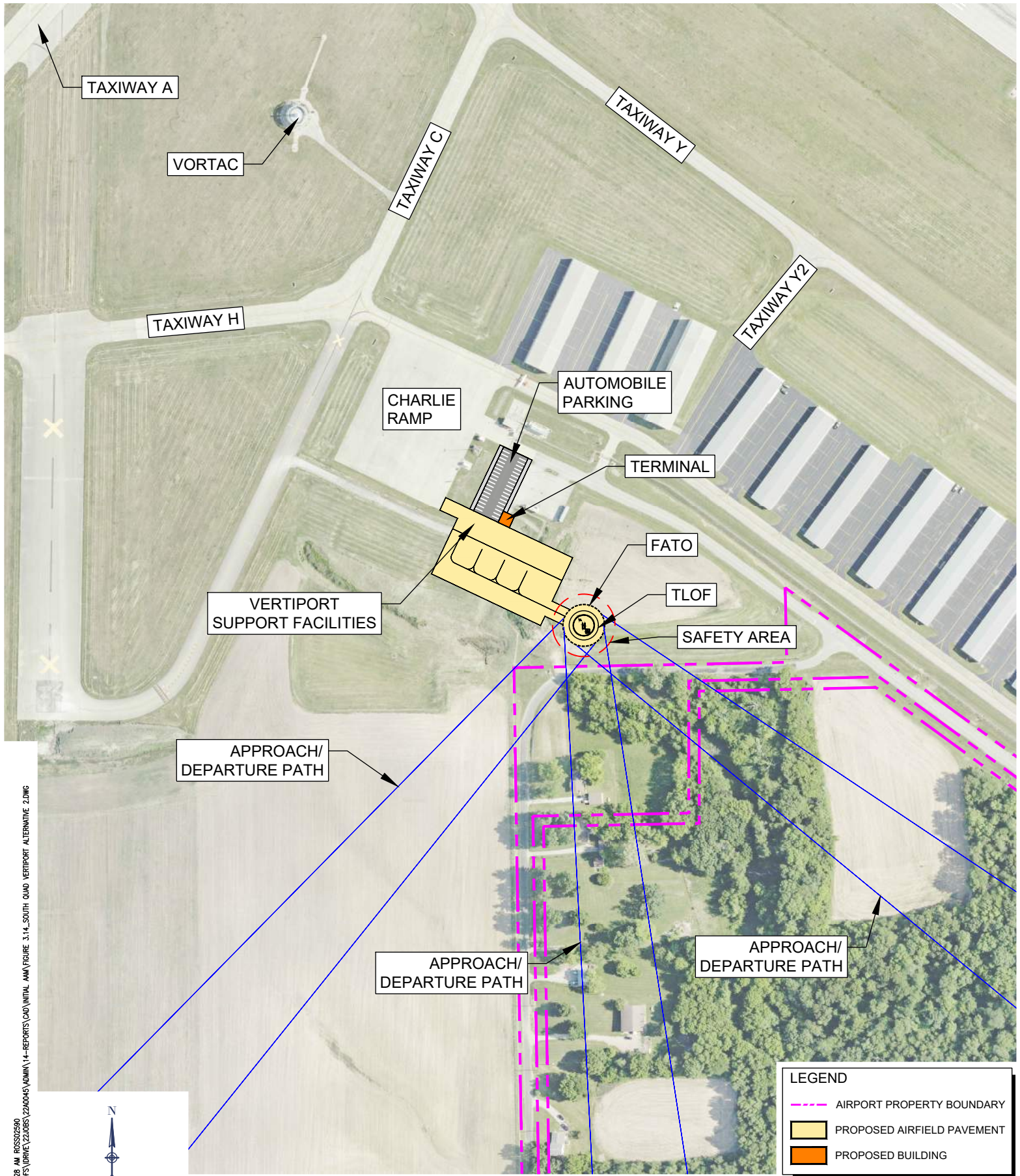
Disadvantages of this site:

- separated from the commercial service terminal and FBO; access would require shuttle service
- no pavement connection to airfield
- landside access is limited

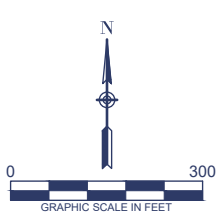


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 \\HANSON\DOM\UPS\DRIVE\224065\224065\ADMIN\14-REPORTS\CAD\INITIAL_AAA\FIGURE_3.13_SOUTH_QUAD_VERTIPORT_ALTERNATIVE.DWG

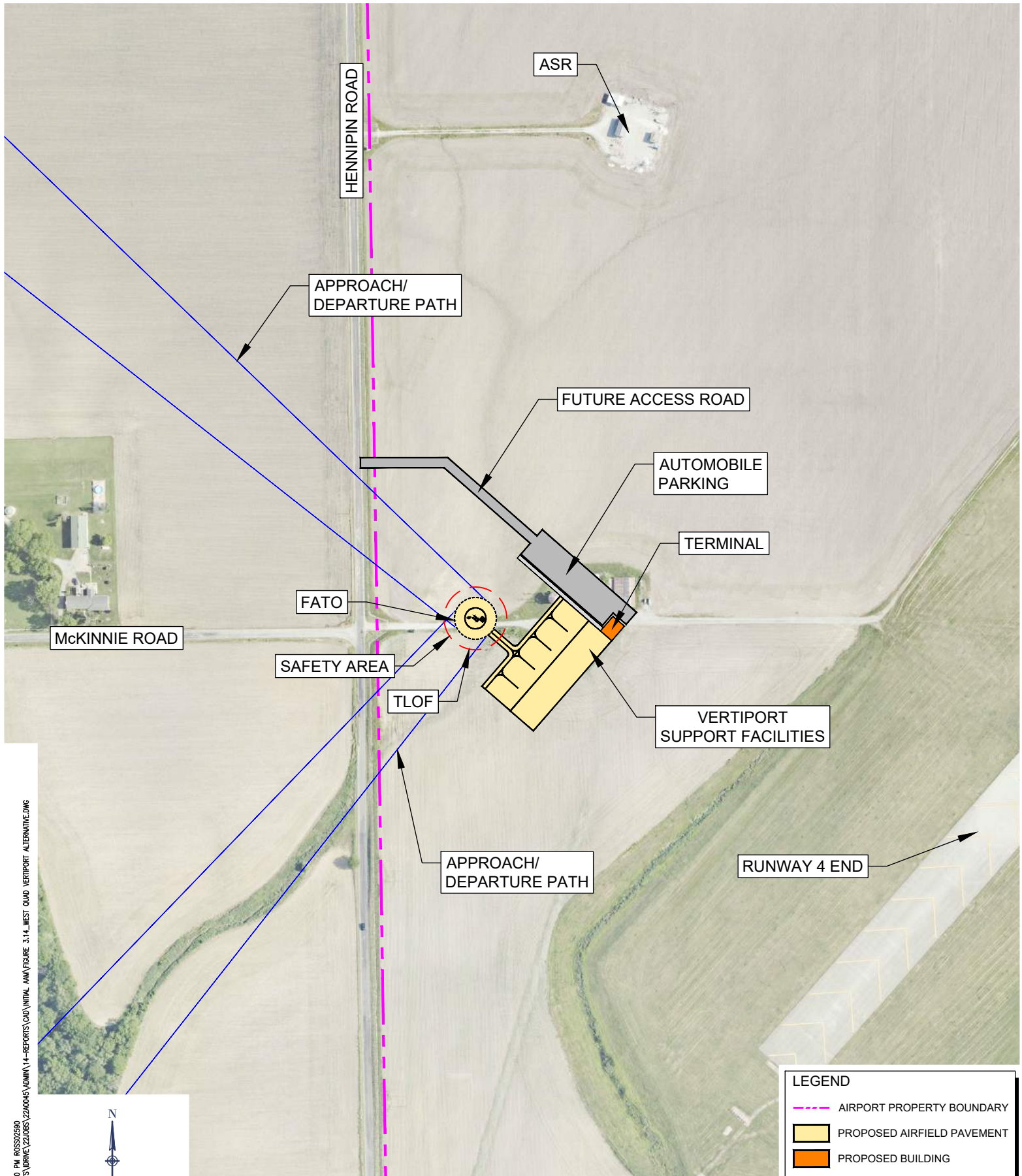
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	PROPOSED AIRFIELD PAVEMENT
	PROPOSED BUILDING



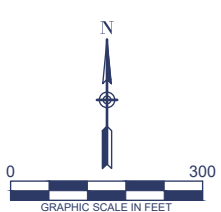
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 \\HANSON\DOM\UPS\DRIVE\224065\224065\ADMIN\14-REPORTS\CAD\INITIAL_AAA\FIGURE_3.14_SOUTH_QUAD_VERTIPORT_ALTERNATIVE_2.DWG



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	PROPOSED AIRFIELD PAVEMENT
	PROPOSED BUILDING



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Preferred On-Airport Vertiport Sites

While aeronautical demand to warrant a standalone vertiport must develop, SPI should reserve areas to accommodate future eVTOL demand. The preferred site(s) should be added to the ALP update, which is being produced concurrently with this study. As previously detailed, there are various available sites in the north, east, south and west quadrants, each with advantages and disadvantages depending on the potential users.

If a connection to the terminal and FBO is desired, the east quadrant alternative site best meets that need. The south and north quadrant sites may be better suited for primarily standalone operations that do not need continual connection to the terminal. For either of these sites, a shuttle could be provided for a connection to the terminal.

The south quadrant site provides an opportunity to develop synergies with tenants in the airpark, whereas the north quadrant site is close to the solar arrays that could be expanded to assist in meeting the electrical demands. It is recommended that each of these sites be carried forward onto the ALP to allow them to be reviewed from an airspace perspective. The west quadrant is best suited to a standalone facility, such as a training facility. Any site determined to be feasible should be reserved so that SPI staff can evaluate the best fit when the development is needed.

Until a vertiport is needed to meet the demand, the parking and proposed charging infrastructure to be placed between the terminal and FBO will support initial general aviation electric aircraft operations, whether eCTOL or eVTOL. The commercial eCTOL operations would be supported at the terminal.

3.21. Vertiport Development Steps

In accordance with FAA EB 105A Section 6.0, as a federally obligated airport sponsor, the Airport Authority is “required to ensure the safety, efficiency, and utility of the airport and to provide reasonable and not unjustly discriminatory access to all aeronautical users.” Any new vertiport infrastructure or fixed equipment must be depicted on the ALP for SPI and submitted for FAA review prior to development and operation. Because any vertiport development would materially impact the safety of people at, to or from the airport as a result of aircraft operations, the vertiport development would be subject to FAA approval, regardless of the use of federal funding on the project, and an appropriate level of environmental review under NEPA would be required.

Additional approvals required prior to site operations, including FAA Form 7460-1 for airspace evaluation, FAA Form 7480-1 for landing area publication, appropriate NEPA review and IDOT Office of Intermodal Implementation – Aeronautics landing area certification would not be required until a separate vertiport is needed.

3.22. Off-Airport Site Alternatives

The Springfield metropolitan area has three published helipads. All are primarily private-use, emergency response operation locations. Two are at downtown area hospitals, and one is near IDOT’s headquarters along the Interstate 55 corridor. The hospital helipads will continue to primarily serve emergency medical transport for patients as well as organ transplant services. These helipads serve fossil-fuel combustion engine helicopters but could be adapted to serve eVTOL vehicles in the future. It should be noted that FAA EB 105A requires that “for heliport facilities that serve single, tandem (front and rear), or dual (side by side) rotor helicopters and intend to accommodate emerging VTOL aircraft, the proponent should follow the recommendations in this EB and mark the facility as a vertiport “(H plus VTL designation). If these heliport owners intend to accommodate eVTOL aircraft in the future, additional infrastructure improvements to the sites may be needed. For further details on Springfield regional AAM and vertiport development opportunities, see the Airport & Regional Logistics chapter.

4. Electrical Roadmap

4.1. Overview

This overview provides a summary of the scope of this chapter, a list of key findings, a list of key activities for Abraham Lincoln Capital Airport (SPI) to consider over the next three to 10 years and a roadmap summary table. **Table 4.1** shows the load growth projected by sources of electrical demand over 30 years and compares this to projected City Water, Light and Power (CWLP) electrical system capacity. It then summarizes the electrical projects needed to support further growth, including the high-level scope, the rough order of magnitude (ROM) cost and the space needed to support each potential project.

Scope: The “Advanced Air Mobility (AAM) and Other Future Electrical Demand” chapter outlines the potential future electrical demands at SPI. Referencing the AAM data, this chapter shows the amount of power and energy infrastructure needed to support electrification for charging different categories of aircraft and ground-based vehicles. It then outlines the electrical infrastructure at SPI and identifies an electrical infrastructure improvement plan to support this growth. The chapter then discusses potential on-site energy and microgrid strategies, with a focus on identifying how different assets could be used strategically to manage the type of short-duration load growth that aircraft charging represents. Finally, to support SPI’s capital planning process, the chapter provides a preliminary list of projects for SPI’s consideration. A high-level scope, schedule and budget for each project concept is provided.

Result 1: Aircraft charging (up to 13 megavolt-amperes [MVA]) projected to dwarf electric vehicles (EV)/electrical ground support equipment (eGSE) (up to 3.6 MVA)

- Through 2054, aviation charging requires up to 13 MVA to support the electrification of commercial (9 MVA) and fixed-base operator (FBO) serviced or general aviation (GA) aircraft (4 MVA). This is based on projections from the study’s AAM chapter.
- Ground vehicle charging is much smaller, at up to 3.6 MVA conservatively projected by 2054. This allows 0.9 MVA each for eGSE, rental cars, fleet and public charging.
- As a result, SPI should focus on closely monitoring the electrical needs of specific aviation stakeholders to ensure that major infrastructure upgrades are in place to anticipate changing demands.

Result 2: SPI’s electrical grid is reliable (no outage greater than 1.5 hours in the past 10 years). With 9 MVA of spare capacity, it can support the 5.2 MVA of new demand projected by 2033.

- The utility provider for SPI, CWLP, confirmed as of June 2025 that the system has 9 MVA of spare capacity out of 12 MVA of total capacity (3 MVA in use).
- CWLP summarized the basis for the level of reliability achieved at SPI (no outage greater than 1.5 hours in the last 10 years). At the high-voltage level, SPI’s power comes from multiple transmission sources. At medium voltage levels, CWLP’s distribution service at SPI consists of two feeders configured in a loop. This reduces the extent and duration of outages, because CWLP can better reroute power to users and isolate faults.

Result 3: By 2034, invest in on-site energy (microgrid) assets such as batteries, charge management systems and photovoltaic (PV) to manage peak demands, lower operating costs and avoid CWLP upgrade costs.

- CWLP noted that adding new loads requires new or upgraded transformers and feeders.

- Batteries can limit the need for more CWLP capacity by flattening peaks (which also lowers demand charges).
- SPI should also consider managing peak demand and preserving CWLP capacity by using electricity via a microgrid controller that integrates networked charger management and energy-monitoring features.
- SPI should also consider adding more PV up to CWLP's limits, assuming it lowers operating costs or assists with tenant retention.

Key Activities (All Years)

1. Coordinate with CWLP annually and ahead of executing any new on-site energy projects or adding loads and charging or storage infrastructure.
 - a. Projects self-developed by SPI, such as battery energy storage systems (BESS), PV\ or generator projects intended to serve new loads, should be compared with what CWLP can offer to meet new service demands.
 - b. Refer to Table 4.25 and Section 4.6 for additional information on CWLP considerations.
2. As baseline energy use changes due to additions or implementation of savings measures, monitor energy and power requirements to update infrastructure needs.
3. Monitor developing energy technologies including but not limited to micro or small modular reactor (SMR) nuclear technology, hydrogen, and energy storage solutions. These developing technologies are currently not commercially mature and widely available (in comparison to PV, for example). However, they continue to receive policy support and investment that indicate commercial solutions may be available to SPI in the future.

Key Activities, Years One to Three

1. Phase in eGSE and EV charging systems. Pilot charge management systems.
2. Develop airport terminal Phase II PV system to maximize available net metering energy savings.
3. Coordinate with the airlines and other users for hybrid aircraft charging requirements and complete plans to implement charging systems.
4. Continue to execute and update on a regular basis strategic energy management to support continuous improvement of energy and utility use at SPI. Deploy attractive facility improvement measures (FIMs) or energy conservation measures (ECMs) to manage demand and energy usage. This would entail referencing and updating energy audits of the facility. Typical FIMs/ECMs that might be recommended from an audit could include, but are not limited to: lighting upgrades, retro-commissioning, HVAC upgrades, or other on-site efficiency or energy improvement measures.
5. Ensure that planning considers that the lead times for major energy projects are often measured in months and years. This could include the time required for design (typically six to 18 months), permitting (months and years) and procurement (months and years). The lead times have been fluctuating for energy supply chains in particular over the past several years, with high demand for major electrical infrastructure components such as transformers, breakers, batteries, generators and solar components.
6. Budget space and capital for new energy assets; engage with CWLP on growth/microgrid plans.

Key Activities, Years Three to 10

1. Coordinate with CWLP for additional large (greater than 1 MVA) aircraft chargers or BESS and PV systems.
2. Implement aircraft-charging systems in phases, aiming to avoid exceeding the 9 MVA CWLP threshold.
3. Implement on-site storage systems and microgrid controls to reduce systemwide peak demands, assuming these are determined to be desirable alternatives to viable CWLP improvements.

- Continue engagement with CWLP to monitor system capacity and coordinate the phased implementation of energy growth and microgrid development.

TABLE 4.1 2025–54 ROADMAP OF LOAD GROWTH AND ROM COSTS FOR SUPPORTING INFRASTRUCTURE PROJECTS

Time	Budget	Sources of Electrical Demand	Required CWLP Capacity	Electrical Infrastructure Improvements by Budget, Time and Space
2025–33	\$4M–8.5M	<p>2028: 0.45 MVA +0.15 eGSE +0.3 shared charging for fleet, rental cars, public visitors</p> <p>2029: 3 MVA +3 eCTOL</p> <p>2032: 1 MVA +1 eVTOL</p>	<p>Maximize 12 MVA of existing feeder capacity</p> <p>CWLP indicates up to 9 MVA</p> <p>4.45 MVA added in eight-year period</p>	<p>\$3M to \$6M and up to four years for feeder upgrade or BESS project to support short-duration aircraft charging once CWLP indicates growth would exceed system capacity. Plan for BESS to require up to 0.3 acres of space. Negotiate split with CWLP for feeder upgrade. Refer to Table 4.25 in Section 4.6 to understand the implications of the feeder versus BESS decision.</p> <p>Vehicle chargers: Plan \$1M to \$2.5M and two years for new eGSE and general vehicle charging. Chargers to consume wall or floor space for electrical equipment or existing parking stall space.</p>
2034–43	\$6M–13.5M	<p>2034: 4.75 MVA total +3 eCTOL +1 eVTOL +0.75 for eGSE (0.15), fleet EVs (0.15), rentals (0.15) and public (0.3)</p>	<p>>12 MVA</p> <p>Likely requires feeder upgrade</p>	<p>\$2M to \$5M for feeder. Negotiate split with CWLP for feeder upgrade based on forecasted use. Refer to Table 4.25 in Section 4.6 to understand the implications of the feeder versus BESS project.</p> <p>\$3M to \$6M for additional BESS project</p> <p>EVSE: Plan \$1M to \$2.5M to expand charging infrastructure.</p>
2044–54	\$2M–5M (Feeder)	<p>2044: 1 MVA +1 eCTOL</p> <p>2054: 4.45 MVA +3 eCTOL +1 eVTOL +0.45 (0.15 each) for fleet EVs, rentals and public</p>	<p>18 MVA load up from 3 MVA baseline feeder capacity usage in 2025. 18 MVA capacity used (15 MVA new + 3 MVA baseline)</p> <p>Exceeds 12 MVA CWLP capacity by up to 6 MVA, depending on BESS options selected</p>	<p>Plan \$1.5M to \$2.5M and two years for first 0.3 MW of capacity for vehicle charging. Add second round of charging once first-round utilization is reaching saturation.</p> <p>Up to 30 acres required for solar, if offsetting new usage is a goal. Cost to be determined at the time of installation.</p>

Note: eVTOL = electric vertical takeoff and landing; eCTOL = electric conventional takeoff and landing; EVSE = electric vehicle supply equipment; MW = megawatt

4.2. Introduction

SPI is conducting a planning study to establish a 30-year roadmap for electrification and on-site energy systems (microgrids) to support the energy needs of future electrified airside and landside infrastructure. This potentially includes hybrid or fully electric aircraft, eGSE and EV for public charging, rental cars, SAA and tenant fleets. The study reports on the electrical power distribution infrastructure needed to provide for projected growth. It also provides concepts of solutions for the implementation of on-site energy (microgrids). The study also offers planning-level approximations of project durations, in years, and ROM capital estimates. These are provided to support SPI staff in managing its 30-year plan. Significant updates are likely required, along with additional diligence for any projects selected for implementation.

This document is organized as follows:

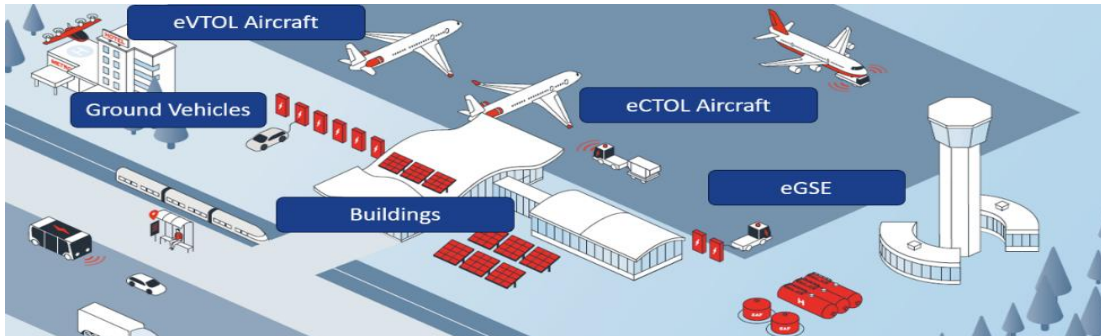
- Section 4.3: Overall Load Growth and Implications and Section 4.4: Peak Load Growth and Implications discuss the baseline loads and projected increases due to the electrification of the airside or landside.
- Section 4.6: Electrical System provides an overview of the electrical infrastructure, including a discussion of the system's capacity and the options available for expanding capacity. This provides a baseline understanding of the energy users at SPI and discusses the system's total peak demand. Options for the upgrades, whether required or not, to support additional electrification distribution system loads are also covered.
- Section 4.7: Microgrid Considerations and Technologies provides an overview of a microgrid's functions and services, differentiating between the variable nature of solar and its energy offset and savings to the short-duration, peak demand mitigation that batteries might offer with controls and charge management systems. This section includes a discussion of hydrogen that, while unlikely in the near term, may become more relevant over time as the technology matures.
- Generally, the study team found that in the near term, a facility-focused microgrid, primarily developed with batteries and charge management capabilities, are most appropriate for SPI, considering the high level of reliability it enjoys as served by CWLP.
- If, however, toward the end of the 30-year forecast, the load growth expands for ultra-fast charging to support fully electric commercial aircraft, which pushes the demand above 50 MVA, a new substation or utility-scale microgrid may be required. The microgrid section, therefore, provides considerations for developing a utility-scale and grid-interactive microgrid that is not contemplated by CWLP. It provides a high-level summary of key activities that might be involved in developing a microgrid of this kind.
- Chapter 4 provides a cost estimate for the projects most likely to be required to support the eVTOL- and eCTOL-driven load growth in the next 10 years. Estimates of cost and the time required to conduct those projects are provided to support planning. The team emphasizes that all estimates of scope, time and cost are highly preliminary in nature and focused on providing initial input for near-term capital plans. Before finalizing the scope, schedule and budget for each project, regular updates of these scopes as well as diligence for each project are recommended.
- This chapter's conclusion provides recommendations for a phased implementation to expand the electrical distribution system, the development of renewable energy sources and the use of a microgrid.

4.3. Overall Load Growth and Implications

This section characterizes the potential of new load sources at SPI and establishes quantified growth forecasts for each source in instantaneous power needs and annual energy use. This section also describes the key assumptions and data used to develop the projected load growth by source, which was developed in alignment with the broader AAM forecasts for eVTOLs and eCTOLs. The projections generated from this process serve as the basis for estimating what type of electrical infrastructure is required to support the load growth and when it is

needed. The projections indicate that airside growth (eCTOL, eVTOL, eGSE) should be much larger than landside EV growth.

FIGURE 4.1 SCHEMATIC OF ENERGY USERS ACROSS SPI BY SOURCE



Refer to **Figure 4.1** and the list below for an illustration of the potential sources of electrical load growth.

1. Airside
 - aircraft: eCTOL (regional commercial travel) and eVTOL (short, urban hops)
 - eGSE: supporting commercial and private aircraft
2. Landside
 - ground vehicles SAA fleet, rental cars and passenger vehicles
3. Buildings
 - SPI terminal
 - industrial/tenant operations

TABLE 4.2 TOTAL VEHICLE LOAD GROWTH

Load Growth Sources*	Annual Energy Use (MW-Hour/Year)		Peak Charging Capacity (MW)	
	2028	2054	2025	2054
eVTOL	-	3,066	0	9
eCTOL	-	8,322	0	4
eGSE	-	250	0	0.3
Landside EVs	-	1,721	0	1.35
Totals		13,358	0	14.65

*Note: Building and operational loads were assumed to be relatively stable. These loads consist of the SPI terminal, SPI airfield lighting, fire crash rescue facility, tenant hangars and fueling system operations. In contrast to electrification-driven load growth, it is expected that these loads remain relatively stable over time. SPI can update this assumption if new buildings are planned and work with CWLP to monitor for spikes across SPI or tenant loads.

The required energy and peak output for each of the load growth types is depicted in **Figure 4.2**. The base year (2025) energy for SPI terminal and tenant loads were estimated using offset estimates from SPI-provided and publicly available phases I and II solar information. **Table 4.3** corresponds to this figure, breaking down each users' energy consumption by year.

FIGURE 4.2 SPI ANNUAL ENERGY AND PEAK DEMAND GROWTH (2025–54)

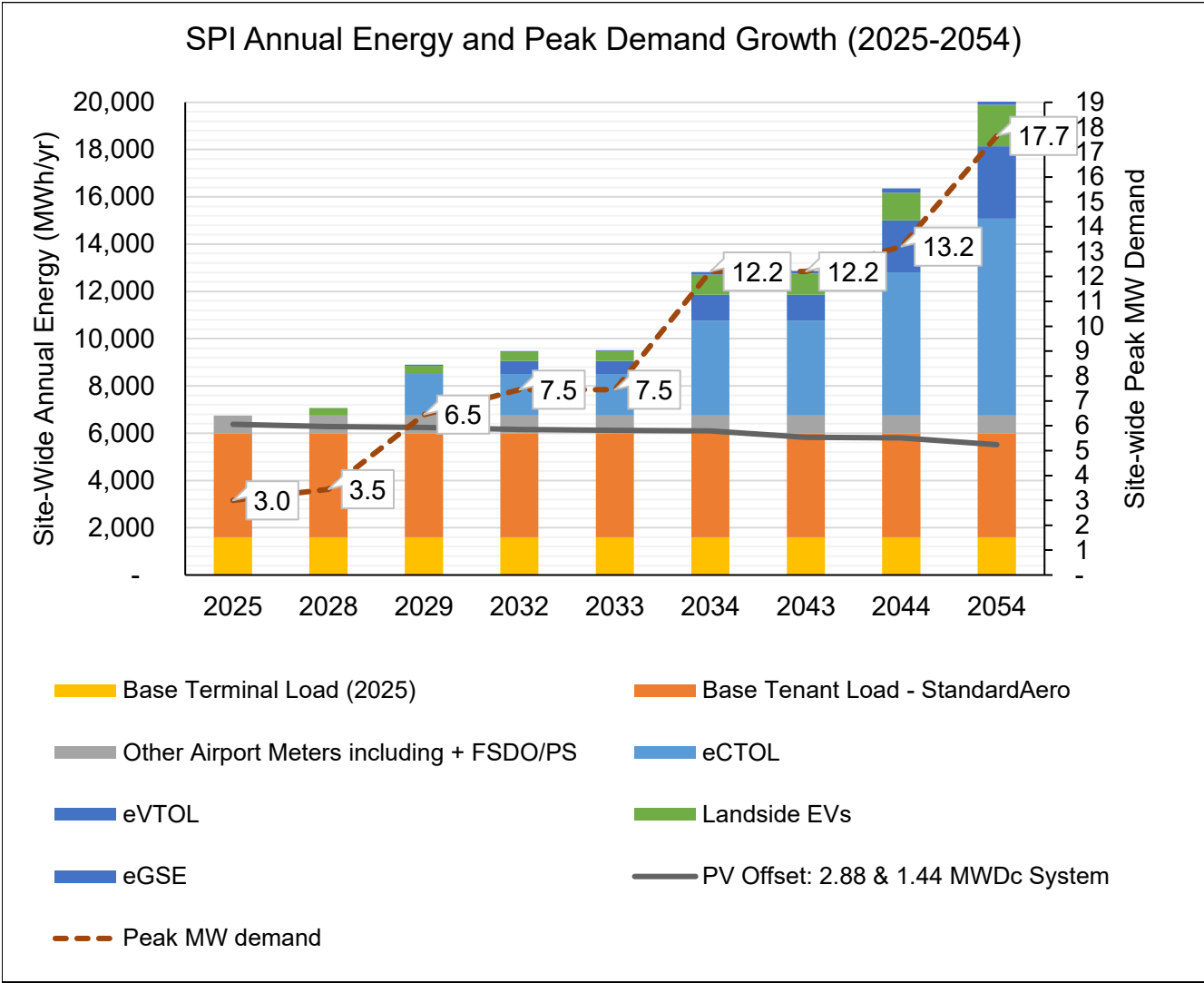


TABLE 4.3 ANNUAL TERMINAL ENERGY USE

Year	Energy Consumption (MWh/yr)	Annual Energy Cost
2019	1,835	\$271,919
2020	1,541	\$228,767
2021	1,633	\$249,765
2022	1,755	\$278,693
2023	1,204	\$192,816
Average	1,593	\$244,392

The energy growth is calculated to support estimates for sizing the future phases of PV or on-site generation to offset the load growth. The peak power is calculated to support estimating the sizing for BESS and/or when CWLP infrastructure upgrades will be required. This is discussed further in the next two sections.

The **Table 4.4** forecasts the increases in annual energy consumption at SPI due to each new end use. Up to 13,358 megawatt-hours (MWh) per year of energy use is projected by 2054.

The SPI terminal averages about 1.6 gigawatt-hours (GWh) per year of energy, based on 2019 to 2023 data¹⁵, at an average flat rate usage at approximately \$0.14 per kilowatt-hour (kWh). The flat usage rate is the blended annual rate that includes summer and winter usage charges (\$ per kWh energy usage charges) with summer and winter demand charges (\$ per kW peak demand charges). The cost of the new load projected by 2054 is approximately \$1.87 million annually that SPI would be responsible for paying or collecting from airlines via fees or other charges. This assumes that the demand charges remain proportional, which is discussed in the next section.

TABLE 4.4 FORECASTED SPI ENERGY CONSUMPTION (MWh) ACROSS BUILDINGS, AIRCRAFT AND GROUND VEHICLES

Year	2025	2028	2029	2032	2033	2034	2043	2044	2054
Base Tenant Load (Standard Aero)	4,390	4,390	4,390	4,390	4,390	4,390	4,390	4,390	4,390
Base Terminal Load (2025)	1,595	1,595	1,595	1,595	1,595	1,595	1,595	1,595	1,595
Remaining Airport Meters	769	769	769	769	769	769	769	769	769
eVTOL	-	-	-	548	548	1,095	1,095	2,190	3,066
eCTOL	-	-	1,752	1,752	1,752	4,015	4,015	6,059	8,322
eGSE	-	-	42	42	42	111	111	180	250
Landside EVs	0	312	348	385	421	842	897	1,171	1,756
Combined Annual Usage (MWh/yr)	6,753	7,065	8,895	9,479	9,516	12,817	12,872	16,354	20,147
Total New Annual Usage		312	2,142	2,726	2,762	6,063	6,118	9,600	13,394
Equivalent Solar to Offset New Demand (MW of Direct Current)		0.2	1.5	1.9	1.9	4.2	4.2	6.6	9.2
Cost (in Thousands) of New Annual Usage at a Flat Rate of \$0.14/kWh		\$44	\$300	\$382	\$387	\$849	\$857	\$1,344	\$1,875

If SPI would like to offset this usage via solar, up to 9.2 MW of direct current (DC) from solar panels would be required. At the current space efficiency levels, this is equivalent to approximately 30 to 40 acres of land. The subsequent sections on solar note that the land near the Phase I solar installation is approximately the right acreage for a solar installation of this size. Recommendation: Reserving 30 to 40 acres over a single or multiple parcels adjacent to the CWLP electrical feeder infrastructure is recommended. The space for future PV is sized to match the forecasted demand. The final location of PV should consider whether it is intended to directly serve new loads and augment that load during outages if it is paired with energy storage and/or generators..

4.4. Peak Load Growth and Implications

Table 4.5 forecasts the peak instantaneous load for each of these segments. The airside growth is based on AAM projections and SPI-provided vehicle fleet information. The analysis for landside and eGSE power assumes that

¹⁵ Based on SPI data, these four terminal assets have the following IDs: 105987, 154368, 105991, 105992.

the transformers for ground vehicles (eGSE, SAA or tenant fleet, car rental and public) are added conservatively (higher than required) in 300-kW increments, as described in the EV load growth section.

Peak demand is projected to grow by a multiple of six over 30 years. Because of the intermittent nature of charging, while peak load is expected to grow by a factor of six, total energy use is projected to grow by a factor of just four.

TABLE 4.5 PEAK LOAD GROWTH (MW) BY AIRCRAFT, GROUND VEHICLES AND BUILDINGS (2025–54)

SPI Campus Segment	Peak Power by User (MW)	Year								
		2025	2028	2029	2032	2033	2034	2043	2044	2054
Aircraft	eCTOL – Peak	0	0	0	3	3	6	6	6	9
	eVTOL – Peak	0	0	0	1	1	2	2	3	4
Airside Vehicles	eGSE	0	0.15	0.15	0.15	0.15	0.3	0.3	0.3	0.3
Airside/Landside Vehicles	SPI/Tenant Fleet	0	0.15	0.15	0.15	0.15	0.3	0.3	0.3	0.45
Landside Vehicles	Car Rental	0	0.15	0.15	0.15	0.15	0.3	0.3	0.3	0.45
	Public Parking	0	0	0	0.15	0.15	0.3	0.3	0.3	0.45
Total Installed New Capacity (MVA)		0	0.45	3.45	4.45	4.45	9.2	9.2	10.2	14.65

Because of general trends in energy development nationally, major energy infrastructure — such as large transformers, battery energy storage, solar equipment and other electrical materials — are often in short supply, with lead times measured in months and years. As a result, SPI should coordinate closely with airlines, CWLP, contractors and equipment suppliers when planning load growth that could exceed system capacity.

In 2034, for example, the new capacity is projected to increase beyond the 9 MVA that CWLP indicates is available. Because aircraft charging is projected to increase in increments as large as 3 MVA at a time, it is important that SPI plan for these new loads years in advance, especially when initiating the first round of new charging loads (2032 in the table above), which would consume a significant portion of the 9 MVA of spare CWLP capacity.

Because of the short duration that aircraft chargers are at peak per day, the potential financial cost of not managing and flattening these new loads is very high in proportion to the overall energy costs.

Peak demand charges in 2023 ranged seasonally between about \$12 to \$14 per kW per month. Without demand charge management systems in place to shift the energy consumption to lower cost periods, a peak load growth of 1 MVA could increase the demand costs by \$150,000 per year. If the 13 MVA of new aviation chargers were engaged simultaneously with no battery to offset that demand, SPI would be responsible for about \$1.95 million of demand charges per year in 2054 for aircraft charges alone. This is nearly equivalent to the \$1.87 million of charges projected for new annual usage in that period and demonstrates how active management and battery storage can help avoid coincident peak demands.

With costs increasing due to higher energy use and peak demands, SPI should be planning for how the service of charging is used to generate revenue to offset the investment and running costs incurred.

4.5. Specialized Infrastructure by Source

This section provides a source-by-source projection of load growth over time. For each projection, the background data from key stakeholders, along with clarifying assumptions made by the study team to forecast load changes, is provided. This includes source-specific aspects of load growth to be considered, such as:

- specialized versus general infrastructure required
 - While all new loads require an electrical power source, the type of power varies by end use. Ground vehicles and eGSE typically can share the same charge ports, while aircraft may require more complex electrical infrastructure to deliver energy to them. Additionally, the charger capacity and delivery mechanism are dependent on the class of aircraft using the charger.
- peak load growth
 - overall new peak load required (sizes major electrical infrastructure)
- duration, shape and frequency of load
 - short peaking loads (aircraft charging in one hour or less, just a few times per day)
 - longer vehicle charging (peaks initially, then trails to a trickle over hours; occurs many times per day and can be staggered)
 - duration drives actual energy usage estimates
- management of coincident peak loads
 - Can loads be flattened or staggered/delayed with networked charge management?
 - Can short-duration, infrequent peaks be offset by batteries to avoid peak demand limitations and demand charges?

Generally, electric vehicle load growth is either long-duration charging for levels 1 or 2 charging cases or high turnover for DC fast charging cases. Charge management systems using networked chargers can limit the impact of EV charging peaks on distribution and charge management systems. However, they must be configured and managed by users and service providers, which adds operational and maintenance layers to managing charging systems.

Electric Ground Support Equipment

Background

Unlike other ground vehicles, eGSE loads are directly tied to aircraft operations. The use of eGSE also varies by aircraft type, segmented by commercial airline operations and general aviation (GA). In this section, GA is assumed to reference private jet charter flights instead of small training aircraft, which would require minimal eGSE support per turn.

EGSE load growth is low compared to electric aircraft due to smaller batteries and small numbers of daily flights. EGSE energy estimates include power for baggage and aircraft pushback tractors; belt loaders; lavatory service, refueling, deicing and catering trucks; portable aircraft stairs; ramp service vehicles; and electric service vans. Large hub airports, such as Los Angeles International Airport, have implemented zero-emission GSE transition policies to improve air quality, reduce greenhouse gas emissions and reduce noise for surrounding communities.¹⁶ Airlines and ground handlers operating at other airports have expressed the need for careful eGSE charging station placement and ground staff training to maximize the utility of this infrastructure.

¹⁶ Los Angeles World Airports, [Los Angeles International Airport \(LAX\) Zero-Emission Ground Support Equipment Policy](#), Jan. 5, 2024.

Tables 4.6 and 4.7 list the assumptions for eGSE supporting commercial aircraft and GA, respectively, covering the average number of vehicles used, battery capacity and usage rate.

TABLE 4.6 eGSE ASSUMPTIONS (COMMERCIAL AIRCRAFT)

Assumption	Value	Justification
Number of Powered eGSE Servicing Commercial Aircraft	6	GSE required per regional aircraft turn; omitting cargo tractors, deicing equipment and other shuttles
Average Battery Capacity (kWh)	33	Based on Airport Cooperative Research Program (ACRP) Research Report 236: Preparing Your Airport for Electric Aircraft and Hydrogen Technologies, which benchmarks 19 eGSE vehicles on the market, from tow tractor to towbarless tractor
Charges Per Aircraft Turn	0.17	Assuming eGSE can support six turns per charge ¹

¹ This is assumed to be achievable as manufacturers target vehicles for multiday operation. This manufacturer lists the range and efficiency as all-day or multiday operation for its tow tractor: <https://www.waevinc.com/all-new-lithium/>.

TABLE 4.7 eGSE ASSUMPTIONS (FBO COMMERCIAL)

Assumption	Value	Justification
Number of GSE Servicing Private Aircraft	3	Fewer GSE required – tug, baggage cart and potentially fueling truck with technology advances
Average Battery Capacity (kWh)	15	Smaller GSE with a lower range of capacities; equipment can range from 10 kWh/day baggage tugs ¹ to 22 kWh/day belt loaders ²
Charges Per Aircraft Turn	0.11	Assuming eGSE can support nine GA turns per charge

¹ Electric Power Research Institute, "[Heavy-Duty Vehicle Electrification and Its Impacts](#)" presentation, March 17, 2018.

² [Sage Parts Electric Power Conversion Kit](#)

Using these assumptions, the energy required per day is calculated as:

$$eGSE\ Energy = Number\ of\ GSE\ per\ turn * Battery\ Capacity\ (kWh) * turns\ per\ charge * flights\ per\ day$$

Infrastructure Requirements

EGSE infrastructure power is required for baggage and aircraft pushback tractors; belt loaders; lavatory service, refueling, deicing and catering trucks; portable aircraft stairs; ramp service vehicles; and electric service vans.

Figure 4.3¹⁷ depicts a typical charging arrangement for eGSE. Table 4.8 includes the SPI-specific projected load growth rate and charging system requirements for eGSE over 30 years.

¹⁷ Port of Seattle, "[Electric Ground Support Equipment \(EGSE\) Charging Stations](#)" presentation, July 28, 2020.

FIGURE 4.3 TYPICAL AIRPORT EGSE CHARGING STATION



TABLE 4.8 EGSE LOAD AND INFRASTRUCTURE GROWTH

Item	Year				
	2024	2029	2034	2044	2054
MWh/yr of Usage	0	42	111	180	250
MVA of Capacity	0	0.15	0.3	0.3	0.45
Number of eGSE Vehicles	0	10	17	23	23
Number of EV Chargers	0	5	9	12	12

As a small eGSE fleet, providing up to five chargers for 10 vehicles is conservative and would require up to 150 kilovolt-amperes (kVA) of new capacity. Conservatively, 300 kVA of charger capacity is allocated to eGSE infrastructure over 30 years, based on vehicle counts increasing over time by applying the same generous ratio of chargers and transformer capacity to the energy budget. However, the actual usage rates of eGSE charging may be very low. For this reason, the energy budget in Table 4.8 likely exceeds the charging requirements for SPI's low-usage environment. This also assumes that the eGSE chargers are specialized and dedicated to eGSE (i.e., they cannot also be used to charge fleet vehicles) and does not assume that batteries or charge management to reduce peak demand will be implemented.

Note that the eGSE assumptions in this section are conservative on a per-flight basis when scaled against larger reference airports. To further tailor the estimates of conversion opportunities for GSE to eGSE, track the annual fleet and individual GSE fuel consumption data at SPI to ensure the total use can be benchmarked. At the point of conversion to eGSE, survey each vehicle for its daily typical use to ensure the replacement electric unit can operate for at least one day (ideally more) without recharge. This should offer the best reference for the total equivalent MWh per year of new load to expect (assume the eGSE is at least as efficient as equivalent fuel use by conventional GSE).

To confirm the conservative nature of the above assumptions, note, for example, Seattle-Tacoma International Airport (SEA), which posted annual eGSE usage data in its scopes 1 and 2 emissions reports listing a range of

361 MWh in 2023 to 1,314 MWh/yr in 2018 of eGSE use. This is an airport that has conducted a multiphased transition to eGSE and has annual aircraft departures ranging from 134,106 (2020) to 196,355 (2019) per year. This is also based on daily average aircraft operations ranging from 370 to 1,410, based on publicly available data from 2019 to 2025.¹⁸ While the data does not necessarily include all eGSE energy because metering between SEA and airline operators may be obfuscating this data, this places the potential range of average per-turn energy use between 2 kWh and 7.5 kWh. In context, the estimate provided in this report conservatively places the per-turn kWh usage of eGSE combined at 33 kWh, based on six vehicles with an average battery size of 33 kWh each consuming 1/6 of its battery in each turn for commercial aircraft.

Electric Vehicles

Background

EV load growth, which is low in magnitude compared to electric aircraft, includes power for on-site rental cars, taxis, ride-hailing service pickups, short- and long-term parking vehicles and any future shuttle/bus.

Generally, EV load growth is long-duration charging for levels 1 or 2 charging cases or high turnover for DC fast charging cases. Charge management systems using networked chargers can limit the impact of EV charging peaks on distribution and charge management systems. However, they must be configured and managed by users and service providers, which adds operational and maintenance layers to managing charging systems.

The following assumptions were used as a basis for the power and energy required for EV charging:

- The chargers are assumed to be a mix of DC fast and Level 2 chargers.
- Most of the new chargers will be Level 2, but a limited number will be DC fast because of the greater cost for DC fast chargers.
- DC fast chargers will be provided for high turnaround users, such as short-term parking, rental car operators or fleet operators, when advanced planning was not possible.
- Level 2 will be provided for the majority of stalls.

Level 2 charging provides a full charge in 12 hours or less (overnight) and is generally sufficient for light-duty vehicles. Level 2 chargers are more likely to be networked and capable of engaging charge management to reduce the transformer capacity required and to reduce the peak demand charges while ensuring vehicles are charged by the time they are needed. This design goal is aligned with industry-standard practice at commercial locations, per a National Renewable Energy Laboratory (NREL) EV modeling report from 2018,¹⁹ particularly long-term airport parking lots. Level 1 chargers would generally only be used if the system capacity is heavily limited or when the upfront costs for Level 2 chargers exceed the budget.

Table 4.9 shows the percentage of the fleet to be electrified over time. This is an initial projection only and should be reviewed based on the stakeholders' actual operational needs. Generally, EV charging is forecasted to be a mix of fast charging and Level 2 charging. The differences in the charging standard and speeds are noted. A mix of chargers are considered as a starting point for the first set of charging stations for SPI. For example:

- up to two DC fast charger ports at 50 to 125 kW per port (three-phase, 480-volt [V] power)
- approximately 10 Level 2 ports ranging from 3.3 to 19.2 kW per port (208V power)

¹⁸ Port of Seattle. [Measuring Greenhouse Gas Emissions at Port of Seattle](#), [SEA Airport Scope 1 and 2 Emissions Inventory Data \(2023\)](#), [SEA Airport Statistics](#) and [SEA Activity Measures by Week: SEA Measures](#). U.S. Department of Transportation Bureau of Transportation Statistics. [TranStats report](#).

¹⁹ NREL, [Charging Electric Vehicles in Smart Cities: An EVI-Pro Analysis of Columbus, Ohio](#), February 2018. NREL models for work and public locations using Level 2 charging stations, p.19.

TABLE 4.9 ELECTRIFICATION ASSUMPTION

EV or Stall Count by Source	Number	Electrification Assumption
Shuttle/Bus – Fleet Size	0	No buses, no electrification
On-Site Rental Car – Fleet Size	40	Transitions to 50% electric by 2043 and 80% by 2054
Taxis & Ride-Hailing Pickups (Annual)	100	Not significant charging demand
Short-Term Parking Spots	40	Share DC fast charging capacity with SPI /rental fleet
Long-Term Parking Spots	520	50 stalls or about 10% of stalls electrified with Level 2 chargers by 2054, with usage and stall count increasing over time
Airport Fleet Vehicles (non-GSE)	24	Drive 5,000 miles per year and transition over time to EV

Table 4.10 summarizes the anticipated electrical peak power load growth, and **Table 4.11** provides the anticipated annual power consumption.

TABLE 4.10 EV POWER LOAD GROWTH

EV	2024 (Base)	2028	2034	2054
Peak Demand Load (MW)	0	0.45	1.2	1.65

TABLE 4.11 GROUND VEHICLE ENERGY CONSUMPTION (MWH/YEAR)

Vehicle Type	2025	2028	2029	2032	2033	2034	2043	2044	2054
SAA or Tenant Fleet	0	42.8	42.8	42.8	42.8	85.6	85.6	85.6	128.3
Car Rentals	0	268.9	268.9	268.9	268.9	537.8	537.8	537.8	806.7
Passengers	0	0	36.5	73	109.5	219	273.8	547.5	821.3
Total eVSE Energy	0	311.7	348.2	384.7	421.2	842.4	897.1	1,170.9	1,756.3

Public Vehicles and Rental Car Operators

For public visitors and rental car operators, the total number of parking stalls and overall fleet size (vehicles) were respectively used to estimate charging needs, as listed in Table 4.9. The electrification assumptions are stated in the table. SPI hosts no buses or shuttles. It has a rental car operator fleet of about 40 vehicles that is expected to grow linearly with commercial aircraft charging demand in 2034 and 2054, doubling to 80 vehicles in 2034 and tripling to 120 vehicles in 2054. It has a large parking area for short- and long-term parking. Initially, it is assumed that public charging is shared with the first round of SPI-installed fast chargers and Level 2 chargers for SAA fleet and rental car charging. However, it is eventually assumed that dedicated stall chargers are added for up to 10% of the total stalls.

Charger Assumptions

- The study team selected 10% of the stalls as an upper bound of parking spots, based on NREL modeling²⁰ and the practice followed by other airport parking plazas. San Diego International Airport, for example, built a plaza with a phased approach to charger installation, starting with 3.5% of its stalls.²¹

²⁰ U.S. Department of Energy, [Managed Charging Minimizes Costs in National Renewable Energy Laboratory's Parking Garage.](#)

²¹ [San Diego International Airport Terminal 1 Parking Plaza.](#)

- The planning loads are based on a conservative 10%, which provides flexibility to expand the charging footprint as EV adoption increases.

SAA Fleet

As of 2024, SAA's fleet consists of 24 vehicles that burn fossil fuels and whose date of purchase ranges from 1999 through 2021. These vehicles are used primarily to bring crews around the airport for maintenance or other operational activities. Their approximate mileage and efficiencies are captured in **Table 4.12**. Relative to most road vehicles, airport fleet vehicles are expected to drive 5,000 miles per year or less, which is substantially lower than the typical mileage for rental cars. EVs are anticipated to replace these vehicles incrementally based on wear, age and maintenance costs, with an end state of 24 vehicles.

TABLE 4.12 AIRPORT GROUND VEHICLE FLEET ASSUMPTIONS

Assumption	Value	Justifications																																																																																																																																																																																									
		<p>SAA provided the fleet inventory, included in Appendix D.</p> <p>The following data was provided to Hanson and its consulting team to assist with estimating energy projections:</p> <ol style="list-style-type: none"> Annual meter data per Phase II solar presentation, dated July 22, 2024, showing 2,086 MWh/year of usage not offset by solar Phase I. <table border="1"> <thead> <tr> <th colspan="2">SPI terminal meters</th> <th colspan="3">SPI Airport Energy Consumption 2023 Calendar Year</th> </tr> <tr> <th>#</th> <th>Acct #</th> <th>Meter #</th> <th>Account Description</th> <th>Annual kWh</th> <th>% of Total</th> </tr> </thead> <tbody> <tr><td>1</td><td>00043759 - 07612 6260</td><td>154368</td><td>Baggage claim, glass hall, 1st-2nd floor of Prairie-airlines, Subway, Admin</td><td>705,216</td><td>33.79%</td></tr> <tr><td>2</td><td>00043759 - 07612 0866</td><td>105991</td><td>1st-2nd floor/TSA/screening ckpoint, basement</td><td>658,752</td><td>31.57%</td></tr> <tr><td>3</td><td>00043776 - 07612 0860</td><td>139877</td><td>Electric vault (airfield lighting)</td><td>223,920</td><td>10.73%</td></tr> <tr><td>4</td><td>00043778 - 07612 0864</td><td>105987</td><td>1st floor (rental space) (old St Police)</td><td>216,080</td><td>10.35%</td></tr> <tr><td>5</td><td>00043989 - 07612 6060</td><td>191701</td><td>Trans closure under beacon (parking lot)</td><td>93,024</td><td>4.46%</td></tr> <tr><td>6</td><td>00043965 - 07612 5730</td><td>127725</td><td>New Maintenance building</td><td>77,040</td><td>3.69%</td></tr> <tr><td>7</td><td>00043780 - 07612 0930</td><td>199392</td><td>Parking lot lts N. Quad & ramp lights</td><td>24,960</td><td>1.20%</td></tr> <tr><td>8</td><td>00043894 - 07612 4232</td><td>199391</td><td>S Quad Charlie Ramp - Fuel Farm/Ramp Lighting</td><td>19,200</td><td>0.92%</td></tr> <tr><td>9</td><td>00043789 - 07612 1140</td><td>198381</td><td>Street lights N. Airport Drive</td><td>17,176</td><td>0.82%</td></tr> <tr><td>10</td><td>00043759 - 07612 0862</td><td>105992</td><td>2nd floor rental space</td><td>14,800</td><td>0.71%</td></tr> <tr><td>11</td><td>00043893 - 07612 4230</td><td>198323</td><td>S. Quadrant Charlie Ramp - B Row</td><td>14,350</td><td>0.69%</td></tr> <tr><td>12</td><td>00225434 - 81644 5493</td><td>155748</td><td>McClelland's parking lot</td><td>7,308</td><td>0.35%</td></tr> <tr><td>13</td><td>00188393 - 81643 9133</td><td>151347</td><td>M HM-M Row</td><td>2,488</td><td>0.12%</td></tr> <tr><td>14</td><td>00188393 - 81640 5996</td><td>194092</td><td>L Row</td><td>1,465</td><td>0.07%</td></tr> <tr><td>15</td><td>00188393 - 81643 9013</td><td>151697</td><td>N HM-N Row</td><td>1,412</td><td>0.07%</td></tr> <tr><td>16</td><td>00043899 - 07612 4240</td><td>195123</td><td>S. Quadrant Charlie Ramp - D Row</td><td>864</td><td>0.04%</td></tr> <tr><td>17</td><td>00043904 - 07612 4250</td><td>195135</td><td>S. Quadrant Charlie Ramp - E Row</td><td>851</td><td>0.04%</td></tr> <tr><td>18</td><td>00188393 - 81640 5958</td><td>195113</td><td>K Row</td><td>844</td><td>0.04%</td></tr> <tr><td>19</td><td>00188393 - 81640 6913</td><td>195114</td><td>H Row</td><td>828</td><td>0.04%</td></tr> <tr><td>20</td><td>00188393 - 81640 5920</td><td>195081</td><td>I Row</td><td>815</td><td>0.04%</td></tr> <tr><td>21</td><td>00043909 - 07612 4260</td><td>195023</td><td>S. Quadrant Charlie Ramp - F Row</td><td>799</td><td>0.04%</td></tr> <tr><td>22</td><td>00043837 - 07612 4036</td><td>194083</td><td>S. 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Quad & ramp lights	24,960	1.20%	8	00043894 - 07612 4232	199391	S Quad Charlie Ramp - Fuel Farm/Ramp Lighting	19,200	0.92%	9	00043789 - 07612 1140	198381	Street lights N. Airport Drive	17,176	0.82%	10	00043759 - 07612 0862	105992	2nd floor rental space	14,800	0.71%	11	00043893 - 07612 4230	198323	S. Quadrant Charlie Ramp - B Row	14,350	0.69%	12	00225434 - 81644 5493	155748	McClelland's parking lot	7,308	0.35%	13	00188393 - 81643 9133	151347	M HM-M Row	2,488	0.12%	14	00188393 - 81640 5996	194092	L Row	1,465	0.07%	15	00188393 - 81643 9013	151697	N HM-N Row	1,412	0.07%	16	00043899 - 07612 4240	195123	S. Quadrant Charlie Ramp - D Row	864	0.04%	17	00043904 - 07612 4250	195135	S. Quadrant Charlie Ramp - E Row	851	0.04%	18	00188393 - 81640 5958	195113	K Row	844	0.04%	19	00188393 - 81640 6913	195114	H Row	828	0.04%	20	00188393 - 81640 5920	195081	I Row	815	0.04%	21	00043909 - 07612 4260	195023	S. Quadrant Charlie Ramp - F Row	799	0.04%	22	00043837 - 07612 4036	194083	S. Quadrant Charlie Ramp - A Row	775	0.04%	23	00188393 - 81640 5935	195037	J Row	763	0.04%	24	00188393 - 81640 5947	195088	T-Hangar K 128	757	0.04%	25	00225434 - 81643 3673	154435	Runway 22 - Wind Socks	751	0.04%	26	00188393 - 81640 5980	195027	G Row	723	0.03%	27	00188393 - 81640 5945	195066	T-Hangar K 127	453	0.02%	28	00225434 - 04458 1778	153934	Runway 4 - Wind Socks	417	0.02%	Totals				2,086,831	100.00%
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		<p>Appendix C includes the photos and descriptions of key SPI transformers near terminal buildings, the fuel farm and FAA vaults. The photos and data were collected during a May 2025 site visit.</p> <p>SPI Terminal South: U2133 – 300 kVA</p> <p>The south-side service entrance power is supplied by a CWLP 300 kVA, 12.5 kilovolt (kV) to 208/120V, three-phase (3f) pad mount transformer: U2133, as shown in Figure C.1. This transformer feeds a 1,200-ampere (A), 208/120V, 3f switchboard in the electrical closet on the south side of the facility.</p> <p>SPI Terminal North and Northeast: U2133 and U1855 – 300 kVA</p> <p>The second transformer on the northeast side of the terminal is also a CWLP 300 kVA, 12.5 kV to 208/120V, 3f pad mount transformer: U1886, as shown in Figure C.2. This transformer feeds two 600A, 208/120V, 3f panelboards in the northeast side equipment room through two CWLP meter loops.</p> <p>The third service entrance transformer is a CWLP 300 kVA, 12.5 kV to 480/277V, 3f pad mount transformer: U6173, as shown in Figure C.2. This transformer feeds an 800A, 480/277V, 3f switchboard through an automatic transfer switch (ATS) in the basement of the north side of the facility. The ATS connects to a Caterpillar DG250 250kW/313 kVA,</p>																																																																																																																																																																																									

		<p>480/277V, 3f, natural gas-fired generator set adjacent to Transformer U6173, providing emergency power to the terminal air conditioning, passenger boarding bridges, elevator and general power and lighting loads.</p> <p>FAA Vault and Airfield Lighting: U1966</p> <p>In addition to the terminal facility power distribution, the airfield lighting vault has a CWLP 500 kVA, 12.5 kV to 480/277V, 3f pad mount transformer to a 600A, 480/277V, 3f main disconnect switch. This is a critical service, and power is backed up through an ATS connected to a Caterpillar SR-4 210kW/263 kVA, 480/277V, 3f generator.</p> <p>SPI Fuel Farm: U5724</p> <p>The airport fuel storage and pumping station, another critical load, is served by a CWLP 150 kVA, 12.5 kV to 480/277V, 3f pad mount transformer: U5724. This transformer feeds a 225A, 480/277V, 3f main switchboard and distribution.</p> <p>Appendix D: While several of these vehicle types do not have a clear roadmap to an electric alternative, this long-term analysis conservatively assumes each vehicle will transition to electric.¹</p>
Mileage/vehicle	5,000 miles	Mileage may be closer to 2,500 miles, but conservative estimate if the vehicles travel beyond SPI
Energy Transfer Efficiency	85%	Average grid to battery efficiency
Energy Consumption Efficiency	3.3 miles per kWh	Based on average U.S. EVs ²

¹ This inventory includes commercial vans, medium/heavy duty trucks, light pickup trucks and SUVs. A separate zero-emission fleet study could identify alternatives, but with SPI's relatively small fleet, this assumption of transitioning all vehicles to electric has minimal impact on the overall load growth. The energy consumption efficiency factor also reflects a transition to smaller vehicles, which may occur as operational needs evolve.

² InsideEVs, ["2024 U.S. Electric Cars Listed From Lowest to Highest Energy Consumption"](#), Feb. 26, 2024.

Rental Vehicles

Rental vehicles follow similar assumptions as for the airport fleet, with the key differences being in vehicle mileage (four times greater, at 20,000 miles) and a slightly higher energy consumption efficiency at 3.5 miles per kWh. This higher efficiency is based on an assumed rental fleet of lighter passenger vehicles on average compared to the airport fleet's heavier work vehicles; see **Table 4.13**. The growth in car rentals is expected to scale linearly with commercial aircraft movements. This vehicle growth and corresponding energy demand is assumed to be double the baseline in 2034 and triple in 2054. By 2054, 120 EVs are anticipated, based on a 2024 baseline of 40 vehicles.

TABLE 4.13 CAR RENTAL ENERGY ASSUMPTIONS

Assumption	Value	Justification
Rental vehicles per year	40 vehicles	Provided by SPI
Mileage / vehicle	20,000 miles	Average airport rental car mileage
Energy Transfer Efficiency	85%	Average grid to battery efficiency
Energy Consumption Efficiency	3.5 mi/kWh	Based on average US EVs ¹

¹ InsideEVs, ["2024 U.S. Electric Cars Listed From Lowest to Highest Energy Consumption"](#), Feb. 26, 2024.

Passenger Vehicles

Passenger EV energy consumption depends on the infrastructure in parking lots' charging stalls. The analysis assumes Level 2 chargers, consistent with the infrastructure available at peer airports. The following tables list the assumptions for these passenger EV energy models, based on growth rates across forecasted years. This total energy is ultimately the product of the energy per stall multiplied by the count of stalls multiplied by utilization.

Per **Table 4.14**, the average SPI charging stall energy is assumed to be 40 kWh in 2025, rising to 60 in 2054. This figure is based on about two charging sessions per stall. In the base year, the sample vehicle is an average sedan (Nissan Leaf) with a 40kWh battery, which is assumed to increase its state of charge by about 50%. **Table 4.15** shows the assumed use of the charging stalls. The number of charging stalls is expected to reach 50 in 30 years, with an average 75% use rate, as shown in **Table 4.16**.

TABLE 4.14 STALL ENERGY CONSUMPTION ASSUMPTIONS

Start Year	2025	2043	2054
Average Charging Stall Energy Consumption (kWh/Stall/Day)	40	50	60

TABLE 4.15 CHARGING STALL USE ASSUMPTIONS

Start Year	2025	2032	2033
Use Rate of Charging Stalls	25%	50%	75%

TABLE 4.16 CHARGING STALL ASSUMPTIONS

Start Year	2029	2034	2044	2054
Charging Stall Count	10	20	40	50

EV infrastructure needs are based on the airport fleet, rental cars and passenger vehicle charging requirements. From a space planning perspective, DC fast chargers require more space than Level 2 chargers; see **Figure 4.4**. Standard vehicle chargers for commercial applications are most typically Level 2 chargers. These chargers typically serve one or up to a few vehicles per day, depending on whether each user moves the vehicle after the charge session is completed. In contrast, DC Fast chargers require additional space, more electrical capacity, and are suited for high-turnover applications. They can host many vehicles per day and are often utilized at a high rate.

FIGURE 4.4 STANDARD VEHICLE CHARGERS



DC fast charger









Level 2 charger

Charging Standards

Refer to **Table 4.17** for a general summary of charging standards. Note that North American Charging Standard (NACS) connectors are the standard connector type for most major manufacturers as of 2025 and are expected to replace combined charging system (CCS) and CHAdeMO connectors for most vehicles.

TABLE 4.17 EV CHARGING STANDARDS AND SPEEDS

	Alternating Current (AC) Level 1	AC Level 2	DC Fast Chargers
Connector Type	 J1772 connector	 J1772 connector  J3400 (NACS) connector (previously limited to Tesla vehicles)	 CCS connector  CHAdeMO connector  J3400 (NACS) connector
Voltage	120V AC	208-240V AC	400-1,000 V DC
Typical Power Output	1 kW	7-19 kW	50-350 kW (1 MW in future)
Estimated Battery EV Charge Time From Empty	40-50 hours	4-10 hours	20 minute-1 hour
Estimated Range Added Per Hour (Light-Duty Vehicles)	2-5 miles	10-20 miles	180-240 miles
Typical Unit Cost	\$300-\$1,500	\$500-\$10,000	\$10,000-\$80,000

Electric Aircraft

Background

SPI primarily serves regional jets, mid-sized commercial aircraft, private jets and other GA aircraft. Future electric aircraft will require high-voltage DC charging at rates above 1 MVA, meaning peak loads will be concentrated in short time windows. ECTOL and eVTOL aircraft are likely to drive substantial electrical demand growth through 2054.

However, as a regional airport, these peak loads are expected to mirror the regional flight schedule. SPI has two daily flights to and from Chicago. SPI also has flights to other destinations with larger aircraft that are not anticipated to transition to electric or hybrid in the near future. Increasing the regional service frequency has been assumed into the future. Given the short, infrequent peaks associated with such a schedule, SPI should strongly consider a BESS in parallel with CWLP upgrades. The role of a BESS is discussed in Section 4.7.

This section forecasts the load growth and energy consumption for eVTOL and hybrid eCTOL aircraft. These aircraft are segmented by their types of operation (e.g., commercial airline travel and private travel, whether GA or corporate). The daily energy consumption for these aircraft is captured based on the type of aircraft, number of

daily movements and battery capacity. **Table 4.18** captures the estimated battery capacity for each of these types of movements, along with the representative aircraft used for load forecasting.

TABLE 4.18 BATTERY CAPACITY (MWh) BY OPERATIONS CATEGORY AND AIRCRAFT TYPE (EXAMPLE OEM)

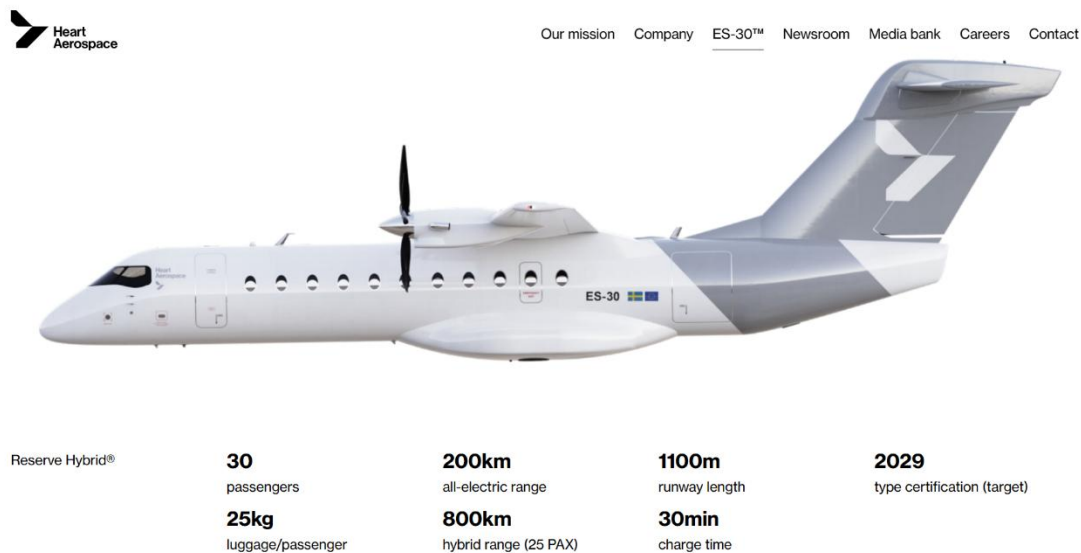
Operations Type	eCTOL	eVTOL
FBO Commercial	0.3 MWh (Pipistrel, two-seat)	0.3 MWh (Joby, three-seat)
SPI Commercial Airline	1 MWh (Heart Aerospace, 30-seat)	0.3 MWh (Joby, three-seat)

This classification of operation types, among other assumptions in this report, are based on ACRP Research Report 236.²²

For eVTOL aircraft, this analysis assumes a 0.3MWh battery capacity charging in one hour. The flights per day is based on coordination with AAM manufactures, which also notes a slower charging speed required for the smaller batteries serving these smaller aircraft. ECTOL private aircraft, such as Pipistrel’s small Alpha Trainer,²³ similarly have a 0.3 MWh battery.

For the larger eCTOL commercial aircraft, this analysis conservatively assumes that they enter the market as hybrid jets, with larger batteries than eVTOLs, to replace daily regional aircraft flights. This analysis is based on the hybrid-electric Heart Aerospace batteries performing a short turnaround.²⁴ A 30-minute turn with a 3 MW charger would be expected to substantially charge a 1 MWh battery. When operating in hybrid mode using electric and then gas turbine engines to extend range), this charge could provide up to 800 kilometers/500 miles of range or 200 kilometers/125 miles in all-electric.²⁵ **Figure 4.5** shows the specifications for Heart Aerospace’s ES-30 used in the analysis. Since the electric and gas turbine engines operate separately, they do not recharge

FIGURE 4.5 HEART AEROSPACE HYBRID ELECTRIC AIRCRAFT SPECIFICATIONS



²² <https://nap.nationalacademies.org/catalog/26512/preparing-your-airport-for-electric-aircraft-and-hydrogen-technologies>

²³ <https://www.pipistrel-aircraft.com/products/alpha-trainer/>

²⁴ <https://heartaerospace.com/es-30/>

²⁵ A detailed turnaround analysis (i.e., the durations aircraft are charged and the resulting range enabled) is beyond the scope of this effort. While this aircraft range will drive operations, it will not impact the peak power output, as required to plan for infrastructure.

the batteries during flight. The ability to recharge in flight technology is under development by certain researchers²⁶

The following eVTOL and eCTOL tables capture the daily aircraft operations, peak hour operations and demand for electricity and hydrogen. These tables are extracted from the AAM chapter. **Table 4.19** references battery-electric and hydrogen-electric aircraft. **Table 4.20** references regional eCTOL and hybrid-electric CTOL operations.

TABLE 4.19 SPI eVTOL (ELECTRIC AND HYDROGEN) FORECAST

Operations Type	2032 (Baseline)	2034 (Year 2)	2044 (Year 12)	2054 (Year 22)
FBO Commercial Movements/Day	2	4	8	11
SPI Commercial Movements/Day	3	6	12	17
Peak Hour Movements/Day	1.10	1.50	1.80	2.30
Peak Hour Electrical Demand	1 MW	2 MW	3 MW	4 MW
Peak Hour Hydrogen Demand ¹	100 kilogram (kg)	100 kg	360 kg	400 kg

¹ While hydrogen demand is in these tables per the AAM study, it is not evaluated in this effort. Hydrogen holds promise in supporting airports' long-term decarbonization efforts. The sector has faced challenges in aircraft production, with Universal Hydrogen's bankruptcy in 2024 and a delay in Airbus' ZeroE program in 2025. The U.S. Department of Energy's hydrogen hubs initiative aims to develop seven regional ecosystems of shared hydrogen users to scale the nascent supply chain. Long-haul aircraft are expected to eventually require hydrogen as a novel propulsion, given the limitations of battery density. Aside from aircraft, hydrogen pilots for ground vehicles and equipment such as ground power units can support airports in developing capabilities for hydrogen transport, storage and fueling. As discussed in the SPI AAM study, if hydrogen infrastructure is required, an additional detailed analysis should be conducted to determine the appropriate infrastructure for SPI.

TABLE 4.20 SPI GENERAL AVIATION eCTOL (ELECTRIC-ONLY) FORECAST

Operation Type	2032 (Baseline)	2034 (Year 2)	2044 (Year 12)	2054 (Year 22)
GA Operations	6	10	14	16
Peak Hour Operations	1.60	2	2.60	3
Peak Hour Electrical Demand	1 MW	2 MW	3 MW	4 MW

As a conservative estimate, aircraft are assumed to recharge fully at each aircraft turn. Conservatively, for planning, the daily energy consumption of each operation type is assumed to be the battery capacity multiplied by the number of movements per day. In practice, their state of charge (percent of battery remaining) may range from 20% to 80% capacity at landing and takeoff, respectively. **Table 4.21** shows a projection of the annual energy consumption between eVTOL and eCTOL aircraft, based on the AAM chapter.

²⁶ Article noting in-flight recharge as a research goal for hybrid helicopter. [Airbus unveils its DisruptiveLab to test new decarbonisation focused technologies | Airbus](#)

TABLE 4.21 SPI eCTOL (ELECTRIC AND HYDROGEN) FORECAST

Operations Type	2032 (Baseline)	2034 (Year 2)	2044 (Year 12)	2054 (Year 22)
FBO Commercial Operations	2	6	10	12
SPI Commercial Operations	3	8	13	18
Peak Hour Operations	1.10	1.60	2	2.40
Peak Hour Electrical Demand	3 MW	6 MW	6 MW	9 MW
Peak Hour Hydrogen Demand	60 kg	660 kg	660 kg	1,320 kg

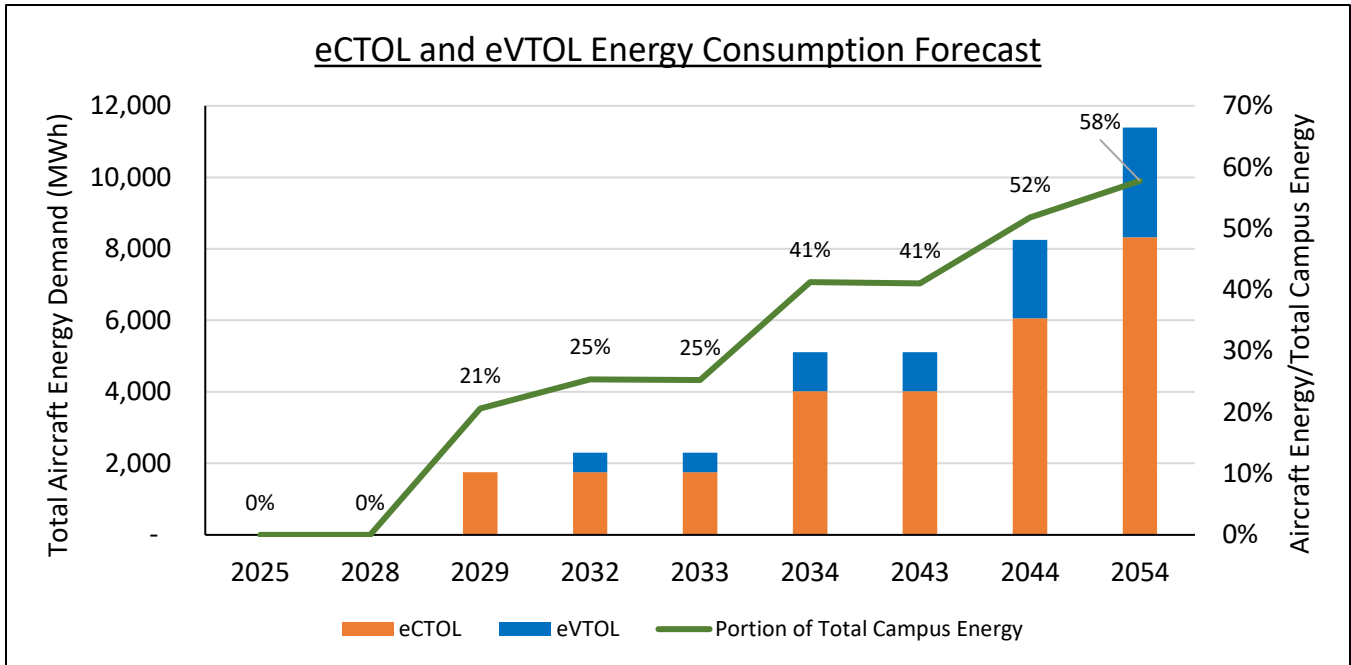
The load growth corresponding to electric aircraft is captured in **Table 4.22**.

TABLE 4.22 FORECASTED ANNUAL AIRCRAFT ENERGY CONSUMPTION (MWh) RELATIVE TO CAMPUS DEMANDS

Aircraft Type	2025	2028	2029	2032	2033	2034	2043	2044	2054
eVTOL	-	-	-	548	548	1,095	1,095	2,190	3,066
eCTOL	-	-	1,752	1,752	1,752	4,015	4,015	6,059	8,322
Gross Aircraft Energy Usage (MWh/Year)	-	-	1,752	2,300	2,300	5,110	5,110	8,249	11,388
Portion of Total Campus Energy	0%	0%	21%	25%	25%	41%	41%	52%	58%

Figure 4.6 highlights that as eCTOL movements grow, they represent an increasingly larger share of total campus demands. These aircraft energy needs correspond to just 20% in 2029, growing to nearly 60%, or about 10 MWh annually, by 2054.

FIGURE 4.6 eCTOL AND eVTOL ENERGY CONSUMPTION FORECAST



Infrastructure Requirements

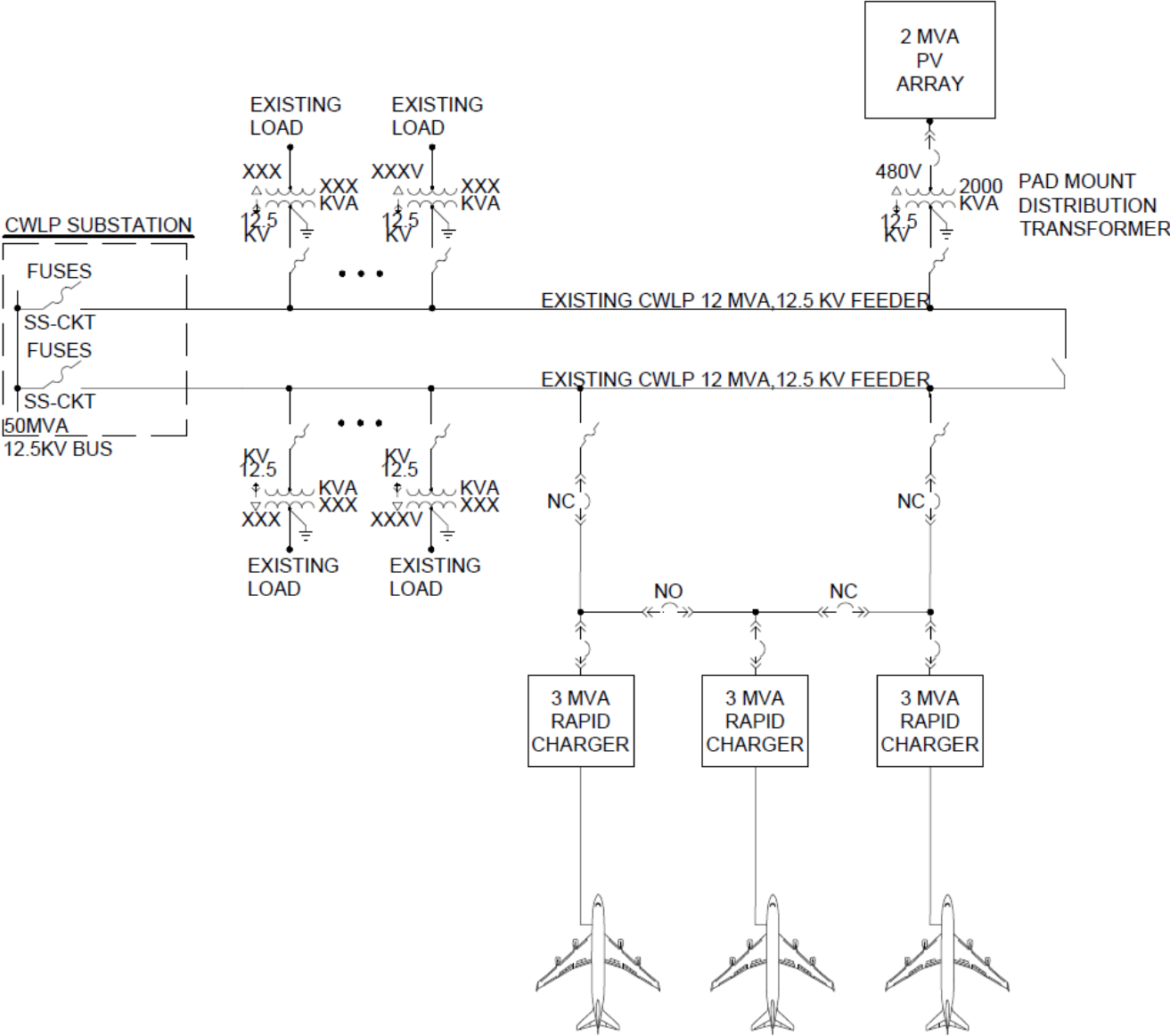
The electric aircraft market is nascent, with commercial eCTOL aircraft yet to be certified in the U.S. With this information about aircraft availability, the hybrid eCTOL scenario is representative of expected near-term loads at SPI. SPI will need infrastructure to support two ultrafast chargers of 3 MW each to charge two aircraft simultaneously. These charging stations will need one additional charging point to allow for maintenance and equipment failure. If fully electric regional aircraft enter the market, it is assumed that the energy required would increase substantially, from up to 3 MW to 10 MW per aircraft via ultra-fast chargers. Under these conditions, the potential impact to peak demand would substantially increase the peak demand and SPI’s campus energy demand.

For hybrid electric aircraft ultra-fast chargers, the following assumptions were made:

- charging time: 30-minute window
- power output: 1–10 MW per aircraft; 3 MW nominal used
- charging session duration: 30 minutes
- charging efficiency: about 95% (5% conversion losses)
- peak ultra-fast charging demand occurs during aircraft turnaround times
- number of aircraft charged: initially, one aircraft at three times a day; later, four (two at twice a day)

There are two alternatives to providing this near-term infrastructure: directly connect the charging systems to the CWLP grid and connect the charging systems to a BESS, which connects to the CWLP grid. The first alternative would cost less but be limited to two 3 MVA aircraft charging stations. These two stations would consume two-thirds of the remaining CWLP power grid; see **Figure 4.7**. It also would have a demand factor to the grid of less than 10%, which most likely would generate severe demand penalties by CWLP by not meeting the required minimum demand load factor of 50%.

FIGURE 4.7 ALTERNATIVE 1 – UTILITY AIRCRAFT RAPID CHARGING (N+1) CONCEPT ONE-LINE DIAGRAM



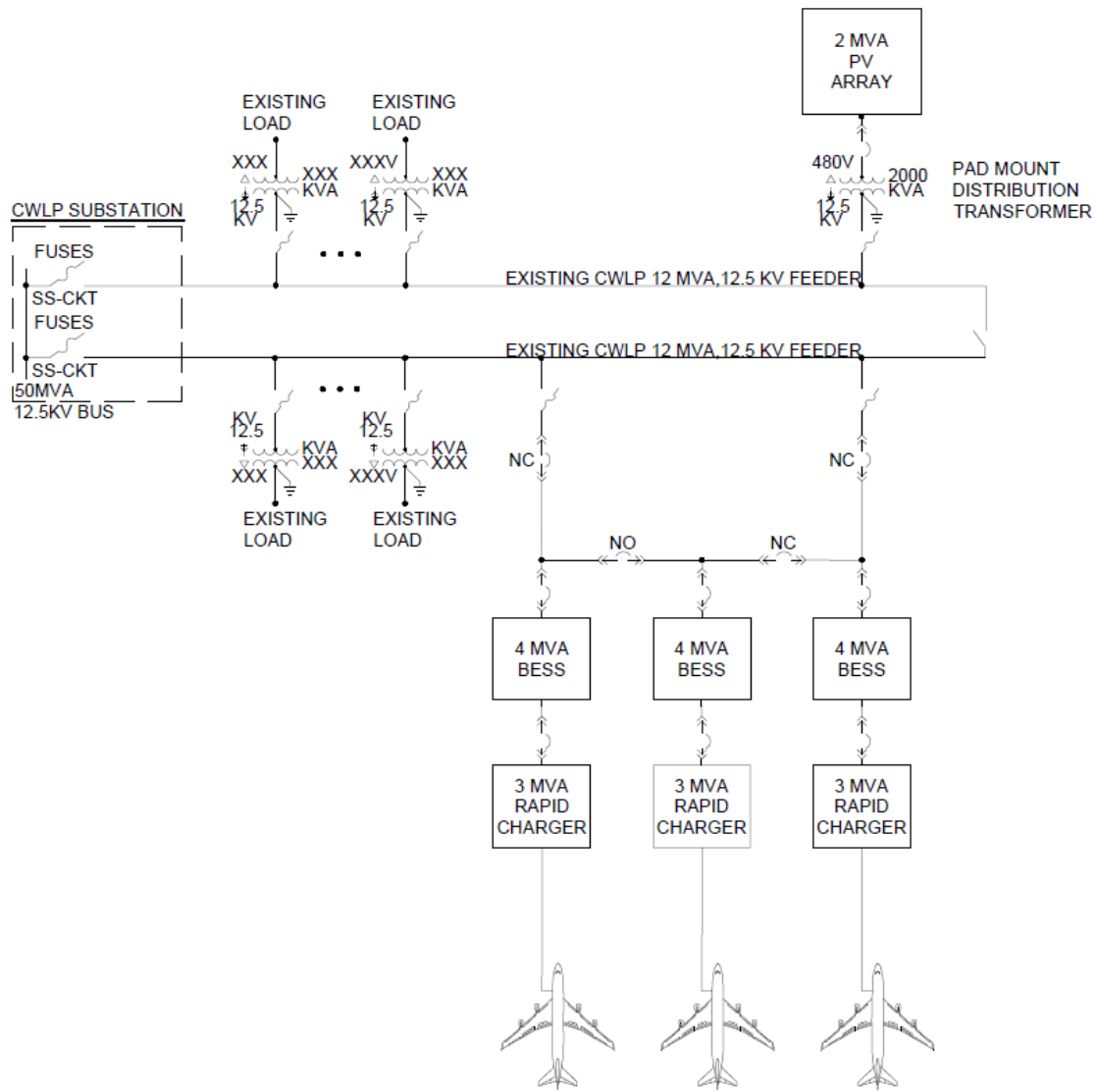
The second approach is to use a 4 MVA BESS for each charging station. This BESS would charge from the CWLP grid over a longer period, maintaining a 50% load factor. It would capture cost savings by charging during off-peak hours; see **Figure 4.8**. This eliminates demand factor penalties while allowing for additional aircraft charging stations without CWLP grid expansion.

Generally, it is recommended to use an N+1 configuration for critical infrastructure. This means that the first charger ($n = 1$) needs at least two BESS (1+1) to allow duty and standby for installation maintenance. When a second set of chargers is required, retaining N+1 redundancy requires adding a third BESS (two duty plus one standby) and so on for each charger added. This single line in the figure does not directly show the backup BESS, because it is highly conceptual in nature.

For planning purposes, it was assumed that ultrafast chargers would require more substantial upgrades to the electrical system at SPI, requiring at least feeder upgrades and more likely requiring a new 138 kV substation, if the peak charging power is to be delivered directly from the grid rather than through a battery that is recharged between flights.

A planning takeaway for a fully electric eCTOL scenario: Fully electric eCTOLs likely require substantial CWLP investment and/or substantial additional battery capacity to support high-peak, short-duration charging demands. This is because the aircraft must charge within 30 minutes using three charging stations at 10 MW, pushing the peak demand potential beyond the capacity of the CWLP substations to support peak demand.

FIGURE 4.8 ALTERNATIVE 2 – UTILITY TO BESS AIRCRAFT RAPID CHARGING (N+1) CONCEPT ONE-LINE DIAGRAM



Facility Buildings

Background

Building loads represent nearly all of the baseline annual energy use at SPI. Building loads were assumed to be fixed in general for the purpose of this study. Per CWLP, buildings are the majority of the connected load and are concentrated in a few areas: west (the FAA air traffic control tower [ATCT] and airfield electrical vault), north (safety, fire, existing solar), east (terminal operations and other tenants) and south (fuel and hangars).

The combined building loads between SPI's airport loads and all tenants is estimated to be about 6.52 GWh per year. Meter data was available for the SPI terminal (1.59 GWh per year). Data was also available for 0.49 GWh per year of additional loads, based on information provided to the study team supporting Phase II solar (refer to Appendix B). Standard Aero appears to be the largest user (4.43 GWh per year), followed by SPI itself (1.59 GWh per year). The loads from other buildings and the FAA comprise the remaining loads provided to the study team for inclusion in this analysis.

It is unlikely that electrification would directly increase the building loads. Therefore, the building loads were not considered a significant element in this study, beyond being used to establish the baseline energy and power consumption. If however, the airport were to make the strategic decision to electrify loads currently serviced by natural gas, it is worth noting that these end-loads would require additional electric capacity. This could be considered directly under a future study as needed if the airport were to engage in a future energy management plan.

Estimating Standard Aero Loads From Solar Phase I Production

Phase I of the solar installation is in operation. The analysis for the offset provided by this is based on the forecasted annual generation of 4.2 GWh per year, with 2.88 MW peak power available.²⁷ Standard Aero's loads were estimated based on assuming that 90% of the connected loads of SPI and Standard Aero would be offset by solar. Based on the project dashboard data, 95% of the energy used in this period went to Standard Aero meters. These were used to estimate the energy consumed per year by Standard Aero as 95% of energy used per year divided by 90% of energy used, offset by solar generation, which means the annual usage is 4.43 GWh.

The calculation of 4.2 GWh per year total PV generation multiplied by 95% allocation to Standard Aero divided by 90% offset of usage equals 4.43 GWh per year is assumed as Standard Aero's annual consumption at baseline.

Key Buildings - Airport Terminal

The SPI terminal, airfield lighting vault and safety facilities are not anticipated to have any significant growth, based on an analysis of annual energy use over five years.

Industrial, Illinois Air National Guard and Other Loads

Generally, no changes were considered to these or other loads not driven by electrification and are not calculated in this load growth portion of the study.

Therefore, in our projection, the industrial loads of Standard Aero and Stellar Aviation are anticipated to remain constant, with Standard Aero continuing to be offset by the existing PV arrays. The Airport Commerce Park development of 180 acres for office, distribution, warehouse, light industrial and commercial facilities will add to the growth.

²⁷ Aviation Pros, ["2024 Airport Business Project of the Year: SPI Invests in Solar"](#), Feb. 13, 2024.

This consistency was also assumed for the Illinois Air National Guard (IANG). The team was not provided direct information on the IANG’s long-term plans. CWLP provides electrical service to the IANG separately from SPI; therefore, this analysis excludes the IANG’s loads. However, the IANG may expand its cyber mission, which would lead to additional load for new network operation center equipment.

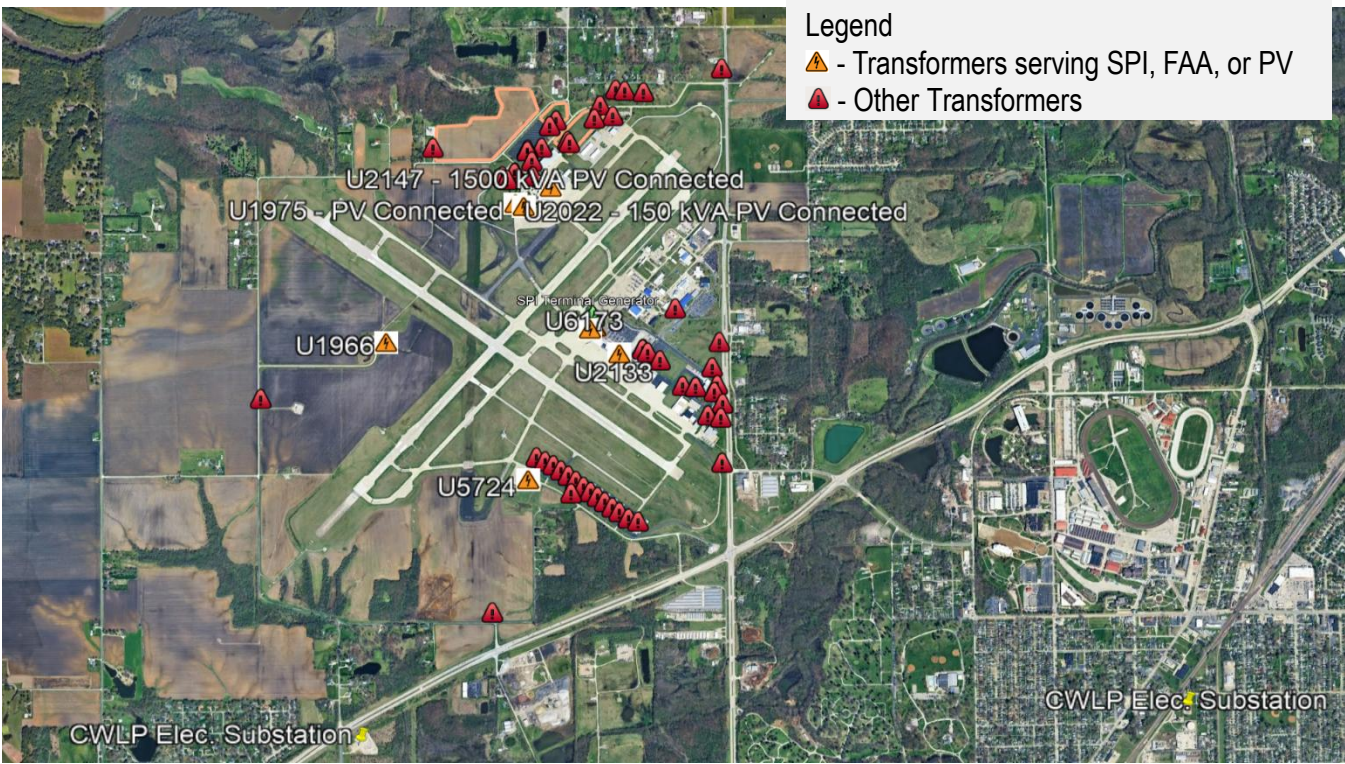
Future Facility Loads

While not in the scope of this study, it is understood that future facility expansions could likely plan to add future PV via net-metering as a repeatable process with at least two caveats. First, serving new loads via PV or other on-site energy generators would require confirmation from CWLP that net-metering remains viable at the given location based on feeder capacity or other potential CWLP system restrictions. Second, it would need to be confirmed that the cost of delivering new on-site energy is still less expensive than utility power. Current PV phases were contracted while benefiting from sunseting solar tax credits.

4.6. Electrical System

The SPI electrical distribution system consists of medium-voltage utility power distribution and low-voltage facility power distribution for air operations, air terminal operations, ground support operations, commercial, industrial and hangar tenants. **Figure 4.9** shows the two main CWLP substations (yellow pins) that service SPI, along with key transformers (orange) connected to PV systems or serving SPI and FAA loads. There are numerous other transformers (red) throughout the site that are also connected to CWLP’s distribution system.

FIGURE 4.9 OVERVIEW OF KEY ELECTRICAL INFRASTRUCTURE AT SPI



The Phase I PV systems support net metering for some of SPI’s operational buildings, ground support operations (including the fire station) and industrial tenant Standard Aero. The planned Phase II PV system could provide

most of the power for the remaining airport authority buildings or tenants (red transformers) through net metering. The underground utility power distribution system also supports some residential areas adjacent to the airport.

A goal of the electrical distribution is to provide reliable, safe, adequately sized and cost-effective service to each end use. To meet the reliability goals, the infrastructure should aim to have diverse sources of power, either via multiple diverse sources from the grid or from energy stored or generated on-site (batteries, generators, PV systems). To meet the safety and size goals, the infrastructure should have sufficient capacity to meet the coincident peak loads of all end users (the main feeders, upstream substations and connected transformers should be adequately sized to support the connected loads). To meet the cost-effective goals, the infrastructure is expected to be developed in a coordinated, planned fashion to balance the capital costs with future needs. Typically, this means that the infrastructure is developed incrementally to avoid having oversized, underused infrastructure years before the loads are connected to the grid.

Utility Medium Voltage Service

CWLP's power distribution infrastructure consists of a 12 MVA, 12.5 kV loop feeder from CWLP's 138 kV to 12.5 kV substations off-site. The feeder loop uses overhead distribution from the substation to the airport perimeter and between the main airport facility and industrial/residential area and underground in the vicinity of the airfield. The loop is segmented into two zones. For each zone, pad-mounted transformers are connected at 12.5 or 7.2 kV. The quantity of transformers served by each zone, southwest (SW) and southeast (SE), is summarized below based on voltage and quantity:

- SW feeder
 - 13 three-phase, 12.5 kV transformers
 - 14 single-phase, 7.2 kV transformers
- SE feeder
 - seven three-phase, 12.5 kV transformers
 - 47 single-phase, 7.2 kV transformers

The FAA radar facility on the north side of the airport campus is served by the Ameren Illinois electric utility company, connected to a separate distribution system that is distinct from the rest of the airport.

For additional information regarding the feeders and distribution system, contact CWLP, the owner and manager of the system, and refer to the detailed information associated with it.

As a critical utility, the airport receives highly reliable service from CWLP. The looped feeder system served by the diverse transmission substations provides redundancy and reliability at the medium voltage level. As qualitatively, because of this configuration, this service can be considered adequately reliable. Quantitatively, CWLP notes that no outages in the past 10 years have been longer than 1.5 hours.

Required and Emergency Power Systems

SPI provides the required power system to maintain National Airspace System (NAS) safety and critical operations, including the airfield lighting vault generator. An emergency generator at the terminal powers one elevator, critical systems and other facility loads. The generator is low-voltage, dedicated to critical and emergency operations and not configured to back-feed to the grid to form a microgrid. A 45 kW emergency generator at the fire crash rescue facility is also facility-dedicated and not configured to back-feed to the grid.

The FAA maintains required generators for the ATCT and airport radar system that are facility-dedicated and required to maintain NAS safety and critical operations.

Distribution Service

The SPI facilities, as mapped in the prior section, are served by multiple CWLP transmission substations. The transformers identified and tabulated in this section are the limited number of key transformers serving significant loads or functions. **Table 4.23** summarizes the key transformers. For additional details and photos of these transformers, refer to Appendix C.

TABLE 4.23 KEY TRANSFORMERS SERVING SPI, FAA OR CONNECTED TO PV

Transformer Location	Connected to PV	CWLP Tag	Capacity	Peak
Terminal South (Near Parking)	Yes Phase 2	U2133	300 kVA	155 kW
Terminal Northeast (Near Generator)	Yes Phase 2	U1886	300 kVA	160 kW
Terminal North (Near Passenger Bridge)	Yes Phase 2	U6173	300 kVA	170 kW
Airfield Lighting/FAA	Yes Phase 2	U1966	500 kVA	Unknown
SPI Fuel Farm	Yes Phase 2	U5172	150 kVA	Unknown
Standard Aero	Yes Phase 1	U2147	1,500 kVA	Unknown
SPI North	Yes Phase 1	U2022/U1975	150 kVA/Unknown	Unknown

Pad-mounted transformers power SPI facility operations and tenants. Notably, the Standard Aero transformer (1,500 kVA) is connected to the nearby Phase I PV system. The power distribution at the terminal includes three service entrances: one on the south side and two on the north side. The SPI terminal is expected to host the majority of the load growth due to electric vehicles, ground equipment and aircraft. It has a noncoincident peak power load of 485 kW, measured over 63 months (2019 to 2024), as noted below by transformer:

- 155 kW – transformer south (U2133/CWLP Meter 154368).
- 160 kW – transformer northeast (U1886/CWLP meters 105992 and 195987).
- 170 kW – transformer north (U6173/CWLP Meter 105991).

The remaining SPI loads include the airfield lighting vault, fire crash rescue and other SPI tenant loads.

CWLP Capacity

CWLP stated that, as of June 2025, the remaining system capacity at SPI was 9 MVA. This was provided in a planning and capacity meeting between CWLP and the study team that focused on load growth over time. Background information regarding this stated capacity was not provided to the study team. CWLP remains the overall authority on the medium voltage system capacity and protects engineering and operational information about its system for security reasons. The study team understands CWLP has access to information about its system that was not necessarily provided to the study team.

When calculating the peak demand and remaining capacity, the study team noted that the CWLP SW feeder has an average demand of 3,487.5 kW and the CWLP SE feeder has an average demand of 1,206.89 kW, for 4,694.4 kW over a year. This data was provided by CWLP. Assuming an average power factor of 0.9, the load of the two feeders is 5,216.03 kVA, or 5.21 MVA. The CWLP SE and SW feeder segments are part of a loop feeder with a capacity of 12 MVA. This leaves 6.78 MVA spare capacity on the loop without considering coincidental loading.

This demand does not consider the coincident peak load. Coincident peaks are determined based on simultaneous systemwide loads. CWLP can meter coincident peak load on its system via feeder-level medium voltage meters. Because CWLP indicates 9 MVA of spare capacity is available, the study team assumes that this

is based on coincident peak load data, rather than noncoincident or connected peak loads. For this reason, the team recommends requesting updates on this capacity value on a regular basis and assumes that the loads and operations will change over time. This is especially important, considering CWLP is likely indicating system capacity based on a coincidental loading of its system. The electrification is expected to add substantial peaks, which may or may not coincide with the existing coincidental peak loads.

Substation Capacity: Spare Bay Versus New Substation

The CWLP substation serving the airport from the south, shown in **Figure 4.10**, has capacity of up to 50 MVA of new loads, with at least one spare bay available at the substation for a new express feeder.

FIGURE 4.10 CWLP SUBSTATION SOUTH OF SPI WITH SPARE CAPACITY



Table 4.24 summarizes the remaining capacity of the feeders serving SPI (9 MVA) and the additional capacity via two upgrade options. The first option is a feeder upgrade, with spare bay capacity of the nearby substation to support an express feed from this bay to SPI, raising capacity from 6 MVA (feeder upgrade) to 12 MVA (spare bay).

TABLE 4.24 SYSTEM CAPACITY AND UPGRADE OPTIONS

Medium Voltage System Element and Configuration	Rated Capacity Versus Remaining	Upgrade Options	Notes
Existing 12.5 kV Feeders A and B at SPI Configured in Loop for Redundancy	Per CWLP: Rated capacity is 12 MVA; remaining capacity is 9 MVA	<p>Overall: 6 to 12 MVA</p> <p>Option 1: Add 6 MVA via feeder upgrade. Under this option, add 6 MVA of capacity by upgrading feeder conductors to 900A, adding 50% additional capacity (6 MVA) to feeders.</p> <p>Option 2: Add 12 MVA via express feed. Under this option, add 12 MVA by providing an express feeder to service SPI from the spare substation bay.</p>	Based on June 2025 input from CWLP. Part of a looped system. Feeders A and B create a preferred and alternate path for serving loads at SPI.
CWLP Distribution Substation (Near Airport)	50 MVA of rated capacity Option to add 12 MVA express feeder via spare bay	<p>Option 2 above: Use spare feeder bay to support express feeder, adding 12 MVA of capacity.</p> <p>Option 3: Add 50 MVA via new 138 kV substation and new 12.5 kV feeders.</p>	Substation is about 0.5 miles from airport. Once the feeder and substation upgrade options are exhausted, a new transmission substation is required (nominally 138 kV and 50 MVA). Location to be determined by CWLP.

Expansion Options and CWLP Considerations

In coordination meetings with CWLP, the utility outlined the following time and cost impacts of increasingly complex upgrades to the distribution system. This list starts with the faster and cheaper transformer upgrades, then feeder capacity to feeder upgrades and, finally, service expansion via a new remote 138 kV substation.

Generally, CWLP indicates that a load factor of up to 50% is required for CWLP to bear the cost of designing and upgrading each item. Additionally, CWLP generally expects the customer to share certain costs, as noted in **Table 4.25**.

TABLE 4.25 CWLP UTILITY UPGRADE CONSIDERATIONS

Upgrade	Time Impact	Cost Impact	Cost-Share Notes
Pad-Mounted Transformers Up to 2.5 MVA	6 months to 2 years; depends if item is in-stock or to be ordered	Under \$500,000	Customer provides pad and any new conduit.
Feeder Upgrade or New Feeder Up to 12 MVA of Capacity Based on Remote Substation Excess Capacity	2-4 years	Not provided by CWLP. Study team believes costs range from \$2 million to \$5 million, depending on complexity of upgrade.	Requires 50% load factor for CWLP to absorb costs. CWLP cost estimates are free. Requires an application for new load, highlighting the benefit of regular coordination between SPI and CWLP.
New 138 kV Remote Substation Up to 50 MVA of New Capacity	3-5+ years	Not provided by CWLP. Study team believes costs to range from \$5 million to \$10 million based on providing a new substation and new feeders from that substation to SPI.	Also requires 50% load factor for CWLP to absorb costs. Study team recommends requesting a free cost estimate for this option as soon as airlines indicate desire to fly fully electric aircraft to/from SPI.

4.7. Microgrid Considerations and Technologies

Considering the demonstrated reliability of CWLP over the past decade, a complex and redundant sitewide microgrid for SPI may not be an operational necessity. Microgrids provide additional capacity for islanded conditions (i.e., when the facility lacks access to utility-provided power). The infrastructure in place to serve SPI, including diverse transmission sources and dense feeders serving CWLP, have demonstrated significant reliability. The design of a microgrid requires ensuring that it will meet the site’s operational needs based on its goals.

These functions are in place and were observed during the site visit:

- emergency generators at the airport terminal
- required standby power systems for ATCT, airfield lighting vault and navigation systems
- Phase I solar PV system

Microgrid requirements specific to SPI:

- on-site storage to provide short-duration peak loads for charging aircraft fast chargers
- secure microgrid controller and energy management system capable of coordinating with utility meters, storage resources, solar resources and networked chargers to manage coincident peak load sitewide

Other functions not necessarily of use to SPI but can be implemented:

- New baseload power via generators
 - SPI has reliable power from CWLP and is unlikely to identify on-site natural gas generation as more economically attractive because of the high cost of staffing and maintaining an on-site power plant operation. The new load is also expected to be irregular.
- Sitewide backup power
 - Most tenant loads, such as hangars, do not require backup power because they are irregularly used or do not have critical or emergency loads.
 - SPI has spot generation for terminal operations and a required standby generator for the airfield lighting vault.
 - The FAA has required standby generators for the control tower and navigation systems.
 - The new loads are expected to be in specific areas, such as parking, new vertiports or terminal boarding bridges.
 - Commercial flights likely require a substantial portion of the airport to be operable. However, nonessential tenants such as hangars would not need to be available. Under hybrid or fully electrified conditions, those flights may or may not be able to rely on a BESS, if installed, for a single charge cycle during an outage. It is recommended to engage airlines as stakeholders to ensure that there are clearly defined service-level requirements and ability to pay for a service like sitewide backup power, if required.
 - The new loads are expected to have intermittent, short duration needs rather than regular power needs. These intermittent loads may be better served by batteries if CWLP's costs for infrastructure and associated capacity charges are higher for these types of loads.
 - Most vehicle charging needs can wait for an outage of less than two hours or more or can be charged in advance of an expected storm.
- Power export and grid services
 - Power export is typically only required when the on-site generation seeks to monetize infrastructure that would otherwise be underutilized. This monetization would occur via a grid export paid for by CWLP or other grid services CWLP would deem necessary to stabilize its grid. The likelihood that SPI would be motivated to seek this capability would depend primarily on an indication from CWLP that it would fund this investment as a condition of revenue-sharing the export load or another agreement for revenue generation.

Four functions typical of a microgrid were evaluated: on-site generation exporting power through net-metering to lower cost, on-site generation with no power exported to serve area loads, spot standby/emergency power and short duration peak output to support the peak charging demand of an aircraft fast charger. The infrastructure required to enable the function, the required investment, CWLP's limitations and SPI's considerations related to goals and initiatives were compared. **Table 4.26** summarizes the evaluation.

TABLE 4.26 MICROGRID FUNCTION EVALUATION

Microgrid Function	Infrastructure Enabling This Feature	Existing at SPI	Requires Investment	CWLP Limitations	SPI Considerations
On-Site Generation to Lower Cost Relative to Utility Cost Via Net-Metering	PV via net-metering grid-tied system	Yes: PV Phase I and PV Phase II (under construction in 2025)	PV Future Phases	Feeders unlikely to support export beyond phases I and II under net-metering	Does not provide reliability, because this is expected to shut down during a CWLP outage per anti-islanding requirements.
On-Site Generation Nonexport to Lower Cost Relative to Utility	PV or natural gas generators paired with battery energy storage	No	Yes. Requires matching varying daily operational loads with seasonal PV generation or minimum generator output with battery and on-site demand to avoid curtailing PV during summer	Battery likely required	Can likely only provide reliability during a CWLP outage if the battery is connected to an islanded portion of CWLP's grid (downstream of a specific transformer).
Spot Standby and Emergency Power	Diesel or natural gas generator BESS	Yes: spot generators No: batteries	Yes, if serving new loads with backup power	Cannot export power under this approach	Generator assets require annual maintenance and testing and integration via transfer switches with specific loads. Only used briefly during short outages due to CWLP reliability. Battery assets can charge via the grid if CWLP agrees to allow nonexport use of batteries for specific loads.
Provide Short Duration Peak Output to Support Peak Charging Demand of an Aircraft Fast Charger	Battery at specific load	No	Yes	Nonexport BESS expected to be allowed; CWLP may view this favorably if it increases the load factor on a new transformer	Can allow SPI to service multiple charging loads via a single transformer and increase load factor for CWLP.

A microgrid consists of an interconnected number of systems, including one or more generation sources, a controller, various system monitors and an interconnection to the grid. These are described in further detail below.

Battery Energy Storage System

A BESS consists of batteries, inverters, battery management systems and monitoring systems to store energy produced by PV arrays or other generation sources and to stabilize generator operation. It can also be used to reduce CWLP service transformer and overall feeder capacity required for fast charging by smoothing out high peak loads by serving short duration aircraft charging loads. For example, a 1 MVA transformer operating continuously can provide 24 MWh in a day but cannot provide more than 1 MVA instantaneously. This is more than sufficient to charge a 4 MWh battery between a morning and evening flight for an aircraft that may require up to 3 MVA instantaneously to recharge a regional aircraft in 30 minutes. The output from the BESS can be connected to one or more step-up transformers to megavolt (MV) site distribution in a pad-mounted switchgear.

CWLP does not impose standard interconnection requirements for a BESS. However, based on other utilities where BESS is commonly interconnected, it is expected that pairing of BESS with solar would be required by CWLP to ensure that an uncontrolled export would not occur at the scale proposed to offset electrification-driven growth.

For example, a layout of up to three BESS with 12 MWh of storage capacity (4 MWh each) and structured with up to 2 MW output per BESS could be arranged in an N+1 (duty + standby) configuration to provide peak charging for up to 4 MW of fast charging, if located on the low side of a 1 MW transformer at the terminal.

Generator

Generators are only recommended when the baseload power demand is constant and can be produced economically. Otherwise, as with current operations, spot generation generators provide backup power during an island mode of operation when utility power is not available and renewable power is not sufficient.

Because of the mismatch between terminal operation demand peaks under 500 kW and peak, it is not expected that a new natural gas-fired generator would be economical. However, if a generator were selected to provide power to a microgrid, it is expected that it would be sized and installed to operate regularly under an overall microgrid master controller and generator set controllers. Individual unit generator set controls and an overall generator set master controller would need to be furnished with the generator set.

The master controller would receive operational commands from the microgrid controller and would distribute control signals to the individual units for stopping, starting and maintaining a given load. The microgrid controller would be responsible for integrating the generator set with the output of batteries or various PV solar installations in the network.

Microgrid Control System

The microgrid system is a utility control system that will monitor and control the distributed energy resources (DER) to support and balance the electrical loads while grid-connected or islanded. A microgrid control cabinet can be used to include the following system components:

- Microgrid Controller A
- Microgrid Controller B
- Layer 2 ethernet switches

- serial port server
- human-machine interface monitor
- keyboard, video and mouse switch
- remote/local digital input/output (I/O)

The microgrid controller can communicate to remote end devices via an ethernet interface. For the end devices that can only communicate using a serial interface, a serial port server installed in the microgrid cabinet will be used.

The end devices that do not need a fast response will communicate through the supervisory control and data acquisition (SCADA) gateway; a serial or an ethernet communication interface is supported. The microgrid system end devices include:

- point of interconnect line relay and meters
- BESS power conversion system (PCS) (e.g., inverters)
- BESS battery management system (BMS)
- generator controllers
- aircraft and vehicle charger controllers (especially fast chargers)
- remote digital I/O interface
- SCADA devices (SCADA gateway)

To supply device power to system components, an uninterruptable power supply (UPS) would be designed to distribute power to the microgrid cabinet, digital I/O interface cabinets, BESS and PCS. The UPS provides auxiliary power during an outage and is required for black-start functionality. The relays and meters in the switchgear cabinets would be powered by the station battery bank.

The microgrid is designed to integrate system component controls (i.e., BESS controls, generator controls, etc.) and manage energy load distribution. The microgrid improves reliability and resilience in an event of a grid disturbance or an incoming line fault that separates the system from a grid-tied mode of operation to an island mode of operation. During the transition period, the microgrid controller dispatches active and reactive set points to the BESS to achieve a zero-power flow meter reading at the point of interconnection prior to separating from the grid, which achieves a seamless, soft transition (i.e., blinkless and bumpless).

The primary use case of the microgrid controller will optimize the performance of the PV when grid-connected, and the secondary use case is to provide a seamless, soft transition from a utility grid-tied mode to an island mode of operation during a utility outage or an incoming line fault.

It would be specified in the design to allow for an automatic grid reconnect, or a user-initiated permissive control will be provided to reconnect the microgrid to the grid when the interconnection utility service returns. The microgrid will be designed to support the following use cases:

- grid-connected, steady-state active/reactive power flow optimization
 - peak shaving
 - PV smoothing
- island mode of operation (i.e., planned, unplanned, reconnection)
- black-start

Secondary use cases, such as peak shaving, will be specified to reduce the utility peak demand charges by dispatching the BESS controls when the configured demand threshold limit is exceeded while grid-connected. This will reduce the peak demand monthly utility charges.

4.8. Photovoltaics

The study team conducted preliminary layouts of photovoltaics across the airport and compared the projected output of those areas to future load growth. This scenario might be relevant to a scenario in which hybrid eCTOLs are in use. By 2054, under a hybrid electric eCTOL scenario, new annual energy usage should remain within the 16.7 GWh per year of production available from approximately 10 MW DC of the empty portion of land north of the Phase I solar project.

PV Expense by Installation Type

Rooftop and ground-mount solar installations are expected to generally be less expensive than carport solar due to the added expense of steel structures required for carport solar. It is expected that the primary scenarios where these parking areas could be prioritized for solar are: 1) If these areas are flagged as desirable in the future for their ability to provide an amenity of shading or 2) for their proximity to the terminal electric users and the expectation that the PV would be paired with batteries to directly serve terminal or aircraft needs. In these cases, the potentially reduced cost of interconnecting at the CWLP medium voltage distribution level or the reduced need to trench to the terminal area may bring value to SPI that is sufficient to offset this higher cost.

PV Capacity by Area

SPI has several parcels of land adjacent to the airfield that may be developed into PV production, as depicted in **Figure 4.11**. The initial conceptual layouts were completed to assist with estimating the installed capacity and available annual and monthly energy production, as listed in **Table 4.27**. The production values are based on the following assumptions:

- assumed fixed-tilt racking at 20 degrees
- 10 to 12 feet between rows
- added roadway placeholders
- oriented due south (180 degrees)
- 475W First Solar panels (typical of current jobs being bid)
- results in a ground coverage ratio of 0.55 to 0.6
- central inverters (SMA) for larger systems – includes integrated MV step-up transformer
- string inverters (SMA) for smaller systems – requires MV step-up transformer as a separate centralized cost item

Note that these assumptions assisted the planning team with identifying area requirements and potential benefits at a high-level to assist with forecasting. Over time, the technology behind these assumptions is expected to evolve and improve. As this occurs, consider updating the forecasts below. For example, based on Phase 2 PV and forecasted Phase 3 PV projects, SPI can expect space required to be reduced. Additionally, energy and power generation estimates are likely to improve in line with advancements and efficiency of new technology.

FIGURE 4.11 PARCEL MAP OF AREAS CONSIDERED FOR SOLAR CORRESPONDING TO TABULATED PROJECTION ESTIMATE



Aerial Source: Google Earth, access Nov. 27, 2024

TABLE 4.27 PV PRODUCTION

Parcel	Acres	MW	GWh/Year	kWh/kW Peak	Maximum Current Amplitude Control	Notes on Inverters
0 (Phase I PV)	7	2.88				Existing System
1	6.44	2.5	3.732	1,483	2.13	String Inverter
2 (Phase II PV)	4	1.4	1.922	1,490	1.13	Existing end of 2025
3	29.45	10	13.77	1,358	8.8	Central Inverters
4	45.78	15	21.6	1,440	13.2	Central Inverters
5	90.25	35	50.4	1,440	30.8	Central Inverters
6	92.55	36	51.8	1,440	30.8	Central Inverters

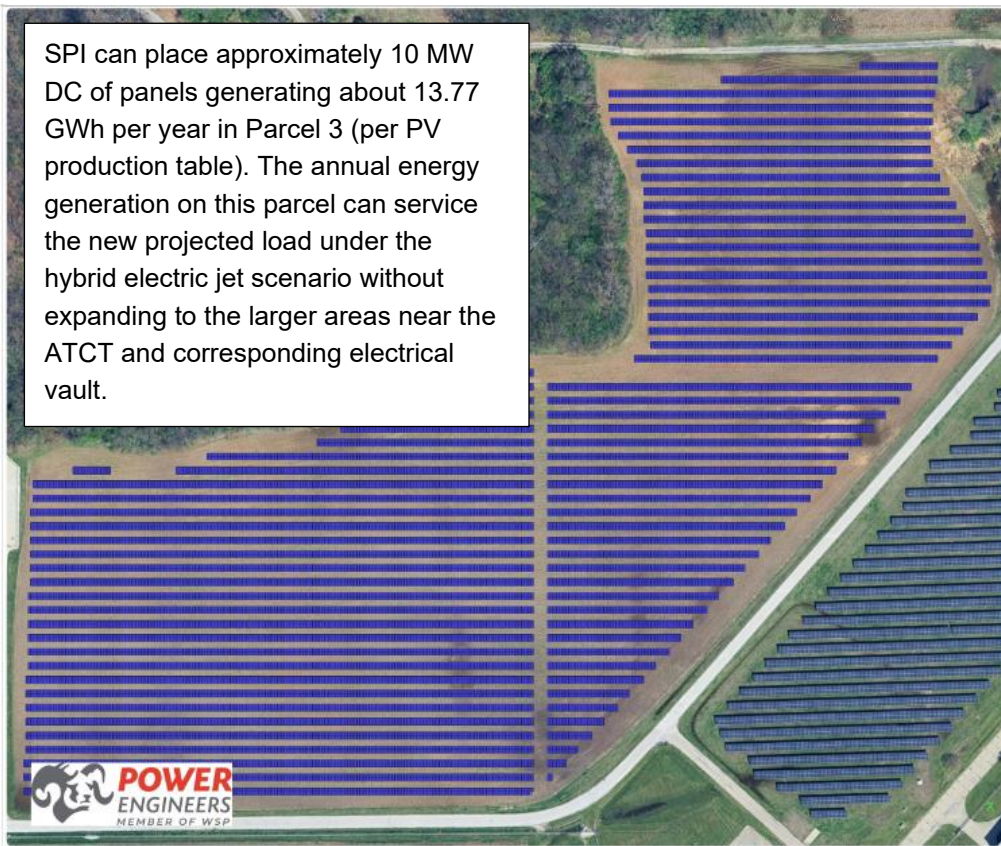
Note: Some examples of conceptual layouts are in Appendix A.

Recommended Role of PV for Future Phases at SPI

Consider planning for Parcel 3 near solar phases I and II to host up to 10 MW (nameplate DC panel capacity) of new solar after Phase II is completed. This is approximately the energy required based on the preliminary annual energy demands forecasted under the hybrid regional jet scenario, which is combined with eVTOLS and the landside electrification of eGSE, SAA and tenant fleets and rental car fleets. See **Figure 4.12**.

With the 7 acres of PV and another expansion of 4 acres north of the airport, continued expansion on the north side of the airport would be recommended. This land use would be consistent with airport plans. The parcels of PV would be interconnected, per CWLP requirements.

FIGURE 4.12 PV ENERGY GENERATION CAPABILITY ON PARCEL 3



However, it is unclear whether net metering would still be available for a PV system at this scale. Instead, it is likely that pairing with a battery storage and/or curtailment-enabled microgrid controller would be required to ensure that the nonexport and anti-islanding safety considerations are balanced with the airport’s need to operate in islanded conditions to service its own load. “Curtailment” is a term utilities use when they require a generation or storage system to reduce or stop producing power under a predefined set of conditions to ensure operator safety and/or grid stability.

Larger parcels to the west (parcels 5 and 6) can also be developed and connected to the overall electrical system.

4.9. Hydrogen

SPI is interested in understanding options for hydrogen (H₂) production and a storage facility to support H₂-fueled aviation and ground operations as discussed in Chapter 3. While not the focus of this chapter, such a facility would

integrate electrolysis-based H₂ production, storage and distribution to serve aircraft transitioning to H₂ fuel propulsion. The outline below establishes key assumptions and describes the system at a high level. The approximate land use is in **Table 4.28**.

Key design assumptions:

- hydrogen demand: about 15.2 metric tons per day (about 5,548 metric tons per year)
- production technology: proton exchange membrane (PEM) electrolysis (scalable and responsive to renewable energy)
- power source: grid electricity and future integration with renewable sources (e.g., solar, wind)
- hydrogen storage: combination of liquid hydrogen (LH₂) tanks for commercial aviation and compressed hydrogen gas (GH₂) tanks for ground vehicles and sale
- land availability: site near SPI with access to natural gas and electricity infrastructure

The hydrogen production system would include:

- electrolysis plant capacity
 - electrolyzer type: PEM
 - production rate: 15.2 metric tons per day (assuming 24/7 operation)
 - power requirement: about 30 to 35 MW of electricity (assumed efficiency of about 50 kWh per kg of H₂)
 - water requirement: about 140,000 liters per day (about 9 liters of water per kg of H₂)
 - oxygen byproduct: about 122 metric tons per day (can be sold or vented)
- production facility components
 - electrolyzers: multiple 5 to 10 MW modular units for redundancy
 - rectifiers and transformers: convert grid power to DC power for electrolyzers
 - buildings: electrolyzers and associated electrical equipment require about 63 cubic meters per MW²⁸
 - water purification system: removes impurities before electrolysis
 - cooling system: manages heat generated by electrolysis

The hydrogen storage and distribution system would include:

- LH₂ storage
 - primary use: commercial aircraft (A320, A220, CRJ-200)
 - storage capacity: about 50 to 100 metric tons to cover (three to seven days of demand)
 - tank type: single cryogenic vacuum-insulated LH₂ spherical tank (-253°C), 12 to 15 meters in diameter
 - refueling method: cryogenic LH₂ dispensers at aircraft fueling stations
- GH₂ storage
 - primary use: private jets and general aviation
 - storage capacity: about 10 to 20 metric tons (one to two days of demand)
 - pressure: up to 700 bar, cascade fill operation
 - tank type: high-pressure bullet tanks
- on-site H₂ distribution
 - pipelines: dedicated LH₂ and GH₂ piping to fueling stations
 - H₂ compression: for high-pressure GH₂ refueling
 - H₂ liquefaction unit: converts excess GH₂ to LH₂

²⁸ Fuel Cells and Hydrogen Joint Undertaking, [“REFHYNE Project 10 MW Electrolyzer Rhineland Refinery” presentation](#), September 2018.

TABLE 4. 28 HYDROGEN GENERATION LAND USE

Facility Components	Estimated Land Area
Electrolysis Plant	<1 acre (PEM electrolyzes, power distribution, cooling)
Water Purification	<1 acre
LH ₂ Storage (Cryogenic Tanks and Liquification Equipment)	3 acres
GH ₂ Storage (High-Pressure Tanks)	1-2 acres
Refueling Stations and Pipelines	2-4 acres
Total Estimated Area	8-11 acres

4.10. Nontechnical Considerations

Utility Policy and Executive-Level Approval

While technically feasible, implementing a utility-level microgrid at the airport would require a significant shift in utility policy and executive-level approval. CWLP emphasized that such a development would need to be addressed through custom agreements and high-level utility planning discussions.

Regulatory and Market Participation Barriers

Participation in wholesale capacity markets (e.g., Midcontinent Independent System Operator [MISO]) introduces complex regulatory hurdles, including transmission deliverability studies, MISO integration requirements and Federal Energy Regulatory Commission-related compliance. Ratepayer equity considerations could also arise if infrastructure is shared.

Rate Structure and Economic Incentives

The utility rate structures provide limited incentives for DER or microgrid investments. Without dynamic pricing or enhanced rate options, there may be limited economic justification for microgrid deployment.

Bilateral Agreements for DER Export

Policy restricts DER systems to net metering. Exporting energy to the grid or broader microgrid operation would require negotiated bilateral agreements, potentially modifying interconnection standards and operational protocols.

Organizational and Stakeholder Coordination

Airport environments involve multiple stakeholders, including airlines, utilities, municipalities and federal agencies. Successful microgrid development requires coordinated roles, responsibilities and access agreements.

Land Use and Institutional Rights

Developing infrastructure near the airport requires securing land use rights. Some strategic land is publicly owned, requiring institutional coordination with entities such as the sanitary district.

Operational Protocols and Safety

Microgrid deployment must be aligned with utility safety protocols, particularly for islanding, reconnection and load-switching operations.

Financial Modeling and Business Case

A strong financial case must be developed to justify capital investments. Without regulatory mandates or incentives, microgrid deployment depends on demonstrating value through resilience, reliability or economic performance.

Lack of Formal Microgrid Standards or Programs

CWLP lacks formal microgrid interconnection policies or structured programs, requiring custom frameworks and agreements, increasing administrative complexity.

Airport-Specific Constraints

Airports must comply with FAA regulations, capital project funding rules and environmental permitting standards. Any microgrid development must avoid conflicts with aviation operations or federal security requirements.

Conclusion

Developing a microgrid at the airport may be strategically valuable, depending on the functionality or cost savings the microgrid assets provide. However, it still presents multiple nontechnical challenges that pose financial and political risks and for which no clear timeline can be defined for a resolution. Developing clear criteria and requirements for the microgrid based on the actual load growth required by the key stakeholders would be critical to its success. Additionally, once those requirements are established, addressing microgrid utility policy, regulatory requirements and stakeholder agreement would be critical to the timely and effective implementation of such a project.

No microgrid is definitively required. However, as described in Section 4.7, a microgrid is defined by what it serves and how it serves it. For example, adding BESS to the system that can operate to charge and support a portion of the terminal and/or only the aircraft chargers when the grid is down could be the first step toward a microgrid.

SPI and CWLP are not constrained from a utility capacity perspective. SPI also has not stated that the outage durations of up to 1.5 hours were a problem based on the frequency of flights and the support provided by its on-site generators.

If SPI shifts to implementing a microgrid sitewide, it likely would be because SPI believes it can develop and deploy on-site assets with a return on investment that is better than relying on CWLP. CWLP appears to want to support future energy demands in a reliable, safe, timely and cost-effective manner.

At each incremental step, SPI will need to determine whether it needs a microgrid to provide one of those elements better than CWLP can offer. The first type of “microgrid” option, for example, could be that a BESS deployed on-site could be faster than a feeder upgrade project. SPI might also elect to use a BESS if its analysis shows the option to be cheaper than a feeder project or offers other uses that the feeder upgrade would not. It is expected that this analysis would require study when new demand is more certain and cost analysis can be made based on market conditions at that time.

4.11. Microgrid Roadmap

Strategic Overview

Although it is not expected to be required based on CWLP's support available to SPI, SPI may determine in the future that a microgrid is a priority. This section provides an overview of the process required. Developing a microgrid at the airport involves navigating a complex matrix of nontechnical challenges. These include utility policies, regulatory hurdles, rate structure constraints, stakeholder coordination, financial modeling and airport constraints. The following roadmap addresses these issues and outlines a five-year approach over to prepare for successful project implementation.

Phase 1: Strategic Visioning and Alignment (Year One)

- Align microgrid development with airport sustainability and future electrification targets.
- Establish a cross-functional microgrid steering committee, including airport leadership, utility representatives, technical consultants and legal/regulatory advisers.
- Update airport master plans to include microgrid development as a core component.
- Conduct high-level risk assessments covering energy security, climate resilience and reliability.

Phase 2: Policy Engagement and Utility Coordination (Years One to Two)

- Initiate formal dialogue with CWLP leadership and policy teams to identify necessary changes to utility frameworks.
- Advocate for policy updates supporting DER export, BESS integration and dynamic microgrid operation protocols.
- Begin drafting preliminary bilateral agreements addressing interconnection, export policies and operational safety protocols.
- Engage regulatory bodies to understand the frameworks for market participation or DER aggregation.
- Explore policy precedents from other airports or municipal microgrids to model local strategy.

Phase 3: Rate Structure Analysis and Business Case Development (Years Two to Three)

- Conduct a detailed analysis of the rate structures to assess feasibility and incentive gaps.
- Explore options for securing a specialized microgrid tariff or resilience-based rate credit.
- Develop full lifecycle financial modeling, considering the capital cost, operations and maintenance, avoided outages, carbon reduction, peak shaving and potential market revenue.
- Present the findings to utility and municipal leadership to advocate for rate structure modernization.

Phase 4: Stakeholder Coordination and Institutional Integration (Years Two to Three)

- Coordinate with internal airport departments (operations, planning, finance) to define responsibilities and governance structure.
- Build institutional alliances with external agencies, such as the FAA, Transportation Security Administration and state energy agencies.
- Initiate land use planning with the sanitary district for siting microgrid infrastructure on publicly controlled lands.
- Begin a formal public engagement and communications strategy to build community support.

Phase 5: Technical Predevelopment and Feasibility Studies (Years Three to Four)

- Commission detailed technical feasibility studies, including DER siting, collector substation design and energy storage configurations.
- Conduct solar-hosting capacity studies with utility engineers to determine interconnection viability.

- Perform detailed islanding and reconnection protocol planning in collaboration with CWLP.
- Evaluate operational risk scenarios and define protocols for emergency operations and fault recovery.
- Develop resilience metrics and design the system with key performance indicators in mind.

Phase 6: Legal, Regulatory and Compliance Structuring (Year Four)

- Finalize regulatory and legal frameworks governing microgrid ownership, DER export and interconnection standards.
- Prepare applications for applicable grants, subsidies or green bonds.
- Draft compliance plans addressing FAA airfield safety regulations and National Environmental Policy Act requirements.
- Develop a cybersecurity and SCADA control strategy in compliance with utility and FAA standards.

Phase 7: Engineering, Procurement and Implementation Planning (Year Five)

- Begin detailed design and engineering for switchgear, BESS, DER infrastructure and feeder upgrades.
- Issue requests for proposals for engineering-procurement-construction contractors, equipment vendors and operations and maintenance providers.
- Develop a phased implementation schedule to avoid a disruption to airfield operations.
- Integrate microgrid control with the airport's energy management systems.
- Coordinate the construction access, permits and interconnection timelines with CWLP and other agencies.

Cross-Cutting Actions Through the Five-Year Horizon

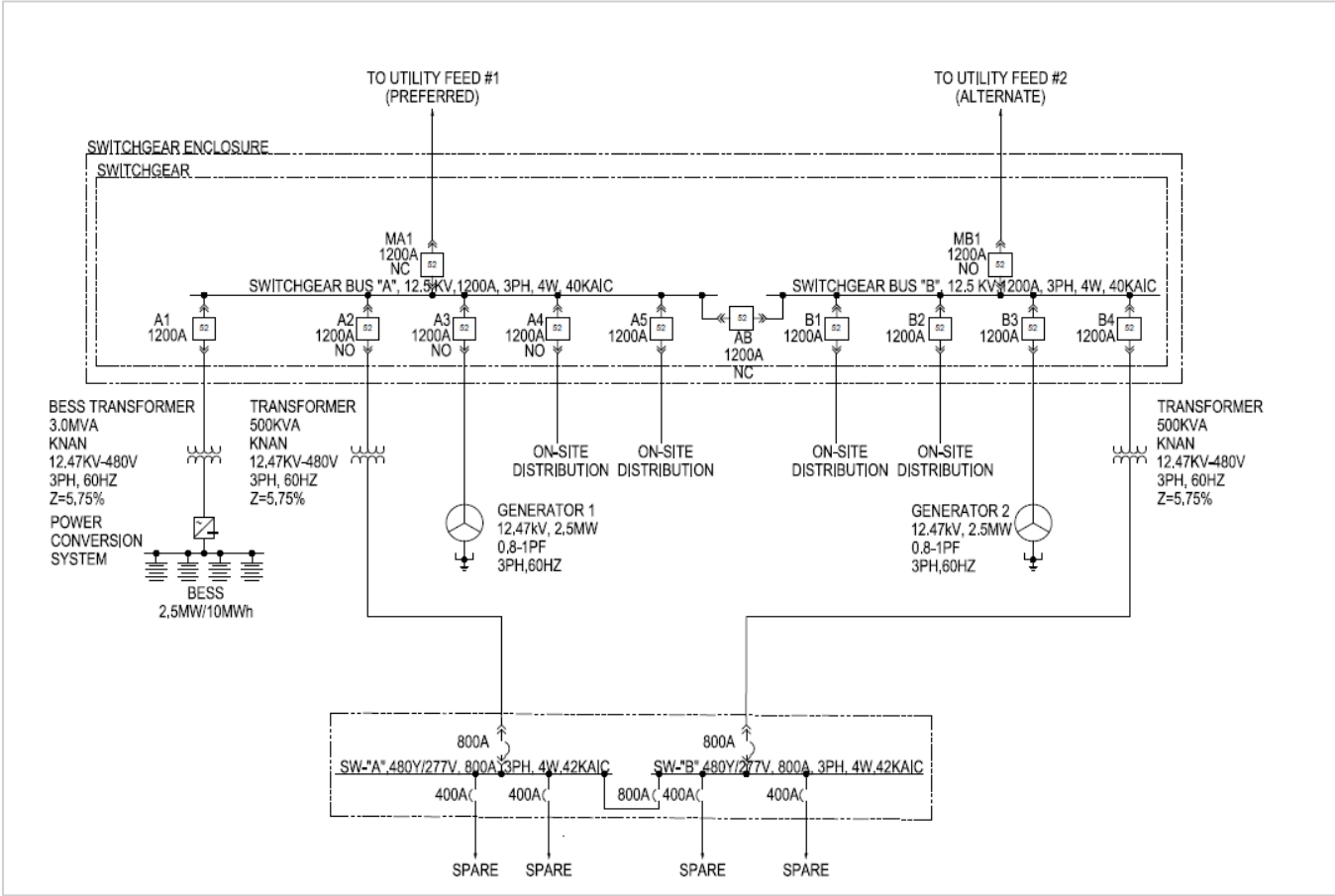
- Maintain engagement with utility planning teams to monitor changing technical standards and hosting policies.
- Continue public outreach and stakeholder engagement efforts to ensure long-term buy-in.
- Update project milestones based on evolving load forecasts and funding opportunities.
- Track legislative changes that may impact energy infrastructure financing or DER market access.

Conceptual Design

One potential microgrid design would include two utility connections (alternate and preferred feeder) to the microgrid switchgear. The switchgear would be configured as a main tie for resilience. If a new generation or storage source is determined to be desired, it would be connected to each bus in the switchgear to enable operation from either end of the switchgear. A BESS would be connected to one of the busses. Critical loads would have a new loop feeder to connect the microgrid system. Refer to **Figure 4.13** for a conceptual one-line diagram of microgrid system.

Note that the actual configuration and controls required depends on what assets are included in the microgrid, ranging from storage assets such as a BESS to generation assets ranging from variable (solar) to firm (diesel or natural gas engines).

FIGURE 4.13 MICROGRID ONE-LINE DIAGRAM



4.12. Cost Estimate

To support budget planning, the estimates in **Table 4.29** (in 2025 dollars) show the potential range of system costs associated with the most likely assets recommended under the scenarios discussed with SPI during the stakeholder engagement.

TABLE 4.29 BREAKDOWN OF COSTS AND ASSUMPTIONS BY INFRASTRUCTURE UPGRADE

New Infrastructure	Description	Rough Order of Magnitude Cost (\$2025)	Key Assumptions	Time Required to Plan, Permit, Procure, Construct
BESS for Hybrid Regional Jet Charging (Alternative to Feeder Upgrade)	Provide up to 4 MVA of peak output per BESS to support hybrid jet charging using the 3.75 MW charging standard per Heart Aerospace. Assume hybrid jets require no more than 1.5 MWh per charge.	\$4M to \$6M	N+1 duty and stand-by arrangement for two batteries assumed. Up to 3MVA of peak capacity. Charge slowly between flights. Discharge capacity (e.g. 2 to 4 MVA) is higher than CWLP transformer peak (e.g., 1 MVA).	Up to three years. Long leads are batteries, power electronics, switchgear and transformers. Requires CWLP interconnection negotiation.
Feeder Upgrade (Alternative to BESS Upgrade)	Add up to 12 MVA of capacity beyond 12 MVA of system capacity.	\$2M to \$5M	Depends on extent of new underground work required, route between new power and level of redundancy required for new service.	Up to four years. Depends on final feeder upgrade approach.
Vehicle Charging Infrastructure	- Up to 300 kVA pad-mounted transformer - Up to two DC fast ports - Up to 10 Level 2 ports - Lighting, accessories	\$1M to \$2.5M	Assumes CWLP has capacity to support chargers at this scale.	Up to two years. Required for long-lead items, CWLP and stakeholder coordination in design.
138 kV New Service Station	Add up to 50 MVA of capacity beyond substation capacity.	\$5M to \$10M	Higher than cost of feeder upgrade only. Combines underground/overhead feeder costs with new remote 138 kV substation to service SPI.	Up to six years. Requires CWLP negotiation, interconnection modeling, transmission capacity, site selection/control, engineering and long lead for major items.

4.13. Conclusion

A preliminary 30-year roadmap for SPI to follow as it grows from its existing baseline load into an electrified airport is summarized in **Figure 4.30**. The roadmap timeline looks at 2025 to 2032 and identifies sources of electrical demand growth, required CWLP capacity, electrical infrastructure improvements and budget to assist with managing this load change.

As stated in Section 4.1, the feeder costs will be a CWLP cost only if CWLP can forecast revenue that meets its requirement. If SPI cannot provide a level-of-use guarantee to CWLP, CWLP is likely to request that SPI pays for at least a portion of the feeder upgrade costs. Therefore, it is suggested for conservative financial planning that the feeder upgrade cost be included in SPI's budget and deployed toward the option that most effectively meets its needs at that time.

A notable outcome reflected in the roadmap is that the total new load over the next eight years is not expected to exceed the existing CWLP feeder capacity, especially if battery energy storage is used to provide the desired system output for aircraft charging instead of relying solely on CWLP to provide instantaneous charging in 3 MVA increments for 30-minute bursts several times a day. Close coordination with CWLP and stakeholders is recommended to ensure that the infrastructure availability does not delay SPI's ability to serve the projected load growth.

Recognizing the industry's need to reduce emissions, these infrastructure upgrades at SPI will help position it as a leader in the state's aviation ecosystem. Through these efforts, SPI is actively positioning itself to help incorporate new electric vehicle and aircraft technologies as they come to market.

TABLE 4.30 2025–54 ROADMAP OF LOAD GROWTH AND ROM COSTS FOR SUPPORTING INFRASTRUCTURE PROJECTS

Time	Budget	Sources of Electrical Demand	Required CWLP Capacity	Electrical Infrastructure Improvements by Budget, Time and Space
2025–33	\$4M–8.5M	<p>2028: 0.45 MVA +0.15 eGSE +0.3 shared charging for fleet, rental cars, public visitors</p> <p>2029: 3 MVA +3 eCTOL</p> <p>2032: 1 MVA +1 eVTOL</p>	<p>Maximize 12 MVA of existing feeder capacity</p> <p>CWLP indicates up to 9 MVA</p> <p>4.45 MVA added in eight-year period</p>	<p>\$3M to \$6M and up to four years for feeder upgrade or BESS project to support short-duration aircraft charging once CWLP indicates growth would exceed system capacity. Plan for BESS to require up to 0.3 acres of space. Negotiate split with CWLP for feeder upgrade. Refer to Table 4.25 in Section 4.6 to understand the implications of the feeder versus BESS decision.</p> <p>Vehicle chargers: Plan \$1M to \$2.5M and two years for new eGSE and general vehicle charging. Chargers to consume wall or floor space for electrical equipment or existing parking stall space.</p>
2034–43	\$6M–13.5M	<p>2034: 4.75 MVA total +3 eCTOL +1 eVTOL +0.75 for eGSE (0.15), fleet EVs (0.15), rentals (0.15) and public (0.3)</p>	<p>>12 MVA</p> <p>Likely requires feeder upgrade</p>	<p>\$2M to \$5M for feeder. Negotiate split with CWLP for feeder upgrade based on forecasted use. Refer to Table 4.25 in Section 4.6 to understand the implications of the feeder versus BESS project.</p> <p>\$3M to \$6M for additional BESS project</p> <p>EVSE: Plan \$1M to \$2.5M to expand charging infrastructure.</p>
2044–54	\$2M–5M (Feeder)	<p>2044: 1 MVA +1 eCTOL</p> <p>2054: 4.45 MVA +3 eCTOL +1 eVTOL +0.45 (0.15 each) for fleet EVs, rentals and public</p>	<p>18 MVA new load from 3 MVA baseline feeder capacity usage in 2025. 18 MVA capacity used (15 MVA new + 3 MVA baseline)</p> <p>Exceeds 12 MVA CWLP capacity by up to 10 MVA, depending on BESS options selected</p>	<p>Plan \$1.5M to \$2.5M and two years for first 0.3 MW of capacity for vehicle charging. Add second round of charging once first-round utilization is reaching saturation.</p> <p>Up to 30 to 40 acres required for solar, if offsetting new usage is a goal. Cost to be determined at the time of installation.</p>

Note: eVTOL = electric vertical takeoff and landing; eCTOL = electric conventional takeoff and landing; EVSE = electric vehicle supply equipment; MW = megawatt

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5. Airport Cities – On-Airport Development

5.1. Airport Layout Plan Update

SPI owns more land than what is required for existing and future aviation use. This additional land serves multiple purposes, two of which are to protect and buffer the aviation use and provide revenue generation opportunities to assist the airport in being as self-sufficient as possible to meet the FAA grant assurance.

Concurrent with this planning process, SPI is updating its airport layout plan (ALP). The proposed development on this ALP has been used to identify areas on SPI to reserve for aviation development. Any other proposed uses on this ALP have also been identified as areas reserved for development. **Figure 5.1** depicts the draft updated redline ALP that is the starting point for identifying areas on SPI reserved for development or available.

The ALP preserves the potential to extend both runways. It also includes the development of a full parallel taxiway system on both sides of each runway (a dual parallel taxiway system). The dual parallel taxiway system would include extending Taxiway Y north of Runway 4/22 and Taxiway G south of Runway 13/31.

5.2. Airport City Concept

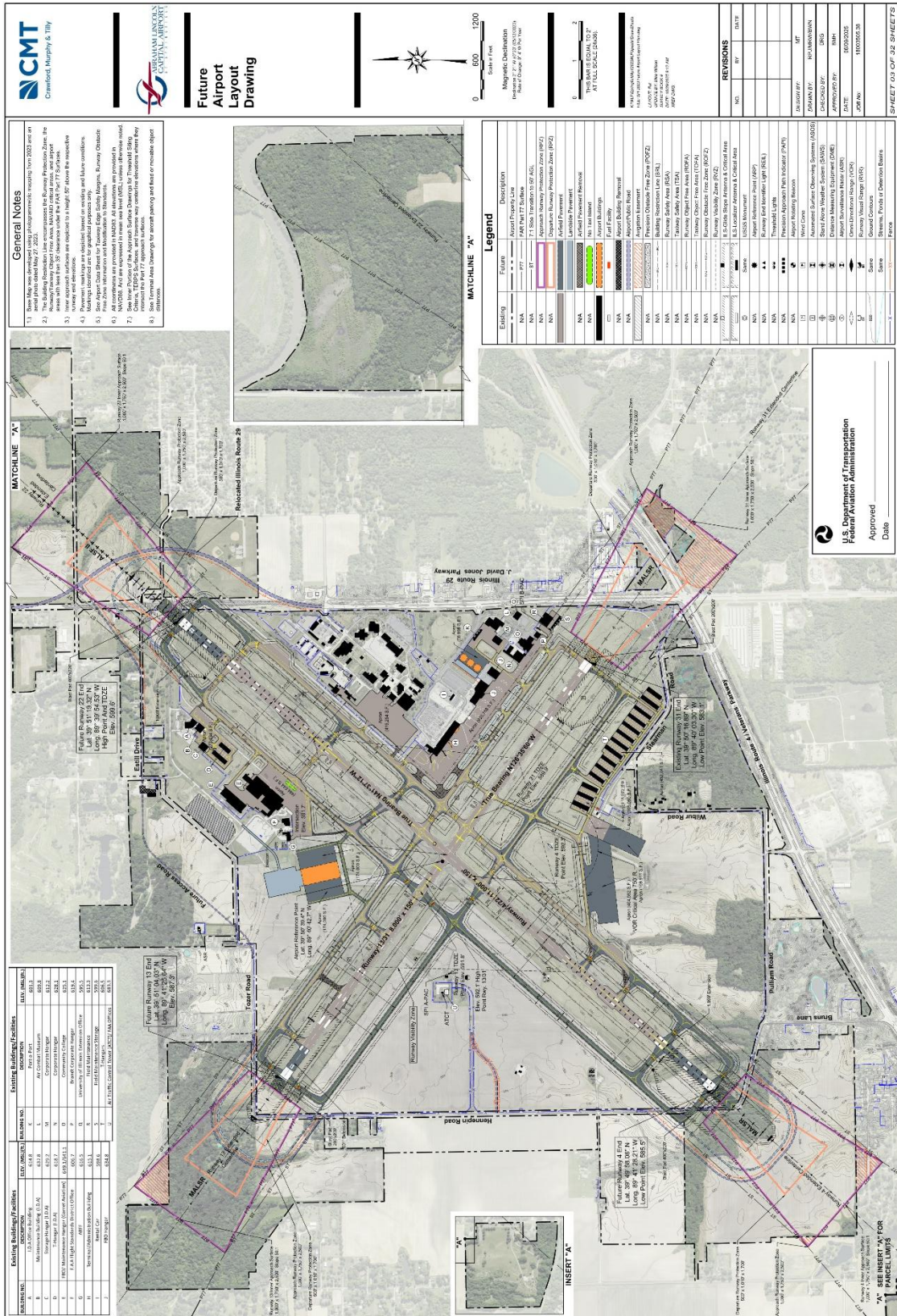
The airport city concept identifies that an airport has the potential to be a catalyst for other development, similar to a downtown business district. The driving force behind the airport city being a development catalyst is the synergies that are tied to having an employment base, commercial passengers, aviation support commerce and direct aviation related commerce. The concept has three areas. The first area is centered on the airfield and is the runway, taxiway and aviation facilities and businesses that depend on access to the airfield. These are aviation businesses including passenger operations, fixed base operator, maintenance and repair operations and overhaul, and state agencies with flight operations, etc., and depend on the airport to function.

The second area does not require airfield access but benefits from proximity to the airport. These could be businesses supplying tenants that need airfield access or benefitting from synergies from the on-airfield tenants. These tenants may be on airport property without airfield access or in proximity to the airport. These include businesses such as rental cars.

The third and final area is support industries. Like the tenants in the second area, they benefit from synergies from the airport but are generally located off-airport. These could be restaurants or hotels or other business that benefit from proximity to an airport. The airport city concept will provide the focus when considering development opportunities at SPI.

In support of the airport city concept, consideration has been given to areas on SPI to reserve for aviation development that requires airfield access and other areas that could be used for nonaeronautical development. Looking at the aviation businesses at SPI, the FBO facilities occupy a depth of about 500 feet from and including the apron to the access roadway northeast of the buildings. The Standard Aero facilities occupy about 600 feet from the edge of the taxiway to a paved area behind the buildings. Thus, where there is existing or future airfield access, a minimum depth of 500 to 600 feet is desirable to reserve for entities that may require airfield access as part of their development. Areas beyond this could be considered for nonaeronautical development. The proposed parallel taxiways have a larger-than-standard separation from the runway centerline to align with

FIGURE 5.1 SPI AIRPORT LAYOUT PLAN UPDATE



existing taxiways. The standard separation is 400 feet. The planned taxiways would have a separation of about 700 feet. For planning purposes, a setback of 700 feet from the parallel taxiway centerline will be reserved for aeronautical use. This allows for the taxiway object free area, plus a minimum depth of at least 500 feet of development area. The exception to this is the area north of taxiways B and G, which is reserved only for aviation development needing airfield access.

5.3. Airport Commerce Park

One of the proposed uses on the ALP is Airport Commerce Park, a 180-acre site on the southern portion of SPI adjacent to Veterans Parkway that SPI is marketing for development. It is anticipated that SPI will retain ownership and lease the sites. This would provide SPI with a long-term revenue stream from the property.

The site contains rolling wooded terrain as well as flat lots. It is anticipated that the rolling terrain may be better suited to office building development that could be situated in a park-like setting. The flat lots could accommodate uses such as light industrial or warehousing. The frontage on Veterans Parkway may also provide commercial opportunities. The minimum desired lot size is 3 acres, with larger sites also available. The airport authority intends to work with prospective tenants to align lot size and dimensions with the user's need. **Figure 5.2** depicts a conceptual layout for Airport Commerce Park from SPI's brochure. **Figure 5.3** provides an aerial view of the same site. SPI has undertaken projects to prepare the area for development, including some tree clearing and removing the closed north-south runway.

Wilbur Road and Pulliam Road are within Airport Commerce Park. Some reconfiguration and improvements of these roads to accommodate commerce park uses are planned. Airport Commerce Park would use the existing connection to Veterans Parkway. A traffic light is a planned improvement at this intersection.

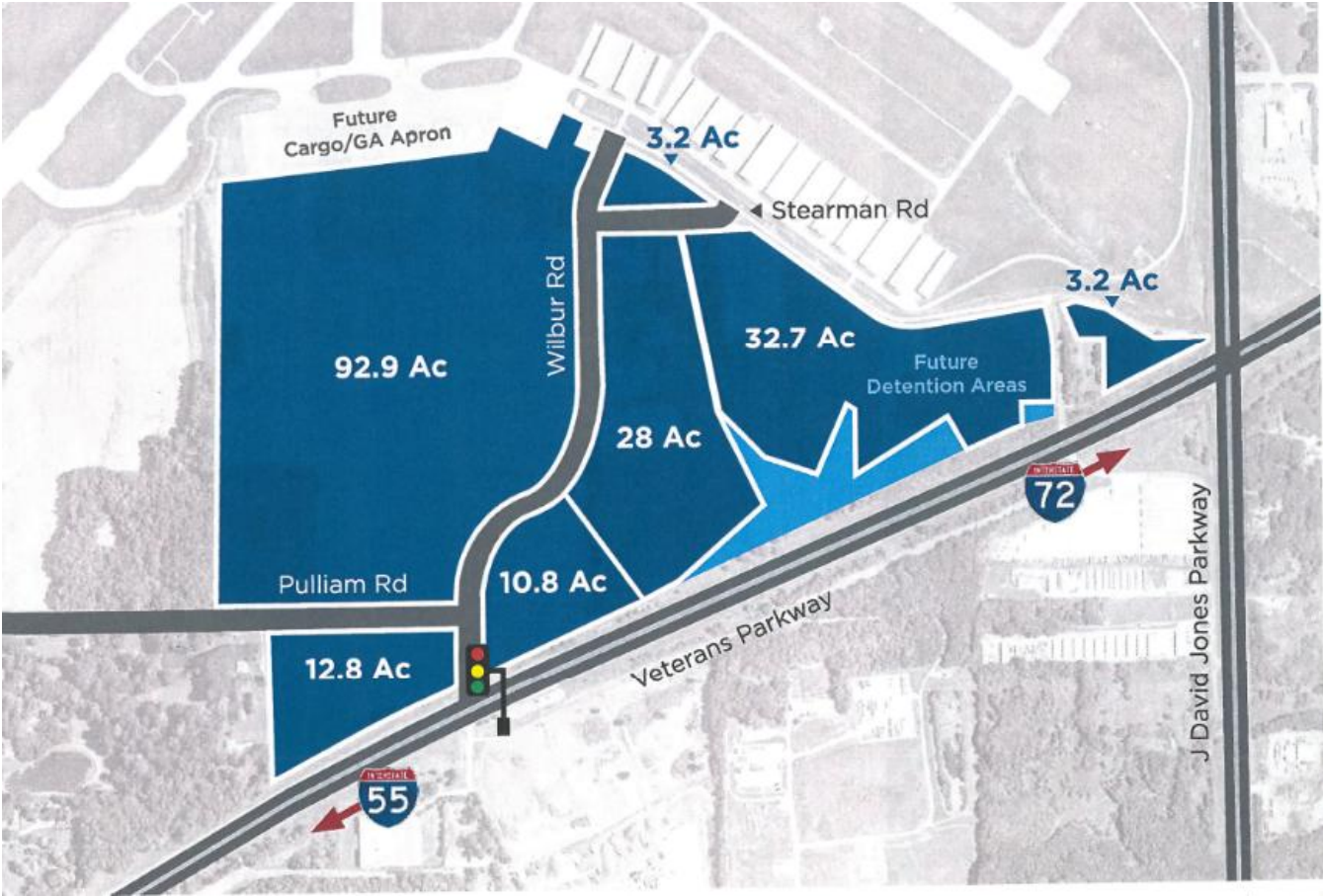
Some portions of Airport Commerce Park could have airside access via a planned cargo/general aviation apron. Other portions are expected to be nonaviation use. Some areas are being reserved for stormwater detention that will be necessary with increased impervious areas from development.

The site is zoned Industrial II. During the project's stakeholder meeting with developers, it was suggested that if some portions of the site are preferentially commercial, it may be beneficial to rezone those areas in advance to expedite development. Also, it was identified that office buildings cannot be in an Industrial II zone, so rezoning may be needed to accommodate that use. Further coordination on the zoning indicated that it may be preferable to keep the zoning as Industrial II until there is a proposal identifying a need for other zoning. Industrial II is one of the most intense classifications, and it is generally easier to modify that use to a less intense use than vice versa.

Airport Commerce Park has access to the following utilities:

- a 12-inch sewer line along Camp Lincoln Road with a capacity in excess of 1 million gallons per day; Camp Lincoln Road is south of Airport Commerce Park and is the intersection proposed for a traffic signal
- broadband cable along Illinois Route 29 east of the airport
- telephone lines along Pulliam and Wilbur roads
- A 6-inch gas line
- water through City Water, Light and Power (CWLP) via a 12-inch line through the site, with the capacity to meet fire suppression regulations
- electricity with CWLP along Illinois Route 29 and to the east side of Aviation Lane, with the capacity to serve additional users
- Ameren Illinois natural gas service along Wilbur Road

FIGURE 5.2 AIRPORT COMMERCE PARK CONCEPT



Source: SPI Airport Commerce Park brochure, 2024.

FIGURE 5.3 AERIAL OF AIRPORT COMMERCE PARK AREA



Source: Google Earth, accessed Nov. 27, 2024.

SPI has one solar array system and a second that will be operational by mid-2026. This study is assessing additional opportunities for solar and microgrid power. Pending that analysis, a decision can be made regarding having a microgrid collocated with the additional renewable energy, which could be significant attractant for the Airport Commerce Park.

Historically, the most desirable development sites are shovel ready. The airport authority has cleared trees to prepare a portion of the site. While there is a conceptual road layout, it has not been constructed to allow for flexibility to accommodate an initial prospective user. The airport has also conducted preliminary analysis to prepare for the installation of a traffic light at the entrance to Airport Commerce Park when needed.

The airport authority, as an independent government agency, has some flexibility in working with a developer. If the intended use is aeronautical, tax relief and other incentives can be made available. The airport authority also has bonding authority, so there is the potential that the airport authority could develop a building for lease in an appropriate situation.

5.4. Developer Outreach

To assist SPI in identifying and fine-tuning development opportunities, a series of meetings were held in June 2024 in Springfield. The goal of these meetings was to obtain feedback from the local industry and developer communities that would help inform and direct the airport cities plan for SPI. These in-person meetings were followed up with calls to several of the industry and development leaders and the Springfield Sangamon Growth Alliance (SSGA) to bring more candid feedback into this plan. While several developers were very forthcoming with their feedback, there was a hesitance in sharing certain proprietary aspects of their businesses due to the competitive nature of the local market.

In general, the meetings were very informative and collaborative. The meetings provided a worthwhile touch point for SPI staff and the local development community.

5.5. Industry and Developer Meeting Feedback

The feedback from the developer community was primarily in the categories of marketing, partnerships, development tools needed and perceived gaps.

Marketing

From a marketing perspective, SPI has chosen a local developer for Airport Commerce Park. From this, a marketing brochure has been developed, but most of the other developers were not very familiar with the site brochure used by SPI. The brochure appears to be adequate for the intended purpose of getting the word out, but the lack of awareness in the community may be an aspect worth improving. SPI staff are active in major industry conferences, such as MRO Americas, on the national level to assist in marketing the site.

SPI has property that borders the airfield and would be considered aeronautical use now and in the longer term. Additionally, the SPI marketing brochure has acreage that is not directly connected to the airfield and abutting Veterans Parkway and would most likely stay in a nonaeronautical category now and in the long term.

The discussion also centered on properties not owned by the airport authority and not contiguous to the airport itself but could be developed in synergy and support of airport purposes. Drawing synergies from the airport, this noncontiguous property could be viewed as “airport cities related” parcels that are not directly associated with aviation but directly support aviation uses. An example of the types of uses in the airport cities category would be hotels, convention/meeting centers, gas stations, food/retail, entertainment and services catering to SPI employees and users.

These off-airfield uses would benefit from and provide a benefit for the many employees and businesses that are aviation- and nonaviation-related located on airport authority-owned land.

There was a general agreement that the marketing materials could be improved with a list of available incentives and development tools supporting development proposals that meet the requirements for the incentives. Further, by establishing stakeholder partnerships with the local economic development agencies, the development tools could be customized to directly support SPI's aviation and nonaviation development initiatives.

Long-Term Partnerships

The group echoed the need to establish long-term partnerships in the region. Follow-up calls with local economic development authorities confirmed the need to establish stronger and more long-term local partnerships. The first

step that was suggested was to establish a quarterly meeting of regional development stakeholders. This meeting could potentially be hosted by the SSGA and would include an open sharing of ideas and incentive, marketing and land-planning initiatives. Further, the meetings would be focused on the airport, its land-planning needs and the surrounding developable property that would support an airport cities growth initiative. It was stated by several of the meeting participants that improving stakeholder partnerships and focusing on the airport in this way would provide a tangible long-term benefit to the community.

Finally, the general recommendation from the meetings was for the airport authority continue to be involved in the local comprehensive planning process. The goal is a comprehensive plan that would put a stronger focus on airport development needs and would consider the airport and surrounding property as the significant economic development attractor that it is. This involvement provides the airport with direct input on future transportation improvements that would benefit both the airport and the community at large.

Development Tools

During the meetings and follow-up phone calls, there was significant discussion centered on development tools, incentives and improving the incentive packages. The following is a recap of the discussions and recommendations voiced in the meetings:

- Some SPI property is in the enterprise zone and some property is not. The enterprise zone can be expanded within a 90-day window on a limited basis. Having all of SPI's developable acreage in the enterprise zone would be beneficial (to fully market the overall enterprise zone benefits).
- Property tax abatement: Tax abatement in the enterprise zone is an exemption and not a rebate. This tool would require support from other industries and industrial development areas in the region.
- SPI is within 60 miles of the foreign trade zone (FTZ) in Decatur, Illinois, which allows for the potential to establish an FTZ subzone at SPI and surrounding properties. The FTZ subzone establishment would benefit the import of international supplies and components that would be taxed after the manufacturing/assembly process, rather than individually as the supplies and components are brought into the United States. This could greatly improve the marketability of SPI for final assembly, manufacturing and handling of international cargo.
- Consider hiring a national broker with aviation/aerospace development expertise to supplement local broker(s). This is particularly important for having national brand awareness for SPI for potential aeronautical business relocations, MRO opportunities and air cargo growth opportunities. Final site selections for aeronautical and MRO businesses usually are generated at the national and international level, rather than the local level.
- Establish a development model for SPI that would include how the review/approval process would work and the expected timing for approval, establish parameters for brokerage and agent fees, detail which incentives can be applied to certain kinds of prospective developments and highlight parcels that can be fast-tracked through the local approval process.
- Consider working toward developing an inland port concept in the SPI area to boost air cargo and work synergistically with SPI operations and a potential FTZ at SPI.
- Scope out and implement a Springfield regional logistics study. The study would focus on the movement of air and ground-based cargo in the region and provide a starting point for the tracking and development of cargo movement in the region.
- Apply for grant(s) and begin to position SPI as a site for AAM as a test bed, an AAM MRO site and training/technology center for Illinois.
- Continue the progress with SPI as a leader in renewable energy production, which provides a significant low-cost energy environment for the economic development initiatives of the airport authority.

Tax increment financing (TIF) dedicates an area's property tax to improvements of that area. This is not anticipated to be a tool for Airport Commerce Park as airport owned property. A TIF would work well on nonairport private land, since there would be more tax collected on those properties.

Perceived Gaps

In discussions with the development stakeholders and SPI staff, there would appear to be gaps in the alignment of goals and needs among the various groups. Most of the perceived gaps are a result of less-than-adequate communication between the groups, which led to a misalignment of overall goals and development agendas.

The airport authority should work to improve the community understanding that SPI is one of its most significant economic development transportation assets. Similarly, the community should bring the airport authority to the table as an active member of all its strategic planning and economic development growth initiatives. Having a means of continual communication between the community development stakeholders could improve the economic development, air service and air cargo growth goals of the airport and region.

Best Practices and Recommendations

The feedback provided above and from ongoing discussions with local development stakeholders has given direction with regard to best practices and recommendations. The following are best practices and recommendations as a result of the feedback received through stakeholder meetings and follow-up calls. SPI is already working on many of these items.

Marketing

- The airport authority should update its marketing brochure for the available aeronautical and nonaeronautical properties and include:
 - new property made available through the runway closure and demolition
 - the potential site for a commercial vertiport and AAM test site at SPI
 - the potential addition of an FTZ subzone at SPI
 - fully marketed enterprise zone benefits
 - applicable messaging regarding the net energy cost benefits vs. other regional locations for future tenants, as appropriate

Partnerships

- Seek support from the SSGA and regional planning interests to scope and implement a Springfield regional logistics study to help baseline all cargo movements at the airport and within the region.
- Look for opportunities for airport authority's senior staff to continue to hold or assume board positions and stakeholder positions in the regional planning, economic development and growth initiative groups.
- Consider engaging a national broker/agent to raise the SPI brand and bring in national and International MRO, air cargo, aerospace, AAM and final aircraft assembly opportunities to SPI.
- Find opportunities and potential growth benefits through leveraging the Illinois Air National Guard and Standard Aero.
- Establish an annual or biannual meeting of all regional development stakeholders with an agenda focused on airport growth needs and the specific needs of the development community.

Development tools

- Establish a development model that would guide the SPI land development process. The model would include incentives, potential broker/agent fees, permitting required and projected time to be shovel-ready.

- Work with local airlines to begin tracking air cargo movement statistics.
- Be ready to expand the SPI enterprise zone to include all existing and new development parcels with appropriate development commitment..
- Investigate the potential for establishing an FTZ subzone at SPI.
- Work with the city and local planning agency to ensure the nonairport parcels on the far side of Veterans and J. David Jones parkways will be planned, zoned and developed for airport-synergistic purposes, e.g., gas stations, retail, conference centers, hotels, aviation support services, middle-mile fulfillment, inland port, logistics support, mixed use, etc. in an airport cities concept. Also, consider the conceptual uses best suited for airport property in the approach to the terminal complex.

Closing Perceived Gaps

- Use new and existing partnerships to raise the SPI brand locally as one of the most significant transportation economic development assets in the region.
- Develop messaging for SPI staff that will raise brand awareness in the community. The messaging should go beyond air service information.
- Review results of IDOT's economic impact studies, if need augment findings with an SPI economic impact study, with its results guiding the brand messaging.

5.6. Springfield Sangamon Growth Alliance-Targeted Industries

With Springfield serving as the state capital of Illinois, Springfield and Sangamon County are known for state government. While state government-related activities will continue to be an important part of the local economy, efforts to expand the variety of businesses is underway. The following types of business are targets²⁹:

- Health and life sciences: Springfield is home to major hospital systems and a growing network of medical organization. Southern Illinois University School of Medicine also has a facility in Springfield.
- Technology: Technology-based businesses are growing in Springfield, rooted in the educational opportunities and affordable cost of living.
- Manufacturing and heavy industry: Logistical access is a strength, with 90 million people within an eight-hour drive.
- Agribusiness: Illinois is the United States' second leading exporter of corn, soybean, feed grains and related products. The Springfield area is surrounded by the agricultural industry and has ready access to transportation.
- Professional services: With public service a leading employer in the area, Springfield is home to insurance, finance, legal and other business services.

These types of businesses are a good fit for SPI, and SPI should continue to work closely with the SSGA to market the targeted industry opportunities at the airport.

5.7. National Guard Synergies

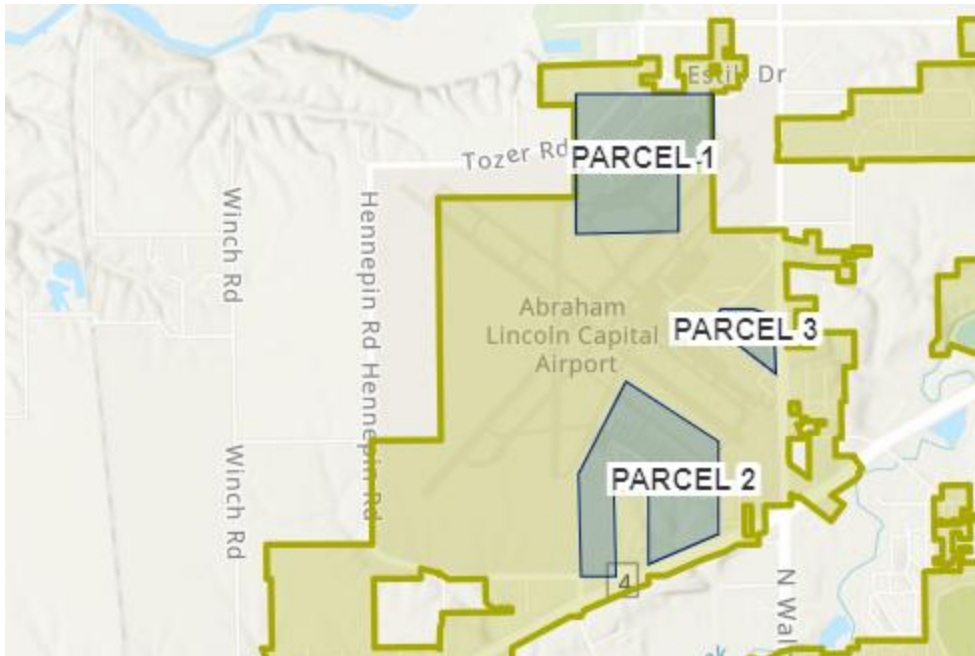
The 183rd Wing has four groups: air operations, mission support, medical and maintenance. These groups have specialties in intelligence, cybersecurity, engineering, maintenance and medical services that align with the targeted industries of the area. Because many of the Illinois Air National Guard's positions are part time, having local industries that align with the Guard members' skills help attract and retain them and provides an educated workforce for the community.

²⁹ <https://www.thriveinspi.org/doing-business-in-spi/key-industries/finance-insurance-professional-services/>, accessed December 3, 2024.

5.8. Enterprise Zone Incentives

As previously mentioned, there is an enterprise zone on SPI. The Springfield/Sangamon County Enterprise Zone was established Jan. 1, 2016, and has an expiration date of Dec. 31, 2030. The limits of the enterprise zone parcels at SPI are depicted in **Figure 5.4**. These enterprise zone parcels do not cover the entire developable areas at SPI and likely reflect SPI’s property ownership at the time the zone was established. Per the city of Springfield’s webpage on the enterprise zone, additions to the Springfield/Sangamon County Enterprise Zone may be considered under special circumstances, and boundaries can be expanded for qualified projects, requires a project commitment. Expanding the zone is subject to an approval process at the city, county and state levels.

FIGURE 5.4 ENTERPRISE ZONES PARCELS AT SPI



Source:
<https://maps.springfield.il.us/portal/apps/webappviewer/index.html?id=53d3ac72c3974ef49e33833766d8bdac>, accessed Dec. 4, 2024.

According to the city’s Office of Planning and Economic Development, enterprise zones offer the following incentives:

- Building material sales tax exemption: an exemption for state, city and county sales tax for building materials used for remodeling, rehabilitation or new construction.
- Investment tax credit: a 0.5% credit against the state income tax for investments in qualified property placed in service in an enterprise zone. It “applies against gross income subject to Illinois income tax and to the depreciable basis of qualified property placed in service within the Enterprise Zone. It is a one-time credit given in the taxable year in which the property is placed in service. If the amount of the credit exceeds the tax liability for that year, the excess may be carried forward and applied to the tax liability of the five taxable years following the excess credit year.”
- Utility tax exemption: “allows a business enterprise certified by the Department of Commerce and Economic Opportunity as making an investment in an Enterprise Zone that either creates a minimum of 200 full-time equivalent jobs in Illinois or retains a minimum of 1,000 full-time jobs in Illinois, a 5 percent

state tax exemption on gas, electricity and the Illinois Commerce Commission 0.1 percent administrative charge and excise taxes on the act or privilege of originating or receiving telecommunications.”

- Manufacturing machinery and equipment sales tax exemption: “allows a business enterprise that is certified by the Department of Commerce and Economic Opportunity as making a \$5 million investment that either: creates a minimum of 200 full-time equivalent jobs in Illinois; or retains a minimum of 2,000 full-time jobs in Illinois; or which retains 90% of the existing jobs, a 6.25 percent state sales tax exemption on all tangible personal property which is used or consumed within an Enterprise Zone in the process of manufacturing or assembly of tangible personal property for wholesale or retail sale or lease. This exemption includes repair and replacement parts for machinery and equipment used primarily in the process of manufacturing or assembling tangible personal property for wholesale or retail sale or lease, and equipment, manufacturing fuels, material and supplies for the maintenance, repair or operation of manufacturing or assembling machinery or equipment.”³⁰

There are also potential city or county property tax abatements; however, if the development is on property leased from SPI, property taxes may not apply.

5.9. Development Opportunities

Based on the forgoing information, each quadrant of SPI was examined for development opportunities. This assessment includes the analysis of development-related AAM. With intersecting runways, the development areas at SPI can be identified by the airport quadrant they are in relative to the airfield. Each quadrant has certain assets that will influence the opportunities in that quadrant.

5.10. South Quadrant of SPI

Airport Commerce Park Development Areas

The south quadrant of SPI houses T-hangars and an apron area. A potential vertiport location in the south quadrant was identified in the AAM chapter. The primary access to this area is from Veterans Parkway. The development in this area is primarily focused on general aviation users. The balance of the area is Airport Commerce Park and is primarily undeveloped. There are a couple of homes that are owned by the airport that can be removed for redevelopment. Wilbur and Pulliam roads provide access through the area. SPI owns the land on both sides of Wilbur Road, so it has the potential to be modified to fit development opportunities. A conceptual relocation of Wilbur Road has been included when considering development opportunities.

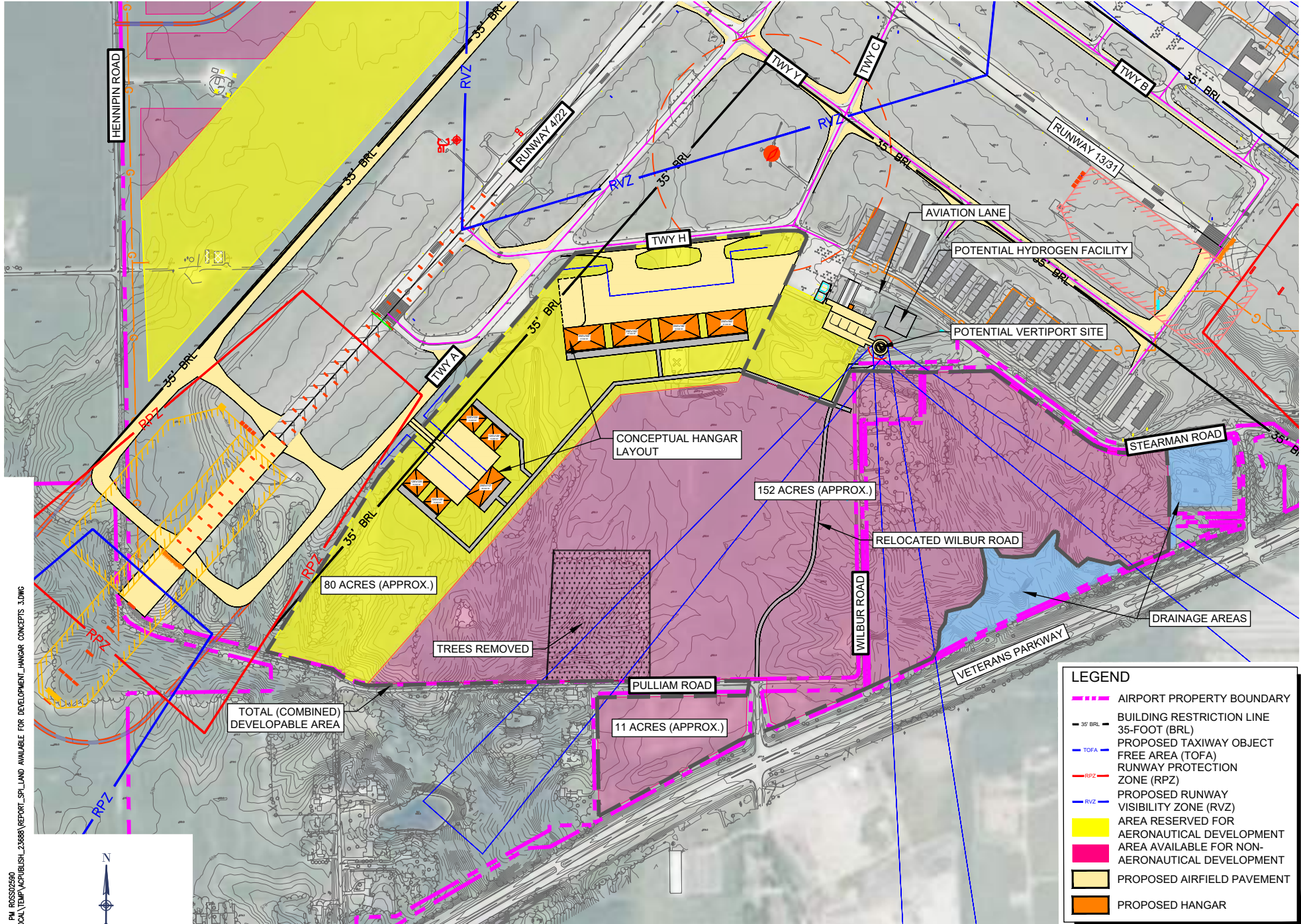
There will likely be multiple future tenants that eventually occupy Airport Commerce Park. However, not every tenant will use or need airside access, while other tenants may be attracted to the area primarily because of the airside access. To allow SPI to take advantage of development opportunities as they arise, it is important to identify and reserve areas for aeronautical and nonaeronautical use. The exact future sizes needed are unknown, but possible business types that may require airfield access include MRO, aircraft storage, aircraft manufacturing, AAM-related, pilot training or other similar development. Other nonaeronautical development that would not need airside access include logistics warehousing, manufacturing, commercial office space, hospitality and retail or restaurant.

As discussed in the AAM chapter, with easy access to water and natural gas, the south quadrant of SPI has the potential to accommodate a hydrogen production facility. It is desirable for a hydrogen storage and/or production facility to be located with ready airside and landside access so that the hydrogen produced can be sold to other

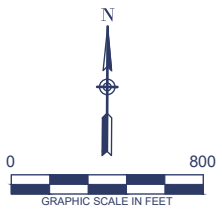
³⁰ <https://www.springfield.il.us/Departments/OPED/OPEDHome.aspx?EnterpriseZones>, accessed Dec. 4, 2024.

users in the community. The most likely location for such a facility would be across from the T-hangars and is included on the south quadrant development concept exhibits.

Using the guiding principle of reserving the areas along the taxiways for aeronautical use and maintaining airfield access, some conceptual layouts were developed to assist in identifying areas to be reserved for aviation development. One concept positions large, MRO or business-sized hangars along the proposed apron paralleling Taxiway H. Considering ground contours and drainage swales, an additional complex of hangars, likely to be smaller-sized, could be developed along an extended Taxiway A. **Figure 5.5** depicts this concept, which uses about 930 feet from parallel taxiway centerlines for aeronautical development.



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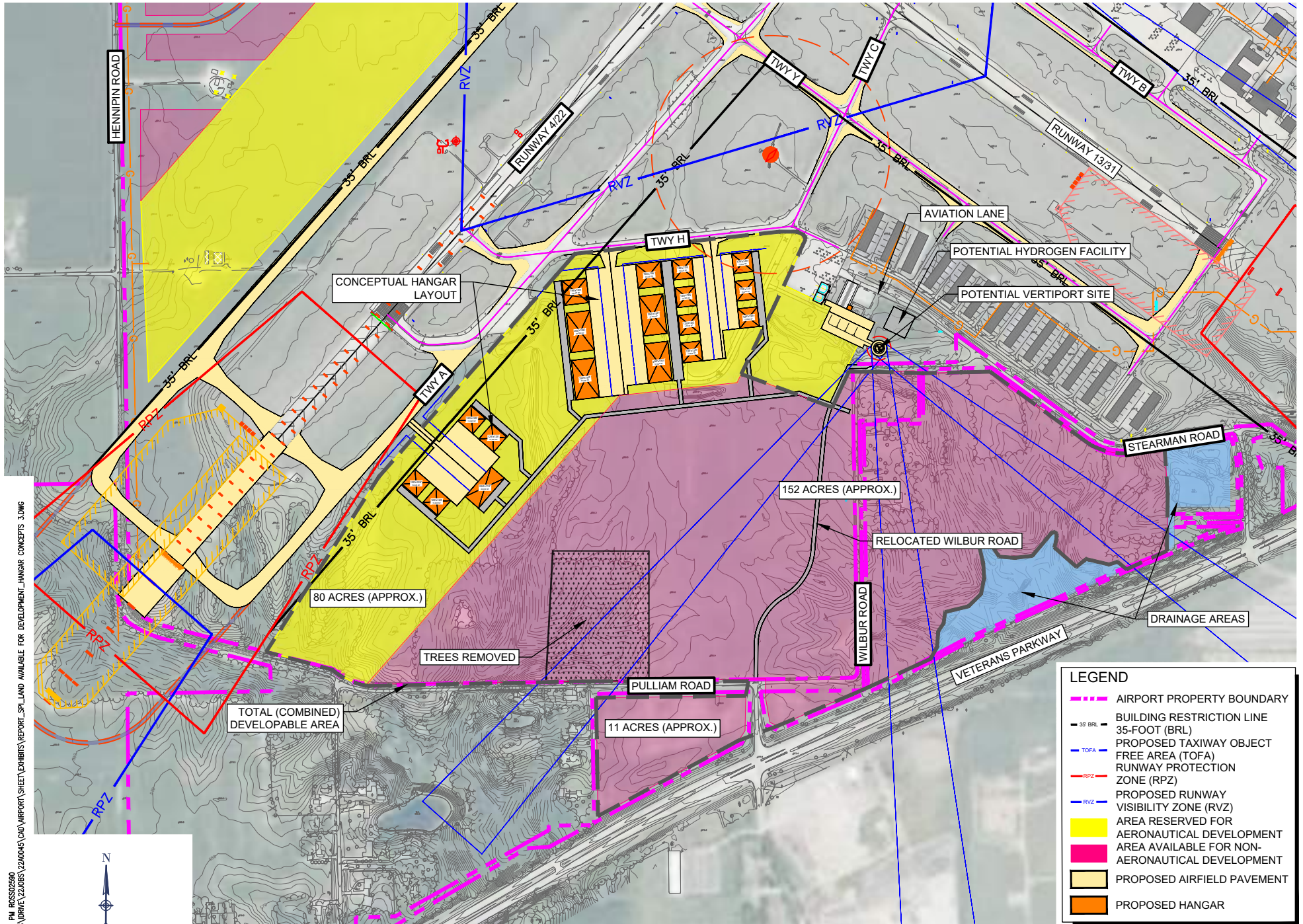
SOUTH QUADRANT DEVELOPMENT
CONCEPT 1

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During the winter in the Midwest, north-facing hangar doors are a disadvantage, because the area in front of the doors receives limited light and does not thaw as quickly or more quickly refreezes. To avoid north-facing doors, the large hangars could be reoriented to face east and west around a shared taxilane and apron space. A similar concept could also be used for medium-sized hangars. **Figure 5.6** depicts this concept. While the hangar development could be extended farther south, to keep the taxi distances reasonable, only four large hangars similar to the first concept were included, as well as two slightly smaller hangars. By reorienting the hangars to face east and west, potentially two sets of hangar areas could be developed. Similar to the first concept, an additional hangar area could be developed along an extension of Taxiway A. In this concept, at least 1,085 feet from the Taxiway H centerline and 930 feet from an extended Taxiway A centerline should be reserved for aeronautical use.

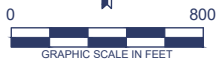
With the area nearest the taxiways reserved for future tenants that would need airside access, the remaining areas can be reserved for nonaeronautical uses. SPI was recently awarded a grant for site preparation from the Illinois Department of Commerce and Economic Opportunity. In addition to recent efforts to improve drainage and remove trees in the area, SPI has made great strides in preparing the nonaeronautical areas to be shovel-ready for future development.

Considering the ground contours, 87 acres are available with 2 to 4 feet of grade difference. Depending on the development, other areas may need more grading. Thirteen acres of the south commerce area is separated from the other acreage by Pulliam Road. This portion of Airport Commerce Park fronts Veterans Parkway. This visibility makes this portion of the site prime for hotel, restaurant or other commercial development. Two acres are east of Camp Lincoln Road, and about 12 acres are west of Camp Lincoln Road. **Figure 5.7** shows potential nonaeronautical uses.



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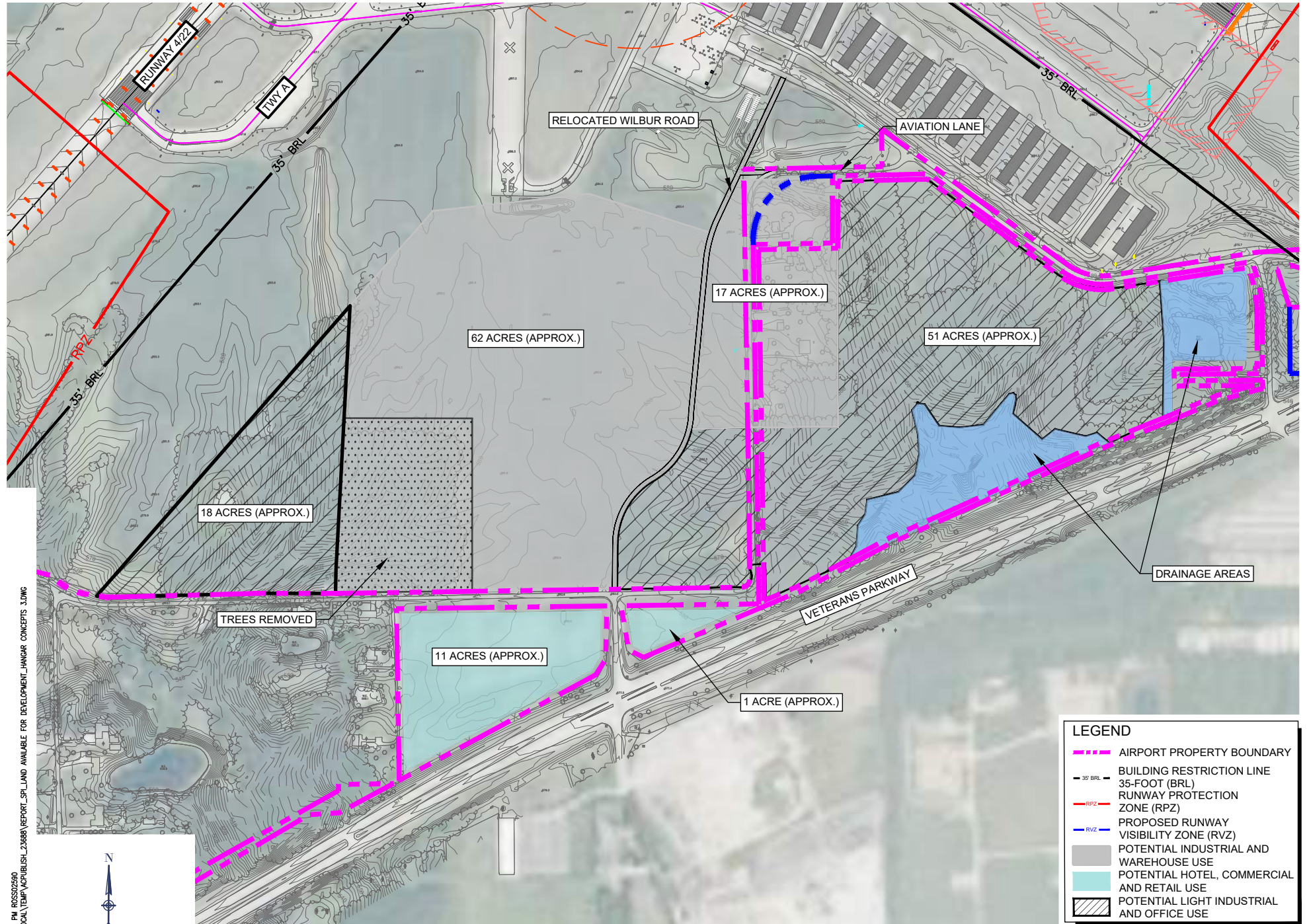
LEGEND	
	AIRPORT PROPERTY BOUNDARY
	BUILDING RESTRICTION LINE 35-FOOT (BRL)
	PROPOSED TAXIWAY OBJECT FREE AREA (TOFA)
	RUNWAY PROTECTION ZONE (RPZ)
	PROPOSED RUNWAY VISIBILITY ZONE (RVZ)
	AREA RESERVED FOR AERONAUTICAL DEVELOPMENT
	AREA AVAILABLE FOR NON-AERONAUTICAL DEVELOPMENT
	PROPOSED AIRFIELD PAVEMENT
	PROPOSED HANGAR



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SOUTH QUADRANT DEVELOPMENT
CONCEPT 2

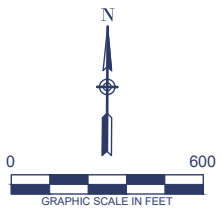
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LEGEND

- - - AIRPORT PROPERTY BOUNDARY
- 35' BRL
- 35-FOOT (BRL) RUNWAY PROTECTION ZONE (RPZ)
- PROPOSED RUNWAY VISIBILITY ZONE (RVZ)
- POTENTIAL INDUSTRIAL AND WAREHOUSE USE
- POTENTIAL HOTEL, COMMERCIAL AND RETAIL USE
- POTENTIAL LIGHT INDUSTRIAL AND OFFICE USE

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SMART AIRPORT

SOUTH QUADRANT NON-AERONAUTICAL
POTENTIAL USE

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FIGURE
5.7

5.11. North Quadrant of SPI

Figure 5.8 provides an aerial view of the north quadrant of SPI that is home to an MRO, IDOT offices, an airport safety facility and solar arrays. There are also some areas reserved for the potential expansion of businesses. The removal of Runway 18/36 increased the contiguous developable area in the north quadrant. The second solar array project is planned in the north quadrant adjacent to the first phase. The airport authority has been acquiring property along Estill Drive for land use compatibility and future expansion potential. The redline ALP shows the closing of a portion of North Airport Drive from the IDOT office east to Estill Drive to add an area adjacent to the airfield. This area would still have ground access via Estill Drive to Ware Road. If demand warrants an extension of Runway 22, the Estill Drive connection to Illinois Route 29 (J. David Jones Parkway) would be relocated. The AAM chapter identified a potential vertiport location in the north quadrant. It would initially be separated from the airfield, but with the closure of a portion of Estill Drive, it could be connected to the airfield.

FIGURE 5.8 AERIAL OF NORTH QUADRANT OF SPI

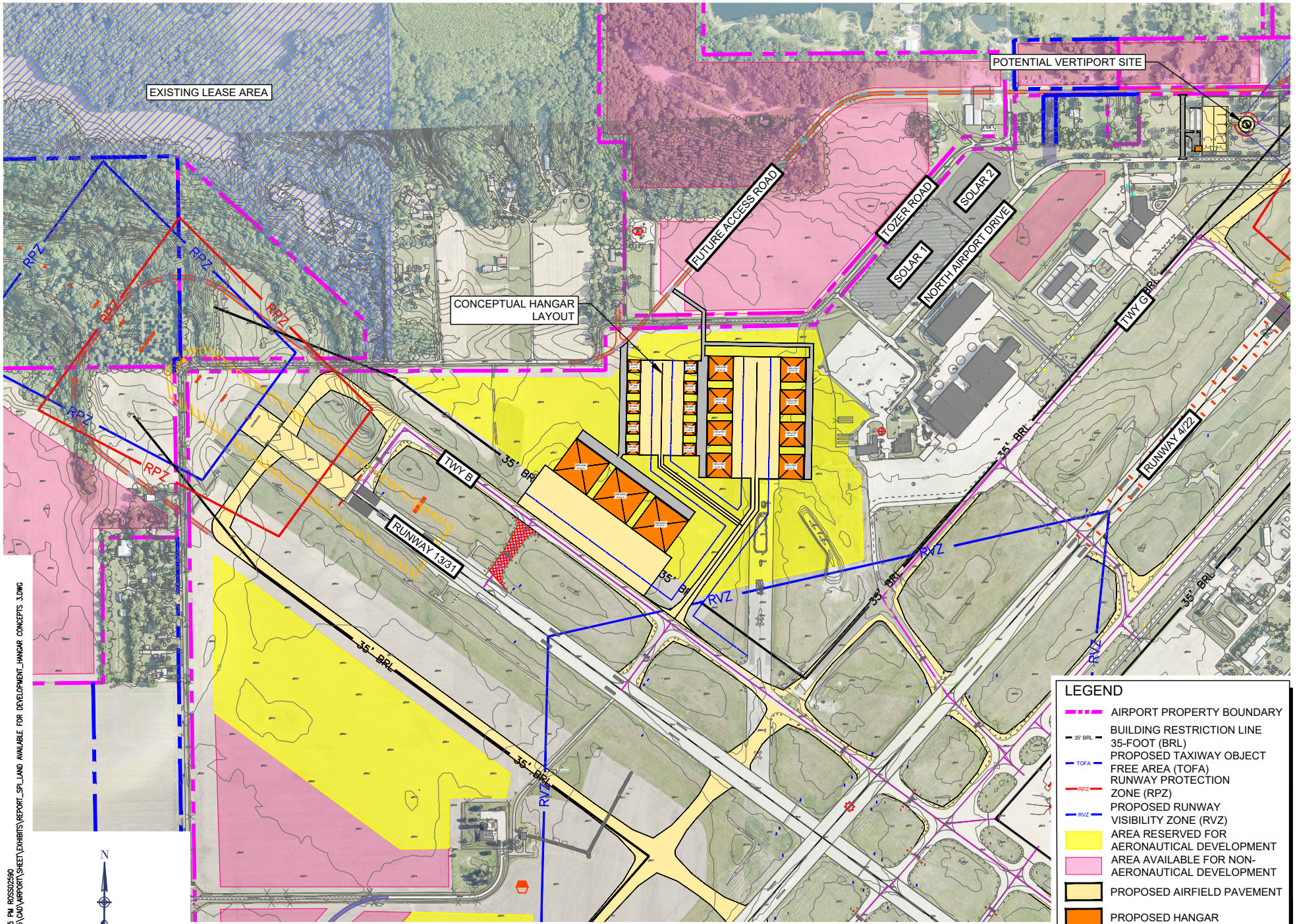


Source: Google Earth, accessed Nov. 27, 2024.

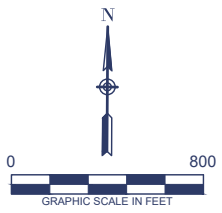
With parallel taxiway access from taxiways B and G, the north quadrant of the airport within the future airport boundary roads has been reserved for aeronautical development. Figure 5.9 shows a concept with a mix of large hangars, similar in size to Standard Aero, with an apron area and two groups of hangars: one for medium-sized

and one for smaller corporate hangars. With the solar arrays and land available for an expansion of the solar arrays, the north side of the airport has the potential to accommodate a hydrogen production facility, as discussed in the AAM chapter, although the south quadrant was identified as the preferred location.

In addition to the property along Estill Drive, the airport authority owns property east of Illinois Route 29 off the end of Runway 22. This land protects the approach to Runway 22 and provides space for a potential extension to Runway 22, if needed. An extension of Runway 22 would require relocating Illinois Route 29 farther from the future runway end. To continue to reserve this area for a potential runway extension, any use of this land should be temporary. Presently, a portion is in agricultural production. Kennedy Park is also on a portion of this land. If the long-term plan changes in the future and an extended runway is no longer included on the ALP, the land along Illinois Route 29 is zoned for general residence, business and agriculture. The frontage on Illinois Route 29 is an asset, especially for business that benefit from visibility and accessibility to the public.



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NORTH QUADRANT DEVELOPMENT
CONCEPT

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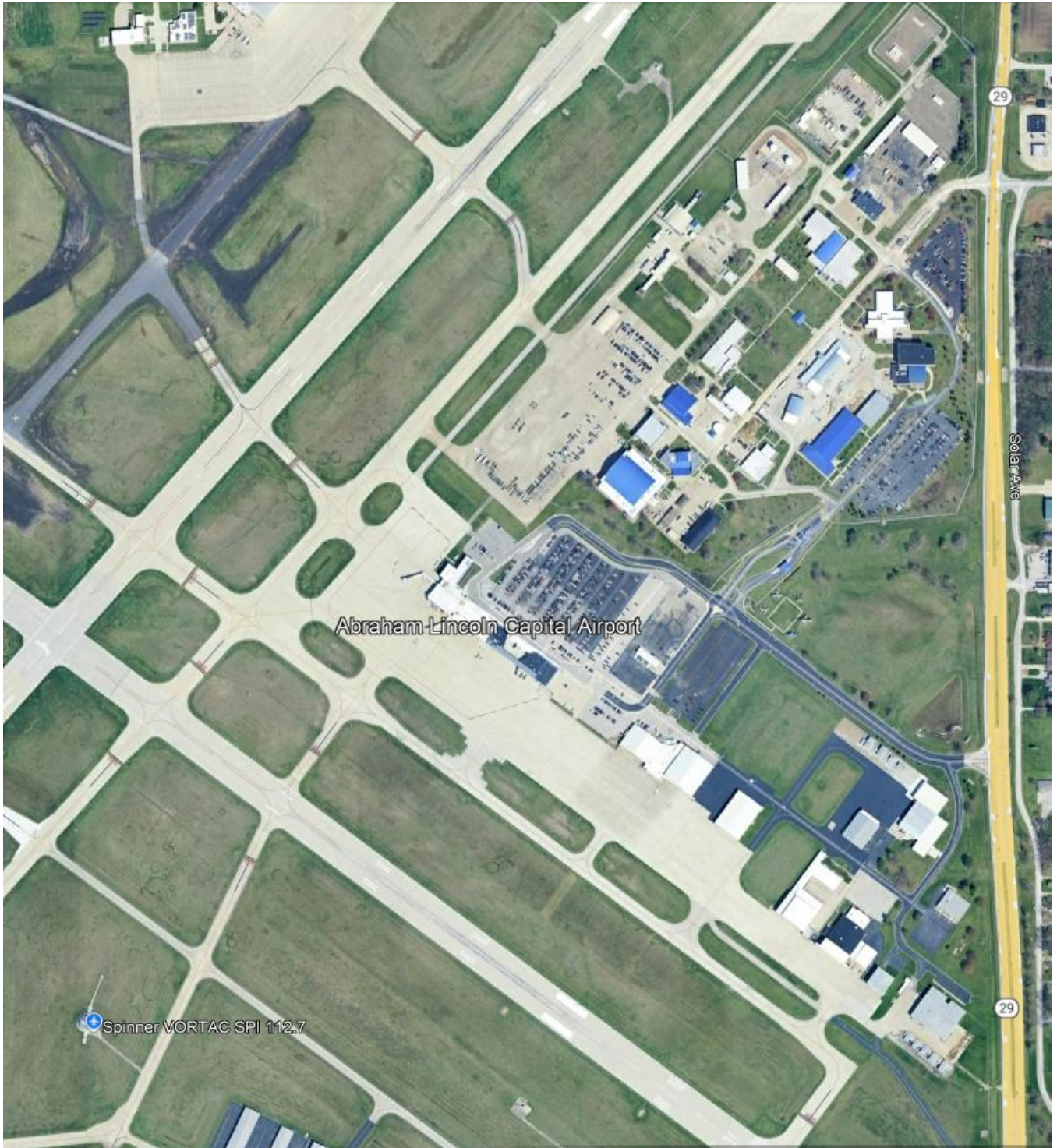
- LEGEND**
- AIRPORT PROPERTY BOUNDARY
 - 35' BRL 35-FOOT (BRL) BUILDING RESTRICTION LINE
 - TOFA PROPOSED TAXIWAY OBJECT FREE AREA (TOFA)
 - RPZ RUNWAY PROTECTION ZONE (RPZ)
 - RVZ PROPOSED RUNWAY VISIBILITY ZONE (RVZ)
 - AREA RESERVED FOR AERONAUTICAL DEVELOPMENT
 - AREA AVAILABLE FOR NON-AERONAUTICAL DEVELOPMENT
 - PROPOSED AIRFIELD PAVEMENT
 - PROPOSED HANGAR

5.12. East Quadrant of SPI – Terminal Area

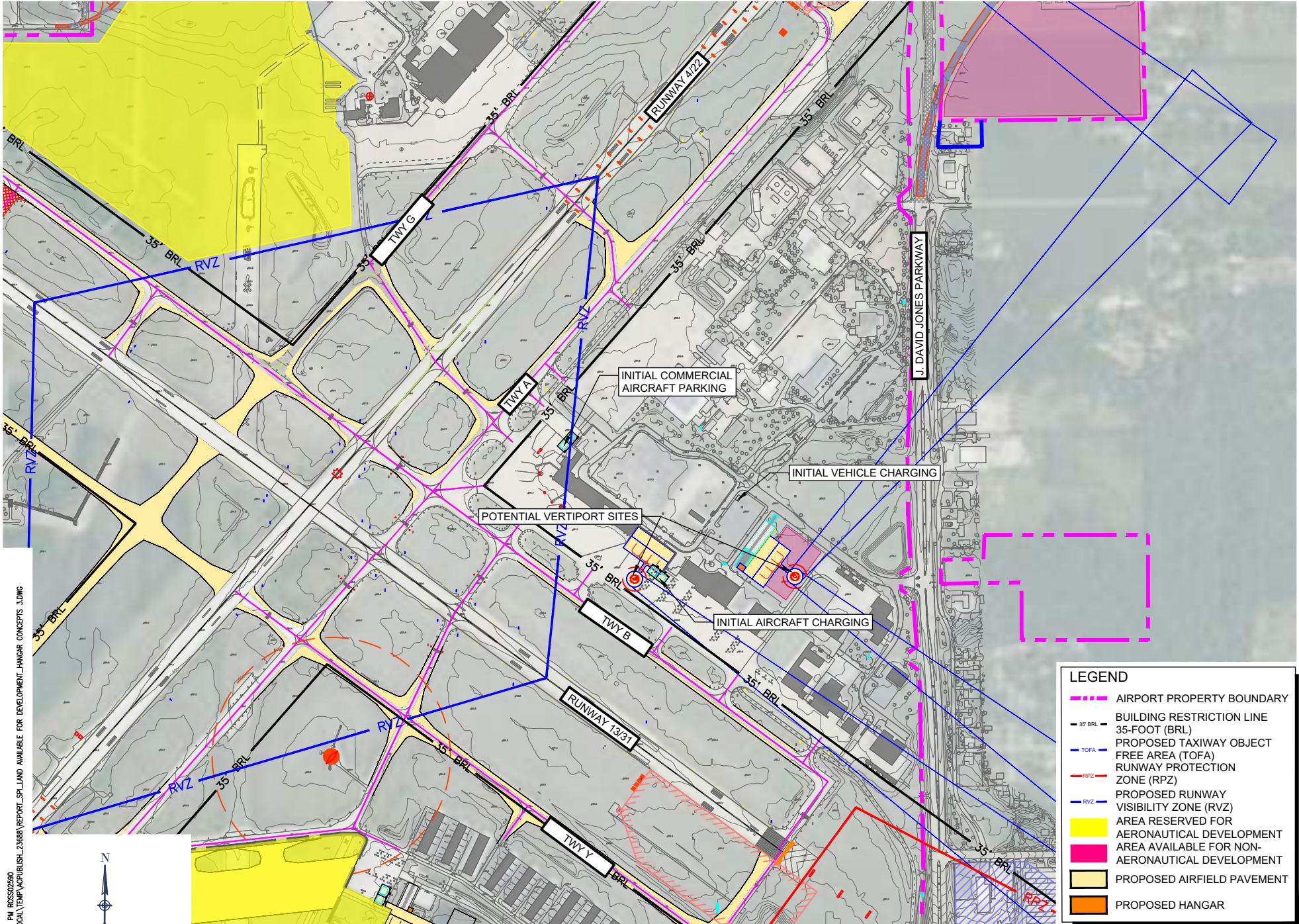
The east quadrant of SPI contains the passenger terminal area, FBO and Illinois Air National Guard. With limited undeveloped area, this quadrant is anticipated to remain primarily dedicated to aviation use and its supporting infrastructure. **Figure 5.10** is an aerial of the east quadrant of SPI and its aviation infrastructure.

It is anticipated that charging infrastructure will be added to the east quadrant to support ground vehicles, as discussed in the AAM chapter. A site for a potential vertiport was also identified in this quadrant near the FBO. The use of this area for a vertiport needs to be weighed against other potential uses of this area. **Figure 5.11** show conceptual development in the east quadrant. There is some additional undeveloped land in the east quadrant. The airport authority has reserved this area for potential Illinois Air National Guard expansion.

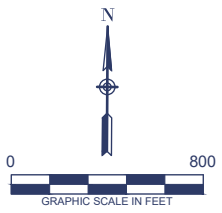
FIGURE 5.10 AERIAL OF EAST QUADRANT AT SPI



Source: Google Earth, accessed Nov. 27, 2024.



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ABRAHAM LINCOLN CAPITAL AIRPORT
 SMART AIRPORT

EAST QUADRANT DEVELOPMENT
 CONCEPT

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LEGEND

- AIRPORT PROPERTY BOUNDARY
- 35' BRL
- PROPOSED TAXIWAY OBJECT FREE AREA (TOFA)
- RUNWAY PROTECTION ZONE (RPZ)
- PROPOSED RUNWAY VISIBILITY ZONE (RVZ)
- AREA RESERVED FOR AERONAUTICAL DEVELOPMENT
- AREA AVAILABLE FOR NON-AERONAUTICAL DEVELOPMENT
- PROPOSED AIRFIELD PAVEMENT
- PROPOSED HANGAR

5.13. West Quadrant of SPI

The west quadrant of SPI accommodates the airport traffic control tower, airport surface radar and remote transmitter/receiver towers and is otherwise primarily undeveloped, as shown on the aerial map in **Figure 5.12**. However, roadway and utility connections are not as readily available as the Airport Commerce Park area. Road access is Pulliam Road to Hennepin Road around the end of Runway 4. Road access could be further restricted if SPI constructs the proposed south extension to Runway 4, which would require closing the roads off the end of the runway. If that occurs, the access would be from Illinois Route 97 via Winch Lane, which passes two subdivisions.

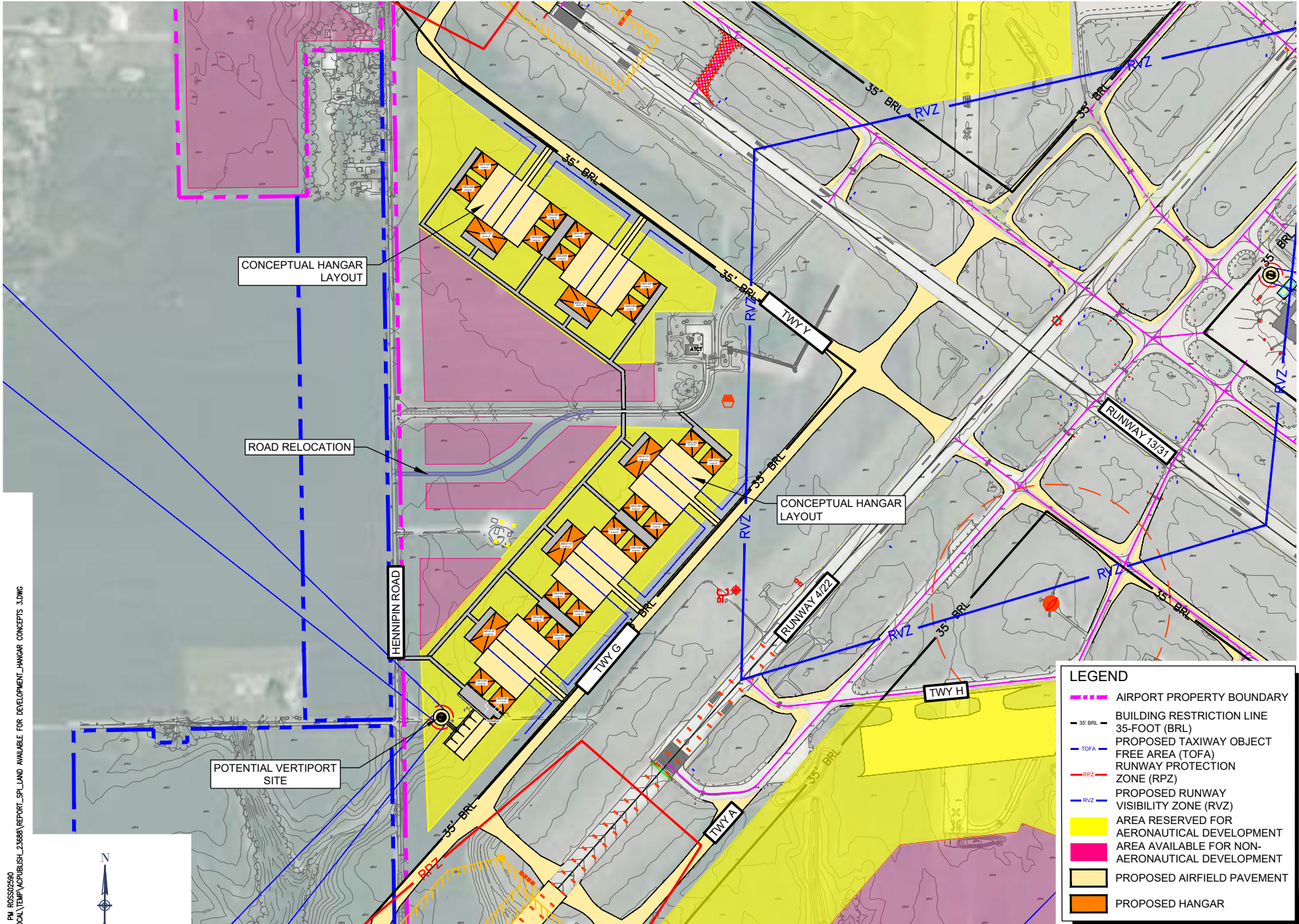
Therefore, while developable, this area is better suited for development with minimal roadway traffic. The ALP includes planned parallel taxiways on the west quadrant of SPI. With potential taxiway access, a portion of this area should be reserved for aeronautical use. Similar to the setback from Taxiway A, it is recommended to reserve approximately 920 feet from the proposed parallel taxiway centerlines for aeronautical development. Initially, aeronautical use could be developed with a taxiway extension to just the new development. Another potential aeronautical use for this area could be an AAM training facility for eVTOL aircraft pilots and mechanics that would not need access to the rest of the airfield. Potential nonaeronautical users could include renewable energy generation. Presently, the west quadrant of SPI is used primarily for agricultural production. **Figure 5.13** shows the potential split between aeronautical and nonaeronautical development.

FIGURE 5.12 AERIAL OF WEST SIDE OF SPI



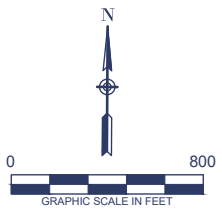
Source: Google Earth, accessed Nov. 27, 2024.

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LEGEND

- AIRPORT PROPERTY BOUNDARY
- BUILDING RESTRICTION LINE 35-FOOT (BRL)
- PROPOSED TAXIWAY OBJECT FREE AREA (TOFA)
- RUNWAY PROTECTION ZONE (RPZ)
- PROPOSED RUNWAY VISIBILITY ZONE (RVZ)
- AREA RESERVED FOR AERONAUTICAL DEVELOPMENT
- AREA AVAILABLE FOR NON-AERONAUTICAL DEVELOPMENT
- PROPOSED AIRFIELD PAVEMENT
- PROPOSED HANGAR



ABRAHAM LINCOLN CAPITAL AIRPORT
 SMART AIRPORT

WEST QUADRANT DEVELOPMENT

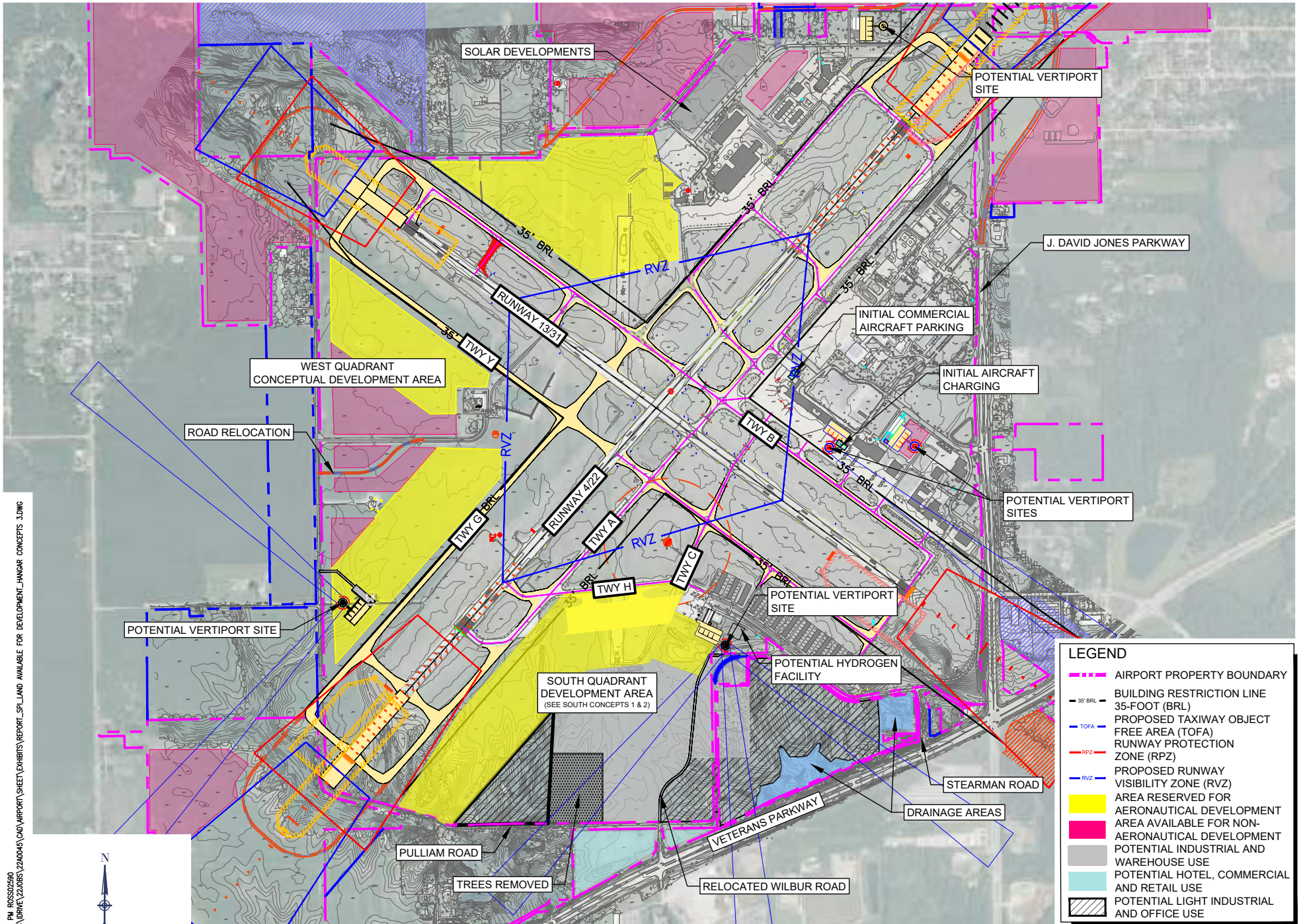
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5.14. Summary

This chapter discussed development opportunities and potential uses in each quadrant of SPI. **Figure 5.14** shows the combination of the development potential for the overall airport. The airport authority has been marketing and pursuing funding to ready Airport Commerce Park. This analysis provide additional information that can be used to market this area for aeronautical and nonaeronautical development.

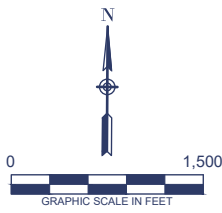
The next step is to incorporate the land use recommendations from this study into the ongoing ALP update. The designation of aeronautical and nonaeronautical land use is important when seeking FAA approval for development on the airport. If the land in areas designated for nonaeronautical development was acquired with FAA funding assistance, an FAA land release will be required before development if not already granted. The current process for the FAA to determine whether or not it has approval authority and thus a land release would be required is through a process known as Section 743, named after its section in the FAA Reauthorization Act of 2024.

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LEGEND

- AIRPORT PROPERTY BOUNDARY
- 35' BRL 35-FOOT (BRL)
- TOFA PROPOSED TAXIWAY OBJECT FREE AREA (TOFA)
- RUNWAY PROTECTION ZONE (RPZ)
- PROPOSED RUNWAY VISIBILITY ZONE (RVZ)
- AREA RESERVED FOR AERONAUTICAL DEVELOPMENT
- AREA AVAILABLE FOR NON-AERONAUTICAL DEVELOPMENT
- POTENTIAL INDUSTRIAL AND WAREHOUSE USE
- POTENTIAL HOTEL, COMMERCIAL AND RETAIL USE
- POTENTIAL LIGHT INDUSTRIAL AND OFFICE USE



ABRAHAM LINCOLN CAPITAL AIRPORT
SMART AIRPORT

SPI CONCEPTUAL DEVELOPMENT PLAN

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6. Airport and Regional Logistics Plan

6.1. Introduction

The focus of Chapter 5 was development opportunities on the Abraham Lincoln Capital Airport (SPI) property. This chapter focuses on opportunities to increase the synergies between development on SPI and the broader community. As part of the ongoing Smart Airport and Regional Logistics Planning Project, a series of regional stakeholder discussions with SPI representatives, the regional planning commission, local economic development groups and other land development stakeholders have been conducted. The purpose of these discussions, along with other elements of this study, was to contribute to the development of a logistics plan that addresses all forms of transportation, with the goal of finding long-term synergies with SPI operations and growth. This plan includes smart cities concepts using digital technology, connected infrastructure and appropriate governance to expedite and accommodate citywide growth patterns.

Also, the FAA recommends establishing long-term cooperative consultation between the airport sponsor and local, regional and state governments and planning organizations regarding land use, zoning and surface access responsibilities to improve consistency between community and airport planning. This collaboration serves to educate local planners and citizens; it also helps gain local agreement and support for future airport projects. Ensuring that synergies exist between the airport sponsor's medium- and long-term goals and regional planners' objectives for future development opportunities helps to improve land use compatibility around the airport. Further, by incorporating the airport development opportunities into regional land use and transportation plans, airport and industry stakeholders can mutually benefit and, subsequently, maximize positive community impact.

This planning also considers parcel zoning and any recommendations to support and enhance airport growth and local development supporting transportation infrastructure, as well as the identification of new technologies that could enhance and improve the movement of people and goods to and from SPI and throughout the greater Springfield region. Additionally, this plan considers and promotes efficient and improved citywide connections to and from the airport for commuters, businesses, cargo and e-commerce. The overall goal of this section is to give the SPI staff actionable recommendations, including coordination with comprehensive plan updates.

This plan seeks to inform and develop comprehensive, area-wide transportation and property development plans, focusing on all transportation modes, as well as distinct synergies with SPI passenger and cargo movements. Roadway, transit and industrial development plans should draw from and focus on SPI in synergy with the broad goals of the metropolitan area as a prime, area-wide economic development infrastructure resource. This chapter discusses the factors to consider related to development opportunities and associated recommendations.

6.2. Inclusion in Regional Plans

SPI is included in the City of Springfield Comprehensive Plan 2017-2037³¹ and the Springfield Area Transportation Study's 2050 Long Range Transportation Plan³² (LRTP), as described below. However, from this study, enhancements to its information in these plans to better recognize its regional role and future plans are recommended.

³¹ <https://www.springfield.il.us/Departments/OPED/Documents/2037ComprehensivePlanPartI.pdf>, accessed Sept. 10, 2025.

³² <https://sangamonil.gov/Portals/0/Departments/Regional%20Planning%20Commission/Docs/Transportation/Plans/LRTP%202050/FINAL%202050%20LRTP.pdf>, accessed Sept. 8, 2025.

The comprehensive plan recognizes that SPI is a major land use that it labels Sector 4: Northwest Area and that the types of development should be compatible with the airport. It also identifies that the area west of the airport and north of Illinois Route 97 should be limited until sewer is readily available and water service is improved. It identifies that SPI should be considered an “Opportunity Area” for on-site commercial and industrial development but does not provide additional detail.

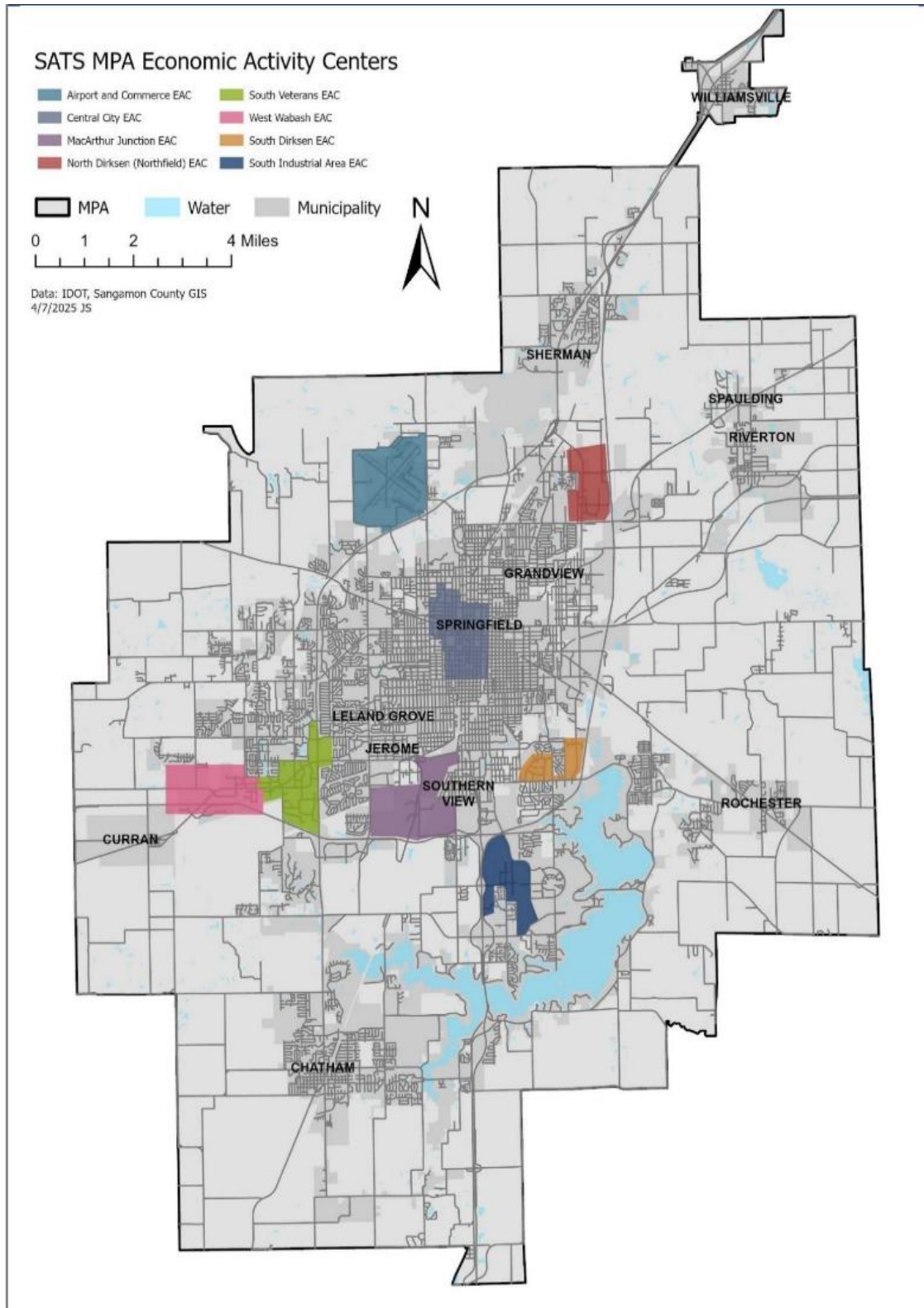
The 2050 LRTP describes the airport, its activity, recent improvements and ground access. It includes Airport Commerce Park and the airport as an economic activity center, as will be further described in the next section. The airport projects through 2033 are listed in the plan. The 2050 LRTP recognizes the Smart Airport and Regional Logistics Planning Project to guide the airport’s future development. Recommendations from this study should be incorporated into long-range plan updates.

6.3. Economic Activity Centers

The 2050 LRTP identifies economic activity centers (EAC) in the city. The EACs are high concentrations with the potential for business parks, office and industry, typical with multiple land uses along multiple modes of transportation. The airport and commerce park are one of eight centers in the city, as depicted in **Figure 6.1**. Each of the EACs has its own characteristics. In the 2050 LRTP, The Airport Commerce Park/Abraham Lincoln Capital Airport EAC is described as providing passenger service to several destinations, without scheduled air cargo, but with the potential to accommodate such. The airport EAC also has educational facilities, a National Guard base, and private aviation facilities. It identifies the area around the airport as a location suitable for warehouses and aviation uses.

One of the Springfield area’s strengths is its location between Chicago and St. Louis, making it a prime location for logistics facilities. The North Dirksen EAC and its vicinity is developing as a logistics area home to FedEx Ground and with an Amazon last-mile center under development. A UPS Access Point is farther south, in the South Dirksen EAC. Both areas are close to I-55. The UPS site has limited growth potential, so there may be a time when a portion of this operation is relocated in the community. Airport Commerce Park would be able to accommodate such an operation.

FIGURE 6.1 ECONOMIC ACTIVITY CENTERS



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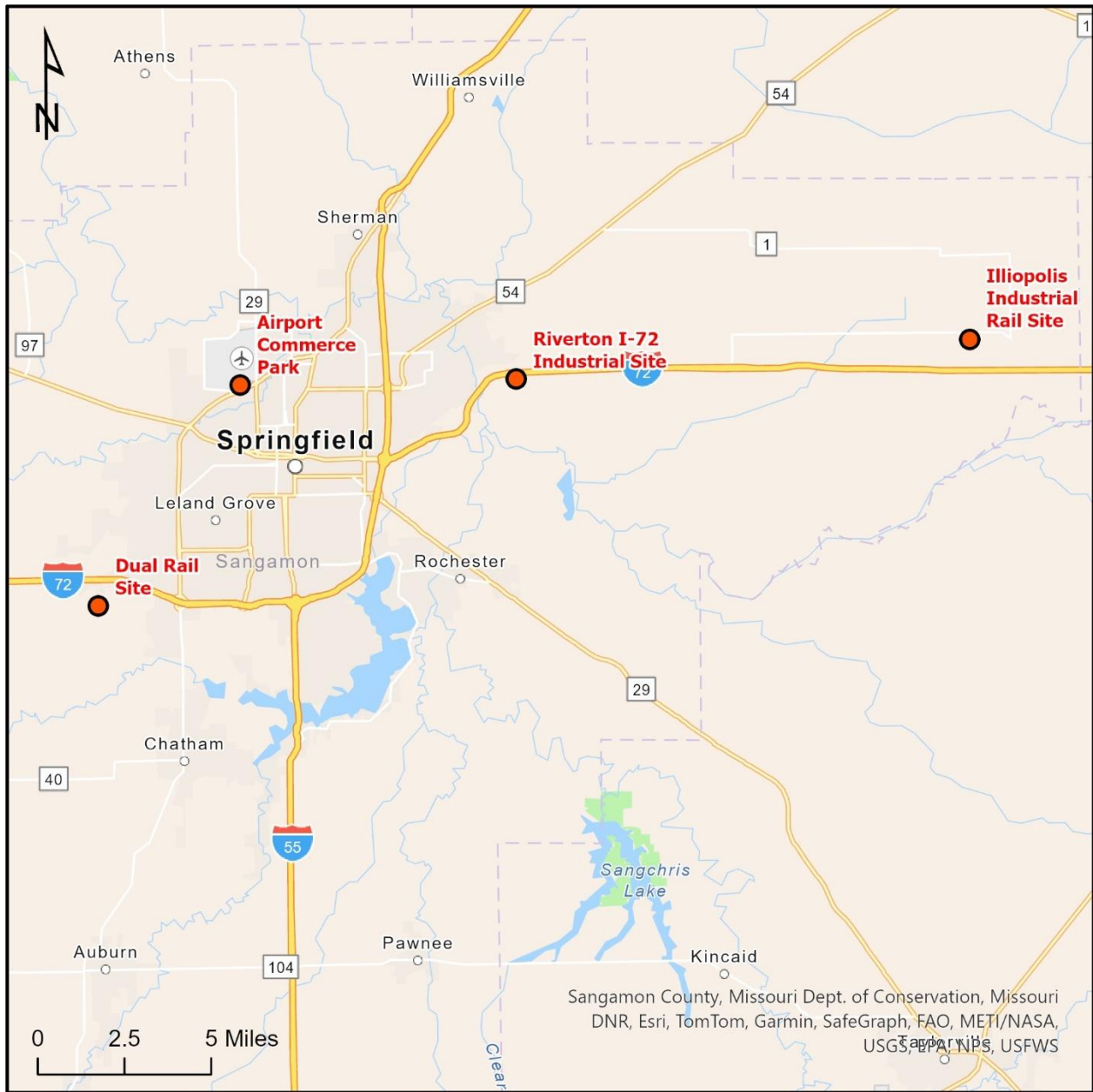
6.4. Regional Available Megsites

Regional economic development and its resulting job growth is often accelerated by large companies relocating to the region or expanding facilities in the region. When large companies develop new facilities, they often require large tracts of land. Megsites are large parcels of land (or several smaller parcels that combine to form a large tract, with the owners committed to a common development purpose) that are generally ready for development, with utilities already on-site or in very close proximity, environmental studies underway or complete and possibly land clearing/grading complete. The shovel-ready nature of these sites can be attractive, because the total development time from property/lease acquisition to construction completion is reduced and allows the corporation to start using its investment more quickly.

For this reason, megasites represent a potential means of attracting large companies to the Springfield region, along with the economic growth they can foster. Similarly, development at a megasite near or adjacent to SPI, such as Airport Commerce Park, has the potential to attract a company that could increase SPI passenger volume and generate air cargo volume. As of September 2025, four megasites were readily found to be available in the Springfield region. The locations of these sites are shown in **Figure 6.2**, and the key attributes of each site are summarized below.

- Airport Commerce Park: This approximately 180-acre site is owned by the Springfield Airport Authority (SAA) with about 87 acres of cleared, relatively flat area identified for nonaeronautical development. An additional 53 acres of similarly developable property has been identified for aeronautical uses adjacent to the 87 acres. Other portions of the site are wooded with hillier terrain. There is a water retention basin in the eastern area, as well as a creek that drains the airfield runoff on the western edge. The middle section features the approximately flat, shovel-ready land with the possibility of airside and landside access. The southernmost section of the property features approximately 4,000 feet of frontage on Illinois Route 4/Veterans Parkway, a major divided highway. Vehicular access is provided via Veterans Parkway, and portions of the site can provide direct access to SPI taxiways. The property is zoned heavy industrial and could also feature office, warehouse/distribution and light industrial land uses with a zoning modification. There is the possibility of commercial, hospitality or retail use along Veterans Parkway with zoning modifications. This property does not have direct rail access, and future rail access is not likely feasible.
- Dual Rail Site: This property is nearly 400 acres and is about a 1/2 mile (straight-line distance) from an interchange with Interstate 72 southwest of Springfield in Curran. The site has over 4,000 feet of frontage on a Norfolk Southern Corp. rail line and almost 2,000 feet of frontage on a Canadian Pacific Kansas City Ltd. rail line on the north and south sides of the property, respectively. The zoning is agricultural, but the future land use plan identifies the site as industrial land use.
- Illiopolis Industrial Rail Site: This almost 135-acre site is about 20 miles east of Springfield and owned by the village of Illiopolis. The site was previously used by a plastics manufacturer. Access to I-72 is only a 2-mile drive, and direct rail access was previously provided to the site by a Norfolk Southern industrial spur track.
- Riverton I-72 Industrial Site: This property is 180-acres and is immediately adjacent to the primary Riverton interchange with I-72. The land use is agricultural, and the site is zoned for industrial development. It is in the Riverton TIF district. This property does not have direct rail access, and future rail access is not likely feasible.

FIGURE 6.2 SPRINGFIELD REGION MEGASITES



6.5. Regional Logistics Routes and Corridors

The Springfield region has an established transportation logistics network that can connect the EACs and megasites to other opportunities in the community. This section summarizes the regional logistics routes.

Air Transportation

SPI is the center of air transportation for Springfield and surrounding communities. SPI has direct service by American Airlines to Chicago; Allegiant Air to Punta Gorda, Florida; and Breeze Airways to Orlando, Florida. The SPI air service market draws leisure destination passengers from the local region and connects regional travelers to worldwide destinations through Chicago.

While SPI has a regular passenger flight schedule, SPI does not have a history of significant air cargo shipment volume. For example, a review of 2019 freight data from an S&P Global Transearch database indicates that only about 750 pounds of cargo were shipped by air to/from SPI, all with an origin/destination in the vicinity of Dallas, Texas. One aspect of the recorded level of air cargo activity is the lack of reliable cargo reporting data from SPI air carriers. Other aspects of commercial and transshipment conditions at SPI were addressed in Chapter 2.

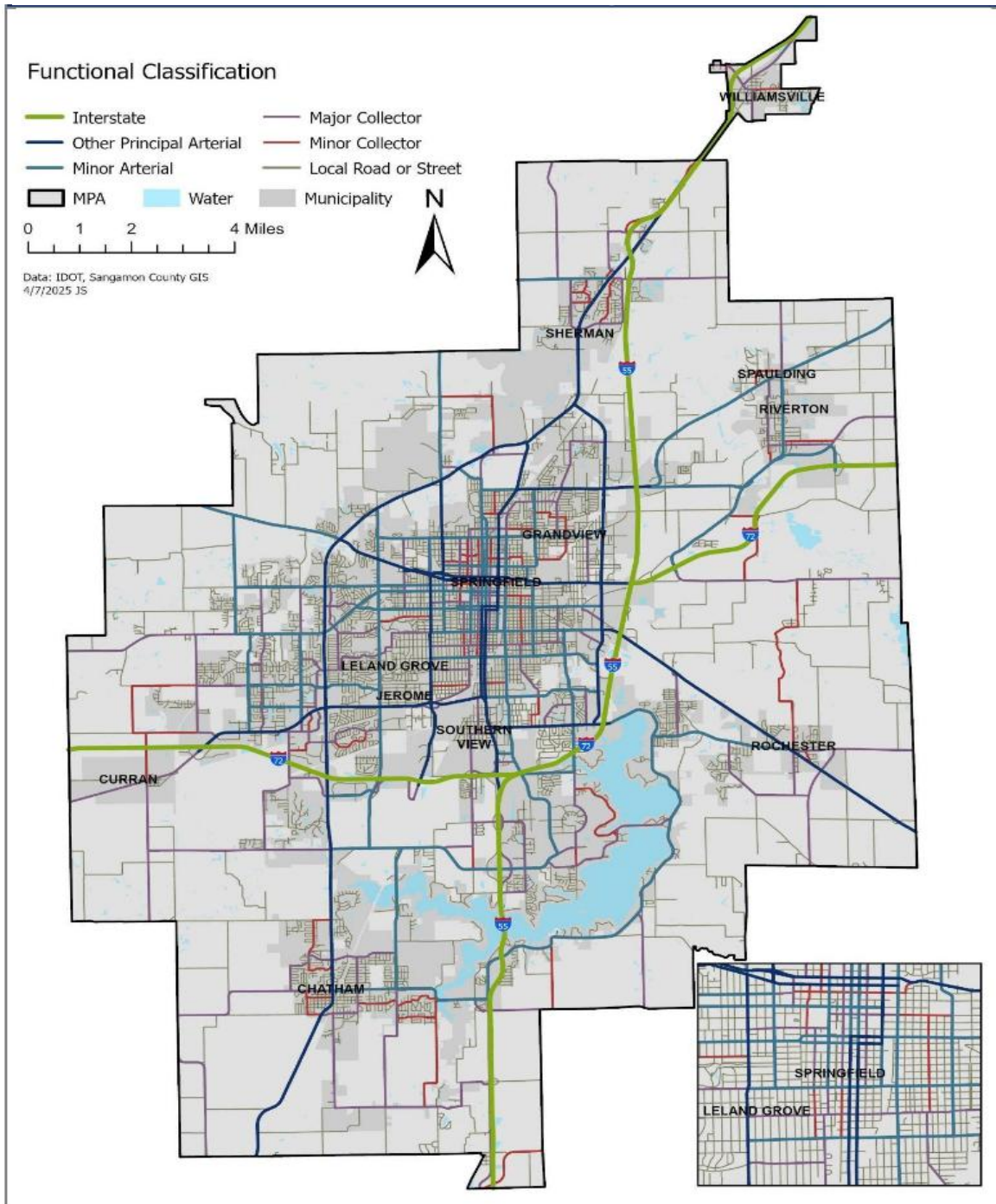
Roadways

The Springfield region has a multitude of ground transportation connections, and the regional highway network is robust. As shown in **Figure 6.3**, two interstate highways pass through Springfield: I-55 provides connectivity with St. Louis to the south and Chicago to the north; I-72 provides connectivity with the Quincy/Hannibal, Missouri, areas to the west and the Decatur/Champaign areas to the east, continuing to Indianapolis via Interstate 74.

In addition to the interstate connections in Springfield, several state highways connect Springfield to the greater region. Although not all are labeled in **Figure 6.3**, the following six major state highways pass through Springfield or are relatively close: Illinois Route (IL) 4, IL 29, IL 54, IL 97, IL 104 and IL 125. Two Class II truck routes pass immediately adjacent to SPI: IL 4/Veterans Parkway and IL 29/J. David Jones Parkway. Interstates 55 and 72 provide routes around Springfield on the east and south sides. Veterans Parkway provides the west-to-north connection.

Only I-55 has a designated business route in Springfield. Business routes are typically former U.S. highways that were rerouted or discontinued when a bypass route was built around the city. A business route needs to be the most direct route and typically connects to its namesake interstate at each end. Business I-55 generally follows the former U.S. 66, providing an alternate route through Springfield.

FIGURE 6.3 REGIONAL ROADWAY NETWORK



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Business Route Designation

There has been discussion as to whether there is an opportunity to establish a Business I-72 route. (There is a Business I-72 in Jacksonville that is the former U.S. 36.) The Special Committee on U.S. Route Numbering of the American Association of Highway and Transportation Officials' (AASHTO) Council on Highways and Streets approves all U.S. and interstate route designations. An application to this committee must come from the state's department of transportation. This would entail generating support from IDOT District 6. This would likely include identifying the problem to be solved. A new business route would require additional signage and maintenance, which would be an additional expense. If the district supports the proposal, it would then need to advocate for it with the IDOT Bureau of Operations. If the bureau supports the proposal, it would still need to be approved by AASHTO.

While it may be possible to get a Business I-72 designation along IL 97 using the Madison/Jefferson couple and Veterans Parkway down to I-72 on the west, as the shortest route, a Business I-72 route that passes by SPI likely would not be approved. A provision in the AASHTO Transportation Policy Book appears to preclude the consideration of an interstate business route that does not provide the shortest distance for travelers: "Any proposal that would exploit the prestige of the U.S. numbered highway system to direct traffic over routes that are not the shortest and best available between major control points on the system, especially when it appears to be for the purpose of benefiting businesses located along such a proposed route, shall constitute reason for denying any application to make such an addition to the system."

Based on this AASHTO policy, it does not appear feasible to establish a Business I-72 route that would pass by SPI. As will be discussed in the next section, establishing preferred routes to SPI and enhancing signage may provide a similar benefit to SPI.

It should be noted that IL 4 is a designated incident bypass route.

Access to SPI

The interstate and state highway connections provide access to SPI from the city and surrounding areas. Unfortunately, there is limited signage to guide the traveler. For travelers using wayfinding apps, the lack of signage is a minor issue. For travelers not using wayfinding apps, the lack of signage can be more of a concern. In addition to assisting in wayfinding to SPI, the signage is a good reminder of the presence of SPI in the community.

SPI's terminal access is from IL 29. The primary routes from the north, west and south can avoid traversing downtown Springfield. Routes from the east need to cross the city. The following are the primary recommended access routes.

From the north: The primary routes are IL 29 or I-55 to Business I-55 to IL 29. All of these are direct routes with less development along the roadways.

From the west: The primary routes are IL 97 to IL 4 to IL 29, IL 125 to IL 97 to IL 4 to IL 29 or I-72 to IL 4 to IL 29. These are also direct routes. While IL 4 has development along it, it is designed to be a through route with signal timing.

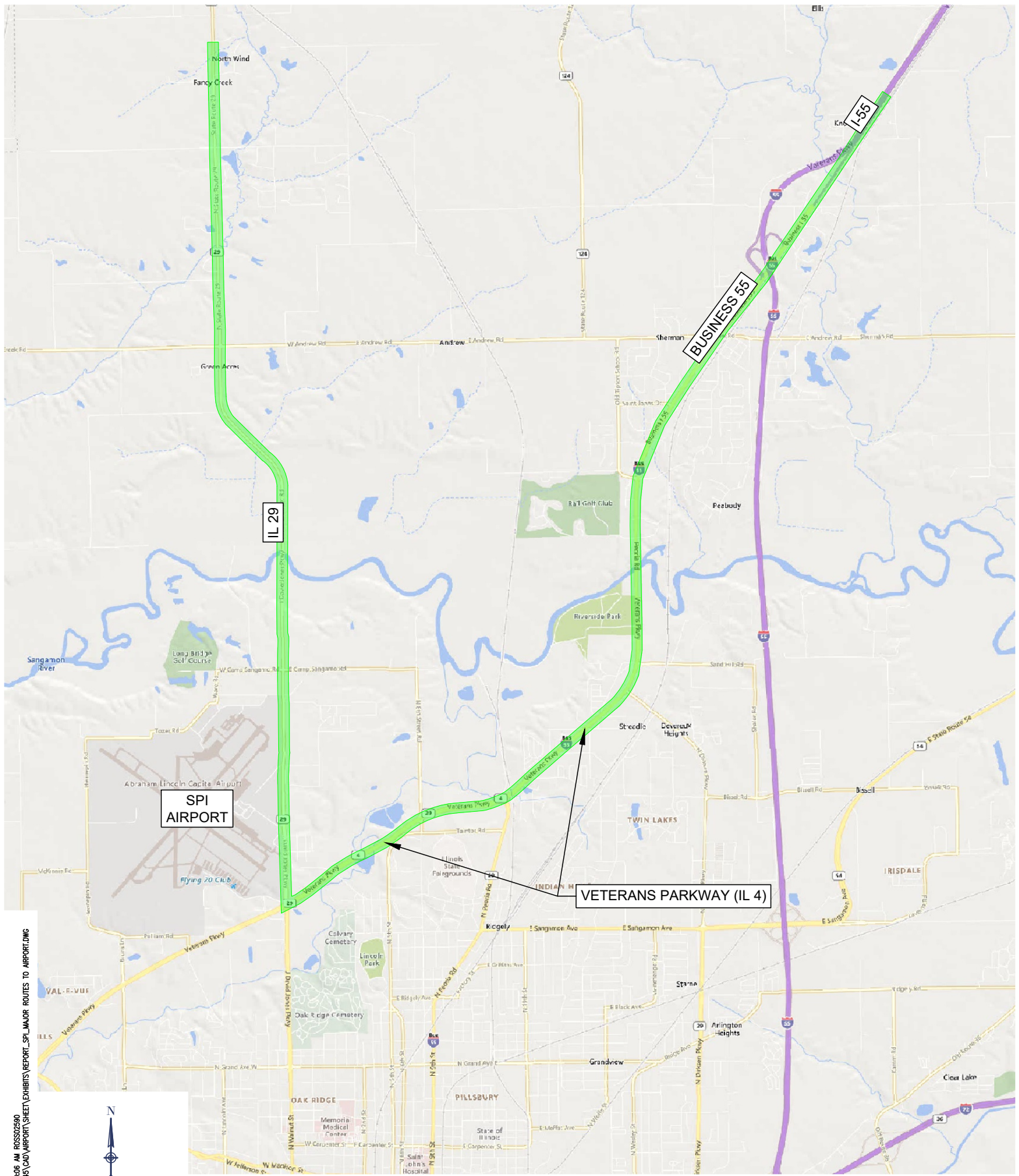
From the south: The primary routes are IL 4 to IL 29 or I-55 to I-72 to IL 4 to IL 29. However, with a lack of signage at the I-55/I-72/Business I-55 interchange, travelers may also take Business I-55 through town to IL 97 to IL 4 to IL 29.

From the east: The primary routes would be I-72 to IL 97 to IL 4 to IL 29. Instead of continuing on IL 97 to IL 4, a traveler could turn north onto North Walnut Street/J. David Jones Parkway. This route has been improved by the Springfield Rail Improvements Project, which eliminated the at-grade crossing on Illinois Route 97/Jefferson Street by constructing an underpass at the 10th Street corridor in downtown Springfield.

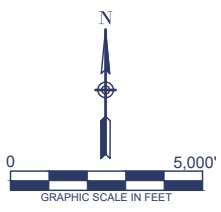
Approaching on westbound I-72 east of Springfield using a wayfinding app, a traveler may also use Exit 104 for Camp Butler Road, taking Old Route 36 to Camp Butler Road to IL 54 to IL 29/East Sangamon Avenue. This route passes the Illinois State Fairgrounds. Mapping applications typically continue the traveler on East Sangamon Avenue to North Fifth Street to West Browing Road to IL 29. Sangamon Avenue is an east-west road; however, it is a narrow four-lane road. Also, when there are events at the fairgrounds, this area can be congested. **Figures 6.4 to 6.7** depict these routes.

While these are the primary routes, the preferred routes — considering traffic, distance and travel experience — should be identified, with a preference for state roads. The signage to SPI is inconsistent on the various routes. Improved signage on the identified primary routes is recommended. As part of this study, a wayfinding/signage plan is being developed that SPI can use to work with IDOT to improve the signage on routes.

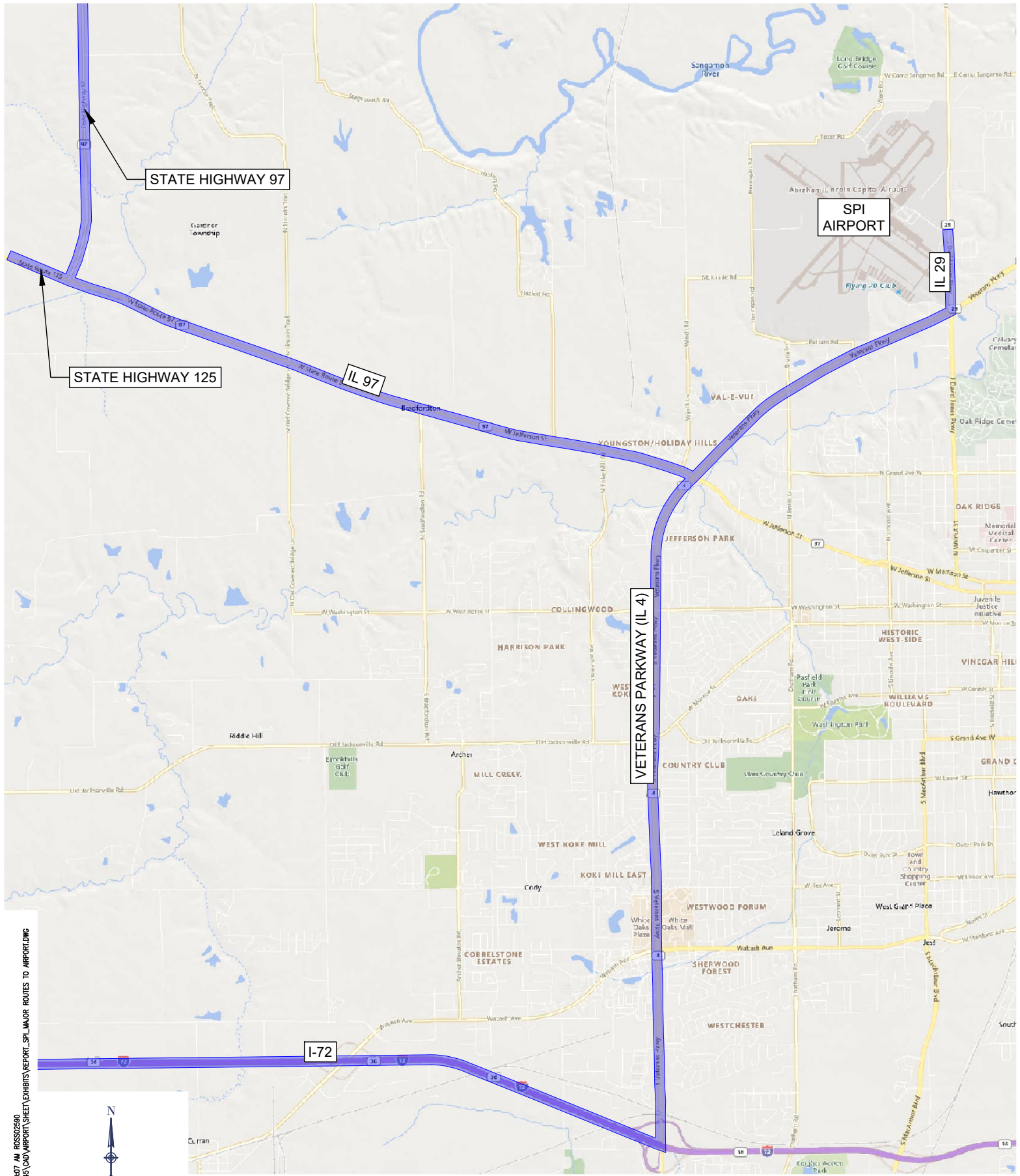
These routes are also used for access to Airport Commerce Park. When development occurs in Airport Commerce Park, an additional enhancement already in the planning process is the installation of a traffic signal at Camp Lincoln Road on IL 4/Veterans Parkway.



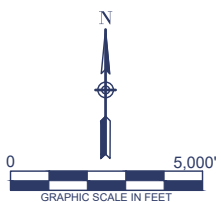
NOV 18, 2025 10:06 AM ROSS02590
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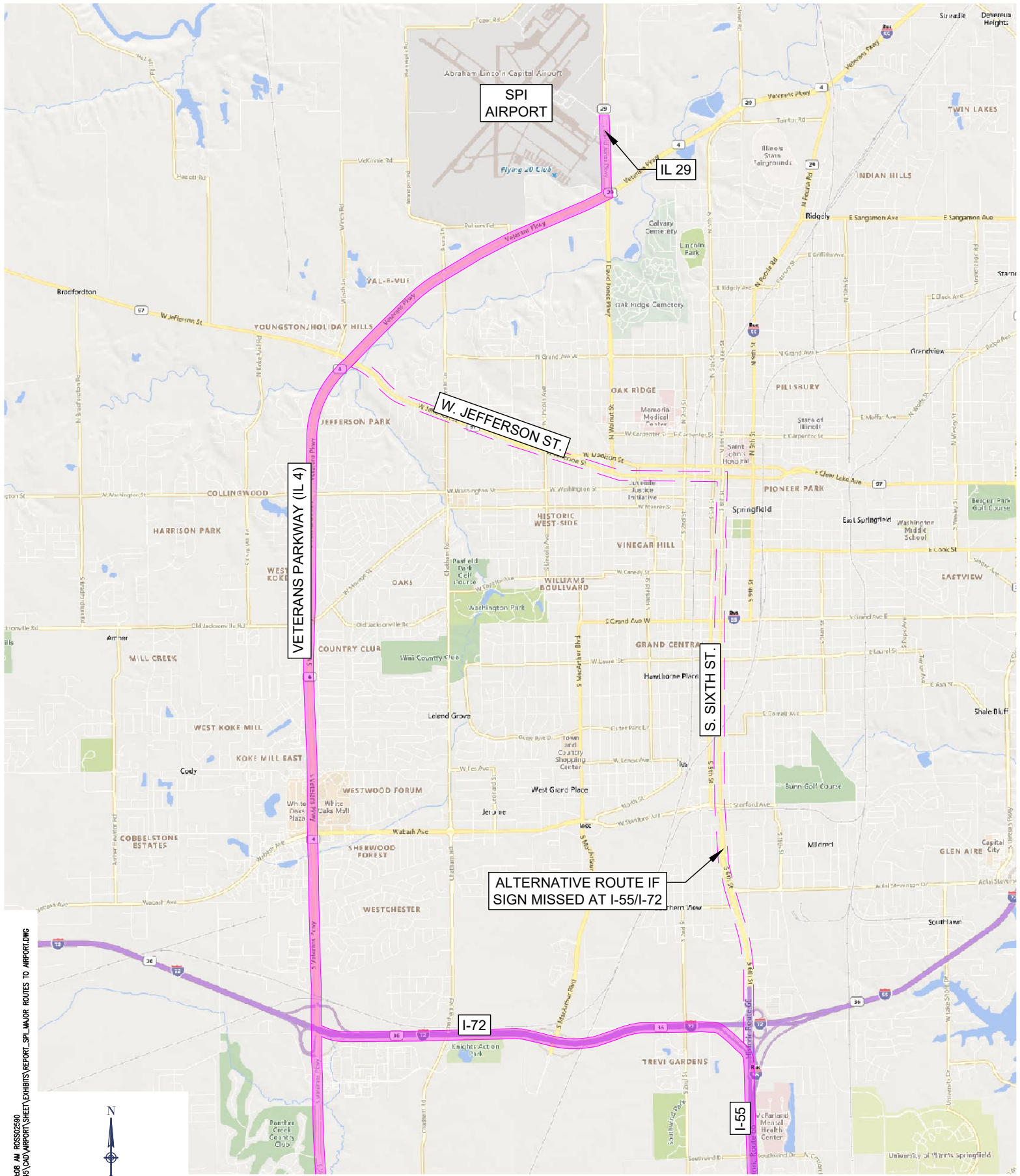
	ABRAHAM LINCOLN CAPITAL AIRPORT SMART AIRPORT	MAJOR ROUTES TO SPI - FROM NORTH	DRAWN BY: IR REVIEWED BY: SZ	FIGURE 6.4
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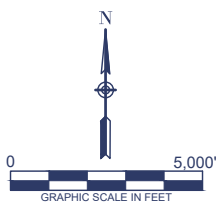
NOV 18, 2025 10:07 AM ROSS02590 E:\224065\224065\CAD\AIRPORT\EXHIBITS\REPORT_SPL_MAJOR_ROUTES_TO_AIRPORT.DWG



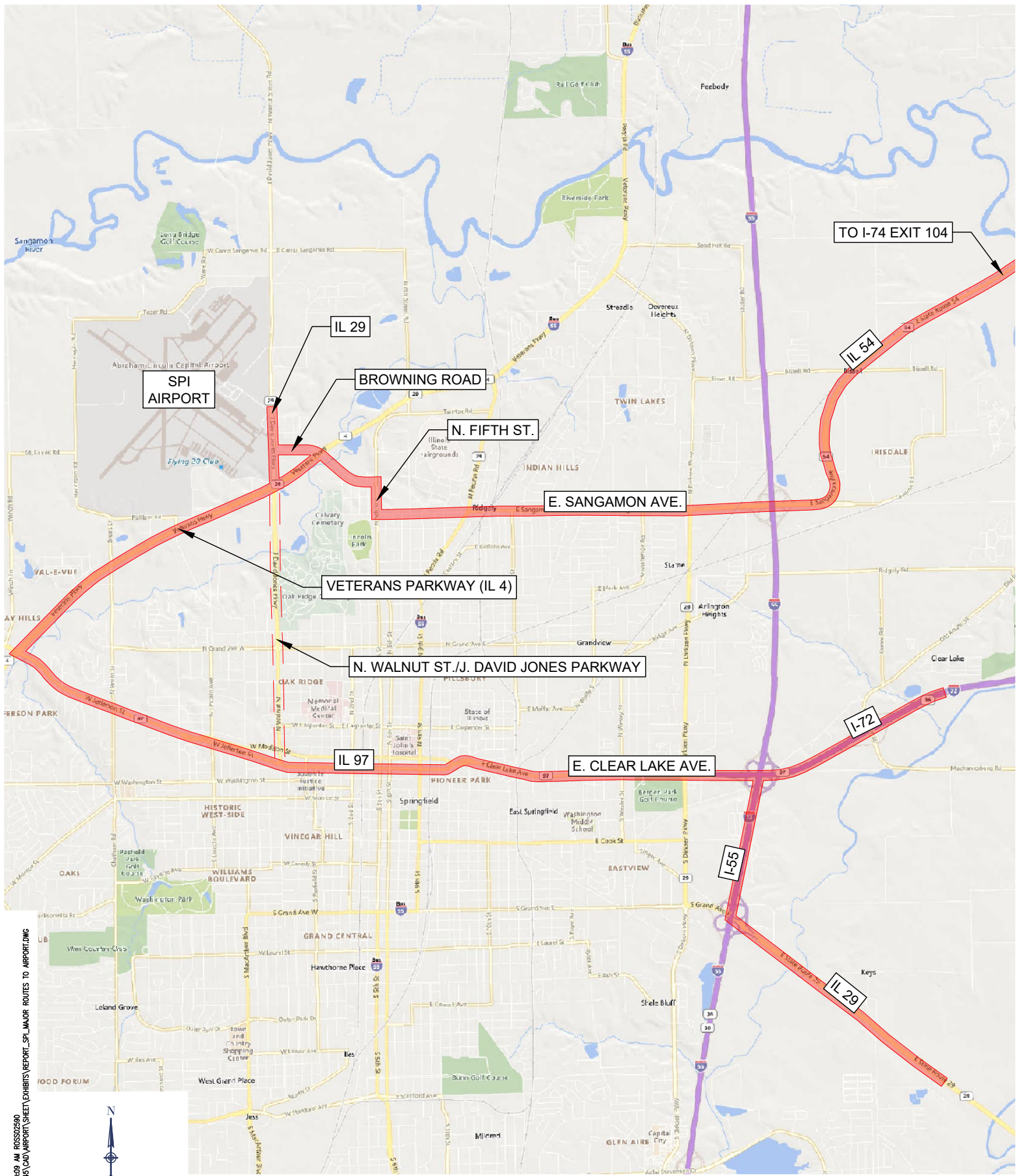
	<p>ABRAHAM LINCOLN CAPITAL AIRPORT SMART AIRPORT</p>	<p>MAJOR ROUTES TO SPI - FROM WEST</p>	<p>DRAWN BY: IR REVIEWED BY: SZ</p>	<p>FIGURE 6.5</p>
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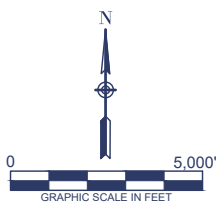
NOV 18, 2025 10:08 AM ROSS02590
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	ABRAHAM LINCOLN CAPITAL AIRPORT SMART AIRPORT	MAJOR ROUTES TO SPI - FROM SOUTH	DRAWN BY: IR REVIEWED BY: SZ	FIGURE 6.6
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	<p>ABRAHAM LINCOLN CAPITAL AIRPORT SMART AIRPORT</p>	<p>MAJOR ROUTES TO SPI - FROM EAST</p>	<p>DRAWN BY: IR REVIEWED BY: SZ</p>	<p>FIGURE 6.7</p>
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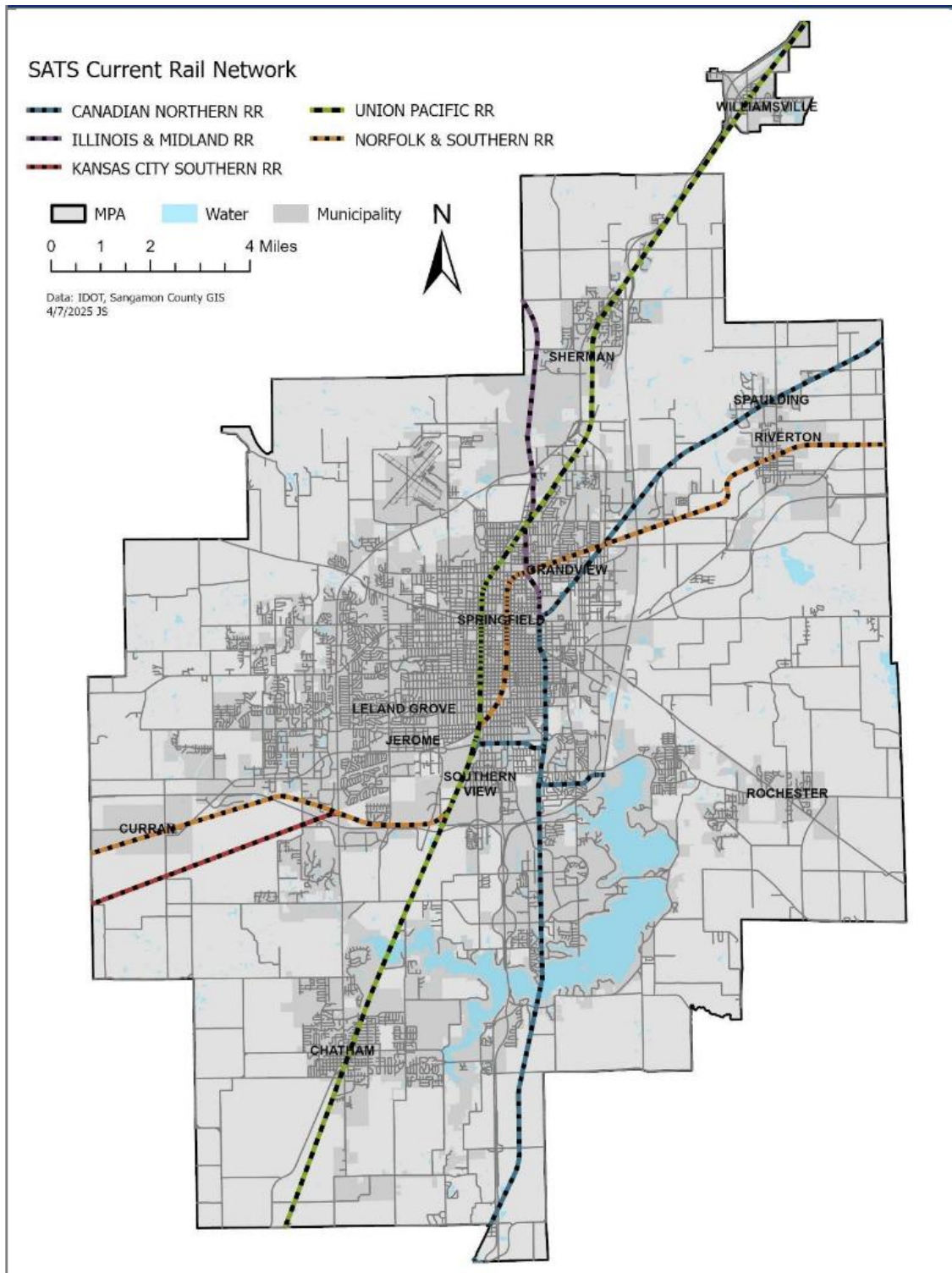
Railroads

The Springfield area is also well served by railroads. As shown in **Figure 6.6.8**, the following five freight railroads have rail lines that pass through Springfield, plus Amtrak:

- Canadian National Railway Co.
- Canadian Pacific Kansas City Ltd.
- Illinois and Midland Railroad
- Norfolk Southern Railway Corp.
- Union Pacific Railroad

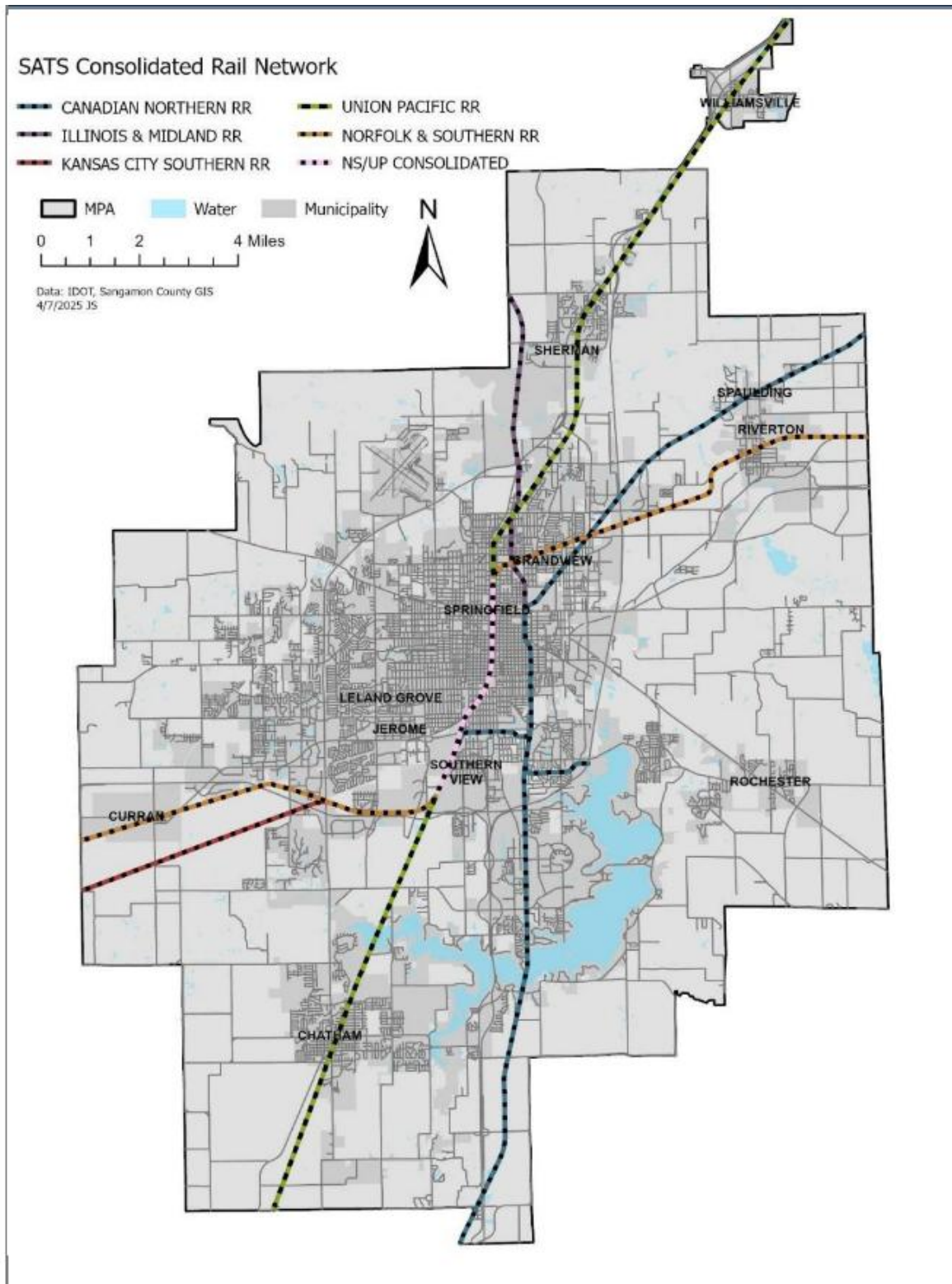
These railroads operate throughout the U.S. and Canada and into Mexico. However, while these railroads pass through Springfield, there is no intermodal connection for regional business to ship their goods. The Springfield Rail Improvements Project will improve safety and relieve congestion by reducing the number of at-grade rail crossings through the construction of underpasses and overpasses. **Figure 6.9** depicts the future rail configuration.

FIGURE 6.8 REGIONAL RAILROADS



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FIGURE 6.9 FUTURE REGIONAL RAILROADS



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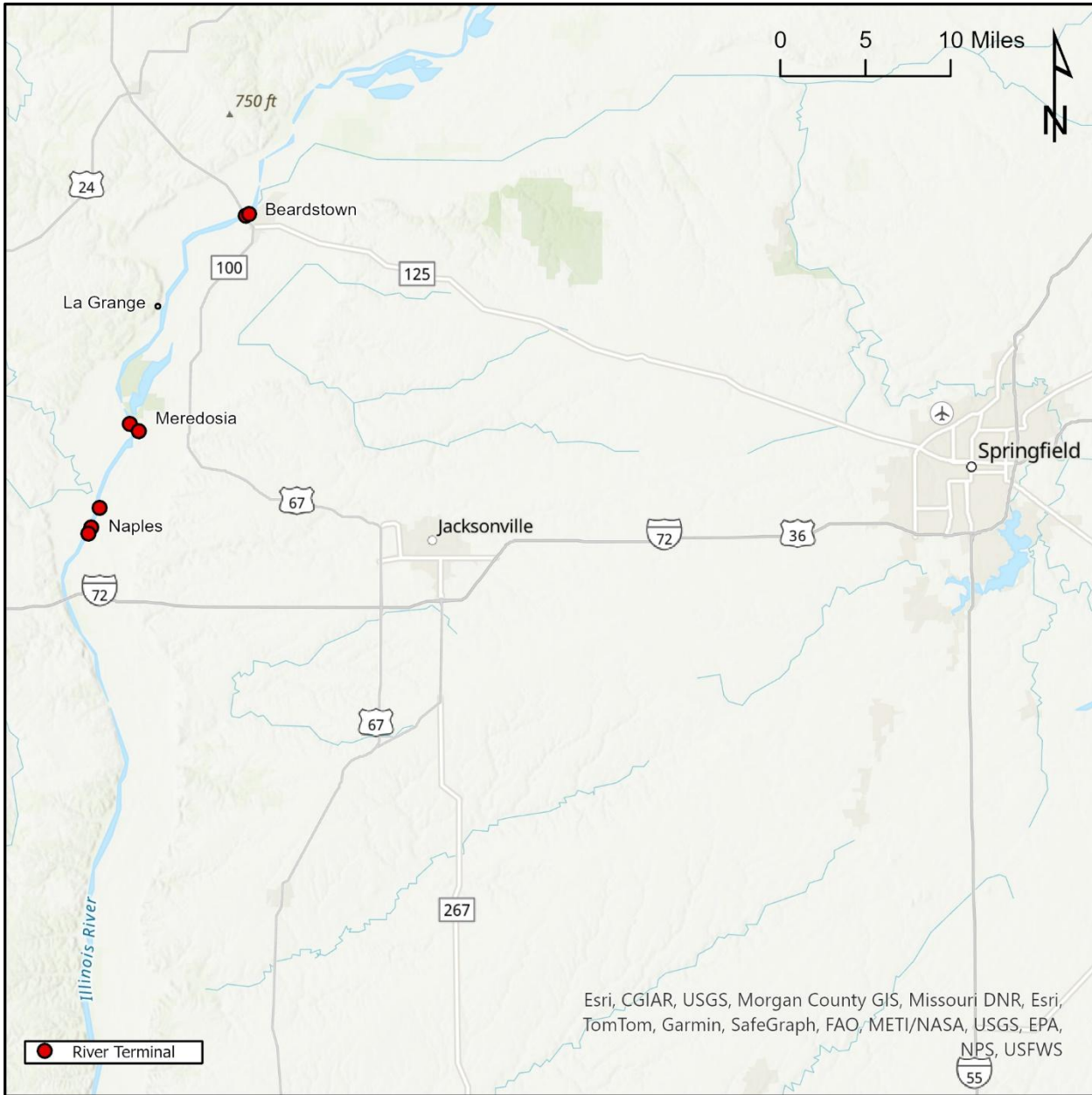
Rivers

The Illinois River is considered a regional transportation asset, offering significant economies of scale for the transportation of bulk commodities via barge. At its closest point, the Illinois River is about 40 miles from Springfield (straight-line distance). The typical maximum distance for which the truck transportation of bulk commodities is considered economically favorable (excluding long-haul trucking) is 50 to 60 miles, which is roughly equivalent to a one-hour trucking distance.

As shown in **Figure 6.10**, seven river terminals are in a 45- to 65-mile roadway distance from Springfield: three in Naples, two in Meredosia and two in Beardstown. All the terminals appear to primarily serve the agricultural industry that is prominent in central Illinois, accommodating outbound grain transloading (truck-to-barge) and inbound fertilizer transloading (barge-to-truck). However, it may be feasible to use existing or expand in-river infrastructure at one or more of the river terminals to accommodate other commodities with an origin or destination in the Springfield region. Note that the downstream-most lock and dam on the Illinois River is in La Grange, which is shown in Figure 6.10.

Air freight is typically low weight and/or high value. Therefore, transferring freight between rail and river or air is unlikely. However, any new or improved logistics connections that benefit Springfield as a logistics center will ultimately provide long-term benefits to airport operations.

FIGURE 6.10 REGIONAL RIVER TERMINALS



6.6. Regional Transportation and Transit Plans

Public transportation in the Springfield region is relatively limited. Sangamon Mass Transit District (SMTD) provides public bus transportation Monday through Saturday, with 17 fixed routes during daytime hours and five fixed routes during nighttime hours (6–10 p.m.). Per the SMTD website, “the fixed-route buses provide service to medical facilities, major employment centers, tourist attractions, major retail shopping centers, schools, colleges, professional buildings, the central business district and all major points of interest.” The SMTD also operates a paratransit service (“Access Sangamon”) for people with disabilities who cannot use the fixed-route service.

SPI is not served by SMTD. SPI was previously served by SMTD Route 5; however, citing low ridership, SPI was removed from that route in the fall of 2019. Route 1 has a stop (19) about 1.4 miles from the primary SPI entrance on IL 29, and Route 5 has two stops (2413 and 2515) about 1.9 miles from the primary SPI entrance. However, pedestrian facilities (sidewalks) are very limited or nonexistent between these bus stops and SPI. Several private transportation companies (taxis and airport shuttles) provide ground transportation to SPI. Several hotels reportedly provide shuttle service to/from SPI for guests. Rental cars are also available at SPI.

As development occurs at SPI, if it could generate ridership, such as employees commuting to work, service by SMTD should be revisited.

The Springfield-Sangamon County Transportation Center (or The Hub) is being developed to provide a centralized, intermodal transportation facility in Sangamon County. The downtown Springfield facility will provide the loading, unloading and transfer of SMTD, Amtrak and Greyhound passengers, as well as offer other services and amenities. Per The Hub's website³³, "This centralized transportation hub will reduce travel time, relieve congestion, encourage use of public transportation and provide improved service to those who depend on public transportation in Illinois' capital city." The SMTD transfer center at The Hub is complete. As discussed in Section 6.7, for multimodal connectivity, a vertiport is recommended in the vicinity of The Hub.

A review of the 2050 LRTP indicates no planned transportation/transit improvements directly related to or close to SPI, with two exceptions. The SAA plans to reconfigure Tozer Road along the north side of SPI from Estill Drive to Hennepin Road, which will realign the roadway around the Runway 13/31 runway protection zone. The other long-term project identified in the LRTP is the reconstruction of Chatham Road/Brunns Lane from Wabash Avenue to Veterans Parkway. This project would not impact the airport directly, but it could improve access to the airport from the south and possibly provide additional transit/multimodal connection opportunities to the airport when complete.

6.7. Regional Advanced Air Mobility (AAM)

As the AAM industry moves from research and development to entry into service (EIS) and commercial operation, it is important to anticipate the industry demand and prepare to accommodate this transportation technology throughout the Springfield region. The *FAA Aerospace Forecast Fiscal Years 2025-2045* includes a National Airspace System (NAS)-wide AAM demand forecast table. As described in the report, these estimates are intended to support the development of vertiports and associated infrastructure, airspace routes and procedures, workforce preparations and safety assessments. The forecast table is based on EIS years, which is anticipated to be sometime in 2026 in targeted markets across the United States. It is of interest to note the rapid pace of growth that the table forecasts with 663% growth in daily trips from Year 1 to Year 2, 90.7% growth from Year 2 to Year 3, and tapering off to an average annual growth rate of 66.3% from Year 3 to Year 6. A similar growth pattern is also forecast for the NAS-wide AAM total annual trips.

³³ <https://sangamonil.gov/thehub/home>, accessed Sept. 9, 2025.

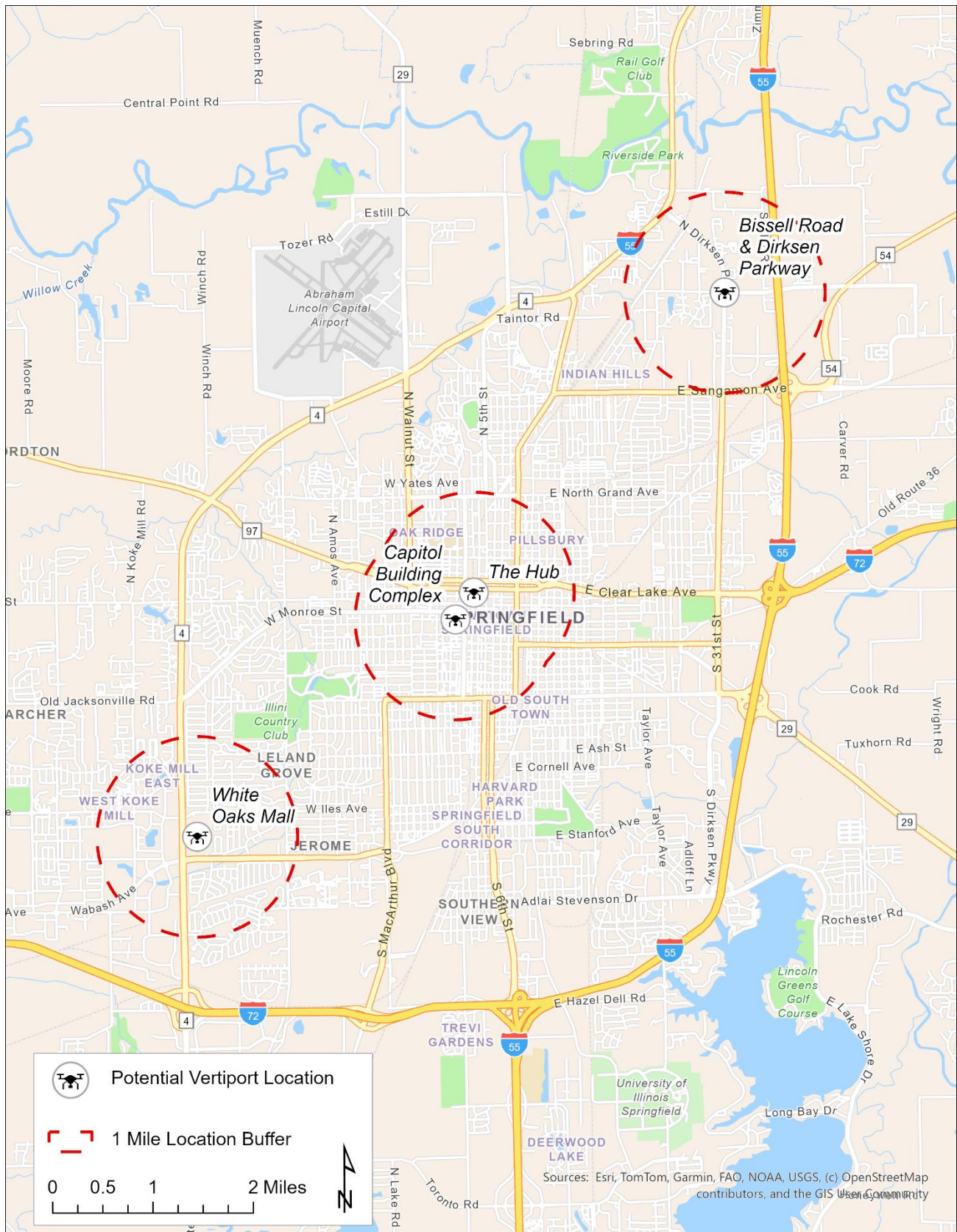
The development of the AAM industry will increase accessibility to the airport, as well as provide a new form of connected transportation throughout greater Springfield. This could include future connection points throughout the city and along transportation corridors. As piloted and unpiloted eVTOL aircraft achieve certification, many viable uses will emerge for passenger and cargo, as well as emergency response operations. McKinsey and Co., in an August 2020 article, “To Take Off, Flying Vehicles First Need Places To Land,” estimates that large, dense, high-income urban cities such as New York City could see as many as 85 to 100 takeoff-and-landing pads across multiple infrastructure archetypes, including vertipads (one pad, two charging spots), vertibases (three pads, six charging spots), and vertihubs (10 pads, 20 charging spots). The study further estimates that medium-size, less-dense, medium-income, urban/suburban cities such as Atlanta, Dallas or Denver could see as many as 38 to 65 takeoff-and-landing pads across the various infrastructure archetypes. Using a ratio of vertipads to population, it can be estimated that Springfield could see as many as five to 10 takeoff-and-landing pads across the various infrastructure archetypes.

Future off-airport sites could include locations in the downtown business district, with one serving the multipurpose arena and The Hub and one serving the Capitol complex. These vertipads would be designed to provide passenger service to possible frequent users of the downtown area and to the airport, thus improving transportation mobility and access across the region. The southwest sector of Springfield, near the mall, has long been a center for commerce and entertainment. A vertiport in that area could readily serve visitors and commuters to the area, improving connectivity between the central downtown business district, the airport and the southwest region of the city. As discussed in Chapter 3, existing helipads in the Springfield region may also be able to be adapted to serve AAM.

Another possible vertipad location could be sited in proximity to the Bissell Road and Dirksen Parkway intersection near the FedEx Ground depot. This vertipad location could be tailored to serve the cargo shipping and logistics trucking businesses in the area and provide a central cargo vertibase or vertihub with multiple landing pads and charging facilities to accommodate eVTOL aircraft, as well as piloted and unpiloted drone delivery operations. **Figure 6.11** shows the general locations that may be conducive to AAM vertipad development.

Another regional concept of operations that could be implemented with AAM aircraft is what has become known as last- or middle-mile service. This service would be operated by commercial airlines or their partners and would use commercial AAM operations for passengers arriving and/or departing SPI to connection points beyond the Springfield metropolitan center. This could include connection points throughout the region, such as Jacksonville to the west, Lincoln to the north and Taylorville and Litchfield to the south. The concept would require vertiports at existing airports and connecting locations in those communities, where passengers could board and depart AAM aircraft and connect to or from the commercial fixed-wing aircraft at SPI. This concept could improve connectivity throughout the region by providing another transportation alternative that would reduce travel time and ground highway congestion. This could also increase revenues for the airlines through increased ticket sales and membership benefits, as well as increased operations, enplanements and airline route structure at SPI.

FIGURE 6.11: AREAS FOR PROPOSED VERTIPTS



It is recommended that in comprehensive and transportation plan updates, a policy be developed to guide the development of AAM facilities. The following are key items to include:

- The comprehensive plan should initiate an overarching AAM policy statement and direction that will result in a local acceptance of electric aircraft activity in the SPI region. Similar to the federal governments' recent AAM policy statement, this would direct the city and county to work toward amending their land use, zoning, permitting, airspace/obstruction management and safety/emergency planning directives to accommodate this new form of transportation. This should probably be fairly broad and under the "transportation" header rather than simply "aviation," because the regional system of vertiports will augment the local transportation system and will connect with the roadway, rail, airport and transit forms of transportation.
- The comprehensive plan should contain a graphic that depicts the various airport and off-airport vertiport nodes identified in this study. These nodes should be protected from obstruction, airspace and incompatible land use changes that would render them unusable.
- The comprehensive plan, as a part of the overarching AAM policy, should direct the modification of land use, zoning, connecting airspace, node airspace and permitting requirements so that the hurdles for the approval of off-airport nodes will be removed from city and county ordinances.
- The comprehensive plan should start from the AAM forecast developed in this plan and track that information through time as changes arise. Useable noise information should be included as soon as that is available.
- The airport vertiport and the off-airport nodes should be included in the comprehensive plan as future multimodal transportation nodes that should be planned to work synergistically with the existing transportation nodes. This could be done in the transportation section and as a preamble in the AAM policy statement.

6.8. Land Use Plans and Zoning

A key to regional development is land use and zoning in alignment with the communities' long-term plans. An FAA requirement for the airport master plan and airport layout plan is a land use drawing that identifies aeronautical and nonaeronautical development land delineations. This drawing combines on- and off-airport land uses, including the existing/future approach surface and runway protection zone, aviation easements, general aviation/corporate development, aviation-related development, redevelopment and agricultural, commercial and residential development. The current airport land use drawing was approved by the FAA in 2003. Some expansions have been executed over the last 21 years in accordance with this plan, and the SAA is updating this drawing as part of its ongoing ALP update.

Local land use and zoning ordinances are effective tools that airports and local governments can use to proactively protect the airspace surrounding the airport while enabling and promoting economic development opportunities. SPI is within the Springfield municipal boundaries, and the area surrounding SPI is a combination of municipal and Sangamon County jurisdictions. The SAA owns more than 2,600 acres of land, including airspace and landside property.

As discussed in chapters 2 and 5, the airport land and land immediately surrounding the airport is zoned as Heavy Industrial District (I-2) by the city of Springfield. The city defines this designation as a district designed to accommodate essential heavy industrial uses, which involve more objectionable influences and hazards and normally generate a great deal of automobile and freight traffic. This designation also restricts any new residences or commercial establishments within the defined district area.

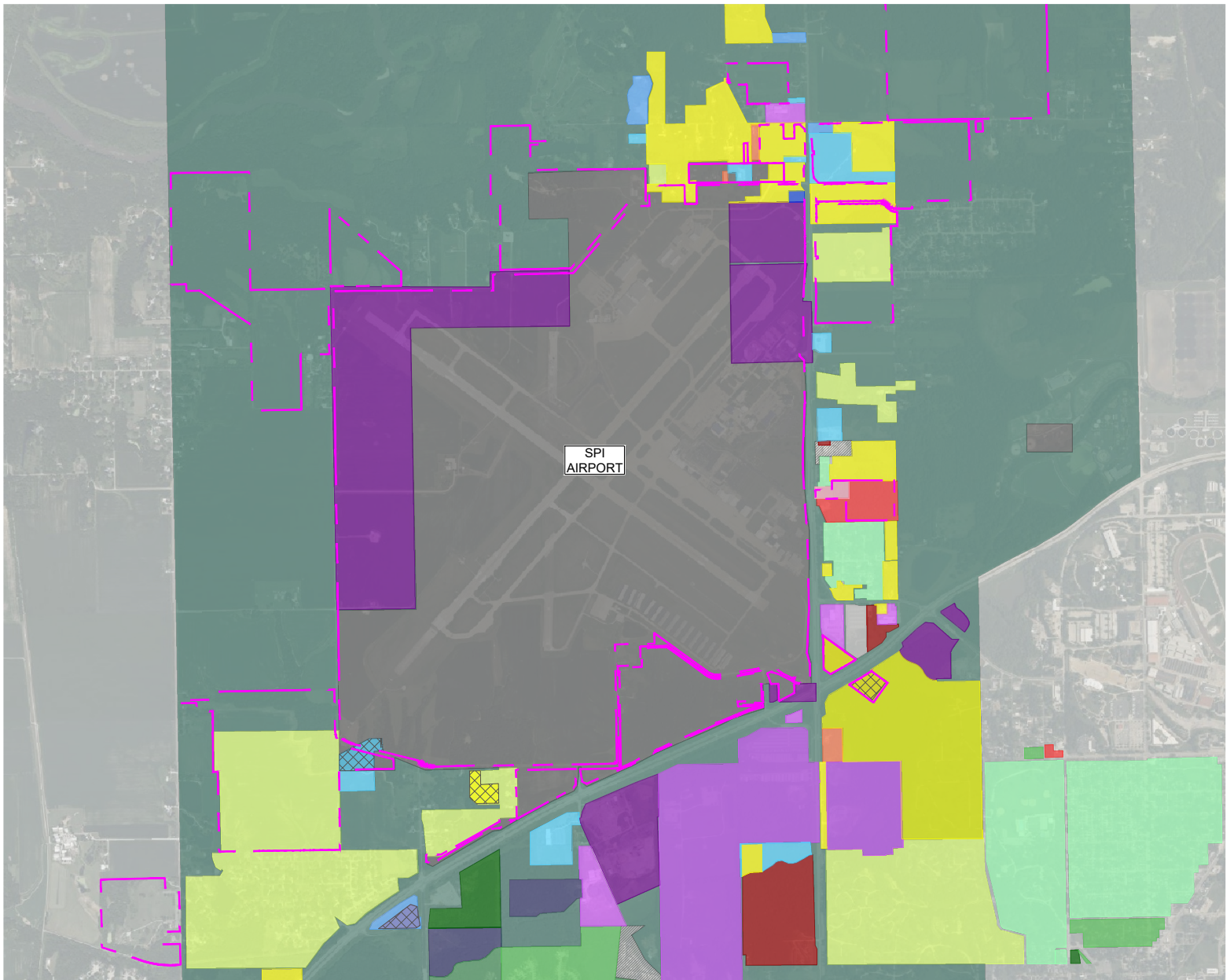
The north and west side of SPI is adjacent to county zoning. **Figure 6.12** depicts the land use zoning on and around SPI. The majority of the county area surrounding SPI is zoned Agricultural (A) or General Industrial (I-2). The county's I-2 land use includes "[a]ny establishment engaged in production, processing, cleaning, servicing, testing, repair or storage of materials, goods or products, provided operations conform with the performance standards and other general requirements applicable to this district," as well as other specific land uses (such as air freight terminals, fertilizer manufacturing, railroad yards/terminals and warehouses).

The city's I-2 zoning is to "accommodate the essential heavy industrial uses which involve more objectionable influences and hazards and normally generate a great deal of traffic, both automobile and freight. No new residences or commercial establishments are permitted." Across IL 29 from SPI is a mix of city and county zoning; some are business districts and some are residential districts. Across from SPI along IL 4/Veterans Parkway are general business and office districts. There are some R-1 residential districts around SPI.

While Airport Commerce Park could attract a user that does not require the heavy industrial zoning, it is easier to rezone property from a heavier industrial use to a lesser industrial or commercial use. Therefore, until the specific development is known that would require zoning other than industrial, it is recommended the airport stay zoned for industrial development. This should provide the most flexibility in attracting future tenants.

As development occurs in Airport Commerce Park, it is anticipated that it will generate interest in other development in close proximity. The City of Springfield Comprehensive Plan 2017-2037³⁴ identifies the airport as part of the northwest sector of the city. The plan identifies that any development in the north-central portion of the section considers the airport's operations. It identifies that commercial uses should be along IL 29. It also identifies that as the residential area north of the airport ages out, lower density could be considered, but only with public services. The SAA has been acquiring property immediately north of the airport as it becomes available, with the intention of using it for airport or airport-compatible uses. The land use plan identifies light commercial uses on either side of Kennedy Park on the east side of IL 29. Further, it identifies that development should be limited west of the airport and north of Illinois Route 97 until sewer is readily available, and water service has the capacity for improved and adequate fire flow. The plan includes a recommendation for the allowance of lower-density residential in this sector. However, best practices are usually to limit residential land uses in close proximity to any airport.

³⁴ <https://www.springfield.il.us/Departments/OPED/Documents/2037ComprehensivePlanPartI.pdf>, accessed Sept. 10, 2025.



LEGEND

- | | |
|--|--|
| AIRPORT PROPERTY BOUNDARY | SPRINGFIELD ZONING |
| OVERLAPPING CITY & COUNTY ZONES | B-1: HIGHWAY BUSINESS SERVICE DISTRICT |
| SANGAMON COUNTY ZONING | B-2: GENERAL BUSINESS SERVICE DISTRICT |
| B-1: NEIGHBORHOOD BUSINESS DISTRICT | I-1: LIGHT INDUSTRIAL DISTRICT |
| B-2: RETAIL BUSINESS DISTRICT | I-2: HEAVY INDUSTRIAL DISTRICT |
| B-3: GENERAL BUSINESS DISTRICT | MIX: COMBINED CITY ZONING DISTRICTS |
| I-1: RESTRICTED INDUSTRIAL DISTRICT | R-1: SINGLE-FAMILY RESIDENCE DISTRICT |
| I-2: GENERAL BUSINESS DISTRICT | R-2: SINGLE-FAMILY & DUPLEX RESIDENCE DISTRICT |
| O: OFFICE & COLLEGE DISTRICT | R-3: GENERAL RESIDENCE DISTRICT |
| R-1: SINGLE-FAMILY RESIDENCE DISTRICT | R-4: MOBILE HOME & TRAILER PARK RESIDENTIAL DISTRICT |
| R-2: SINGLE-FAMILY & TWO-FAMILY RESIDENCE DISTRICT | R-5: GENERAL RESIDENCE & OFFICE DISTRICT |
| RM-4: MANUFACTURED HOME DISTRICT | S-2: COMMUNITY SHOPPING & OFFICE DISTRICT |
| A-1: AGRICULTURAL DISTRICTS | |

OCT 14, 2025 10:45 AM ROSS02590
 E:\22\085\2204045\ADMIN\14-REPORTS\CAD\ZONING\SP\COMBINED AREA ZONING.DWG



SMART AIRPORT AND REGIONAL LOGISTICS PLANNING PROJECT

SPI SURROUNDING ZONING (CITY & COUNTY)

DRAWN BY: IR
REVIEWED BY: SZ

FIGURE 6.12

Enterprise Zones

As identified in chapters 2 and 5, there are three enterprise zone parcels at SPI. Enterprise zones are state and local partnerships jointly administered by the Illinois Department of Commerce and Economic Opportunity (DCEO), Sangamon County and the city of Springfield. They offer a mix of local and state incentives to help attract and retain businesses in the city and county. Enterprise zone incentives may include a combination of building material sales tax exemptions, investment tax credits, utility tax exemptions, manufacturing machinery and equipment sales tax exemptions, as well as city or county property tax abatements. These incentives can be used by SAA to help promote economic development opportunities. In general, the general aviation/corporate development, aviation-related development and nonaeronautical industrial or commercial development area are consistent with enterprise zones. The enterprise zones at SPI were established in 2016 and do not cover all the property now available for development on SPI. There is a process to add adjacent property to the enterprise zone. However, one of the requirements is that the development commitment occurs within two years after the proposed boundary change. Therefore, while the SAA can use the enterprise zone to help attract development, the boundary change would need to occur after a development commitment.

6.9. SPI Opportunities

From a regional perspective, there are five areas in which SPI can provide synergistic opportunities with and for the community:

- Develop Airport Commerce Park.
- Support the regional AAM.
- Be a site for hydrogen fuel production.
- Enhance connectivity with the community.
- Explore inland port potential.

Develop Airport Commerce Park

SPI has an area reserved for aviation and nonaviation in Airport Commerce Park, as identified in Chapter 5, as well as properties outside Airport Commerce Park. SPI has actively sought and obtained grants to assist in making this area ready for development. This has included completing environmental documentation to open the site for development, obtaining FAA land release approval for development and clearing trees. Where actual improvements have not occurred, SPI plans to improve access to accommodate future development, such as a traffic signal on Veterans Parkway.

Site certification has become a valuable tool for economic development agencies seeking to promote industrial development. Airport Commerce Park is part of the Illinois DCEO's listing of vetted sites ready for development. It is also one of the regional megasites offered to site selection consultants for potential large-tract development. While Airport Commerce Park is a large tract of land available for development, an initial smaller development may be easier to attract, which could increase the overall attention to and attractiveness of the area. Once initial development is attracted to a site, it becomes a further attractant for additional development at the site. As development on the airport starts, it can generate spin-off development in the vicinity for synergistic projects, which could increase the attractiveness of Airport Commerce Park.

Within Airport Commerce Park, possible areas of focus could include steady and emerging industries. Steady and emerging industries in the Springfield region include government, health and life sciences, technology, manufacturing and heavy industry (this includes Standard Aero), agribusiness and professional services³⁵.

³⁵ <https://www.thriveinspi.org/doing-business-in-spi/key-industries/>, accessed Oct. 8, 2025.

SPI does not have a history of significant air cargo shipment volume. However, both SPI runways are of sufficient length to accommodate aircraft of the size and weight capacity typically used by major air freight carriers, such as FedEx, UPS or Amazon. Air freight is typically used for lightweight and high-value products, and the relatively high cost of air transportation can be justified by the need for the products to be shipped fast and over long distances. By targeting companies that manufacture such products, the SAA may provide value to and synergize with a company located at Airport Commerce Park or another site near SPI, thus offering improved air cargo throughput. Further, the SAA-owned land can be offered to air freight interests on a ground lease basis, which would be used for air freight-related purposes, whether that be warehousing/distribution, site development for a company that uses air freight in significant volumes or some other use that benefits from the robust transportation network connecting to SPI.

Freight facilities such as warehouses, distribution centers, fulfillment centers and freight depots are primarily sited to provide multiple highway connection options. Because of their typically large size, these freight facilities are also commonly sited on the outskirts of urban areas, where larger tracks of undeveloped land are still available. The immediate vicinity of SPI provides these desirable characteristics and, accordingly, the development of this type of freight facility near SPI has the potential for success. Further, additional value to those freight facilities and synergy with SPI could be established if such a freight facility also processes air cargo. For example, a portion of freight movements by Amazon, FedEx and UPS include a segment of air related cargo. So, siting a facility at SPI could add value to their freight transportation logistics. As a more specific example, if the site-constrained UPS facility near the I-55/IL 29 interchange were to relocate to SPI, UPS could initiate air cargo shipments directly to its Springfield facility. In the somewhat new overnight middle- and last-mile package delivery concept being employed by Amazon Prime Air, fulfillment centers are commonly sited near airports using the runway access for speed to market. It is recommended that the local economic development groups, along with the SAA, continue to reach out to potential fulfillment center groups to gauge the level of interest for facilities on or near SPI.

SPI has developed solar arrays to serve SAA facilities and certain tenants. The first array provided a direct connection from the energy generation to the users. The second array will use net metering to deliver energy to the SAA facilities. During this study's energy roadmap coordination, CWLP indicated that its system could not support additional net metering because that power flows through the utility lines, which are also used to deliver utility-generated or purchased power to end users. Therefore, while SPI has land available that could accommodate additional solar arrays, the arrays would need to be located or connected for directly feeding the power to the end user. Reliable energy-dependent businesses that could benefit from on-site power generation include high-energy-reliant 3D printing and data centers.

There are limited commercial, retail and hospitality businesses (restaurants and hotels) in the immediate vicinity of SPI. This was one of the needs identified during stakeholder meetings. With a change in zoning that happens after there is a firm commitment, this type of development could be accommodated within Airport Commerce Park along the frontage with Veterans Parkway or on land surrounding SPI. Development in Airport Commerce Park would increase and help grow the workforce around the airport. As businesses and developments consider SPI and the immediately adjacent properties to establish their development, supporting retail and hospitality to meet the needs of the workforce are important. This includes fueling, fast food services, sit-down food services and conference and meeting spaces, as well as hotel/motel spaces. These industries could also attract seasonal and recreational traffic visiting the nearby Illinois State Fairgrounds. It is expected that these service facilities would grow and develop in parallel with commerce park development at SPI.

Finally, the development of conference/event space and corresponding accommodations at or near SPI could contribute to attracting industrial development, because proximity to an airport is known to influence company executives during site selection. Similar to the concept of air cargo at SPI, the SAA may provide value to a company at Airport Commerce Park or another site close to SPI by offering nearby conference event space and related amenities. While airport conference and event space works well in numerous locations due to easy access by those using the space, it is important to coordinate any plans or activities with the local economic development interests to ensure that there are no conflicts with similar conference/event venues.

SPI has taken steps to increase the visibility of Airport Commerce Park for development. Through this study process, SPI has met with local developers to obtain their insights. It is important for SPI to continue to market Airport Commerce Park locally and nationally, which should include updating marketing materials with the refinements recommended in this study. The primary recommendations include identifying the benefits for local developers to pursue opportunities in Airport Commerce Park and engaging a national broker to promote the park to a wider national aerospace market. To assist in this process, it is recommended to establish a broker policy. A sample broker policy is in **Appendix F**.

SPI staff and the Springfield Sangamon Growth Alliance should schedule regular coordination meetings so that the SAA and all local development interests can remain aligned and in constant communication. The SAA should coordinate with the Springfield Sangamon Growth Alliance to jointly develop additional property-marketing tools, as referenced below.

Establishing an Foreign Trade Zone (FTZ) is a tool the SAA might consider to encourage development at SPI. According to a National Association of Foreign-Trade Zones infographic from January 2024, "Created by Congress in 1934 to encourage investment and promote U.S.-based manufacturing and distribution, exports, and American jobs, Foreign-Trade Zones (FTZs) are designated areas physically in the United States, but considered outside U.S. customs territory, where goods can be stored, assembled, manipulated, modified, relabeled, repackaged, and re-exported, free of U.S. customs duties."³⁶ Allowing a company in an FTZ to defer, reduce and/or eliminate duties can provide it a competitive advantage by improving cash flow, reducing production costs and potentially increasing overall profit. This may be particularly helpful to manufacturers and suppliers during times of high or fluctuating federal tariffs on goods and materials. The Illinois FTZs nearest to SPI are in Decatur, Granite City and Peoria. It may be possible to include SPI as a subzone in the Decatur FTZ, because SPI is within 60 miles of Decatur.

Enterprise zones are yet another tool the SAA has established and may use to develop transportation logistics at SPI. Expanding the enterprise zones at SPI could occur in support of a project to promote economic development opportunities at SPI.

³⁶ <https://www.naftz.org/assets/pdf/2024-NAFTZ-FTZ-Infographic-08.2023-v1/>

A Tax Increment Financing (TIF) district is a tool the SAA may consider to better facilitate compatible and complementary transportation logistics development at and around SPI. According to the Illinois DCEO, “Illinois law allows units of local governments to designate areas within their jurisdiction as Tax Increment Financing (TIF) districts. These districts dedicate sales tax revenues and additional property tax revenues generated within the TIF for improvements within the district to encourage new economic development and job creation.”³⁷ For example, establishing a TIF district encompassing Airport Commerce Park could potentially assist with infrastructure development in the park. While the SAA-owned land is tax-exempt and will likely be leased rather than sold outright, TIF strategies can still be a helpful tool at and around SPI to attract and sustain development.

Support for Regional AAM

Electric aircraft are under development. While there are operational projections, the timing of these aircraft in the market is unknown. Through this study process, SPI has taken steps to prepare to serve these new aircraft. Further, with the MRO services and training at SPI, it is well-positioned to serve the maintenance, pilot and service training needs of the new aircraft technology. Through the AAM evaluation, an initial and three potential long-term vertiport sites have been identified on the airport property. All these sites will not be needed or developed, but the identification and preservation of multiple options provides SPI with the flexibility to develop facilities to align with the industry as it evolves. Further, through the electrical roadmap prepared as part of this study, initial electrical charging options have been identified for SPI. The electrical roadmap also initiated coordination with CWLP regarding the service capability for SPI and longer-term upgrades. It is recommended that SPI and CWLP meet at least annually to discuss the projected electrical demands at SPI, because service upgrades can have a lead time of several years.

The vertiport sites on SPI would allow it to serve as a hub for regional or air taxi service to the airport, as described above. The new AAM aircraft technology will use electrical power, as well as hybrid applications using hydrogen fuel cells to increase aircraft range.

Potential for On-Site Hydrogen Production

Hydrogen-related industries should be another consideration on SAA-owned property, with a potential site, identified in Airport Commerce Park in Chapter 5, that could serve airside and landside demands. Among other applications, hydrogen is an emerging alternative fuel source, not only for aircraft but also ground vehicles. The commercial deployment of hydrogen-powered aircraft is projected to begin in the late 2020s, based on information conveyed to Hanson by ZeroAvia, a leading manufacturer of aircraft engines powered by hydrogen fuel cells.

According to the U.S. Department of Energy’s (DOE) Alternative Fuels Data Center, there are no hydrogen fueling stations (including nonretail facilities) in Illinois.³⁸ To address this potential future need, the SAA could position itself as an Illinois hydrogen industry leader by attracting a company to develop a hydrogen production and storage facility at SPI. Considering the regional highway access to and from SPI, the development of a hydrogen production facility could encourage or support Springfield-area businesses to convert their commercial truck fleets to hydrogen-powered trucks. This would allow the hydrogen production facility to serve the local hydrogen-powered truck market initially, and when established, the aviation market could be served as well. Green hydrogen is produced using renewable energy sources, such as wind and solar. This may present a synergistic opportunity for SAA if sufficient additional solar capacity and connectivity to the hydrogen production facility can be developed.

³⁷ <https://dceo.illinois.gov/expandrelocate/incentives/taxincrementfinancing.html>, accessed Oct. 18, 2024.

³⁸ <https://afdc.energy.gov/states/IL>, accessed Dec. 13, 2024.

A hydrogen production and storage facility at SPI would also align with the Midwest Hydrogen Hub initiative announced by the DOE in October 2023, which is a multistate effort (initially Illinois, Indiana and Michigan) that aims to promote hydrogen use across many industrial sectors, including commercial transportation and sustainable aviation fuel. It will also establish a network that will “leverage each state’s unique assets to expand the reach of the local hydrogen economy and advance the development of the hydrogen production industry across the Midwest.”³⁹ SAA involvement in this initiative may be feasible and should be further investigated.

Enhance Connectivity with the Community

As indicated in Section 6.2, the Springfield region has a robust ground transportation network. Two Class II truck routes (IL 4 and IL 29) pass immediately adjacent to SPI. It is recommended that the SAA champion any proposed maintenance and improvements to those routes that will facilitate efficient vehicular access to and from SPI. As development is attracted to Airport Commerce Park, SPI should proceed with the traffic signal at IL 4 and Camp Lincoln Road for improved accessibility.

As identified in Section 6.5, SPI should pursue improved signage for the primary routes to the airport. This would aid travelers in wayfinding, as well as serve as a reminder of the aviation assets in the community.

The Springfield-Sangamon County Transportation Center (or The Hub) is expected to improve public transportation in the greater Springfield region and provide synergy among the various forms of ground transportation, from personal vehicles and local transit (SMTD) to national transportation options, such as Amtrak and Greyhound.

Regular SMTD bus route service to SPI ended in Fall 2019 due to low ridership. As development occurs at and around SPI, it could generate additional ridership that would also help reestablish regular route service. Until that occurs, the feasibility of establishing a scheduled shuttle service between Springfield’s central business district and SPI should be investigated. The Hub may be a logical central business district location for such a shuttle service terminal. A clean, professionally run operation providing a direct connection between downtown and SPI, without excessive time spent on a route with many other stops (as was the case with the previous regular route service provided by SMTD), would make this transportation option more attractive to visitors.

Although five Class I railroads operate in Springfield, plus commercial passenger rail services provided by Amtrak, no tracks are close to SPI. Further, for reasons related to development and topography between SPI and the rail corridors, a future rail connection to SPI is not likely feasible.

³⁹ <https://www.iml.org/file.cfm?key=26489>, Oct. 13, 2023.

Explore Inland Port Potential

A University of Texas at Austin Center for Transportation Research report defines an inland port as “a site located away from traditional land, air, and coastal borders with the vision to facilitate and process international trade through strategic investments in multi-modal transportation assets and by promoting value-added services as goods move through the supply chain.”⁴⁰ Inland ports are typically located near multiple interstate highways and multiple Class I railroad mainlines, and both criteria are met in the Springfield area. However, a common characteristic of successful inland ports is being in or adjacent to a major population center, which Springfield is relatively lacking. The nearest major population centers to Springfield are St. Louis, Chicago and Indianapolis. While Springfield does not offer a major population center, it does have exceptional rail, highway and central location geographical traits. For these reasons, there is the potential for a scaled-down inland port concept in Springfield, and this concept should be fully analyzed in the next comprehensive metropolitan area plan.

⁴⁰ <https://library.ctr.utexas.edu/ctr-publications/4083-2.pdf>, October 2002.

APPENDIX A: ACRONYMS AND DEFINITIONS

ACRONYMS AND DEFINITIONS

advanced air mobility (AAM): A new class of aviation that uses electric or hybrid aircraft (like eVTOLs) to enable short-range passenger and cargo transport, typically in or between urban and regional areas.

Airport Cooperative Research Program (ACRP): A federally funded research initiative, managed by the Transportation Research Board, that produces practical guidance and tools to support airport planning, operations, safety and innovation.

automatic transfer switch (ATS): A device that switches the electrical load from one device to another under predetermined conditions.

battery energy storage system (BESS): A system that stores electricity for later use, often used to manage peak loads, provide backup power or support microgrid operations.

breaker: A device that interrupts electrical current in a circuit for protection or control, typically found in panel boards or switchgear.

coincident peak load: The aggregate peak demand of the system that occurs simultaneously. In the context of this study, this refers to the total peak load on the utility system serving SPI over a given period (typically one or more years).

connected load: The total peak load connected to a system. In the context of this study, this refers to total loads that could potentially be turned on, regardless of whether this would occur operationally.

curtailment: A control command requiring a generator or storage asset to stop or reduce power output to a set level. Typically, this is to prevent or limit export to a utility grid for safety or stability reasons.

City Water, Light & Power (CWLP): The municipal utility for Springfield, Illinois, that provides electric and water services to local residents and facilities, including support for transportation electrification.

direct current (DC) fast charging: A high-speed electric vehicle charging method that delivers direct

current power, typically enabling 80% battery charge in 20 to 45 minutes, depending on vehicle and charger capacity.

electric conventional takeoff and landing (eCTOL): Aircraft that use conventional runways, as opposed to vertiports supporting vertical lift, powered by electric propulsion.

electric ground support equipment (eGSE): Airside service equipment (e.g., baggage tugs, belt loaders) powered by electricity rather than fossil fuels.

electric vehicle (EV): A vehicle that uses electric motors powered by batteries instead of internal combustion engines.

electric vertical takeoff and landing (eVTOL): Aircraft designed for short-distance flight using electric propulsion and vertical takeoff/landing capabilities.

feeder: A high-capacity power distribution line that transfers electricity from a substation to a specific load or facility.

fixed-base operator (FBO): A commercial business granted the right by the airport sponsor to operate at an airport and provide aeronautical services, such as fueling, hangaring, tie-down and parking, aircraft rental, aircraft maintenance, flight instrument, etc.

general aviation (GA): All civil aviation (excluding military), except those classified as air carrier or air taxi. The types of aircraft typically used in general aviation activities vary from multiengine jet aircraft to single-engine piston aircraft for purposes such as personal, business and instructional flying.

gigawatt (GW): A unit of power equal to 1,000 megawatts or one billion watts. It is typically used to describe large-scale generation or demand capacity, such as a power plant or national grid load.

islanded operations: When a facility or microgrid operates independently from the main utility grid, often during outages or emergencies.

kilovolt-ampere (KVA): A unit of apparent power in an electrical system, representing voltage multiplied by current, without factoring in the power factor.

kilowatt-hour (kWh): A unit of energy equal to using one kilowatt of power for one hour. It measures electricity consumed over time, commonly used in utility billing and energy planning.

kilowatt (kW): A unit of real power that represents the rate of energy transfer; used to size electrical loads.

Level 1 (L1) charging, Level 2 (L2) charging: Level 1 charging is the most basic form of electric vehicle charging, using a standard 120-volt outlet. It provides slow charging speeds, typically adding 3 to 5 miles of range per hour, and is best suited for overnight or low-usage scenarios. Level 2 charging uses more power and can operate at 120V/240V or 208V. Can charge at speeds from 3 to 19.2 kW to charge vehicles in four to 10 hours.

microgrid: A localized group of electricity sources and load assets that can typically disconnect and operate independently from the main grid. Microgrids generally require a controller to ensure the safe and effective operation of these assets.

megawatt (MW): One million watts; a unit of real power used to describe large-scale energy loads or generation capacity.

megawatts direct current (MWDC): A unit of power output used to describe the capacity of solar photovoltaic systems before energy is converted to alternating current. For example, a 2.8 MWDC system refers to the total power generated by the solar panels under ideal conditions, prior to inverter losses.

megavolt-ampere (MVA): A unit that represents the electrical capacity of large systems, such as substations or transformers. It reflects how much power the equipment can deliver, including usable and standby capacity.

National Renewable Energy Laboratory (NREL): A U.S. Department of Energy research lab focused on advancing renewable energy, energy efficiency and sustainable transportation

technologies through innovation and applied research.

panel board: A component of an electrical distribution system that houses circuit breakers and distributes power to various loads.

photovoltaic (PV): Technology that converts sunlight into electricity using solar cells. PV is used as shorthand for photovoltaic systems or solar power generation.

rough order of magnitude (ROM) cost, budget or cost estimate: A Class 5 cost estimate per the Association for the Advancement of Cost Engineering (AACE International). Class 5 estimates are primarily used for initial project screening, market studies, long-range capital planning and assessing project viability.

substation: A facility in the electrical grid that steps up voltage for efficient long-distance transmission or step down voltage for safe local distribution to equipment, buildings or EV chargers. It serves as the connection point between high- and low-voltage systems.

transformer: An electrical device that changes the voltage level of alternating current in a power system.

ultra-fast charging UFC: High-powered electric charging (typically above 350 kW) designed to rapidly recharge large EV batteries, such as those used in electric aircraft or ground support equipment. UFC supports quick turnaround times by delivering significant energy in a short window, often within 15 to 30 minutes.

vertiport: A dedicated facility for vertical takeoff and landing aircraft, typically supporting passenger, cargo or emergency operations. These facilities are similar to helipads with charging capabilities, supporting conventional helicopter movements.

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**APPENDIX B: BACKGROUND DATA SUPPORTING LOAD GROWTH
CALCULATIONS**

APPENDIX B: Background Data Supporting Load Growth Calculations

The following data was provided to Hanson and its consulting team to assist with estimating energy projections:

- 2) Annual meter data per Phase II solar presentation dated July 22, 2024, showing 2,086 MWh per year of usage not offset by solar Phase I.

SPI Airport Energy Consumption 2023 Calendar Year					
#	Acct #	Meter #	Account Description	Annual kWh	% of Total
1	00043759 - 07612 6260	154368	Baggage claim, glass hall, 1st-2nd floor of Prairie-airlines, Subway, Admin	705,216	33.79%
2	00043759 - 07612 0866	105991	1st-2nd floor/TSA/screening ckpoint, basement	658,752	31.57%
3	00043776 - 07612 0860	139877	Electric vault (airfield lighting)	223,920	10.73%
4	00043778 - 07612 0864	105987	1st floor (rental space) (old St Police)	216,080	10.35%
5	00043989 - 07612 6060	191701	Trans closure under beacon (parking lot)	93,024	4.46%
6	00043965 - 07612 5730	127725	New Maintenance building	77,040	3.69%
7	00043780 - 07612 0930	199392	Parking lot Its N. Quad & ramp lights	24,960	1.20%
8	00043894 - 07612 4232	199391	S Quad Charlie Ramp - Fuel Farm/Ramp Lighting	19,200	0.92%
9	00043789 - 07612 1140	198381	Street lights N. Airport Drive	17,176	0.82%
10	00043759 - 07612 0862	105992	2nd floor rental space	14,800	0.71%
11	00043893 - 07612 4230	198323	S. Quadrant Charlie Ramp - B Row	14,350	0.69%
12	00225434 - 81644 5493	155748	McClelland's parking lot	7,308	0.35%
13	00188393 - 81643 9133	151347	M HM-M Row	2,488	0.12%
14	00188393 - 81640 5996	194092	L Row	1,465	0.07%
15	00188393 - 81643 9013	151697	N HM-N Row	1,412	0.07%
16	00043899 - 07612 4240	195123	S. Quadrant Charlie Ramp - D Row	864	0.04%
17	00043904 - 07612 4250	195135	S. Quadrant Charlie Ramp - E Row	851	0.04%
18	00188393 - 81640 5958	195113	K Row	844	0.04%
19	00188393 - 81640 6913	195114	H Row	828	0.04%
20	00188393 - 81640 5920	195081	I Row	815	0.04%
21	00043909 - 07612 4260	195023	S. Quadrant Charlie Ramp - F Row	799	0.04%
22	00043837 - 07612 4036	194083	S. Quadrant Charlie Ramp - A Row	775	0.04%
23	00188393 - 81640 5935	195037	J Row	763	0.04%
24	00188393 - 81640 5947	195088	T-Hangar K 128	757	0.04%
25	00225434 - 81643 3673	154435	Runway 22 - Wind Socks	751	0.04%
26	00188393 - 81640 5980	195027	G Row	723	0.03%
27	00188393 - 81640 5945	195066	T-Hangar K 127	453	0.02%
28	00225434 - 04458 1778	153934	Runway 4 - Wind Socks	417	0.02%
Totals				2,086,831	100.00%

APPENDIX C: DETAILED DESCRIPTION OF KEY SPI TRANSFORMERS

This appendix includes photos and descriptions of key SPI transformers near terminal buildings, the fuel farm and the FAA vaults. The photos and data were collected during a May 2025 site visit.

SPI Terminal South: U2133 – 300 kVA

The south-side service entrance power is supplied by a CWLP 300 kVA, 12.5 kV to 208/120V, 3f pad mount transformer: U2133, as shown in Figure C.1. This transformer feeds a 1,200A, 208/120V, 3f switchboard in the electrical closet on the south side of the facility.

FIGURE C.1: AIRPORT TERMINAL SOUTH-SIDE TRANSFORMER



APPENDIX C: Detailed Description of Key SPI Transformers

SPI Terminal North and Northeast: U2133 and U1866 – 300 kVA

The second transformer on the northeast side of the terminal is also a CWLP 300 kVA, 12.5 kV to 208/120V, 3f pad mount transformer: U1886, as shown in Figure C.2. This transformer feeds two 600A, 208/120, 3f panelboards in the northeast side equipment room through two CWLP meter loops.

The third service entrance transformer is a CWLP 300 kVA, 12.5 kV to 480/277V, 3f pad mount transformer: U6173, as shown in Figure C.2. This transformer feeds an 800A, 480/277V, 3f switchboard through an ATS in the basement of the north side of the facility. The ATS connects to a Caterpillar DG250 250kW/313 kVA, 480/277V, 3f, natural gas-fired generator set adjacent to Transformer U6173, providing emergency power to the terminal air conditioning, passenger boarding bridges, elevator and general power and lighting loads.

FIGURE C.2: AIRPORT TERMINAL TRANSFORMERS NORTH (U1886, LEFT) AND NORTHEAST (U6173, RIGHT)



FAA Vault and Airfield Lighting: U1966

In addition to the terminal facility power distribution, the airfield lighting vault has a CWLP 500 kVA, 12.5 kV to 480/277V, 3f pad mount transformer to a 600A, 480/277V, 3f main disconnect switch. This is a critical service, and power is backed-up through an ATS connected to a Caterpillar SR-4 210kW/263 kVA, 480/277V, 3f generator.

FIGURE C.3: U1966 FAA AIRFIELD LIGHTING VAULT



SPI Fuel Farm U5724

The airport fuel storage and pumping station, another critical load, is served by a CWLP 150 kVA, 12.5 kV to 480/277V, 3f pad mount transformer: U5724. This transformer feeds a 225A, 480/277V, 3f main switchboard and distribution.

FIGURE C.4: U5724 AIRPORT FUEL STORAGE AND PUMPING STATION DISTRIBUTION



APPENDIX D: AIRPORT AUTHORITY FLEET (2024)

APPENDIX D: AIRPORT AUTHORITY FLEET (2024)

TABLE D-1 AIRPORT AUTHORITY FLEET

Year	Make	Model
1999	Ford	E450 Box Truck
2004	Ford	1 Ton Steel Flat Bed
2008	Ford	F250 4 X 4 (CFR 16)
2008	Ford	F550 (Paint Truck)
2011	Ford	E 350 Cargo Van (Truck 18)
2011	Ford	F 250
2010	International	4300M7 SBA 4x2
2012	Chevrolet	Tahoe
2012	Ford	F250
2014	Ford	F 550
2014	Ford	Expedition
2015	Freightliner	Dump Truck
2015	Chevrolet	Tahoe
2015	Ford	Transit Cargo Van
2019	Ford	F 250
2020	Chevrolet	Tahoe
2020	Chevrolet	Tahoe
2020	Ford	Transit T 150
2021	Ford	Explorer
2021	Ford	F 250
2021	Ford	F 350
2021	Ford	Explorer XLT
2021	Ford	Explorer XLT

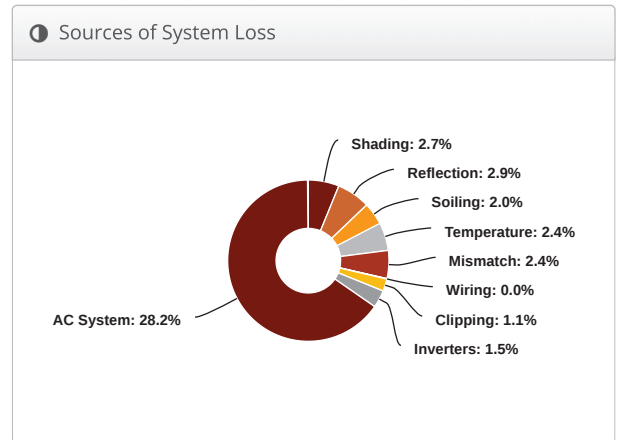
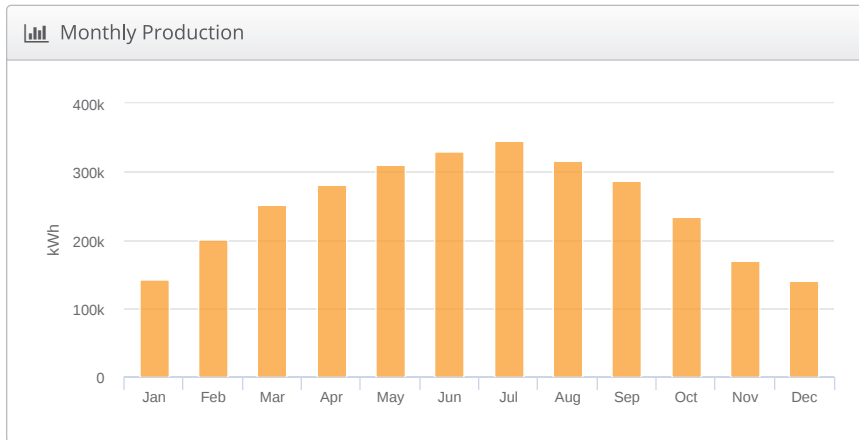
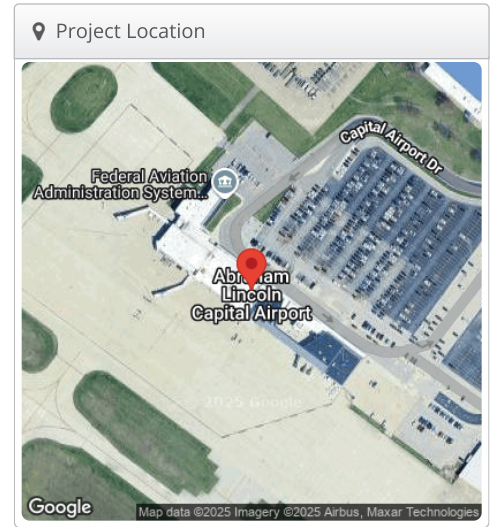
APPENDIX E: CONCEPTUAL PV LAYOUTS

PARCEL 0

Existing Ground Mount SPI, Abraham Lincoln Capital Airport

Report	
Project Name	SPI
Project Address	Abraham Lincoln Capital Airport
Prepared By	Todd Taniguchi todd.taniguchi@powereng.com

System Metrics	
Design	Existing Ground Mount
Module DC Nameplate	2.84 MW
Inverter AC Nameplate	2.38 MW Load Ratio: 1.20
Annual Production	3,005 GWh
Performance Ratio	61.7%
kWh/kWp	1,057.7
Weather Dataset	TMY, 10km Grid (39.85,-89.65), NREL (prospector)
Simulator Version	55152aaae8-5a57783db9-b50766d345-32844f1255



⚡ Annual Production			
	Description	Output	% Delta
Irradiance (kWh/m ²)	Annual Global Horizontal Irradiance	1,490.3	
	Adjusted Global Horizontal Irradiance	1,519.5	2.0%
	POA Irradiance	1,714.5	12.8%
	Shaded Irradiance	1,668.8	-2.7%
	Irradiance after Reflection	1,620.3	-2.9%
	Irradiance after Soiling	1,587.9	-2.0%
	Total Collector Irradiance	1,587.9	0.0%
Energy (kWh)	Nameplate	4,511,207.1	
	Output at Irradiance Levels	4,514,195.8	0.1%
	Output at Cell Temperature Derate	4,404,775.4	-2.4%
	Output After Mismatch	4,297,498.9	-2.4%
	Optimal DC Output	4,295,717.9	0.0%
	Constrained DC Output	4,250,071.7	-1.1%
	Inverter Output	4,185,636.9	-1.5%
Energy to Grid	3,005,480.0	-28.2%	
Temperature Metrics			
	Avg. Operating Ambient Temp		14.6 °C
	Avg. Operating Cell Temp		22.4 °C
Simulation Metrics			
	Operating Hours	4672	
	Solved Hours	4672	

☁ Condition Set												
Description	Condition Set 1											
Weather Dataset	TMY, 10km Grid (39.85,-89.65), NREL (prospector)											
Solar Angle Location	Meteo Lat/Lng											
Transposition Model	Perez Model											
Temperature Model	Sandia Model											
Spectral Adjustment Model (CdTe cells only)	First Solar Spectral Adjustment by Dew Point Temperature											
Temperature Model Parameters	Rack Type	a	b	Temperature Delta								
	Fixed Tilt	-3.56	-0.075	3°C								
	Flush Mount	-2.81	-0.0455	0°C								
	East-West	-3.56	-0.075	3°C								
	Carport	-3.56	-0.075	3°C								
Soiling (%)	J	F	M	A	M	J	J	A	S	O	N	D
	2	2	2	2	2	2	2	2	2	2	2	2
Irradiation Variance	5%											
Cell Temperature Spread	4° C											
Module Binning Range	-2.5% to 2.5%											
AC System Derate	0.50%											
Module & Component Characterizations	Type	Component		Characterization								
	Module	FS-6475-C (First Solar)		Spec Sheet Characterization, PAN								
	Inverter	Sunny Highpower PEAK3 125-US (2020) (SMA)		Spec Sheet								

📦 Components		
Component	Name	Count
Inverters	Sunny Highpower PEAK3 125-US (2020) (SMA)	19 (2.38 MW)
AC Home Runs	1/0 AWG (Aluminum)	19 (360,405.2 ft)
Strings	10 AWG (Copper)	1,212 (289,828.9 ft)
Module	First Solar, FS-6475-C (475W)	5,982 (2.84 MW)

🔌 Wiring Zones			
Description	Combiner Poles	String Size	Stringing Strategy
Wiring Zone	-	4-5	Along Racking

🏗 Field Segments									
Description	Racking	Orientation	Tilt	Azimuth	Intrarow Spacing	Frame Size	Frames	Modules	Power
Field Segment 1	Fixed Tilt	Portrait (Vertical)	Module: 20°	Module: 178°	10.0 ft	2x1	2,991	5,982	2.84 MW

Detailed Layout2



PARCEL 1

SPI 6.44 ac parcel SPI, Abraham Lincoln Capital Airport

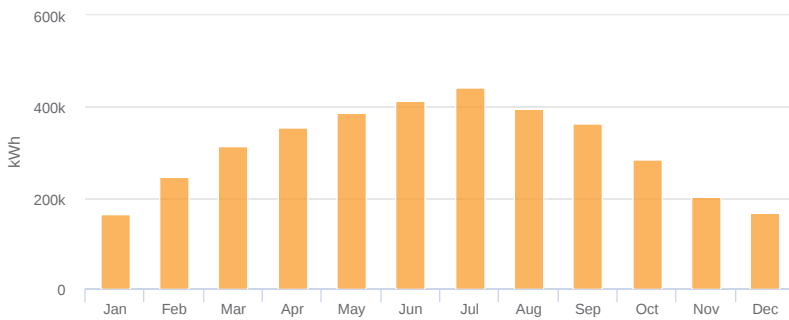
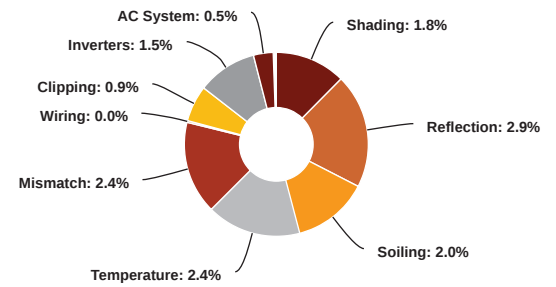
Report

Project Name	SPI
Project Address	Abraham Lincoln Capital Airport
Prepared By	Todd Taniguchi todd.taniguchi@powereng.com

System Metrics

Design	SPI 6.44 ac parcel
Module DC Nameplate	2.52 MW
Inverter AC Nameplate	2.13 MW Load Ratio: 1.18
Annual Production	3.732 GWh
Performance Ratio	86.5%
kWh/kWp	1,483.1
Weather Dataset	TMY, 10km Grid (39.85,-89.65), NREL (prospector)
Simulator Version	55152aaa8-5a57783db9-b50766d345-32844f1255

Project Location

Monthly Production

Sources of System Loss


⚡ Annual Production			
	Description	Output	% Delta
Irradiance (kWh/m ²)	Annual Global Horizontal Irradiance	1,490.3	
	Adjusted Global Horizontal Irradiance	1,519.5	2.0%
	POA Irradiance	1,714.9	12.9%
	Shaded Irradiance	1,684.1	-1.8%
	Irradiance after Reflection	1,635.2	-2.9%
	Irradiance after Soiling	1,602.5	-2.0%
	Total Collector Irradiance	1,602.5	0.0%
Energy (kWh)	Nameplate	4,032,122.0	
	Output at Irradiance Levels	4,035,183.3	0.1%
	Output at Cell Temperature Derate	3,938,518.5	-2.4%
	Output After Mismatch	3,845,628.8	-2.4%
	Optimal DC Output	3,843,991.7	0.0%
	Constrained DC Output	3,808,765.3	-0.9%
	Inverter Output	3,751,105.0	-1.5%
Energy to Grid	3,732,349.4	-0.5%	
Temperature Metrics			
	Avg. Operating Ambient Temp		14.6 °C
	Avg. Operating Cell Temp		22.4 °C
Simulation Metrics			
	Operating Hours	4672	
	Solved Hours	4672	

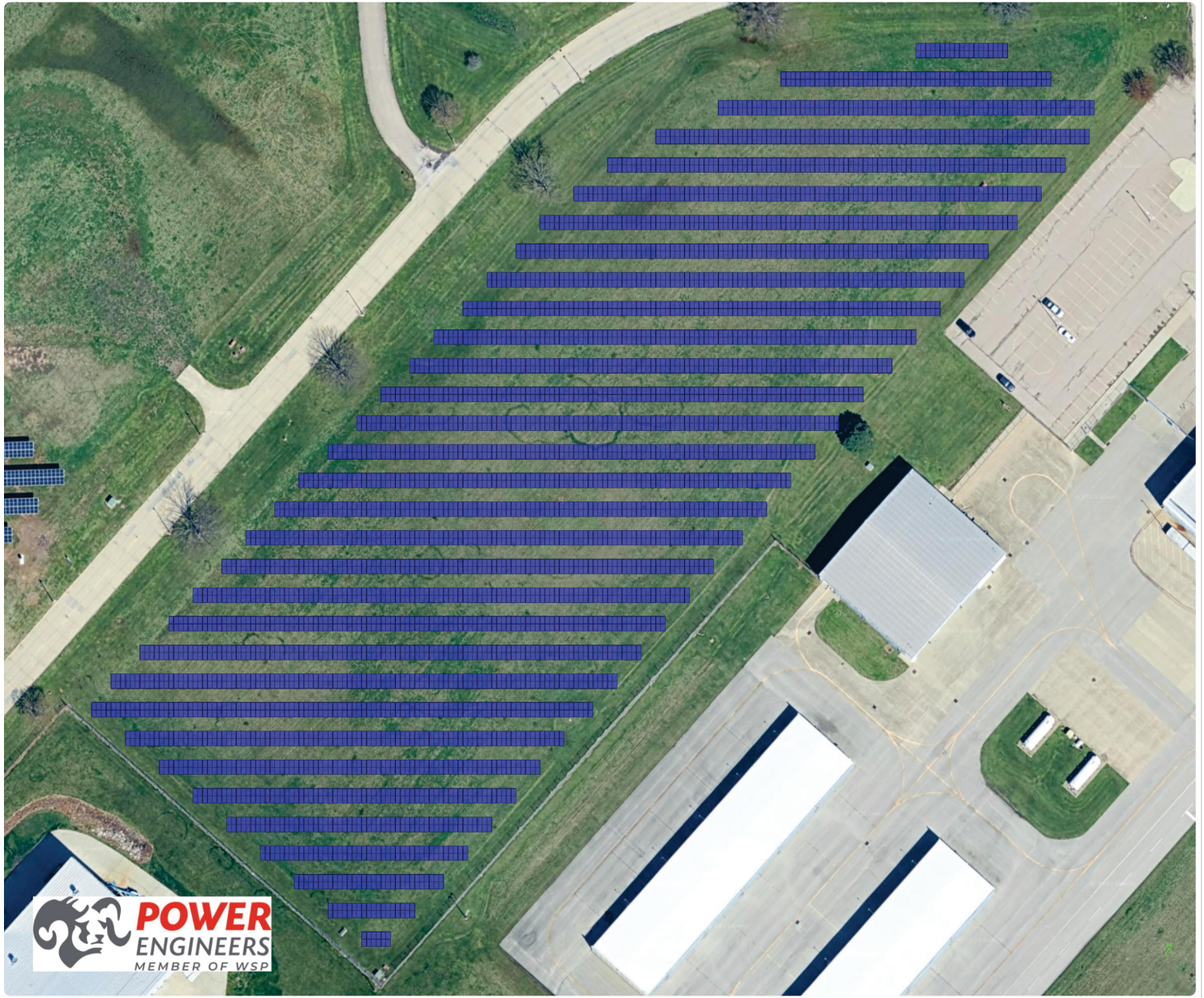
☁ Condition Set												
Description	Condition Set 1											
Weather Dataset	TMY, 10km Grid (39.85,-89.65), NREL (prospector)											
Solar Angle Location	Meteo Lat/Lng											
Transposition Model	Perez Model											
Temperature Model	Sandia Model											
Spectral Adjustment Model (CdTe cells only)	First Solar Spectral Adjustment by Dew Point Temperature											
Temperature Model Parameters	Rack Type	a	b	Temperature Delta								
	Fixed Tilt	-3.56	-0.075	3°C								
	Flush Mount	-2.81	-0.0455	0°C								
	East-West	-3.56	-0.075	3°C								
	Carport	-3.56	-0.075	3°C								
Soiling (%)	J	F	M	A	M	J	J	A	S	O	N	D
	2	2	2	2	2	2	2	2	2	2	2	2
Irradiation Variance	5%											
Cell Temperature Spread	4° C											
Module Binning Range	-2.5% to 2.5%											
AC System Derate	0.50%											
Module & Component Characterizations	Type	Component		Characterization								
	Module	FS-6475-C (First Solar)		Spec Sheet Characterization, PAN								
	Inverter	Sunny Highpower PEAK3 125-US (2020) (SMA)		Spec Sheet								

📦 Components		
Component	Name	Count
Inverters	Sunny Highpower PEAK3 125-US (2020) (SMA)	17 (2.13 MW)
Strings	10 AWG (Copper)	1,150 (265,835.5 ft)
Module	First Solar, FS-6475-C (475W)	5,298 (2.52 MW)

🔌 Wiring Zones			
Description	Combiner Poles	String Size	Stringing Strategy
Wiring Zone	-	4-5	Along Racking

🏠 Field Segments									
Description	Racking	Orientation	Tilt	Azimuth	Intrarow Spacing	Frame Size	Frames	Modules	Power
Field Segment 2	Fixed Tilt	Portrait (Vertical)	Module: 20°	Module: 180°	12.0 ft	2x1	2,649	5,298	2.52 MW

Detailed Layout2



PARCEL 2

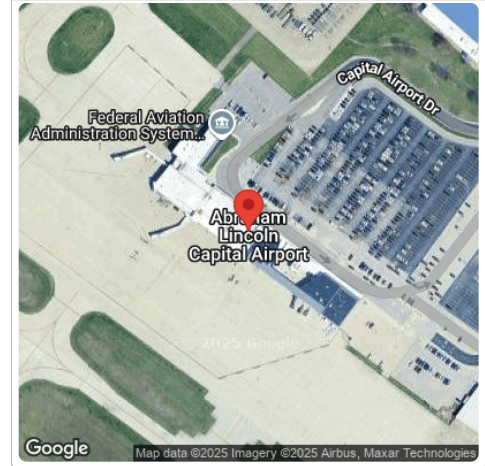
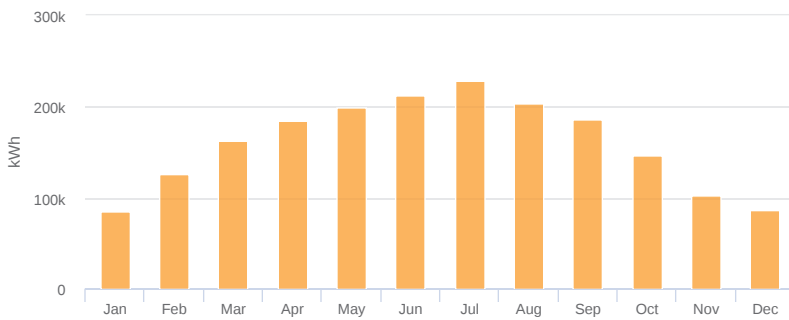
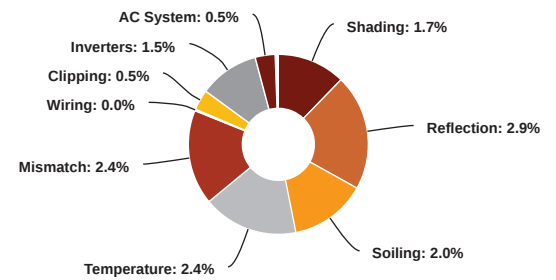
SPI 4 ac parcel SPI, Abraham Lincoln Capital Airport

Report

Project Name	SPI
Project Address	Abraham Lincoln Capital Airport
Prepared By	Todd Taniguchi todd.taniguchi@powereng.com

System Metrics

Design	SPI 4 ac parcel
Module DC Nameplate	1.29 MW
Inverter AC Nameplate	1.13 MW Load Ratio: 1.15
Annual Production	1,922 GWh
Performance Ratio	86.9%
kWh/kWp	1,490.1
Weather Dataset	TMY, 10km Grid (39.85,-89.65), NREL (prospector)
Simulator Version	55152aaae8-5a57783db9-b50766d345-32844f1255

Project Location

Monthly Production

Sources of System Loss


⚡ Annual Production			
	Description	Output	% Delta
Irradiance (kWh/m ²)	Annual Global Horizontal Irradiance	1,490.3	
	Adjusted Global Horizontal Irradiance	1,519.5	2.0%
	POA Irradiance	1,714.9	12.9%
	Shaded Irradiance	1,685.5	-1.7%
	Irradiance after Reflection	1,636.5	-2.9%
	Irradiance after Soiling	1,603.7	-2.0%
	Total Collector Irradiance	1,603.7	0.0%
Energy (kWh)	Nameplate	2,068,651.9	
	Output at Irradiance Levels	2,070,274.0	0.1%
	Output at Cell Temperature Derate	2,020,666.2	-2.4%
	Output After Mismatch	1,972,471.5	-2.4%
	Optimal DC Output	1,971,720.9	0.0%
	Constrained DC Output	1,961,608.7	-0.5%
	Inverter Output	1,932,033.7	-1.5%
Energy to Grid	1,922,373.5	-0.5%	
Temperature Metrics			
	Avg. Operating Ambient Temp		14.6 °C
	Avg. Operating Cell Temp		22.4 °C
Simulation Metrics			
	Operating Hours	4672	
	Solved Hours	4672	

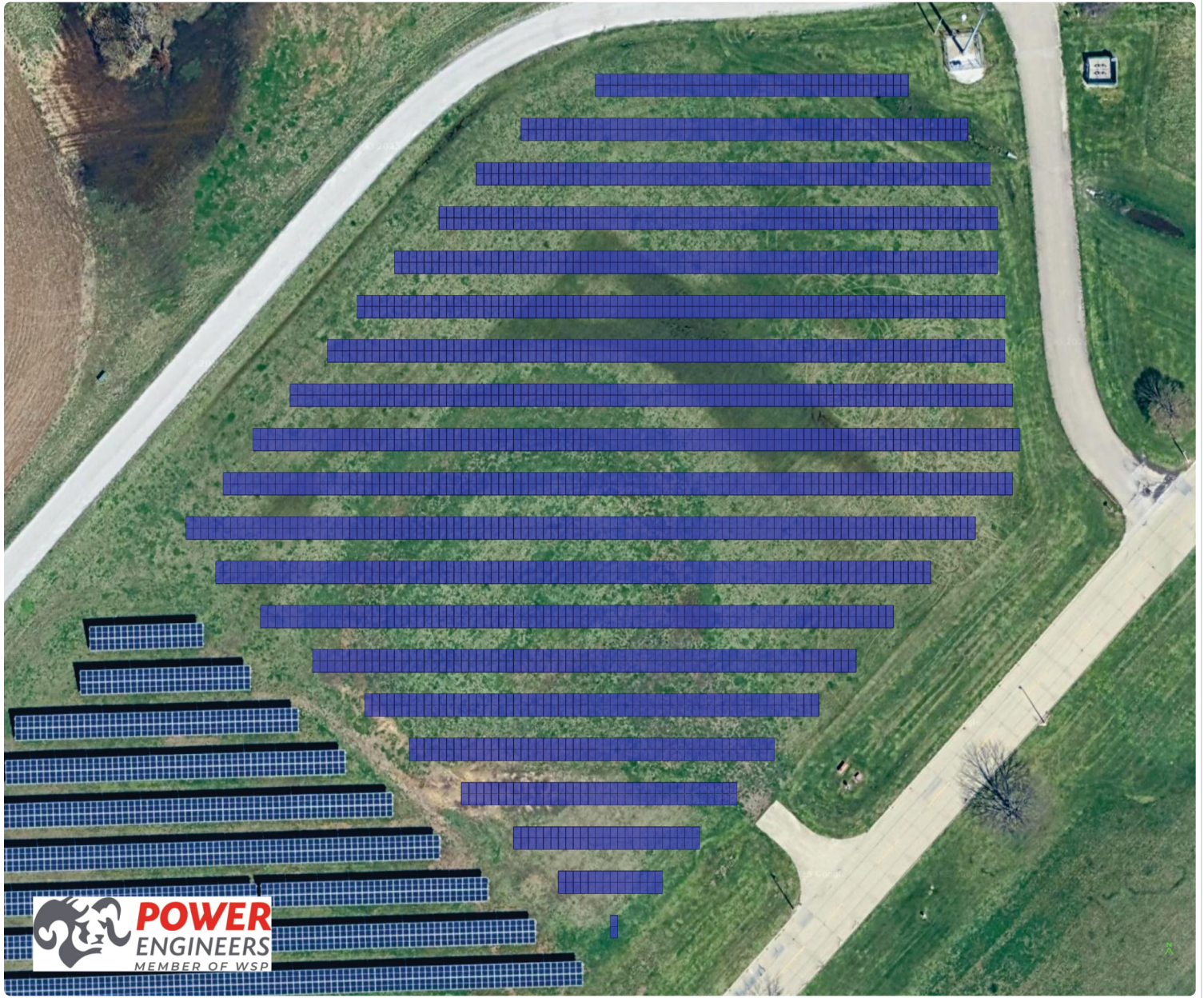
☁ Condition Set												
Description	Condition Set 1											
Weather Dataset	TMY, 10km Grid (39.85,-89.65), NREL (prospector)											
Solar Angle Location	Meteo Lat/Lng											
Transposition Model	Perez Model											
Temperature Model	Sandia Model											
Spectral Adjustment Model (CdTe cells only)	First Solar Spectral Adjustment by Dew Point Temperature											
Temperature Model Parameters	Rack Type	a	b	Temperature Delta								
	Fixed Tilt	-3.56	-0.075	3°C								
	Flush Mount	-2.81	-0.0455	0°C								
	East-West	-3.56	-0.075	3°C								
	Carport	-3.56	-0.075	3°C								
Soiling (%)	J	F	M	A	M	J	J	A	S	O	N	D
	2	2	2	2	2	2	2	2	2	2	2	2
Irradiation Variance	5%											
Cell Temperature Spread	4° C											
Module Binning Range	-2.5% to 2.5%											
AC System Derate	0.50%											
Module & Component Characterizations	Type	Component		Characterization								
	Module	FS-6475-C (First Solar)		Spec Sheet Characterization, PAN								
	Inverter	Sunny Highpower PEAK3 125-US (2020) (SMA)		Spec Sheet								

📦 Components		
Component	Name	Count
Inverters	Sunny Highpower PEAK3 125-US (2020) (SMA)	9 (1.13 MW)
Strings	10 AWG (Copper)	585 (120,237.4 ft)
Module	First Solar, FS-6475-C (475W)	2,716 (1.29 MW)

🔌 Wiring Zones			
Description	Combiner Poles	String Size	Stringing Strategy
Wiring Zone	-	4-5	Along Racking

🏠 Field Segments									
Description	Racking	Orientation	Tilt	Azimuth	Intrarow Spacing	Frame Size	Frames	Modules	Power
Field Segment 1	Fixed Tilt	Portrait (Vertical)	Module: 20°	Module: 180°	12.0 ft	2x1	1,358	2,716	1.29 MW

Detailed Layout2

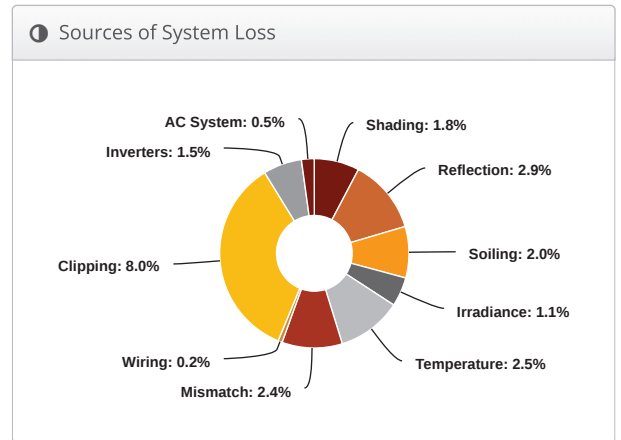
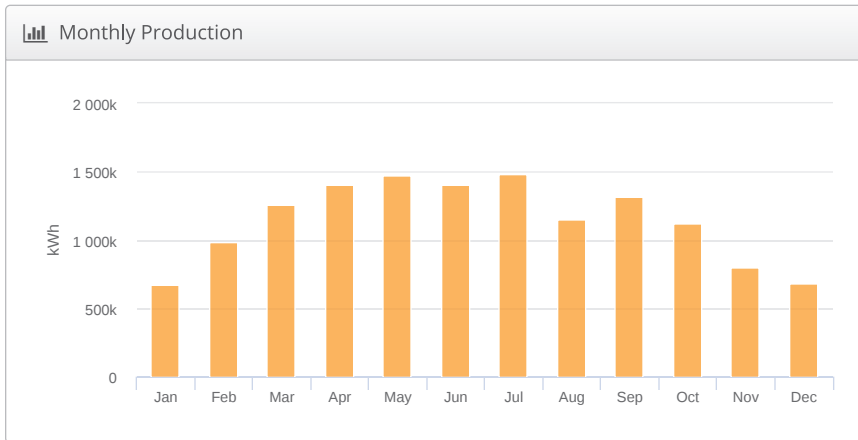
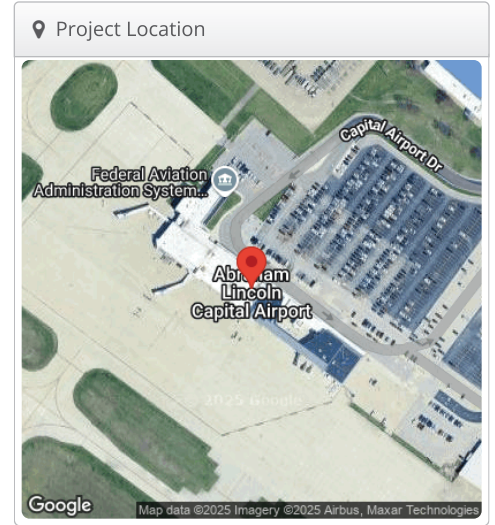


PARCEL 3

SPI 29.5 ac Parcel SPI, Abraham Lincoln Capital Airport

Report	
Project Name	SPI
Project Address	Abraham Lincoln Capital Airport
Prepared By	Todd Taniguchi todd.taniguchi@powereng.com

System Metrics	
Design	SPI 29.5 ac Parcel
Module DC Nameplate	10.1 MW
Inverter AC Nameplate	8.80 MW Load Ratio: 1.15
Annual Production	13.77 GWh
Performance Ratio	79.2%
kWh/kWp	1,358.5
Weather Dataset	TMY, 10km Grid (39.85,-89.65), NREL (prospector)
Simulator Version	55152aaae8-5a57783db9-b50766d345-32844f1255



⚡ Annual Production			
	Description	Output	% Delta
Irradiance (kWh/m ²)	Annual Global Horizontal Irradiance	1,490.3	
	Adjusted Global Horizontal Irradiance	1,519.5	2.0%
	POA Irradiance	1,714.9	12.9%
	Shaded Irradiance	1,684.7	-1.8%
	Irradiance after Reflection	1,635.8	-2.9%
	Irradiance after Soiling	1,603.1	-2.0%
	Total Collector Irradiance	1,603.1	0.0%
Energy (kWh)	Nameplate	16,255,096.9	
	Output at Irradiance Levels	16,070,194.3	-1.1%
	Output at Cell Temperature Derate	15,665,571.7	-2.5%
	Output After Mismatch	15,297,395.0	-2.4%
	Optimal DC Output	15,272,026.5	-0.2%
	Constrained DC Output	14,054,463.1	-8.0%
	Inverter Output	13,843,311.0	-1.5%
	Energy to Grid	13,774,094.0	-0.5%
Temperature Metrics			
	Avg. Operating Ambient Temp		14.6 °C
	Avg. Operating Cell Temp		22.4 °C
Simulation Metrics			
	Operating Hours	4672	
	Solved Hours	4672	

☁ Condition Set												
Description	Condition Set 1											
Weather Dataset	TMY, 10km Grid (39.85,-89.65), NREL (prospector)											
Solar Angle Location	Meteo Lat/Lng											
Transposition Model	Perez Model											
Temperature Model	Sandia Model											
Spectral Adjustment Model (CdTe cells only)	First Solar Spectral Adjustment by Dew Point Temperature											
Temperature Model Parameters	Rack Type	a	b	Temperature Delta								
	Fixed Tilt	-3.56	-0.075	3°C								
	Flush Mount	-2.81	-0.0455	0°C								
	East-West	-3.56	-0.075	3°C								
	Carport	-3.56	-0.075	3°C								
Soiling (%)	J	F	M	A	M	J	J	A	S	O	N	D
	2	2	2	2	2	2	2	2	2	2	2	2
Irradiation Variance	5%											
Cell Temperature Spread	4° C											
Module Binning Range	-2.5% to 2.5%											
AC System Derate	0.50%											
Module & Component Characterizations	Type	Component		Characterization								
	Module	FS-6465-P-B (First Solar)		Spec Sheet Characterization, PAN								
	Inverter	SC 4400 UP-US (SMA)		Spec Sheet								

📦 Components		
Component	Name	Count
Inverters	SC 4400 UP-US (SMA)	2 (8.80 MW)
Strings	10 AWG (Copper)	4,361 (4,622,198.7 ft)
Module	First Solar, FS-6465-P-B (465W)	21,805 (10.1 MW)

🔌 Wiring Zones			
Description	Combiner Poles	String Size	Stringing Strategy
Wiring Zone	-	5-5	Along Racking

🏠 Field Segments									
Description	Racking	Orientation	Tilt	Azimuth	Intrarow Spacing	Frame Size	Frames	Modules	Power
Field Segment 1	Fixed Tilt	Portrait (Vertical)	Module: 20°	Module: 180°	12.0 ft	2x1	10,903	21,805	10.1 MW

Detailed Layout2



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APPENDIX F: SAMPLE BROKER POLICY

SAMPLE

COMMERCIAL REAL ESTATE BROKER POLICY

I. STATEMENT OF PURPOSE

The purpose of this Commercial Real Estate Broker Compensation Policy (“Policy”) is to establish policies and procedures to provide for the use of and compensation to commercial real estate brokers (Broker) involved in the leasing of real property owned by the _____ (the Airport). This Policy applies to the payment of commissions on selected land, facilities, and other real property, both improved and unimproved, to eligible Brokers who successfully procure tenants for the Airport.

This Policy does not apply to leasing of any passenger terminal areas, including space inside the terminal, the terminal apron, existing parking lots, or the rental car facility. This Policy is not applicable to any pre-existing leases or one for which the Airport is already engaged in lease discussions with a prospective tenant. The Airport will not pay commissions on any sublease or assignment of a lease or on any extension of a lease term.

II. POLICY

All Brokers are eligible to earn commissions for facilitating new property lease agreements on buildings, hangars, or developable land at the Airport. All Brokers will be required to register their leasing prospects by executing a Prospect Registration Form (attached as Exhibit A) with the Airport’s _____ Department in advance of the prospect’s first visit to the Airport. Failure to register a prospect prior to the prospect’s first visit to the Airport will disqualify the Broker’s eligibility to receive a commission. Brokers may not be affiliated (as an officer, director, partner, manager, employee, shareholder, etc.) with the prospect it has registered. Brokers must possess an active State of _____ commercial real estate broker’s license and shall maintain all required licenses during the term of any negotiations. Broker shall have an active and continuing role in meetings and communications between the prospect and the Airport during the period of negotiations.

The Airport retains the right to solicit and acquire prospects and/or tenants utilizing its own staff and/or consultants. The Airport has no obligation to lease any particular property. The Airport may issue a Request for Letters of Interest, Request for Proposals, Request for Bids or other

competitive solicitations for available Airport properties and will retain the right to accept or reject any offers to lease. No commission will be paid on a transaction which the Airport has rejected.

All leases will be prepared and executed by the Airport. Brokers shall have no authority to bind the Airport to particular terms or to execute a lease on behalf of the Airport. The Airport will provide a sample form of lease to qualifying Brokers.

III. COMMISSION STRUCTURE

The maximum period of lease term that shall be eligible for a commission payment shall be ten (10) years. No commission payments will be made for subleases, assignments, options, extensions, renewals, or holdovers. No commission will be paid on monies obtained by the Airport in the form of a deposit, security or performance bond, or any awards obtained through litigation. Broker/Agent shall receive a commission if, and only if, Broker's prospect is procured and a formal binding agreement executed by both parties has been consummated. There will be no commission payments for a LOI/RFP or nonbinding agreements.

In the event a Broker is eligible for a commission on the leasing of Airport property, the amount of the commission shall be based on the annual lease rent at a rate not to exceed five percent (5%). The lease rent upon which the Broker's fee is calculated shall be the base rent or minimum guaranteed rent payable by the tenant to the Airport over the ten (10) year maximum allowable commissionable period.

Example:

One (1) acre of real property is leased for \$1.00 per square foot per year for a twenty (20) year initial term with one (1) ten (10) year option for renewal.

Annual lease rent equals \$43,560 per year.

$$\$43,560 \times 10 \text{ years} = \$435,600 \times .05 = \$21,780$$

Years 11 – 20 are not eligible for commission. Renewal options are not eligible for commission.

Commissionable lease rent does not include any amounts that are, as of the date the lease is signed, contingent, undetermined, or unliquidated, such as (but not limited to) percentage rent, CPI or other index-based inflation adjustments, sales tax, maintenance charges, utility fees, real property taxes or assessments, or similar charges or pass-throughs to be remitted by a tenant to the Airport or any third party in addition to the minimum guaranteed rent. The Airport will pay

said commission only to the primary Broker. Any commission splits among two or more Brokers sharing in the procurement of the tenant shall be determined by the Brokers and shall not be the responsibility of the Airport.

The Airport reserves the right to further negotiate the amount of a commission and/or the terms of payment prior to execution of any lease in the event of unusual circumstance, including early termination provisions within the lease, financial issues associated with the Prospect, or similar matters.

Commissions shall be payable as follows:

1. Fifty percent (50%) shall be payable within thirty (30) days of the full execution of the lease agreement by both parties and either the waiver of, or satisfaction of, all lease contingencies, payment of required deposits, receipt of any required performance or payment guarantee, and the delivery of acceptable insurance by the tenant.
2. Fifty percent (50%) shall be payable within thirty (30) days of the date of rent commencement.

In the event a transaction involving a Broker results in the Airport granting an option or right of first refusal for an adjoining parcel, a commission will be payable if said option or right of first refusal is exercised within a period of two (2) years or the term established in the agreement, whichever is shorter. Broker shall provide a letter of representation to the Airport for all clients that establishes the period of representation. The Airport reserves the right to request a new letter of representation after the two-year period or term established in the agreement.

Should any property lease agreement facilitated by a Broker be terminated due to any lessee default, said Broker shall be required to refund that portion of any commission received for the defaulted term.

EXHIBIT A

PROSPECT REGISTRATION FORM

Attention:

Subject Airport Property (Property): _____

Prospective Tenant (Prospect): _____

Type of Tenancy Sought (land, existing building, new development): _____

Use/Description: _____

Firm Name (Broker): _____

In accordance with the _____ (Airport) Commercial Real Estate Broker Policy (Policy), you are hereby notified that the above named Broker is representing the above-named Prospect in the negotiation of a lease with the Airport for the above-named Property. Such consent shall serve only as Broker's formal registration of the Prospect and the Prospect's acknowledgement that Broker has been engaged to assist the Prospect in identifying and leasing the Property.

The undersigned Broker acknowledges that:

1. We have received a copy of the Policy and have thoroughly read, understand and to its terms;
2. We understand that this is an open listing and that the Airport reserves the right to lease the Property itself or through any other Broker without payment of a commission;
3. We are not authorized to bind the Airport in these negotiations and will be entitled to a commission only if and when all the terms and conditions of the Policy have been satisfied.

The undersigned Broker further declares that:

1. We possess an active commercial real estate brokerage license in the State of _____;
2. We are not affiliated with the Prospect as identified within the Policy;

3. The signature of the Prospect that appears below is the genuine and authorized of the person legally authorized to bind the Prospect. Prospect may be required to provide proof of authority to bind the prospective lessee.

The above-named Prospect shall hereafter be considered acknowledged as such by the Airport within the meaning of the Policy upon the signature of the Airport's Representative below. The Policy and this Prospect Registration Form constitute the entire agreement between the Airport and Broker relating to the subject hereof, and no other agreements or understandings relating to this subject exists between the Airport and Broker.

Broker: _____

Prospect: _____

Title: _____

Title: _____

Signature: _____

Signature: _____

Date: _____

Date: _____

Received by & Acknowledged: _____

Signature

Date