PREFACE

The purpose of this preface is to provide insight to the reader as to preparation of a forecast update for Colorado Springs Airport (COS) in June 2013 after the planning was completed prior to the publication of this Technical Report. The original forecast was prepared in the summer of 2010 and approved by FAA on September 23, 2010. In the fall of 2012, the FAA requested that airport management prepare a forecast update given the forecast approval was more than two years past. Airport management agreed that a forecast update was warranted given significant changes in air service at the Airport since the original forecast was prepared. The forecast update was approved by FAA in August 2013.

Notably, the master plan recommendations, which primarily involve airfield improvements for safety, efficiency, and/or operational reasons, are justified regardless of present or future activity levels. In other words, the recommendations are not demand-driven projects. Moreover, the master planning process employed planning activity levels (PAL) that tie future improvements to realized activity levels rather than arbitrary years in the future. Accordingly, the planning recommendations from this master plan remain valid and were unchanged based upon the forecast update.

Chapter 3 of this document includes the original forecast, as well as a brief summary of the forecast update, with Appendix B to this report including a more complete explanation of the assumptions and projections from the forecast update. The remainder of the report references the planning activity levels which were based upon the original forecast.

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Executive Summary
MASTER PLAN UPDATE
Colorado Springs Airport

INTRODUCTION

This Master Plan Update (Master Plan) was initiated in late 2009. A lot has changed since then. Back in 2009, Delta Air Lines and Northwest Airlines announced their merger but were still far from completing the process to form the new Delta Air Lines. United Airlines and Continental Airlines had not yet announced their merger, but it would be announced soon after the master planning process was underway in May of 2010. Fast forward to today, and the dynamic aviation industry continues to change to meet new economic demands and pressures. In February 2013, American Airlines and US Airways announced their intent to merge as well. Each of these changes, along with others in the industry, have an impact at individual airports. When the Master Plan began, the Colorado Springs Airport (Airport) was served by each of these "legacy" airlines prior to these mergers, along with the low cost carriers Allegiant Air and Frontier Airlines. While Frontier Airlines has left Colorado Springs, Alaska Airlines has announced that it will enter the market and begin nonstop flights between Colorado Springs and Seattle in November 2013.

Given all the changes in the aviation industry, an airport cannot plan to accommodate specific airlines or business models. Change in this industry is often unpredictable. Therefore airports, like Colorado Springs, must proactively develop plans for their future that are flexible and meet the needs of this dynamic industry. To that end, Colorado Springs has focused on improvements the Airport will need to implement over the next several years to accommodate changes in service, growth of passengers, and each segment of the aviation market, including but not limited to airline passengers.

The intent of a master plan is to provide a conceptual plan for future development of the airport campus over the long-term that will serve each major function of the airport including: commercial passenger service, air cargo and freight transport, general aviation activity, and military facilities. This particular Master Plan forecasts demand expected to occur over the next 20 years and provides a planning framework that will enable Airport management to implement a series of smaller projects over time to optimize critical infrastructure to meet future needs. This document presents highlights of the full Technical Master Plan report.

Guiding Principles

To ensure that plans formulated in the Master Plan will meet the needs of the dynamic aviation industry, a comprehensive set of guiding principles were developed at the outset of the planning process. The guiding principles also provide interested parties a high-level explanation of the purpose for the master planning process.

- The recommended development plan should give priority to safety and security, followed by financial feasibility, operational efficiency, environmental prudence, and

social responsibility; the plan should be beneficial to all users of the Airport, and the positive customer experience must be maintained or enhanced.

- Airport development plans should preserve flexibility to permit changes to the plan as industry and local conditions warrant.
- The planning effort will seek to foster consensus among key stakeholders, including Airport users, the Federal Aviation Administration (FAA), the Airport Advisory Commission, and Airport management.
- The master planning process will employ a focused public involvement program to inform interested parties as to the Airport's positive community impacts as well as future plans.
- Future development at the Airport shall continue to be self-funded by users of the airport and aviation system; no local sales or property taxes will be used to fund Airport capital improvements.
- The master planning process shall emphasize cost effective solutions and shall consider the total cost of implementation when evaluating alternatives.
- Planning for future facilities will consider the role of emerging technologies and industry trends that could affect the requirements for future facilities.
- The master planning process shall incorporate Business Park plans and identify potential synergies between its future development and the development of the rest of the Airport.

Goals and Objectives

Using the guiding principles, the Airport drafted a more detailed, actionable set of "goals and objectives." The goals and objectives were used to evaluate whether or not a planning concept is viable as the recommended development plan. Airport management identified goals for the airfield, passenger terminal, land use and access, sustainability, and social responsibility. Each of the goals has an accompanying list of objectives which is located in Chapter 1 of the Master Plan Technical Report. The goals were as follows:

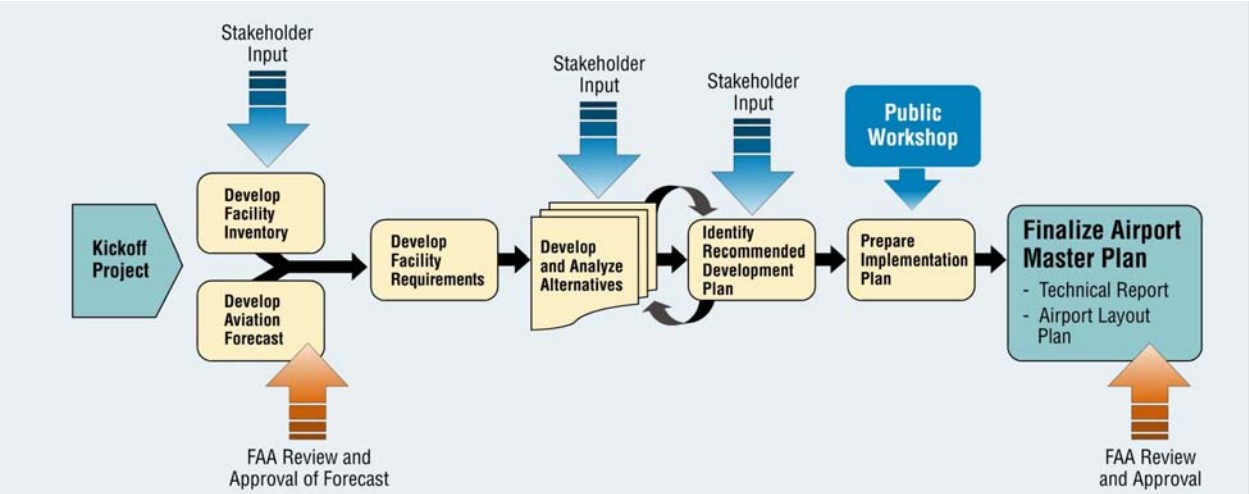
- **Airfield –** plan for a safe, operationally efficient airfield that meets FAA standards.
- **Passenger terminal –** provide plans that will help maintain a positive customer service experience throughout the entire terminal complex, from the entrance road and parking lots to the aircraft gate.
- **Land use and access –** provide a plan to enhance Airport access and encourage compatible land use surrounding the Airport.
- **Sustainability –** provide a plan that is fiscally and environmentally sustainable.

- **Social responsibility** – provide a plan that meets the aviation needs of the region in a socially responsible manner.

Master Planning Process

The master planning process followed the best practices of the industry and the guidance provided by FAA in Advisory Circular 150/5070-6B, *Airport Master Plans*.1 The steps involved in the master planning process are shown in the Figure 1 below.

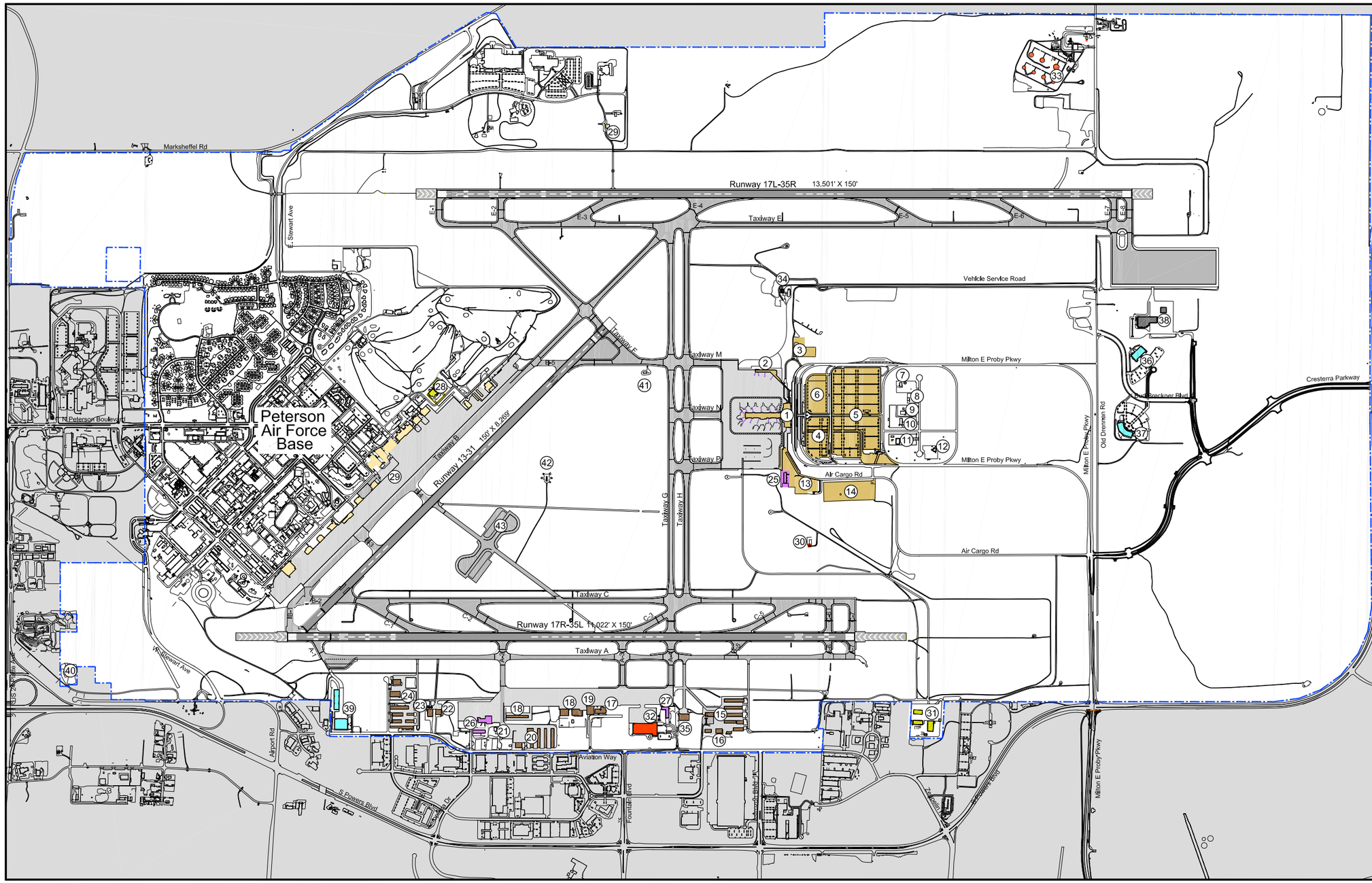
Figure 1
MASTER PLANNING PROCESS
Colorado Springs Airport



Existing Condition

The Airport consists of the airfield and the following other primary facilities: passenger terminal with two concourses accommodating 16 aircraft gates, ground transportation facilities, surface parking lots, rental car facilities, air cargo ramp, fixed base operator facilities, aircraft maintenance facilities, fuel farms, and FAA facilities. The airfield occupies approximately 30% of the Airport land area, with three runways, Runway 17L-35R, Runway 17R-35L, and Runway 13-31, associated taxiways and safety areas. The Airport encompasses approximately 7,353 acres. The passenger terminal complex and terminal support facilities are located in the center of the Airport campus; general aviation, cargo, aircraft maintenance, and airline support facilities are located primarily in the West Aviation Development Area, west of Runway 17R-35L. Major airport facilities are depicted on Figure 2.

[1] Advisory Circular (AC): Federal Aviation Administration Advisory Circular. Advisory Circulars are informational publications that provide guidance for complying with aviation regulations and requirements.



FACILITY INDEX

1. Passenger terminal
2. East unit terminal
3. Valet parking lot
4. Short term parking lot
5. Long term parking lot
6. Rental car ready/ return lot
7. Advantage rental car service center
8. Enterprise rental car service center
9. Alamo rental car service center
10. Avis rental car service center
11. Hertz rental car service center
12. Budget rental car service center
13. Employee parking lot
14. Overflow parking lot
15. J.H.W. Investment Company
16. A-Cent Aviation hangar and office
17. Former passenger terminal building
18. Colorado jetCenter hangars
19. Western Pacific maintenance hangar
20. Cutter Aviation
21. Colorado Division of Wildlife hangar
22. Corporate hangar
23. Colorado Springs Police hangar
24. Colorado Springs Owners Association
25. Belly cargo building
26. FedEx cargo facility
27. Cargo building (available)
28. Airport Trafiic Control Tower (ATCT)
29. Aircraft Rescue and Fire Fighting (2)
30. Glycol pretreatment facility
31. Airport maintenance facilitity
32. Skywest maintenance facility
33. Diamond Shamrock fuel farm
34. Airline fuel farm
35. Maintenance hangar
36. Aerospace Corp.
37. Northrop Grumman
38. A/DACG facility
39. National Museum of World War II Aviation
40. Colorado Springs Utilities stockpile
41. Airfield electrical vault
42. Radio transimtter site
43. Infield military operating surface

LEGEND

- Airport property boundary
- Airfield pavement
- Passenger terminal complex
- General aviation
- Air cargo
- Airport support
- Airline support
- Military
- Commercial use
- Non airport property

Figure 2
BASELINE AIRPORT FACILITIES

NORTH

0 1,000' 2,000' 4,000'

Master Plan Update
Colorado Springs Airport
July 2013

Leigh | Fisher
Management Consultants

AVIATION DEMAND FORECAST

The following three sections summarize the forecast in terms of enplaned passengers, air cargo tonnage, and aircraft operations. For enplaned passengers and aircraft operations, the forecast projections are compared to the FAA 2013 Terminal Area Forecast (TAF).[2] The projections presented herein are a forecast update, completed in June 2013, to the original Master Plan forecast prepared back in 2010. For further information regarding the forecast, see Chapter 3 and Appendices B and C of the Technical Report.

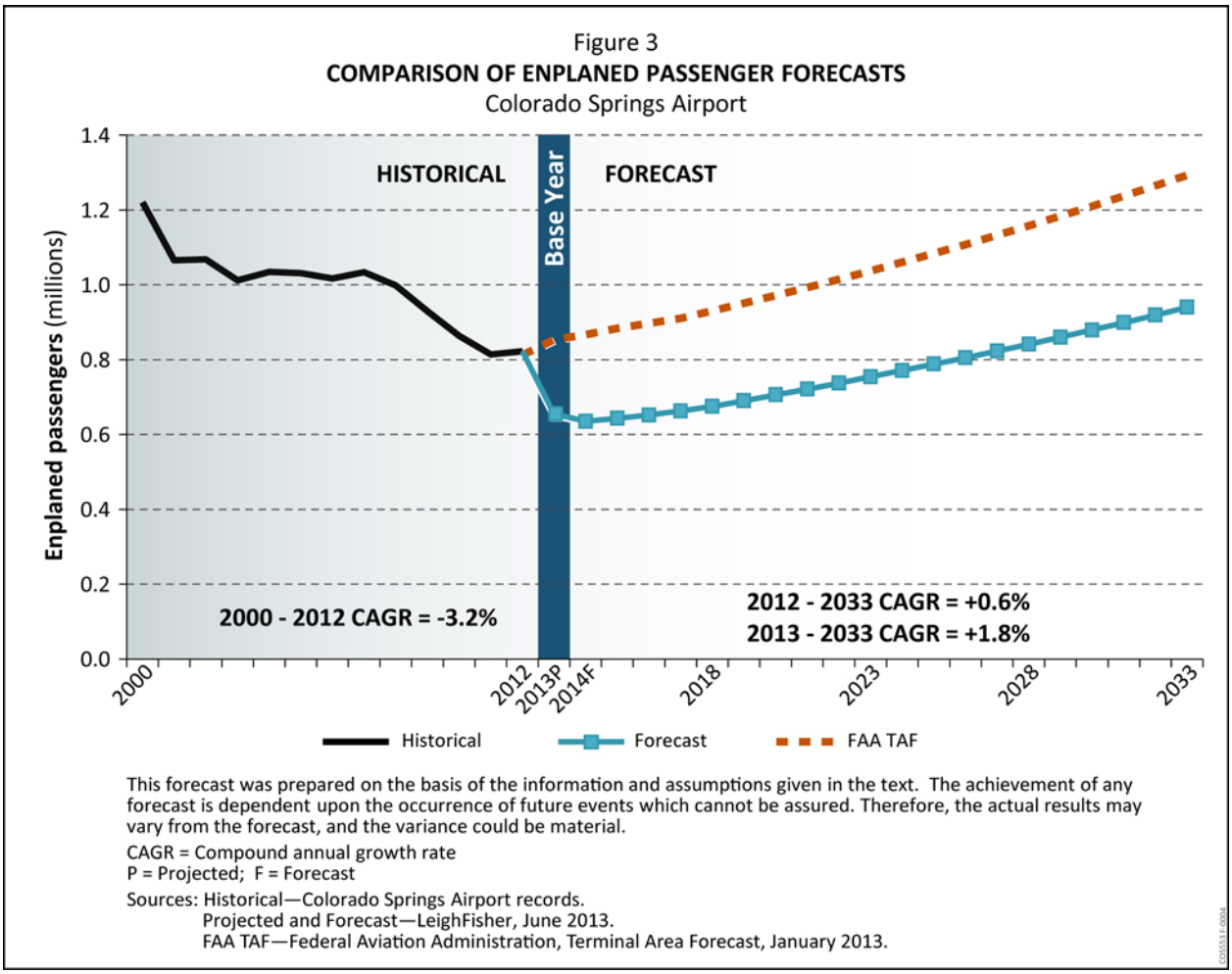
Enplaned Passengers

Figure 3 presents a chart showing annual enplaned passengers at the Airport—actuals for 2000 through 2012, a projection for 2013, and forecasts for 2014 through 2033, compared with the FAA 2013 TAF for the Airport. Notably, the enplaned passenger forecasts are substantially lower than the TAF in 2013 and all subsequent years. The primary reason is a projected 20% decline in enplanements in 2013 due largely to the termination of service in April by Frontier Airlines.[3]

The enplaned passenger average growth rate of 1.8% per year from 2013 to 2033 projects the Airport to grow from its 2013 estimate of approximately 655,000 enplaned passengers to 940,000 in 2033. For further information regarding the forecast, see Chapter 3 and Appendices B and C of the Technical Report.

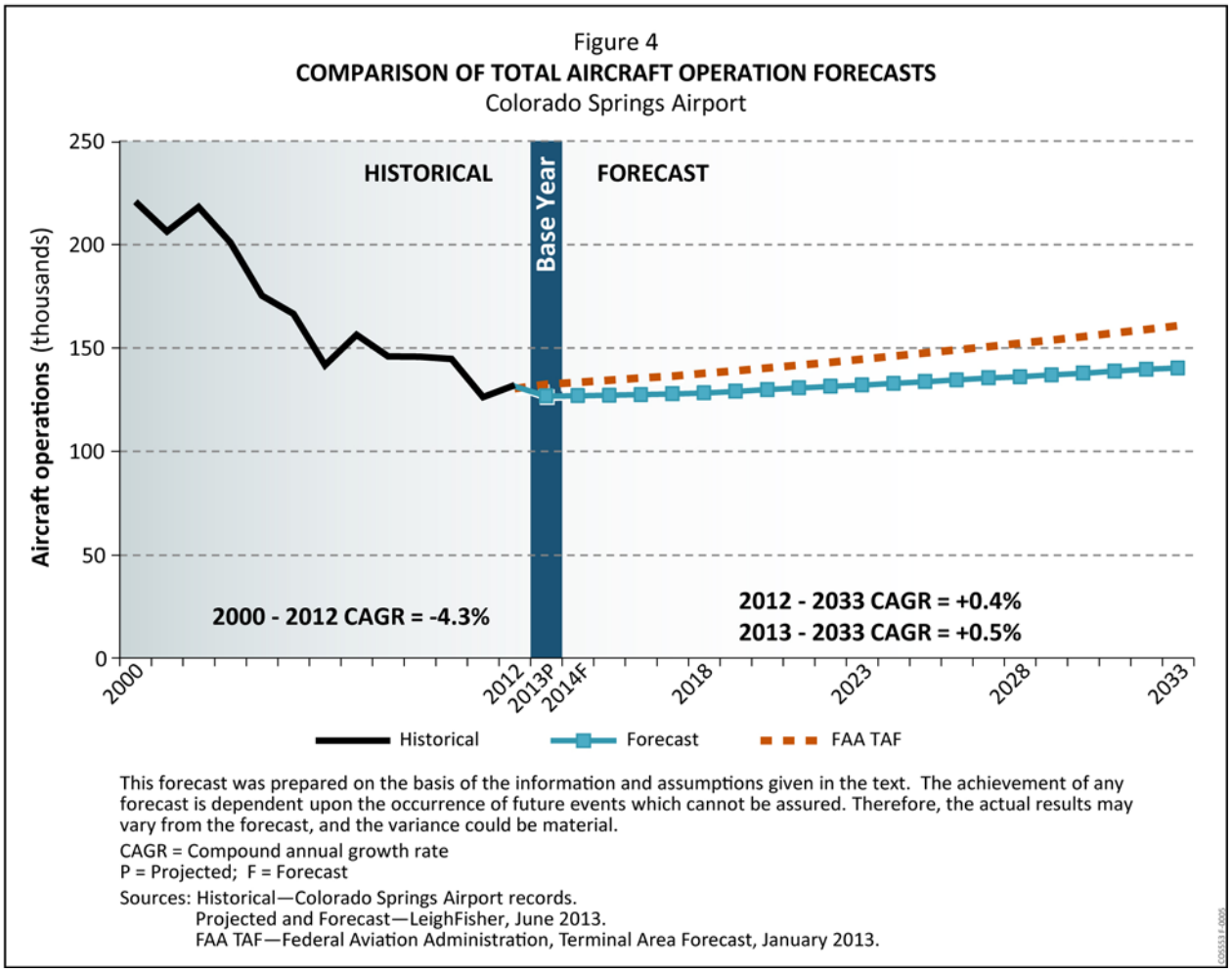
[2] Terminal Area Forecast (TAF): historical aviation activity data and FAA's forecasts for airports receiving FAA and contract tower services.

[3] This forecast update was prepared in advance of the Alaska Airlines annoucement of their intention to operate nonstop flights between Colorado Springs and Seattle beginning in November 2013. Accordingly, the estimate for 2013 does not include the increase that may be expected as a result of this new service offering.



Aircraft Operations

Figure 4 presents a chart showing historical total aircraft operations for 2000 through 2012, a projection for 2013, and forecasts for 2014 through 2033, compared with the FAA TAF for the Airport. The aircraft operations forecasts are somewhat lower than the TAF (e.g., -6.8% in 2018 and -8.7% in 2023). The forecast average growth rate in total aircraft operations of 0.5% per year between 2013 and 2033 projects the Airport to grow from its 2013 estimate of approximately 126,000 aircraft operations to 140,000 in 2033.



ALTERNATIVES IDENTIFICATION AND EVALUATION

The facility requirements analysis indicated that the airfield and passenger terminal provide sufficient capacity to accommodate the baseline forecast aircraft operations through the planning horizon. However, the major finding of the requirements analysis involved airfield geometrics, specifically the Runway 17R-35L intersection with Runway 13-31. Accordingly, the majority of the alternatives effort involved identification of a number of alternatives intended to:

- Reduce the risk of wrong runway departures;[4]
- Address airfield hot spots as identified on FAA Airport Diagram;[5]
- Reduce the number of runway crossings to the extent practical;

[4] Wrong runway departures occur when aircraft depart from a different runway than that assigned by FAA air traffic control.

[5] FAA produces official Airport Diagrems which depict major airport facilites for most airports in the U.S. available at http://www.faa.gov/airports/runway_safety/diagrams/

- Improve operational capability of the airfield;
- Improve taxiway geometry to prevent potential confusion.

Recommended Airfield Alternative

As a result of a thorough, comprehensive screening of several alternatives and consultation with the FAA, three "finalist alternatives" were fully defined and compared relative to one another. In the end, one of the three finalist alternatives was selected for inclusion in the Recommended Development Plan (RDP). For further information regarding the alternatives formulation and evaluation, see Chapter 5 of the Technical Report. A summary description of the RDP is provided beginning on page 8 of this document.

Passenger Terminal Facilities

Since most of the functions in the passenger terminal have excess capacity, the Master Plan did not consider expansion options for the passenger terminal. However, the passenger security screening checkpoint was identified as a more near-term need, which required additional space for security queue and passenger processing. Subsequent to those master plan findings, Airport management constructed an expansion of the security checkpoint area to address this future need by providing additional space as part of the construction of a new checked baggage system.

Ground Transportation Facilities

The evaluation of ground transportation facilities including parking, rental car, access roadways, and the terminal curbfront indicated that most facilities had excess capacity and could meet the needs through the planning horizon. The notable exception was public parking and rental car ready return parking toward the end of the planning horizon, associated with the original forecast. To meet the demand in the near-term, airport management can reinstitute a public parking overflow lot that is located immediately west of the Air Cargo Road and south of the employee parking lot. This space provides approximately 875 additional spaces, which would bring the Airport total available public parking spaces to about 5,510, which is sufficient to meet future demand. The Airport could also provide an additional 1,040 spaces to meet holiday demand at the greatest level of activity evaluated which corresponds to an additional 300,000 square feet of public parking. This space would best be provided by displacing the rental car service center areas to the south.

General Aviation, Air Cargo, and Airport Support Facilities

The requirements analyses indicated that additional space for general aviation should be provided at the Airport for corporate and community aircraft hangars and associated general aviation terminal space. Using past studies of the west side development area, optimal space was identified for additional general aviation facilities west of Taxiway A.

While the area dedicated to air cargo appears to be adequate through the planning horizon, air cargo demands can change quickly depending on the market and the airline; accordingly, additional space contiguous to the existing cargo area should also be set aside.

Finally, two airport support functions required additional space to be set aside. Specifically, a deicing pad was planned for the southeast quadrant of the intersection of Taxiways M and H. Additional space for Airport Maintenance activities is identified for west of the airfield vehicle service road and immediately north of Old Drennan Road.

RECOMMENDED DEVELOPMENT PLAN

With the individual projects associated with the airfield, general aviation, air cargo, and airport support functions identified, the Master Plan identified a comprehensive RDP. The primary goal of the RDP is the elimination of the intersection of Runway ends 17R and 13 and associated taxiway improvements on the west airfield. These projects are founded upon Airport management's intent to reduce the risk of wrong runway departures, while providing improved capability of Runway 17R-35L (west runway) the secondary runway to Runway 17L-35R (east runway). With the net increase in length for Runway 17R-35L departures and the provision of an enhanced instrument landing system (ILS) for Runway 35R, the Airport improves its operational capability.[6] Specifically, the ILS on Runway 35R allows the primary runway to serve aircraft operations during Category II weather conditions, and the increased departure length of Runway 17R-35L provides near equivalent capability to primary Runway 17L-35R. The individual components of the RDP are depicted on Figure 5, numbered 1-21 as described below.

1. **Shift the Runway 17R threshold to the south by 1,790 feet.** Runway 17R-35L is shown on Figure 5 shifted to the south by approximately 1,790 feet. This project provides separation from Runway 13-31, eliminating the runway intersection and reducing the risk of wrong runway departures. The project involves pavement removal, earthwork, and re-marking of the runway. This project would be completed in concert with projects 2 and 3.

2. **Extend Runway 35L to the south by 2,500 feet.** This project would involve extension of Runway 35L to the south approximately 2,500 feet. The net increase in departure length for Runway 17R-35L would be 710 feet. The net increase in arrival length for Runway 17R is 710 feet, and the net decrease for Runway 35L is

[6] Instrument landing system (ILS): a system of electronic devices whereby the pilot guides his aircraft to a runway by reference to instruments in the cockpit. In some instances the signals received from the ground can be fed into the automatic pilot for automatically controlled approaches. The ILS consists of a localizer, glideslope and marker beacons, and approach light system.

65 feet. The Runway 35L threshold is displaced by approximately 775 feet to provide a Runway Protection Zone (RPZ) clear of Milton E. Proby Parkway.[7,8] The project involves construction of proposed pavement, significant earthwork, re-marking of the runway, and relocation of the approach lighting system for Runway 35L arrivals. This project would be completed in concert with projects 1 and 3.

3. **Reduce length of Runway 13-31 by 400 feet.** Runway 13-31 would be shortened by approximately 400 feet. Shortening Runway 13-31, coupled with project 2, eliminates the runway intersection conflict and provides a clear Runway Safety Area (RSA).[9] The Runway 13 threshold would be displaced by approximately 510 feet to provide a standard 1,000 foot Runway Safety Area and clear RPZ. The net decrease in departure length of Runway 13-31 would be 400 feet. The net decrease in arrival length of Runway 13 is 910 feet, and the net decrease in arrival length of Runway 31 is 400 feet. This project would be completed in concert with projects 1 and 2.

4. **Remove existing high-speed exit Taxiway C1.** This project would be completed in concert with project 1. The high-speed exit would no longer be located in the proper placement for Runway 35L arrivals as it is too near the relocated end of the runway. Further, the geometry of the existing taxiway would conflict with the proposed perpendicular exits.

5. **Remove existing high-speed exit Taxiway C3.** The location of this high-speed exit would no longer be properly placed given the shift of the Runway 17R threshold to the south. Moreover, the geometry associated with Taxiway C3 conflicts with the geometry of Taxiway G in its current configuration.

6. **Construct proposed high-speed exit Taxiway C4.** This project provides a proposed high-speed exit for Runway 35L arrivals. The location of this high-speed exit taxiway accounts for the shift of the Runway 35L threshold with the runway extension to the south.

7. **Remove existing exit Taxiways A6, C6, C7.** These taxiways currently serve the existing end of Runway 35L. With the extension to Runway 35L, these taxiways

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[7] Runway protection zone: an area at ground level prior to the threshold or beyond the runway end to enhance the safety and protection of people and property on the ground.

[8] Threshold: the beginning of that portion of the runway available for landing; a displaced threshold is located at a point on the runway beyond the beginning of the runway.

[9] Runway safety area: a defined surface surrounding the runway prepared or suitable for reducing the risk of damage to aircraft in the event of an undershoot, overshoot, or excursion from the runway.

are no longer required but may remain in place. However, these exits must be removed to enable the construction of a proposed high-speed exit Taxiway C6 to serve Runway 17R arrivals. This project would be completed in concert with project 8.

8. **Construct proposed high-speed exit Taxiway C6.** This project provides a proposed high-speed exit for Runway 17R arrivals. The location of this high-speed exit accounts for the change in location of the Runway 17R threshold to the south. This project would be completed in concert with project 7.

9. **Remove and realign Taxiway A.** The realignment of Taxiway A would provide a parallel taxiway for Airplane Design Group (ADG) IV aircraft, with a centerline to centerline separation from Runway 17R-35L of 500 feet.

10. **Realign Taxiway B.** Taxiway B currently intersects Taxiways E, E4, and G creating the potential for pilot confusion. Taxiway B would be realigned to intersect Taxiway E at a 90 degree angle, eliminating potential confusion and providing improved functionality.

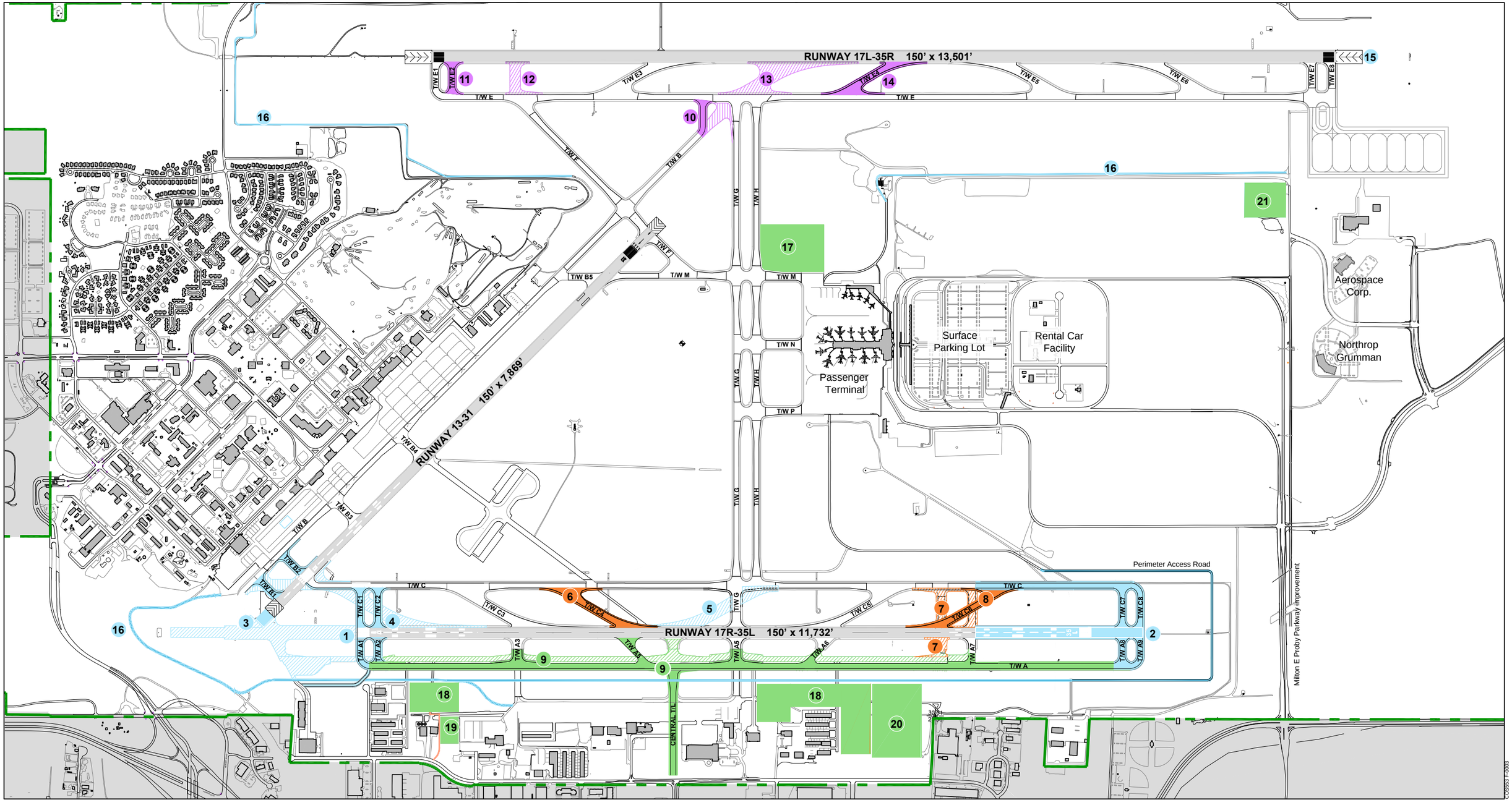
11. **Construct proposed bypass Taxiway E2.** This proposed taxiway would provide a bypass taxiway to serve aircraft needing to exit the Runway 17L end.

12. **Remove existing Taxiway E2.** Taxiway E2 would be better located nearer the end of Runway 17L. This project would be completed in concert with project 12.

13. **Remove existing high-speed exit Taxiway E4.** The geometry at the intersection of Taxiway E, E4, G, and H is complex, potentially causing pilot confusion. This taxiway would be replaced in a location approximately 1,400 feet south to reduce the potential for pilot confusion.

14. **Construct proposed high-speed exit Taxiway E4.** This project provides a proposed high-speed exit for Runway 35R arrivals. The location of this high-speed exit accounts for the removal of existing Taxiway E4. This project would be completed in concert with project 13.

15. **Provide Runway 35R with an improved Instrument Landing System.** The approach to Runway 35R would be enhanced by the addition of a High Intensity Approach Lighting System with Sequenced Flashing Lights (ALSF-2). The ALSF-2 would provide Category II capability for arrivals in inclement weather conditions.



LEGEND

- PHASE 1 (Projects 1-5, 15, 16)
- PHASE 2 (Projects 6-8)
- PHASE 3 (Projects 10-14)
- PHASE 4 (Project 9, 17-21)

Source: Airport Layout Drawing - Jacobs Engineering, June 2013

Recommended Projects

1. Runway 17R: shorten 1,790' and construct new taxiways
2. Runway 35L: extend 2,500' and construct new taxiways
3. Runway 13: shorten 400' and construct new taxiways
4. Remove existing Taxiway C1
5. Remove existing Taxiway C3
6. Construct new Taxiway C4
7. Remove existing Taxiways C6, C7, and A6
8. Construct new Taxiway C6
9. Remove existing Taxiway A; realign Taxiway A to 500' from Runway 17R-35L; construct central taxilane
10. Realign Taxiway B segment
11. Construct new Taxiway E2
12. Remove existing Taxiway E2
13. Remove existing Taxiway E4
14. Construct new Taxiway E4
15. Construct new instrument approach lighting system (ALSF-II)
16. Pave vehicle service roads
17. Construct deicing pad area
18. General aviation expansion areas
19. Air cargo expansion area
20. MRO expansion area
21. SRE facility

NORTH

0 700' 1400' 2800'

Figure 5
RECOMMENDED DEVELOPMENT PLAN
Master Plan Update
Colorado Springs Airport
July 2013

LeighFisher

16. **Pave perimeter vehicle service roads.** The perimeter vehicle service roads require realignment around the ends of Runway 17R-35L. In addition, the perimeter road is not paved in its entirety. The FAA Runway Safety Action Team has expressed the need for the perimeter road to be paved to reduce the number of vehicles using taxiways and runways to move about the Airport.

17. **Construct deicing pad.** This project would provide additional space for deicing aircraft nearer their point of departure, primary Runway 17L-35R.

18. **General aviation expansion areas.** These parcels of land were identified in the master planning process as being ideal for general aviation expansion as the need arises.

19. **Air cargo expansion area.** This parcel of land was identified in the master planning process as being ideal for air cargo expansion as the need arises. The project would likely involve expansion of the existing cargo apron, currently in use by FedEx, to the north, allowing for one additional aircraft parking position.

20. **Maintenance, repair, and overhaul (MRO) expansion area.** This parcel of land was identified in the master planning process as being ideal for MRO expansion should the need arise. The parcel of land provides good access to the airfield, is consistent with the surrounding land use on the west side of Taxiway A, and has good landside access as well.

21. **Snow removal equipment (SRE) facility.** This parcel of land was identified in the master planning process as being ideal for an SRE storage facility. The goal of constructing additional SRE storage is to achieve increased efficiency for snow removal operations that occur on the east side of the Airport.

Cost Estimates and Phasing

Project cost estimates for the RDP are summarized in Table 2. In total, the plan is estimated to cost approximately $114.5 million. Phases 1 and 2, which total $80.6 million include all of the west airfield improvements excluding the realignment of Taxiway A. Table 2 and Figure 5 also indicate in which of the four phases each individual project component is included.

Phase 1, including projects 1-4, involves the improvements necessary to decouple the intersection of Runway ends 17R and 13. Each of these projects is located on the west side of the airfield. Phase 1 also includes projects 15 and 16 which are of immediate interest to Airport management and may be implemented independently of projects 1-4. These projects have independent utility; in the case of project 15 the Airport would improve its capability to accommodate landings during Category II weather conditions. In the case of

project 16, the Airport would reduce runway crossings by maintenance and operations vehicles by providing paved service roads that reduce the need to traverse taxiways and runways.

Phase 2, including projects 6 through 8, could be completed in concert with Phase 1; however, they are not necessary to implement the runway decoupling. This phasing scheme allows airport management the flexibility to decrease the upfront cost of implementation should it be prudent to do so.

Phase 3 includes projects 10 through 14 and is primarily focused on improvements to the east side of the airfield. These projects could be completed in concert with major maintenance to Runway 17L-35R or its parallel Taxiway E.

Phase 4, including projects 17-21, would be implemented by the Airport on an opportunistic basis and as the need arises. It may be prudent to implement one of these projects ahead of the other phases, depending on the need and availability of funding. Further, these projects need not be completed and would not likely be completed as part of a package. Each project has independent utility, and their implementation schedule should be revisited on an annual basis by Airport management as part of the routine review of the RDP. Phase 4 also includes project 9, which involves the realignment and reconstruction of parallel Taxiway A. This project would likely be undertaken when Taxiway A pavement would be scheduled for reconstruction.

Anticipated Funding Sources

A combination of traditional airport funding sources and financing mechanisms including federal Airport Improvement Program (AIP) grants, airport revenue bonds, passenger facility charges, state grants, and cash generated from Airport operations could be used to fund the RDP. The majority of funding would likely come in the form of AIP discretionary grants, which are awarded to airports on the basis of priority and available funding.

Future development at the Airport shall continue to be self-funded by users of the airport and aviation system; no local sales or property taxes will be used to fund Airport capital improvements.

Capital Improvement Program

The Airport has an ongoing capital improvement program (CIP) which assigns projects to a given year, currently looking out nine years to 2021. While the majority of the implementation of the RDP is anticipated to be beyond the next five years, the Airport is planning to undertake a number of projects to enable the implementation of the master plan recommendations, beginning in 2018. Projects in the CIP related to implementation of the RDP include:

- Environmental Assessment for master plan projects 1-5, scheduled for 2018;
- Design for projects 1-5, scheduled for 2019;
- Construction for projects 1-5, scheduled for 2020 and 2021.

Notably, the CIP for the first five years is the most well-defined. Beyond five years, the CIP includes order of magnitude cost estimates and is subject to continual refinement of priorities and schedule. The CIP for years 2019-2021 will be the subject of continual refinement as the Airport consults with the FAA and plans for the implementation of the RDP. For further information regarding the CIP, see Chapter 6 of the Technical Report.

ENVIRONMENTAL REVIEW

Based on implementation FAA guidelines, it is likely that the key projects in the RDP, needed to reconfigure the airfield to meet safety and functional requirements, would require an Environmental Assessment, although the appropriate level of environmental review would ultimately be subject to FAA oversight. Specifically, a runway extension, as envisioned in the RDP, normally requires an Environmental Assessment according to Section 702 of FAA Order 5050.4B. Less intrusive projects with independent utility, such as paving a vehicle service road, could likely be accomplished through preparation of a Categorical Exclusion.

The context and minimal intensity of any potential environmental impacts associated with the recommended airfield improvements appears unlikely to trigger the requirement for an Environmental Impact Statement (EIS), based on Section 501 of FAA Order 1050.1E, which details Actions Requiring Environmental Impact Statements. In evaluating the need for an EIS, "context" refers to the setting and effects on the local area, while "intensity" measures the severity of potential impacts.

Table 2
RECOMMENDED DEVELOPMENT PLAN COST ESTIMATES
Colorado Springs Airport

Project no. *(a)*	Description	Cost *(b)*
PHASE 1		
1	Shift Runway 17R-35L 1,790 feet south; construct Taxiways A1, A2, C1, and C2	$ 8.5
2	Construct 2,500 foot extension to Runway 35L; construct Taxiways A8, A9, C7, and C8	43.8
3	Shorten Runway 13-31 by 400 feet; construct Taxiways B1 and B2; displace Runway 13 threshold	3.6
4	Remove existing high-speed exit Taxiway C1	0.8
5	Remove existing Taxiway C3	1.1
15	Construct approach lighting system (ALSF-II) for Runway 35R arrivals	3.3
16	Pave vehicle service roads around Runway 17R-35L; from PAFB to A/DACG facility; from A/DACG to fuel farm.	6.1
	Subtotal	**$67.2**
PHASE 2		
6	Construct proposed high-speed exit Taxiway C4	$6.7
7	Remove existing Taxiways A6, C6, and C7	0.6
8	Construct proposed high-speed exit Taxiway C6	6.1
	Subtotal	**$13.4**
PHASE 3		
10	Realign Taxiway B at intersection with Taxiway E	$2.3
11	Construct Taxiway E2	2.2
12	Remove existing Taxiway E2	0.8
13	Remove existing Taxiway E4	2.2
14	Construct proposed high-speed exit Taxiway E4	5.1
	Subtotal	**$12.6**
PHASE 4 *(c)*		
9	Realign Taxiway A to provide 500 foot separation from Runway 17R-35L	$21.3
	Subtotal	**$21.3**
GRAND TOTAL	Total for Phases 1 through 4 (excluding projects 17-21)	**$114.5**

(a) Corresponds to numbering Figure 5, Recommended Development Plan.
(b) Cost in millions of dollars.
(c) Projects 17-21 were not included as the cost would be dependent upon the scope of the development which is unknown at this time.

Source: Cost estimates provided by Jacobs Engineering, July 2013.

Chapter 1
INTRODUCTION AND BACKGROUND
Colorado Springs Airport

INTRODUCTION

This chapter summarizes the guiding principles, and goals and objectives for the Colorado Springs Airport Master Plan.

Guiding Principles

Guiding principles provide the foundation of the planning effort by providing the roadmap for a successful project. If the planning effort adheres to the guiding principles set forth at the outset, the project will have a high likelihood of yielding successful results. In addition, the guiding principles provide interested parties a high-level explanation of the purpose for the master planning process. The following are the guiding principles for the Colorado Springs Airport master planning process.

- The recommended development plan should give priority to safety and security, followed by financial feasibility, operational efficiency, environmental prudence, and social responsibility; the plan should be beneficial to all users of the Airport, and the positive customer experience must be maintained or enhanced.

- Airport development plans should preserve flexibility to permit changes to the plan as industry and local conditions warrant.

- The planning effort will seek to foster consensus among key stakeholders, including Airport users, the FAA, the Airport Advisory Commission, and the Airport staff.

- The master planning process will employ a focused public involvement program to inform interested parties as to the Airport's positive community impacts as well as future plans.

- Future development at the Airport shall continue to be self-funded by users of the airport and aviation system; no local sales or property taxes will be used to fund Airport capital improvements.

- The master planning process shall emphasize cost effective solutions and shall consider the total cost of implementation when evaluating alternatives.

- Planning for future facilities will consider the role of emerging technologies and industry trends that could affect the requirements for future facilities.

- The master planning process shall incorporate Business park plans and identify potential synergies between its future development and the development of the rest of the Airport.

Goals and Objectives

Goals and objectives build upon the foundation set by the guiding principles. The goals and objectives are used to evaluate whether or not a planning concept is viable as the recommended development plan. Accordingly, the alternatives screening criteria will be developed based on these goals and objectives. Airport management identified goals for the airfield, passenger terminal, land use and access, sustainability, and social responsibility. Each of the goals has an accompanying list of objectives. Alternatives will be judged relative to one another with regard to their performance in meeting or exceeding the objectives set forth below.

Airfield – plan for a safe, operationally efficient airfield that meets FAA standards.

a) Eliminate existing modifications to standards as soon as feasibly practical and do not create conditions warranting additional modifications or waivers from the FAA;
b) Ensure that planning concepts support the Airport's ability to maintain airfield pavement conditions in a cost-effective manner;
c) Consider the use of emerging technologies within the planning period to enhance the overall efficiency of the airfield complex;
d) Coordinate with pilots and local air traffic control to identify any airfield issues of concern and address those that can be done so in a practical manner.

Passenger terminal – provide plans that will help maintain a positive customer service experience throughout the entire terminal complex, from the entrance road and parking lots to the aircraft gate.

a) Maintain or improve the existing level of service throughout the planning horizon for the entrance roadway, parking lots, terminal curbside, ticketing lobby, security checkpoints and screening processes, departure holdrooms, baggage claim lobby, and rental car facilities;
b) Provide a balanced suite of airport concessions that delight our passengers and generate revenue for the Airport;
c) Ensure that the capital investment strategy for the passenger terminal provides sufficient flexibility to enable the Airport to adapt to industry changes.
d) Provide ideas and concepts for the creative re-use of terminal building components that may become obsolete or redundant due to industry or technological changes throughout the planning period.

Land use and access – provide a plan to enhance Airport access and encourage compatible land use surrounding the Airport.

a) Ensure that appropriate property is reserved for development/expansion of airport functional elements, including general aviation, air cargo, and aircraft maintenance;
b) Promote consistency with Peterson Air Force Base mission expansion plans;
c) Fully integrate Airport and Cresterra Business Park plans to ensure compatibility and optimization of shared infrastructure;
d) Provide the information necessary to assist the Airport, FAA, and military in protecting the airspace and promoting compatible land use surrounding the Airport and Peterson Air Force Base;
e) Participate in cooperative regional transportation planning to improve access to the Airport, including but not limited to access to/from Interstate 25.

Sustainability – provide a plan that is fiscally and environmentally sustainable.

a) Ensure the development plan is fiscally responsible from both the capital and operational cost perspectives;
b) Wherever prudent, make use of existing facilities through renewal or modernization to meet future demand;
c) Wherever possible, provide plans that will diversify airport revenues and strengthen the financial position of the Airport;
d) Seek to improve the Airport's competitive position in the region by reducing airline rates and charges;
e) Seek to minimize adverse environmental impacts of future development while reducing the impact of existing facilities;
f) Seek to identify opportunities for the siting and feasible application of renewable energy sources;
g) Produce new mapping of the Airport to ensure that all analysis is based on the most up-to-date, accurate information available.

Social responsibility – provide a plan that meets the aviation needs of the region in a socially responsible manner.

a) Seek input and when practical address the concerns of stakeholders and users of the airport, all the while enhancing existing relationships with stakeholders and the wider community;
b) Provide a plan that is responsive to the needs of the community while preserving flexibility to make changes when conditions warrant;
c) Ensure that the Airport's positive impacts on the community are communicated;
d) Ensure that the needs of the military and business community are addressed in future plans.

Chapter 2
EXISTING CONDITIONS
Colorado Springs Airport

INTRODUCTION

This chapter summarizes the facility, land use, infrastructure, and environmental data that were considered in the development of Colorado Springs Airport (Airport) development alternatives. The data are based on site visits, interviews, surveys, airport records, and third party sources, including the following:

- *Airport Layout Plan* (ALP), March 2008
- *Airport Master Plan Update*, Barnard Dunkelberg, November 1998
- *Jeppesen Charts,* November 2010
- *Pavement Management Investigation and Field Investigation,* Carter and Burgess, December 2006
- Miscellaneous drawings for the passenger terminal facilities, provided from airport records and The Van Sant Group
- Aerial ortho-photography and planimetric data from The Sanborn Map Company, November 2010.

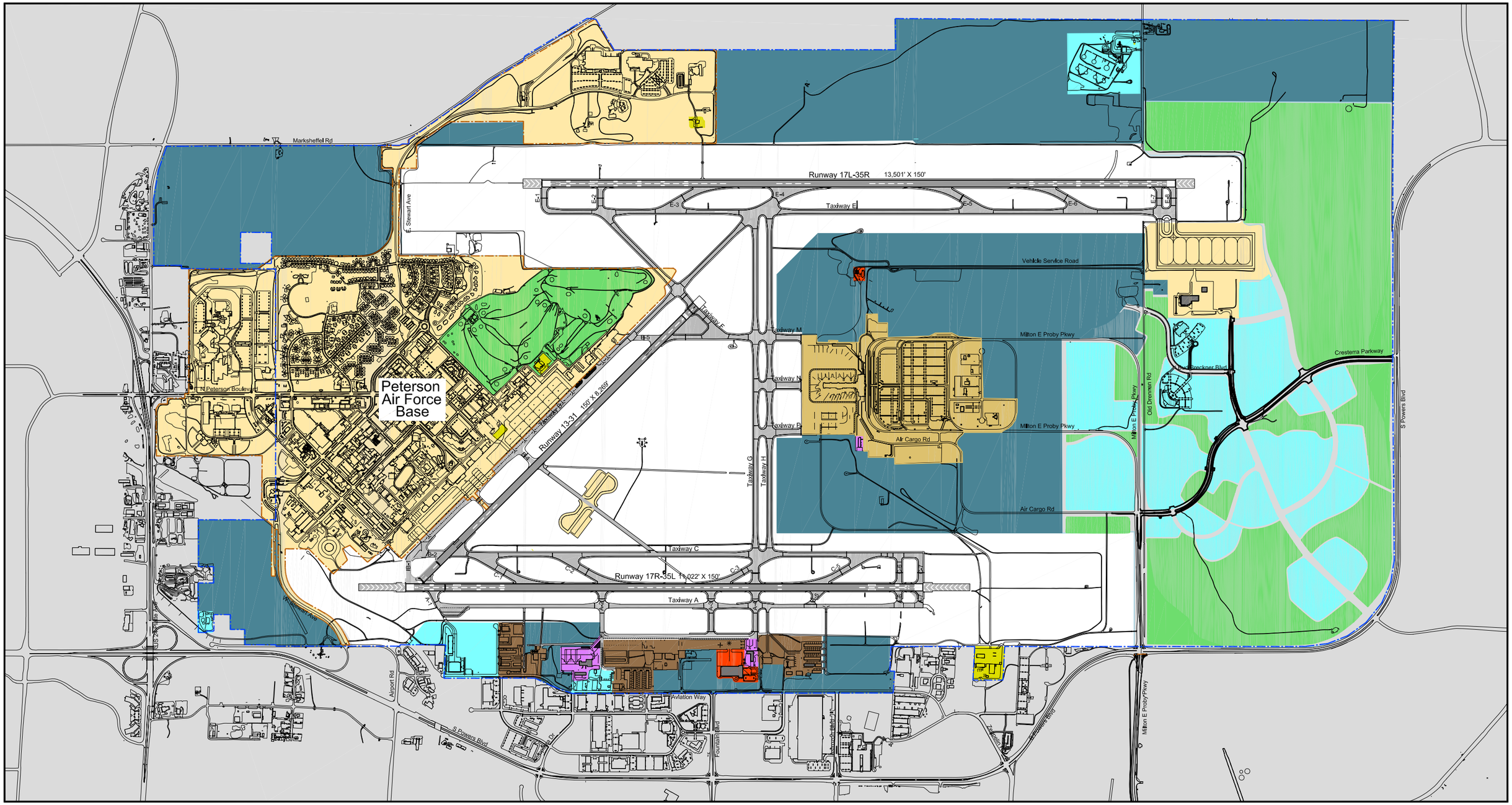
The information throughout this chapter is current as of March 2012, except where noted otherwise.

FACILITIES OVERVIEW AND AIRPORT LAND USE

The Airport consists of the airfield and the following other primary facilities: passenger terminal with two concourses accommodating 19 aircraft gates, ground transportation facilities, surface parking lots, rental car facilities, air cargo ramp, fixed base operator facilities, aircraft maintenance facilities, fuel farms, and Federal Aviation Administration facilities. The airfield occupies approximately 30% of the Airport land area, with three runways, Runway 17L-35R, Runway 17R-35L, and Runway 13-31, associated taxiways, safety areas, and runway protection zones.[1]

The Airport occupies approximately 7,253 acres. The passenger terminal complex and terminal support facilities are located in the center of the Airport campus; general aviation, cargo, aircraft maintenance, and airline support facilities are located primarily in the West Aviation Development Area, west of Runway 17R-35L. Existing land use is depicted on Figure 2-1. The uses and acreage of Airport land by functional designation are presented in Table 2-1.

[1] The magentic declination of Runway 13-31 recently changed from 12-30, and the runway was recently redesignated as such.



LEGEND

- Airport property boundary
- Peterson Air Force Base boundary
- Airfield
- Airfield pavement
- Passenger terminal complex
- General aviation
- Air cargo
- Airport support
- Airline support
- Military
- Commercial use
- Open space
- Strategic reserve
- Non-airport property

NORTH

0 1,000' 2,000' 4,000'

Figure 2-1
BASELINE AIRPORT LAND USE

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Colorado Springs Airport
July 2013

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Management Consultants

Table 2-1
LAND USE AND ACREAGE
Colorado Springs Airport

Land use	Area (acres)
Airfield	2,202
Passenger terminal complex	220
General aviation	82
Airport support	10
Air cargo	16
Airline support	12
Military	1,399
Commercial use	552
Strategic reserve	1,873
Open space (e.g. golf course)	887
Total	7,253

Note: all area totals are approximate.
Source: Exhibit A from Airport Layout Plan set, August 2013.

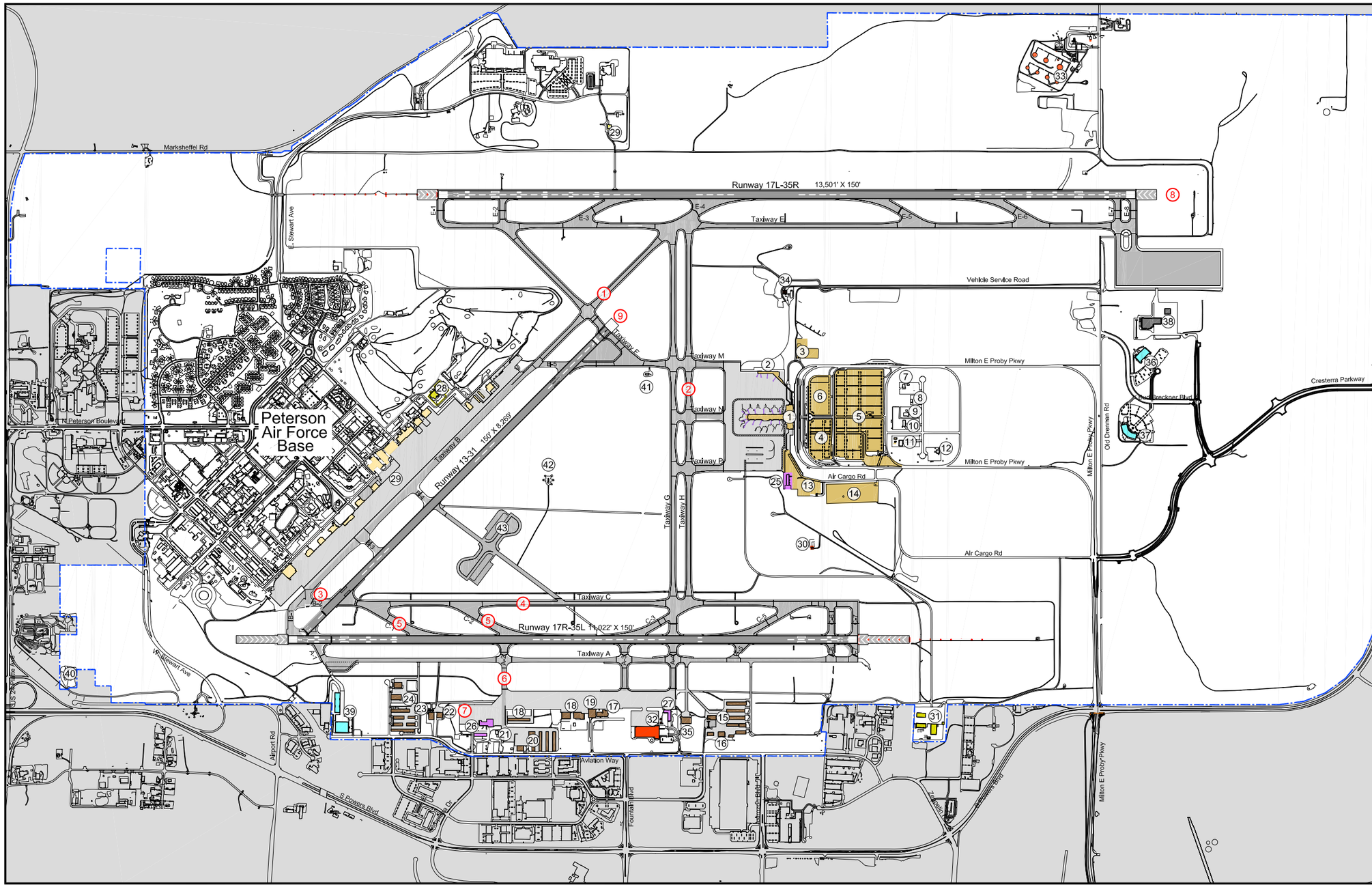
AIRFIELD

The existing airfield consists of runways, taxiways, apron areas, and navigational aids, as discussed below.

Runways

As illustrated on Figure 2-2, the airport has three runways: two parallel runways, 13,501-foot-long Runway 17L-35R and 11,022-foot-long Runway 17R-35L and the crosswind runway, 8,269-foot-long Runway 13-31. The characteristics of the Airport's runways, including their dimensions, pavement strength, end elevations, and gradient are summarized in Table 2-2.

The FAA uses a two-part code to designate the design criteria that apply to runways. This two-part code, termed the Airport Reference Code (ARC), describes two key aircraft characteristics—approach speed and wingspan—that govern the required dimensions of runways and their design surfaces. The first part of the ARC indicates the maximum approach speed of the aircraft that the runway can accommodate. The second part of an ARC—indicated with a Roman numeral ranging from I to VI—is termed the Airplane Design Group (ADG) and indicates the maximum aircraft wingspan a runway can accommodate. As explained below, the ADG is also used to determine taxiway dimensional standards and associated design surface dimensions. Table 2-3 summarizes the ARC and design standards for each runway.



FACILITY INDEX

1. Passenger terminal
2. East unit terminal
3. Valet parking lot
4. Short term parking lot
5. Long term parking lot
6. Rental car ready/ return lot
7. Advantage rental car service center
8. Enterprise rental car service center
9. Alamo rental car service center
10. Avis rental car service center
11. Hertz rental car service center
12. Budget rental car service center
13. Employee parking lot
14. Overflow parking lot
15. J.H.W. Investment Company
16. A-Cent Aviation hangar and office
17. Former passenger terminal building
18. Colorado jetCenter hangars
19. Western Pacific maintenance hangar
20. Cutter Aviation
21. Colorado Division of Wildlife hangar
22. Corporate hangar
23. Colorado Springs Police hangar
24. Colorado Springs Owners Association
25. Belly cargo building
26. FedEx cargo facility
27. Cargo building (available)
28. Airport Trafiic Control Tower (ATCT)
29. Aircraft Rescue and Fire Fighting (2)
30. Glycol pretreatment facility
31. Airport maintenance facilitity
32. Skywest maintenance facility
33. Diamond Shamrock fuel farm
34. Airline fuel farm
35. Maintenance hangar
36. Aerospace Corp.
37. Northrop Grumman
38. A/DACG facility
39. National Museum of World War II Aviation
40. Colorado Springs Utilities stockpile
41. Airfield electrical vault
42. Radio transimtter site
43. Infield military operating surface

LEGEND

- Airport property boundary
- Airfield pavement
- Passenger terminal complex
- General aviation
- Air cargo
- Airport support
- Airline support
- Military
- Commercial use
- Non airport property

1998 MASTER PLAN PROPOSED PROJECTS THAT HAVE BEEN IMPLEMENTED

1. Extension of Taxiway B from the military ramp to Taxiway E-4.
2. Connection of the east and west portions of Taxiway H from Taxiway M to Taxiway P.
3. Construction of Taxiway B-3.
4. Extension of Taxiway C from Taxiway G to Runway 12-30.
5. Construction of high speed exits C-1 and C-2.
6. Construction of a new taxiway from Runway 17R-35L to the north portion of the GA area
7. Extension of the apron north of the FedEx cargo facility.
8. Provision of Category I instrument approach capabilities to Runway 35R.
9. Provision of non-precision instrument approach capabilities to Runway 30.

NORTH

0 1,000' 2,000' 4,000'

Figure 2-2
BASELINE AIRPORT FACILITIES

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Table 2-2
EXISTING RUNWAY CHARACTERISTICS
Colorado Springs Airport

	17L-35R		17R-35L		13-31	
Runway pavement length (ft)	13,501		11,022		8,269	
Runway pavement width (ft)	150		150		150	
Pavement strength (lbs)						
S	75,000		75,000		75,000	
D	175,000		175,000		175,000	
2D	400,000		340,000		280,000	
2D/D1	-		443,000		-	
2D/2D2	850,000		-		550,000	
Pavement type/friction	Concrete, grooved		Asphalt, grooved		Asphalt, grooved	
	17L	35R	17R	35L	13	31
Runway end elevation (feet above MSL)	6,187.12	6,102.87	6,176.56	6,045.20	6,173.22	6,137.21
Effective gradient	-0.62%	0.62%	-1.2%	1.2%	-0.4%	0.4%

Gear designations per FAA Order 5300.7:
S = single wheel main gear;
D = dual wheel main gear;
2D = two dual wheels in tandem main gear with dual wheels nose gear;
2D/D1 = two dual wheels in tandem main gear/dual wheel body gear with dual wheel nose gear;
2D/2D2 = two dual wheels in tandem main gear/two dual wheels in tandem body gear with dual wheel nose gear.

MSL = Mean sea level

Source: Sanborn survey, April 2011; airport records, 2010.

Runway 17L-35R is the Airport's primary runway; it is utilized by air carrier, military, air cargo and general aviation aircraft. The runway is constructed of Portland cement concrete and is equipped with an instrument landing system (ILS) on both ends, which enables the runway to serve arriving aircraft in inclement weather conditions. The secondary runway is Runway 17R-35L, which is also utilized by air carrier, military, air cargo and general aviation aircraft.
Runway 17R-35L is constructed of asphaltic concrete and is equipped with an ILS for Runway 35L. The crosswind runway is Runway 13-31, which serves all aircraft at the Airport. The Runway 31 threshold is displaced 356 feet. The runway is constructed of asphaltic concrete.

Table 2-3
RUNWAY DESIGN STANDARDS
Colorado Springs Airport

		FAA Standard	Runways					
			17L-35R		17R-35L		13-31	
			17L	35R	17R	35L	13	31
	Airport reference code	C-IV	C-IV	C-IV	C-IV	C-IV	C-IV	C-IV
Physical characteristics	Runway width (feet)	150	150	150	150	150	150	150
	Runway shoulder width (feet)	25	25	25	25	25	Turf	Turf
	Runway blast pad width (feet)	200	200	200	200	200	n.a.*(a)*	200
	Runway blast pad length (feet)	200	400	400	200*(b)*	200*(b)*	n.a.*(a)*	200
	Runway centerline to parallel taxiway centerline distance (feet)	400	600	600	400W/ 700E	400W/ 700E	550	550
Obstacle free areas	Runway safety area (RSA) width (feet)	500	500	500	500	500	500	500
	RSA length beyond runway end (feet)	1,000	1,000	1,000	1,000	1,000	1,000	1,000
	Runway object free area (OFA) width (feet)	800	800	800	800	800	800	800
	Runway OFA length beyond runway end (feet)	1,000	1,000	1,000	1,000	1,000	1,000	1,000
	Runway protection zone (RPZ)*(c)*							
	Length (ft)	-	2,500	1,700	1,700	2,500	1,700	1,700
	Inner width (ft)	-	1,000	1,000	500	1,000	500	500
	Outer width (ft)	-	1,750	1,510	1,010	1,750	1,010	1,010

Notes: Airport Reference Code C-IV standard is a combination of approach category C with a maximum approach speed of 140 knots and Airplane Design Group IV with a wingspan of less than 170 feet.

(a) The end of Runway 17R is located just off the end of Runway 13, which prevents provision of a blast pad for Runway 13.

(b) The overall blast pad length for Runway 17R-35L is 1,000 feet, with a width of 200 feet for the first 200 feet and a width of 150 feet for the remaining 800 feet.

(c) The RPZ dimensions for approach minimums for visual approaches or visibility not lower than 1 mile are: 1,700′ length x 500′ inner width x 1,010′ outer width. The RPZ dimensions for approach minimums for visibility not lower than 0.75 mile are: 1,700′ length x 1,000′ inner width x 1,510′ outer width. The RPZ dimensions for approach minimums for visibility lower than 0.75 mile are: 2,500′ length x 1,000′ inner width x 1,750′ outer width.

Sources: Federal Aviation Administration Advisory Circular 150/5300 – 13A, *Airport Design*, September 28, 2012 and Airport Layout Plan, Colorado Springs Airport, March 2008.

The *1998 Airport Master Plan* proposed that Runway 17R-35L be extended from its current length of 11,022 feet to 12,801 feet, and Runway 13-31 be shortened from its existing length of 8,269 feet to 7,973 feet. These recommendations have not yet been implemented and are revisited in this Master Plan.

Taxiways

Figure 2-2 shows the locations of the taxiways that connect the runways, aircraft parking and hangar areas of the airport. All taxiways are at least 75 feet wide, satisfying the dimensional requirement for accommodating ADG IV aircraft.

Taxiway Alpha (A) and its connectors, A-1 through A-7, provide the parallel taxiway system on the west side of the Runway 17R-35L and connect it with the apron area on the west side of the airport, including the former passenger terminal facilities (the Fountain Terminal), the general aviation areas, and the cargo areas. Taxiway Bravo (B) and its connectors, B-1 through B-6, form the parallel taxiway system on the northeast side of Runway 13-31 and connect the crosswind runway with the military apron area. Taxiway Echo (E) and its connectors, E-1 through E-8 provide the parallel taxiway system on the west side of Runway 17L/35R and connect it with other taxiways that lead to Runway 13-31 and the main passenger terminal complex.

Other major taxiways on the airport include Taxiway Golf (G), which is a mid-field east/west taxiway connecting Taxiway E and Runway 17R-35L with the passenger terminal apron area; Taxiway Hotel (H) which is parallel with Taxiway G and connects Taxiway E with the terminal apron area; Taxiways November (N), Mike (M) and Papa (P), which connect the passenger terminal apron with Taxiways G and H; Taxiway Delta (D), which connects the approximate mid-point of Runway 17R-35L with the approximate mid-point of Runway 13-31; Taxiway Charlie (C), which is a partial parallel taxiway on the east side of Runway 17R-35L; and Taxiway Foxtrot (F), which is a diagonal taxiway connecting Taxiway M with Taxiway E.

The *1998 Airport Master Plan* proposed various improvements to the then existing taxiway network, some of which have been implemented. The improvements implemented are listed as items 1 through 6 on Figure 2-2 including:

- Extension of Taxiway B from the military ramp to Taxiway E-4 (1)
- Connection of the east and west portions of Taxiway H (2)
- Construction of Taxiway B-3 (3)
- Extension of Taxiway C to Runway 13-31 (4)
- Construction of high speed exits C-1 and C-2 (5)
- Construction of a new taxiway from Runway 17R-35L to the north portion of the general aviation area (6)

The other improvements proposed in the *1998 Airport Master Plan* include:

- Construction of a full length parallel taxiway to the west of Taxiway E
- Construction of a partial length parallel taxiway to the east of Runway 17L-35R
- Construction of a partial length parallel taxiway to the southwest of Runway 13-31
- Construction of a partial length parallel taxiway east of Taxiway C and other perpendicular taxiways

These recommendations have not yet been implemented and are revisited in this Master Plan.

Apron Areas

The primary aircraft aprons at the Airport include the passenger terminal apron, the general aviation/cargo apron west of Taxiway A, and the military apron north of Taxiway B. The*1998 Airport Master Plan* proposed widening the existing passenger terminal apron and the general aviation/cargo apron. These improvements have not yet been implemented. It was also proposed that the cargo apron for the FedEx facility be expanded to the north. As shown on Figure 2-2, this apron expansion has been constructed.

Navigational Aids

Navigational aids assist pilots by providing horizontal and/or vertical guidance to an aircraft's instrumentation during navigation and facilitate flight procedures during poor weather or low visibility conditions. A summary of navigational aids for which each runway is equipped is provided in Table 2-4.

As previously mentioned, Runways 17L, 35R and 35L are each equipped with ILS. Runways 17L and 35L both include approach lighting systems which provide for operations in visibility as low as 0.5 mile. Because Runway 17L includes runway centerline lights, the ILS procedure provides the Airport's best approach with a runway visual range (RVR) of 1,800 feet, as opposed to the Runway 35L procedure with an RVR of 2,400 feet. The Runway 35R ILS procedure can accommodate operations with visibility as low as 0.75 mile with the higher visibility minimum a result of Runway 35R not having an approach lighting system.

In addition to the ILS procedures, several of the runways also include Area Navigation or RNAV procedures. These RNAV procedures include GPS approaches for Runways 17L, 35R, 17R, 35L, and 31. In addition, RNAV procedures designated as Required Navigation Procedures (RNP) are also available for Runways 17L, 35R, 17R, and 35L. These RNAV procedures provide approach minimums approaching the capability of the ILS procedures. For example, the Runway 17R GPS approach can accommodate operations with visibility as low as 0.75 mile.

Table 2-4
AIRPORT NAVIGATIONAL AIDS
Colorado Springs Airport

	17L-35R		17R-35L		13-31	
	17L	35R	17R	35L	13	31
Runway markings	Precision	Precision	Precision	Precision	Visual	Non-precision
Runway lighting	HIRL/HIRCL	HIRL/ HIRCL	HIRL	HIRL	MIRL	MIRL
Approach aids	ILS DME GPS MALSR PAPI-L TDZL CL GS	ILS DME GPS PAPI-R REIL TDZL CL GS	PAPI-L REIL GPS	ILS NDB GPS MALSR PAPI-L GS OM MM	PAPI-R REIL	GPS PAPI-L REIL
Instrument runway status	Precision	Precision	Non-precision	Precision	Visual	Non-precision
Instrument approach procedures	ILS (CAT I) LOC RNAV(GPS) RNAV (RNP)	ILS LOC RNAV(GPS) RNAV (RNP)	RNAV (GPS) RNAV (RNP)	ILS (CAT I) LOC RNAV(GPS) RNAV(RNP) NDB	n.a.	RNAV (GPS)
Approach minimums *(a)*						
Ceiling						
DA	6,387	6,318	-	6,275	-	-
LPV DA	-	-	6,377	-	-	-
LNAV MDA	-	-	-	-	-	6,580
Visibility	RVR 1,800 *(b)*	0.75 mile	0.75 mile	RVR 2,400	Visual	1.25 mile

CL = runway centerline lights
DA = decision altitude
DME = distance measuring equipment
GPS = global positioning system
GS = glide slope
HIRL = high-intensity runway lights
HIRCL =high-intensity runway centerline lights
ILS = instrument landing system
LOC =localizer
MALSR = medium-intensity approach light system with runway alignment indicator lights
MDA = minimum descent altitude
MIRL = Medium-intensity runway lights
MM = Middle maker
n.a. = Not applicable
NDB = Non-directional beacon
OM = Outer marker
PAPI = Precision approach path indicator
REIL = Runway end identifier lights
RNAV = Area navigation global positioning system approach
RVR = Runway visual range
TDZL =Touchdown zone lights

Notes:
(a) Approach minimums are shown for the procedures with the lowest approach minimums, accordingly the ILS procedures are reported for Runways 17L, 35R, and 35L and the RNAV (GPS) procedures for Runways 17R and 31. All minimums are reported for Approach Category C aircraft (with approach speeds of 141-165 knots).
(b) The runway centerline lighting improves the Category I ILS for Runway 17L to provide for a range of 1,800 RVR.

Sources: Jeppesen, AVN data online, November 2011.

In addition to the landing aids available at the Airport, the primary navigational aids include a very-high frequency omnidirectional range/tactical air navigation facility (VORTAC) and an airport surveillance radar (ASR) system.[2] The VORTAC is located approximately 9 miles northeast of the Runway 17L threshold, and the ASR antenna is located approximately 1,600 feet southeast of the Runway 17L threshold.

The *1998 Airport Master Plan* proposals for improving the approach capabilities of the runways that have already been implemented include:

- Runway 35R ILS
- Runway 31 non-precision instrument approach capabilities (RNAV GPS)

The other improvements proposed in the *1998 Airport Master Plan* that have not yet been implemented include:

- Category II/III ILS for Runways 17L, 35R, and 35L
- Runway 13 non-precision instrument approach capabilities

Airspace and Air Traffic Control Overview

The airspace in the Colorado Springs area falls under the jurisdiction of two entities: (1) the Denver Air Route Traffic Control Center (ARTCC), and (2) the Colorado Springs Terminal Radar Approach Control (TRACON). The airspace over the continental United States is divided into 20 geographically defined Air Traffic Control (ATC) jurisdictions based on ARTCCs. The primary purpose of an ARTCC is to provide radar service and other ATC services to en route aircraft (i.e., those aircraft that are not landing or taking off). The Denver ARTCC (ZDV), which has jurisdiction over Colorado Springs Airport, is located in Longmont, Colorado.

The purpose of a TRACON is to provide radar approach and departure control as well as other ATC services to aircraft flying in terminal area airspace.[3] The Denver Center has delegated control over certain airspace in the Colorado Springs area to the Colorado Springs TRACON, located at the Airport. In radio communications, pilots refer to the Colorado Springs TRACON as either Colorado Springs approach control or Colorado Springs departure control, depending on the phase of flight. The area within and around the Colorado Springs TRACON airspace is depicted on Figure 2-3.

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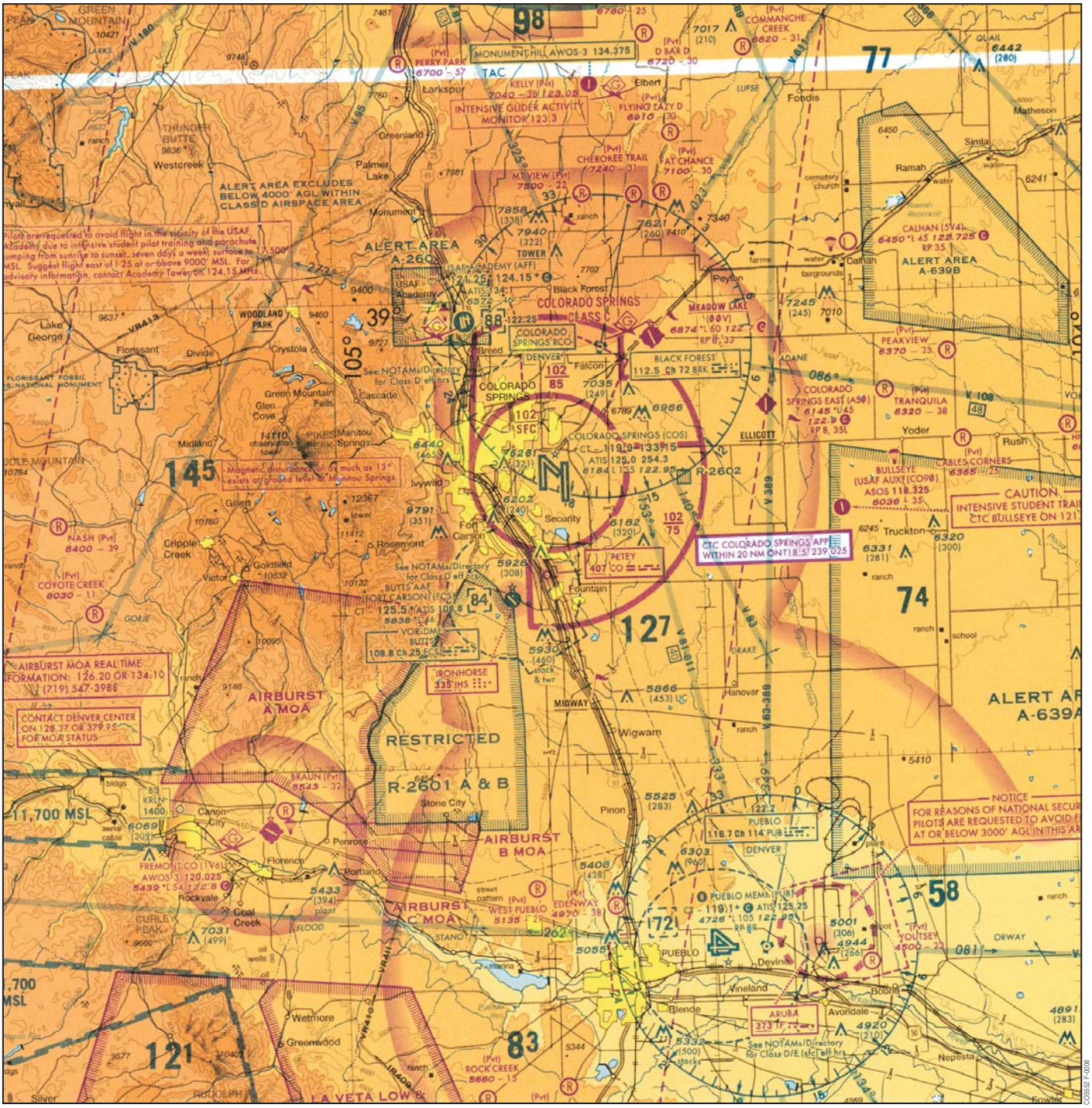
[2] The term VORTAC refers to a navigational aid that incorporates very-high frequency omnidirectional range (VOR) and tactical air navigation equipment, providing both azimuth and distance information. The ASR is used to detect and display an aircraft's position in the airspace terminal area, providing azimuth and range information.

[3] Typically Class B or Class C airspace, as defined in the "Controlled Airspace"section.



Source: Federal Aviation Administration.

N

5 0 5 10

Graphic Scale in Nautical Miles

Figure 2-3

COLORADO SPRINGS TERMINAL AREA AIRSPACE

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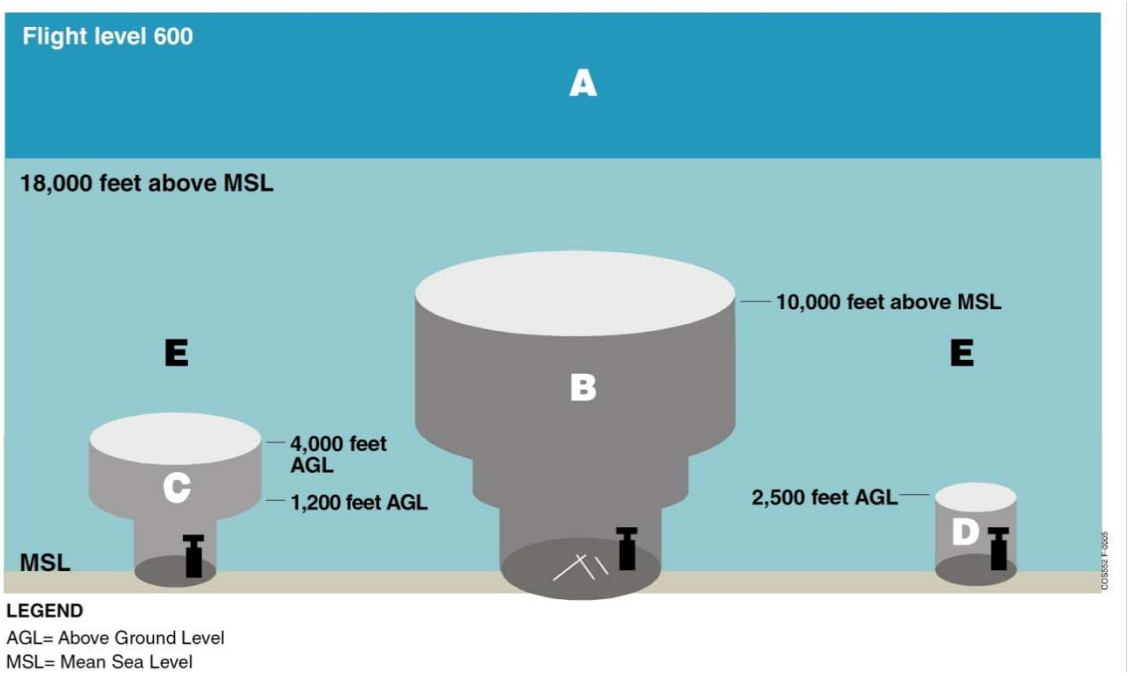
Controlled airspace is airspace that has defined dimensions within which ATC service is provided to aircraft in accordance with the airspace classifications established by the FAA. As illustrated on Figure 2-4, there are five classes of controlled airspace in the United States: Class A, Class B, Class C, Class D, and Class E.

Figure 2-4
CONTROLLED AIRSPACE CLASSIFICATIONS



Class C airspace surrounds the Airport. Class C airspace is generally that airspace from the ground to 4,000 feet above airport elevation surrounding those airports that have both an operational tower and a certain number of IFR operations or passenger enplanements. Control responsibilities within Class C airspace are typically assumed by either a TRACON or a tower. Although the configuration of each Class C area is individually tailored, the airspace usually consists of a first tier with a 5 nautical mile radius and a second tier with a 10 nautical mile radius that extends from 1,200 feet to 4,000 feet above the airport's elevation. Pilots must establish two-way communications with the facility providing ATC services prior to entering Class C airspace and must maintain these communications while within the airspace. Within Class C airspace, aircraft operating under VFR are only provided with separation services from aircraft operating under IFR.

The Colorado Springs Class C airspace boundary is shown as a thick magenta line surrounding the Airport on Figure 2-3, and resembles an upside-down, two-tiered wedding cake, as shown on Figure 2-4. In the vicinity of the Airport, the Class C airspace extends from the ground up to 4,000 feet above mean sea level (MSL). The

floor of the airspace at more distant locations from the Airport ranges from 1,200 feet above MSL up to 4,000 feet above MSL. The outer portion of the Class C airspace circle is irregular to because of terrain to the west, Fort Carson/Butts Army Air Field on the southwest, and Meadow Lake Airport on northeast.

Class B airspace is generally that airspace surrounding the nation's busiest airports from the ground to 10,000 feet above MSL. With the exception of the airspace within approximately 3 to 6 nautical mile of a towered airport, control responsibilities within Class B airspace are typically assumed by a TRACON. The configuration of Class B airspace is individually tailored and designed to contain all published instrument procedures once an aircraft enters the airspace. ATC provides radar vectoring and sequencing on a full-time basis for all aircraft operating in Class B airspace.

The Denver Class B airspace is approximately 30 nautical miles north of Colorado Springs Airport. The Airport is not located within the Denver Class B airspace; however its proximity influences the use of the Airport and surrounding airspace. Discussions with Colorado Springs Tower/TRACON staff revealed that the Denver Class B airspace currently has minimal impact on operations at the Airport.

As depicted on Figure 2-3, there are several military operations areas (MOAs) and restricted areas in the vicinity of the Airport which impact the use of airspace surrounding the Airport. To the northwest of the Airport, Alert Area A-260 surrounds the Air Force Academy, and to the southwest of the Airport, Restricted Area R-2601 surrounds Fort Carson. There are also two alert areas, A-639A and A-639B to the east of the airport. Two MOAs are proximate to the Airport, Airburst A and Airburst B, both southwest of the Airport.

PASSENGER TERMINAL COMPLEX

The passenger terminal complex is located between the parallel runways, south of Taxiway H, as shown on Figure 2-5. This area encompasses the main passenger terminal, the east unit terminal, and supporting facilities. The main passenger terminal building was opened in 1994. It has three levels and comprises approximately 314,000 square feet. The east unit terminal was constructed in 1996 and acquired by the Airport in 1998. The east unit terminal comprises approximately 38,000 square feet and is currently used on an infrequent basis. Table 2-5 summarizes the amount of area designated for each terminal function.

The departures level of the main passenger terminal accommodates airline ticket counters and offices for United Airlines on the west side of the primary entrance and Delta Air Lines, American Airlines and Allegiant Air on the east side.[4] The departure level also includes concessions areas including a retail facility and two restaurants. Other areas on the departures level include: the passenger

[4] The United Airlines and Continental Airlines merger transaction was closed in October 2010, and the FAA issued a single operating certificate to the merged airline in November 2011.

Table 2-5

PASSENGER TERMINAL FUNCTIONAL AREAS

Colorado Springs Airport

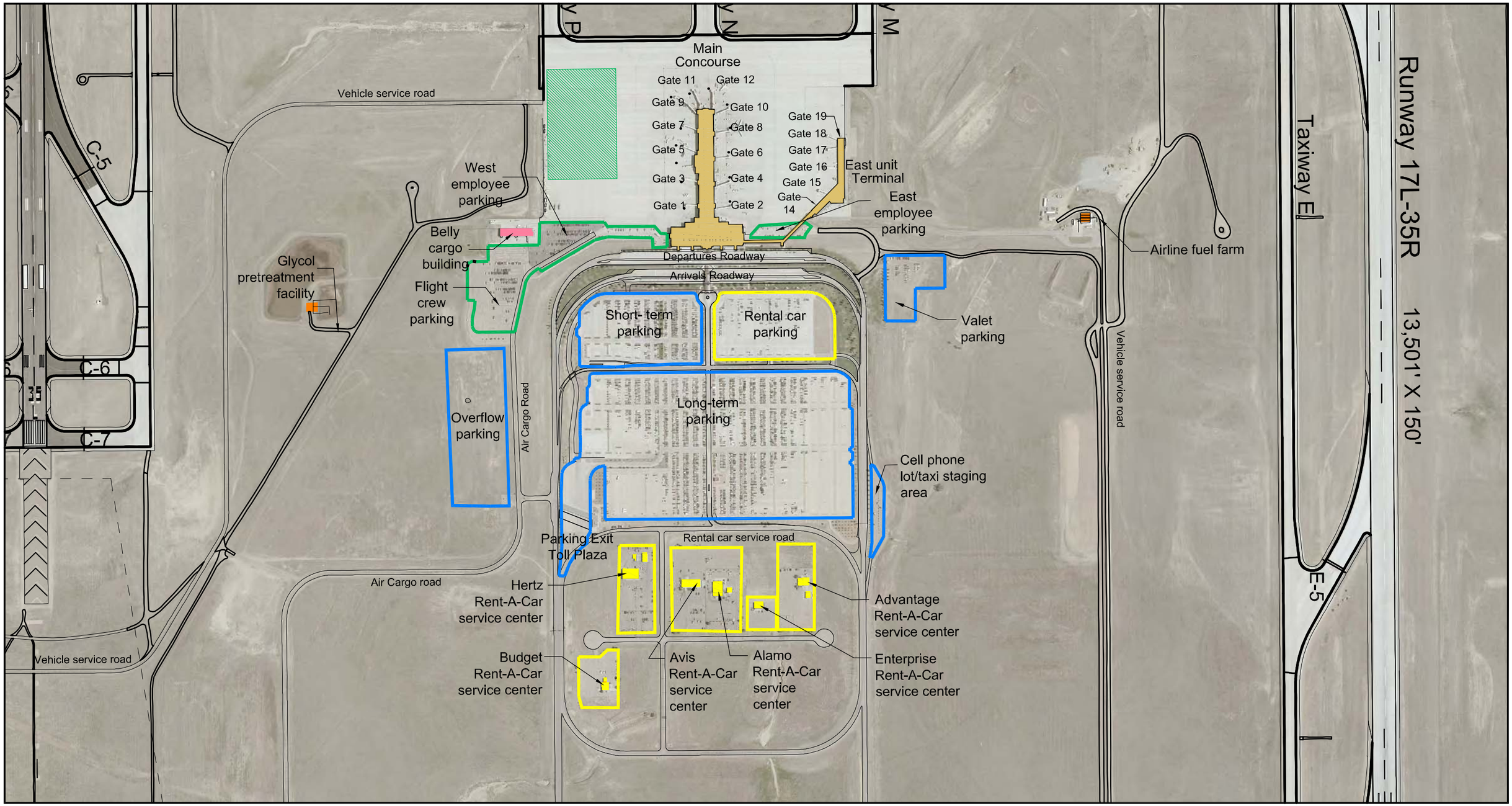
	Departures level			Arrivals level			
Functional area*(a)*	Processor	Concourse	East unit terminal	Processor	Concourse	3rd floor	Total
Airline operations	9,700	16,300	-	5,500	9,000	-	40,500
Airline operations (available)	6,700	14,600	16,600	4,200	12,000	-	54,100
Airport administration	2,800	-	-	200	3,700	10,500	17,200
Baggage claim	-	-	-	15,300	-	-	15,300
Baggage handling	-	-	-	21,100	-	-	21,100
Building operations, storage and mechanical	1,800	4,000	-	4,800	22,600	3,500	36,700
Concession	11,200	8,300	200	3,200	500	-	23,400
Transportation Security Administration	4,700	-	-	2,800	1,400	-	8,900
Public space and circulation *(b)*	35,500	16,100	22,000	16,100	7,300	-	97,000
Total	72,400	59,300	38,800	73,200	56,500	14,000	314,200

Notes:

(a) All areas in square feet

(b) Includes ticketing areas, public waiting and circulation areas, and airport staff circulation areas

Source: Colorado Springs Airport records, December 2011.



LEGEND

- Airfield pavement
- Passenger terminal
- Remote aircraft parking area
- Air cargo
- Airline support
- Employee parking
- Public parking
- Rental car lot

NORTH

0 300' 600' 1,200'

Figure 2-5
PASSENGER TERMINAL COMPLEX

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screening checkpoint, departure hold rooms, airport administrative offices, building operations and storage, and restrooms.

The main terminal has three levels. The departures level includes the ticketing lobby, security checkpoint, and concourse serving departing passengers, and the arrivals level includes the baggage claim lobby and rental car counters serving arriving passengers. The third level is primarily comprised of airport administrative offices. Figure 2-6 depicts the departures and third levels, and Figure 2-7 depicts the arrivals level.

The *1998 Airport Master Plan* proposed that in the long term, which was assumed to be a twenty-year planning period, the main terminal concourse would be expanded to include four additional gates. The master plan also proposed the demolition of the east unit terminal and construction of two additional passenger terminal concourses, each with 20 aircraft gates, located on either side of the main concourse. This configuration would provide a total of 60 aircraft gates. These proposals have not yet been implemented.

The arrivals level accommodates the baggage claim lobby with 6 claim devices, ground transportation facilities, a visitors center, and rental car counters for Advantage, Hertz and Alamo on the west side of the primary entrance, and Avis, Enterprise and National on the east. The lower level also includes space for the Airport Development and Maintenance Office, Airport Facilities Maintenance Office, the Transportation Security Administration (TSA) office, and offices for Delta, Skywest, and United Airlines. The outbound baggage makeup and TSA screening for outbound baggage are also provided on this level.

The main terminal concourse has 12 aircraft gates, each of which is equipped with a passenger boarding bridge. The east unit terminal concourse, which is currently used on an infrequent basis, has 6 additional aircraft gates and 4 passenger boarding bridges. As of July 2013, the airlines currently operating at the airport include Allegiant Air, American Airlines, Delta Air Lines, and United Airlines.[5] A summary of the passenger loading bridges is provided in Table 2-6.

Aircraft Parking Apron

Approximately 52 acres of apron are available for aircraft maneuvering and parking at the passenger terminal. The terminal concourse provides aircraft parking for approximately 12 narrowbody jets, and the terminal apron can accommodate an additional 16 narrowbody jets. The size and configuration of the apron would accommodate the future concourse expansion or additional concourses as proposed in the *1998 Airport Master Plan.*

[5] Further information regarding the airlines and aviation demand at the airport, see Chapter 3, Aviation Demand Forecasts.

Table 2-6

PASSENGER LOADING BRIDGE SUMMARY

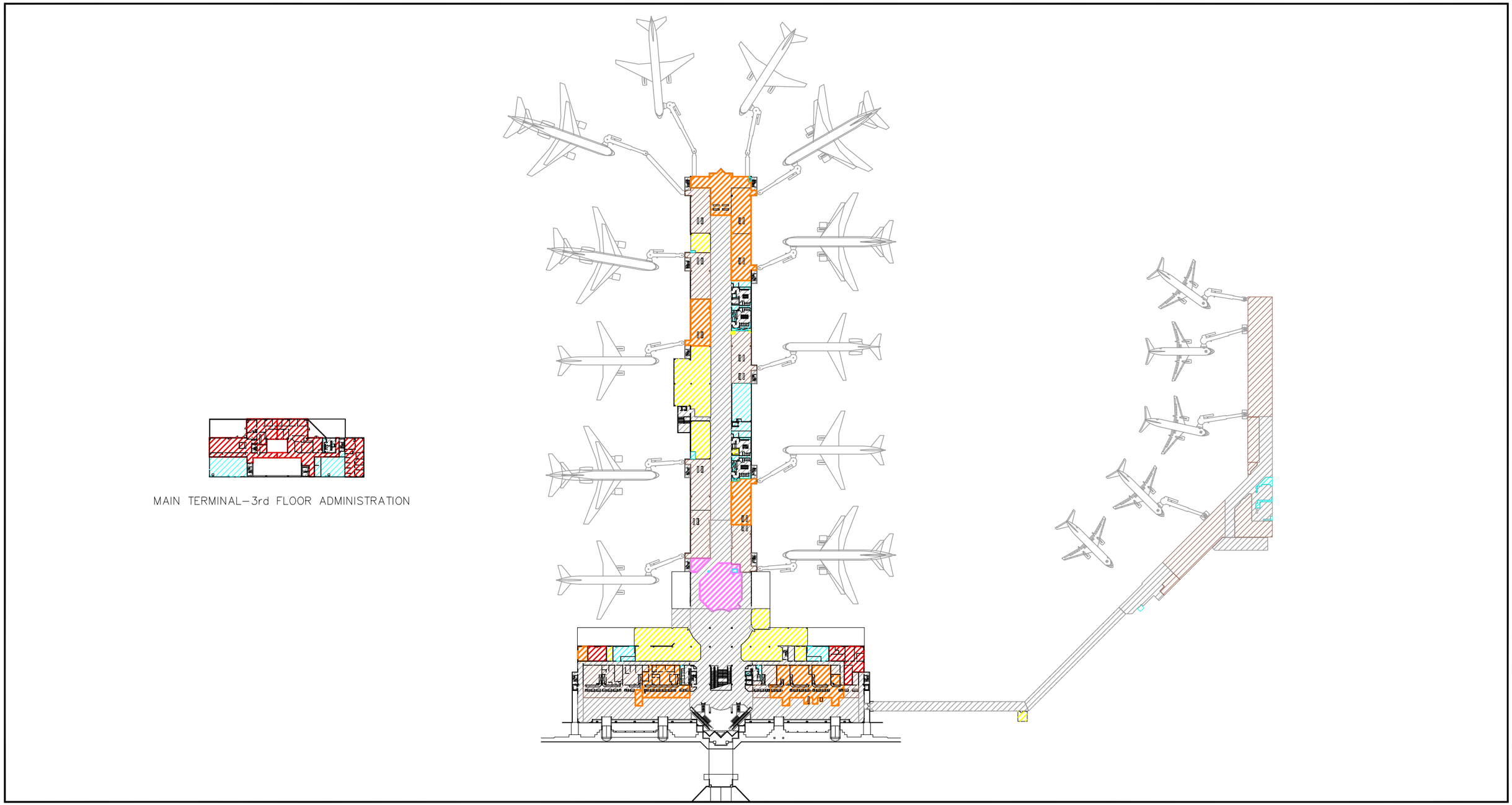
Colorado Springs Airport

	Airline	Make	Model	Year of installation
1	Unassigned	Jetway	A3 60/119 125R	1994
2	Unassigned	Jetway	A3 60/119 125R	1994
3	Allegiant Air	Jetway	A3 60/119 125R	1994
4	Delta Air Lines	Jetway	A3 60/119 125R	1994
5	Unassigned	Jetway	A3 60/119 125R	1994
6	Unassigned	Jetway	A3 60/119 125R	1994
7	Unassigned	Jetway	A3 60/119 125R	1994
8	American Airlines	Jetway	A3 60/119 125R	1994
9	Unassigned	Jetway	A3 60/119 125R	1994
10	United Airlines	Jetway	A3 60/119 125R	1994
11	United Airlines	Jetway	A3 60/119 125R	1994
12	United Airlines	Jetway	A3 60/119 125R	1994
14	Unassigned*(a)(b)*	-	-	-
15	Unassigned*(b)*	Jetway	A3 60/119 125R	1996
16	Unassigned*(b)*	Jetway	A3 60/119 125R	1996
17	Unassigned*(b)*	Jetway	A3 60/119 125R	1996
18	Unassigned*(b)*	Jetway	A3 60/119 125R	1996

(a) Gate 14 provides ground level boarding.

(b) Gates 14 through 18 are located in the east unit terminal.

Source: Van Sant Group, November 2010.



LEGEND

- Airline operations
- Airline operations - available
- Airport administration
- Baggage claim
- Baggage handling
- Building operations, storage and mechanical
- Concession
- Transportation Security Administration
- Public space and circulation

Note: This exhibit does not depict changes made during the 2013 passenger security screening checkpoint expansion/renovation project.

Source: Colorado Springs Airport records, December 2011.

NORTH

0 75' 150' 300'

Figure 2-6

MAIN TERMINAL - DEPARTURES LEVEL

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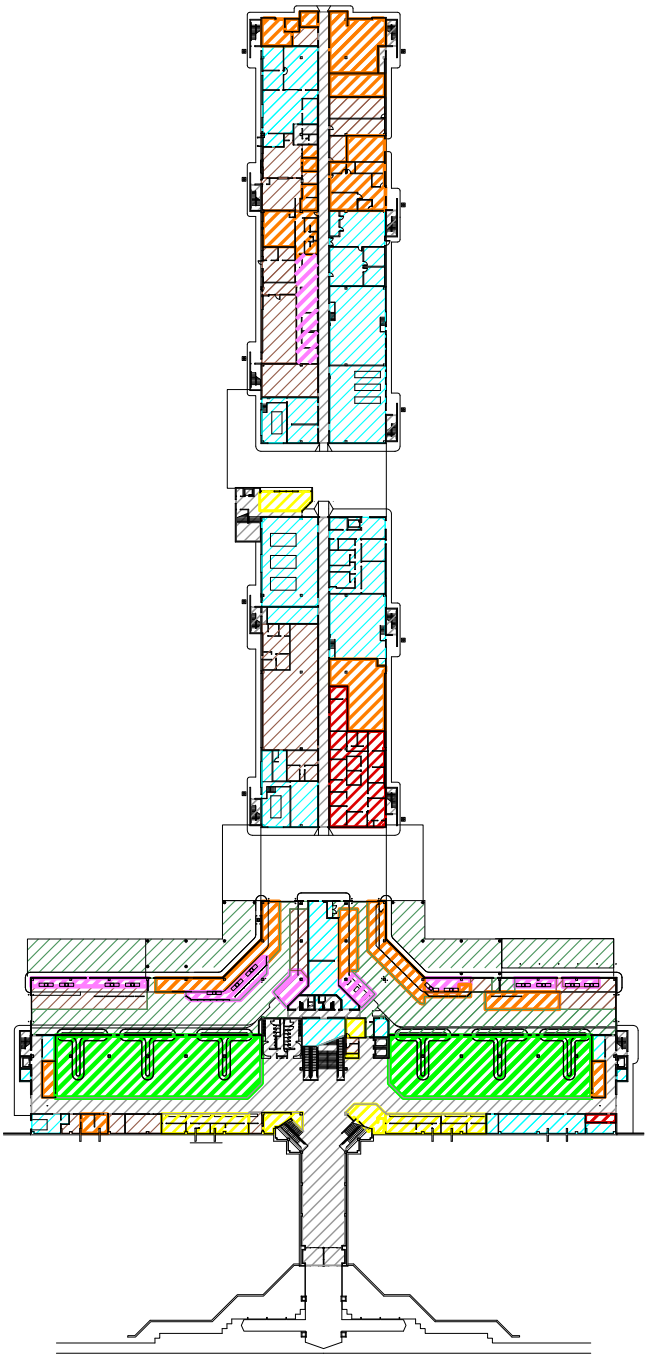

LEGEND

- Airline operations
- Airline operations - available
- Airport administration
- Baggage claim
- Baggage handling
- Building operations, storage and mechanical
- Concession
- Transportation Security Administration
- Public space and circulation

Source: Colorado Springs Airport records, December 2011.

NORTH

0 75' 150' 300'

Figure 2-7
MAIN TERMINAL - ARRIVALS LEVEL

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GROUND TRANSPORTATION FACILITIES

As illustrated on Figure 2-8, access to the passenger terminal complex and ground transportation facilities is via Milton E. Proby Parkway. Milton E. Proby Parkway provides access to ground transportation facilities including the terminal curbside, public parking lots, rental car ready/return lot, cell phone lot, and commercial vehicle hold lot. Milton E. Proby Parkway also provides access to the Cresterra Business Park. Vehicles bound for the employee parking lots located west of the terminal building turn north from Milton E. Proby Parkway onto Air Cargo Road.

Peterson Air Force Base (PAFB) facilities are accessed primarily from U.S. 24/Platte Avenue and Airport Road, both on the north side of the airport. Access to the west side aviation facilities is via Powers Boulevard to Aviation Way.

In the fall of 2011, the City of Colorado Springs, in conjunction with the Pikes Peak Rural Transportation Authority (PPRTA), completed construction of the segment of Milton E. Proby Parkway between Powers Boulevard and Academy Boulevard which runs adjacent to, and north of, existing Drennan Road. This project is expected to improve traffic flow between Interstate 25 and the Airport while reducing traffic impacts to the nearby Deerfield Hills and Soaring Eagles neighborhoods.

In January 2011, the Federal Highway Administration approved a Finding of No Significant Impact (FONSI) for the Powers Boulevard corridor improvements being proposed by the Colorado Department of Transportation (CDOT). CDOT completed an Environmental Assessment (EA) of the proposed improvements in late 2010. The proposed action evaluated in the EA included the following: (1) upgrading Powers Boulevard to a six-lane freeway for 11 miles between Woodmen Road and Milton E. Proby Parkway; (2) preserving the right-of-way for future interchanges that anticipate a 4-lane freeway on the approximately 6-mile stretch between Milton E. Proby Parkway and State Highway 16; and (3) building 11 new grade-separated interchanges between Woodmen Road and Milton E. Proby Parkway, such that motorists on Powers Boulevard would no longer encounter stoplights along the corridor. The grade-separated interchanges considered include several along the west side of the Airport boundary, including Powers Boulevard and the following roads: Airport Road, Fountain Boulevard, Hancock Expressway, and Milton E. Proby Parkway.

Terminal Area Access and Circulation Roadways

As illustrated on Figure 2-8, Milton E. Proby Parkway is the primary access route to and from the terminal area. Immediately east of Powers Boulevard, Milton E. Proby Parkway consists of two one-way roadways separated by a median. Further east, the roadway becomes a one-way loop that turns north to provide access to the curbside and other ground transportation facilities. In front of the passenger terminal building, the inbound roadway splits to the departure and arrival curbside

levels. West of the terminal building, the curbside roadways merge as the roadways turn to the south.

The one-way loop road also provides access to the rental car service facilities, public parking lots, and rental car service centers located inside the loop as well as the cell phone lot and commercial vehicle hold lot located outside the loop. Vehicles exiting the rental car area and the parking exit toll plaza merge with the loop roadway as it heads south. A return-to-terminal road is provided south of the rental car service centers allowing vehicles to return to the curbsides, parking, and other terminal area access facilities.

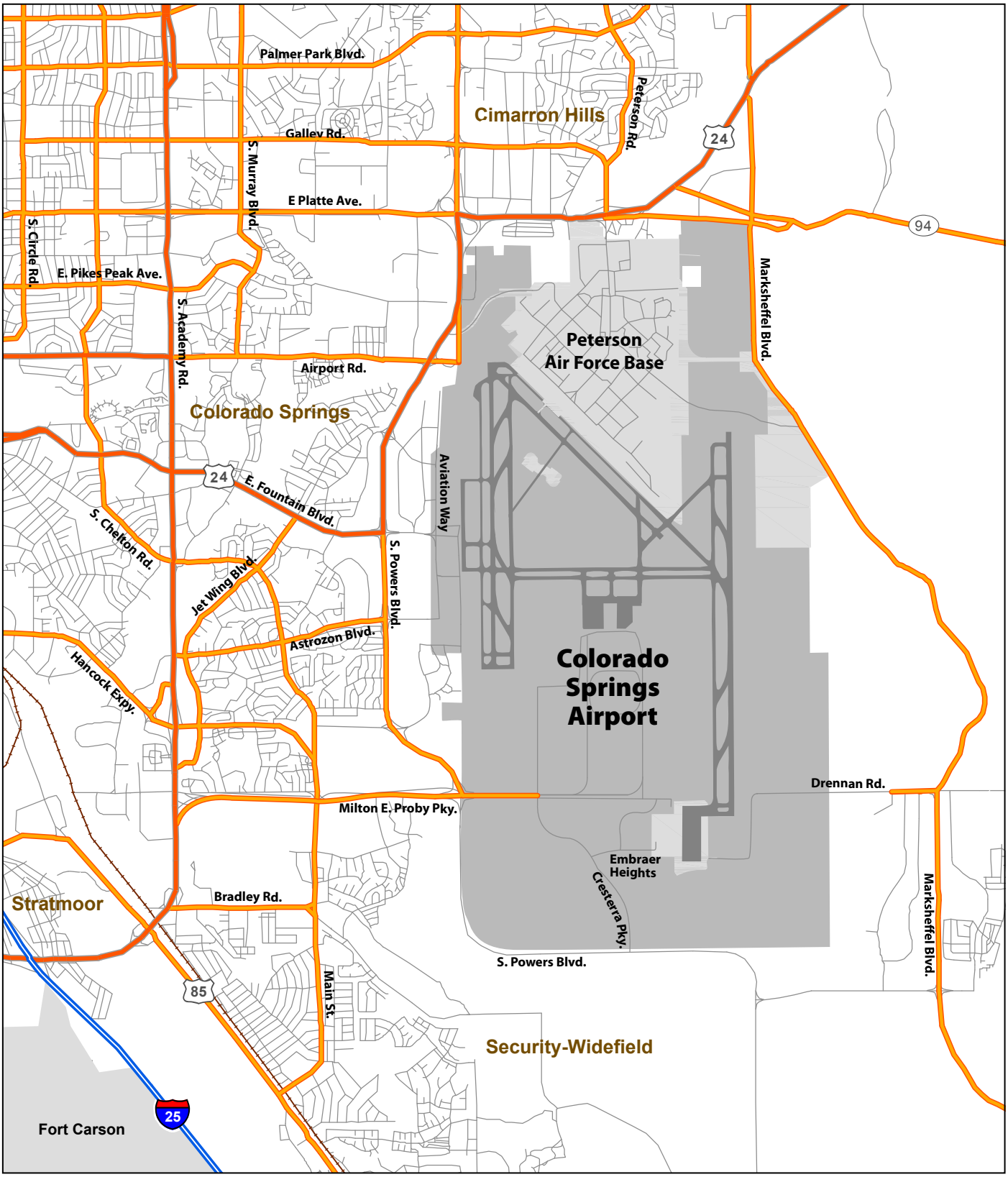
Cresterra Business Park Roadways

Cresterra Business Park roadways Cresterra Parkway and Embraer Heights roadways were constructed in 2011. Cresterra Parkway bisects the business park in a northwest-southeast orientation providing access to the business park parcels and connecting Milton E. Proby Parkway and South Powers Boulevard. Embraer Heights bisects the business park in an east-west orientation and connects Cresterra Parkway to the A/DACG facility. These roadways are shown in Figures 2-1 and 2-2.

Curbside Facilities

Drivers dropping off passengers at the Terminal typically use the Upper Level roadway, which is comprised of (a) a terminal-front curb ("inner curbside") for private vehicles, taxicabs, and limousines and (b) an island curb ("outer curbside") for courtesy vehicles and large buses. The inner curbside, which provides two stopping lanes and two through lanes, provides approximately 950 linear feet of curbside, not including area occupied by pedestrian crosswalks to the island curb. The outer curbside, which provides one stopping lane and one through lane, provides approximately 1,065 linear feet of curbside. Figure 2-9 depicts the passenger terminal curbside, including those areas that are underutilized at the outer edges of the terminal building façade.

Drivers picking up passengers at the Terminal typically use the Lower Level roadway. The Lower Level roadway has a similar configuration as the Upper Level roadway, with a 4-lane inner curb for private vehicles and a 2-lane outer curb for taxicabs and other commercial vehicles. The inner curb provides approximately 925 linear feet of curbside, not including area occupied by pedestrian crosswalks, and the outer curb provides approximately 975 linear feet. Passengers walk to the Lower Level from the terminal via a pedestrian tunnel located in the middle of the curbside. The tunnel location results in much of the curbside parking activity on the inner curb concentrating at the center near the tunnel exit.



LEGEND

- Airport area
- Military installation
- Railroad
- Major highway
- Secondary highway

Source: ESRI data.

N

.5 0 .5 1

Graphic Scale in Miles

Figure 2-8
KEY ACCESS ROADWAYS
Master Plan Update
Colorado Springs Airport
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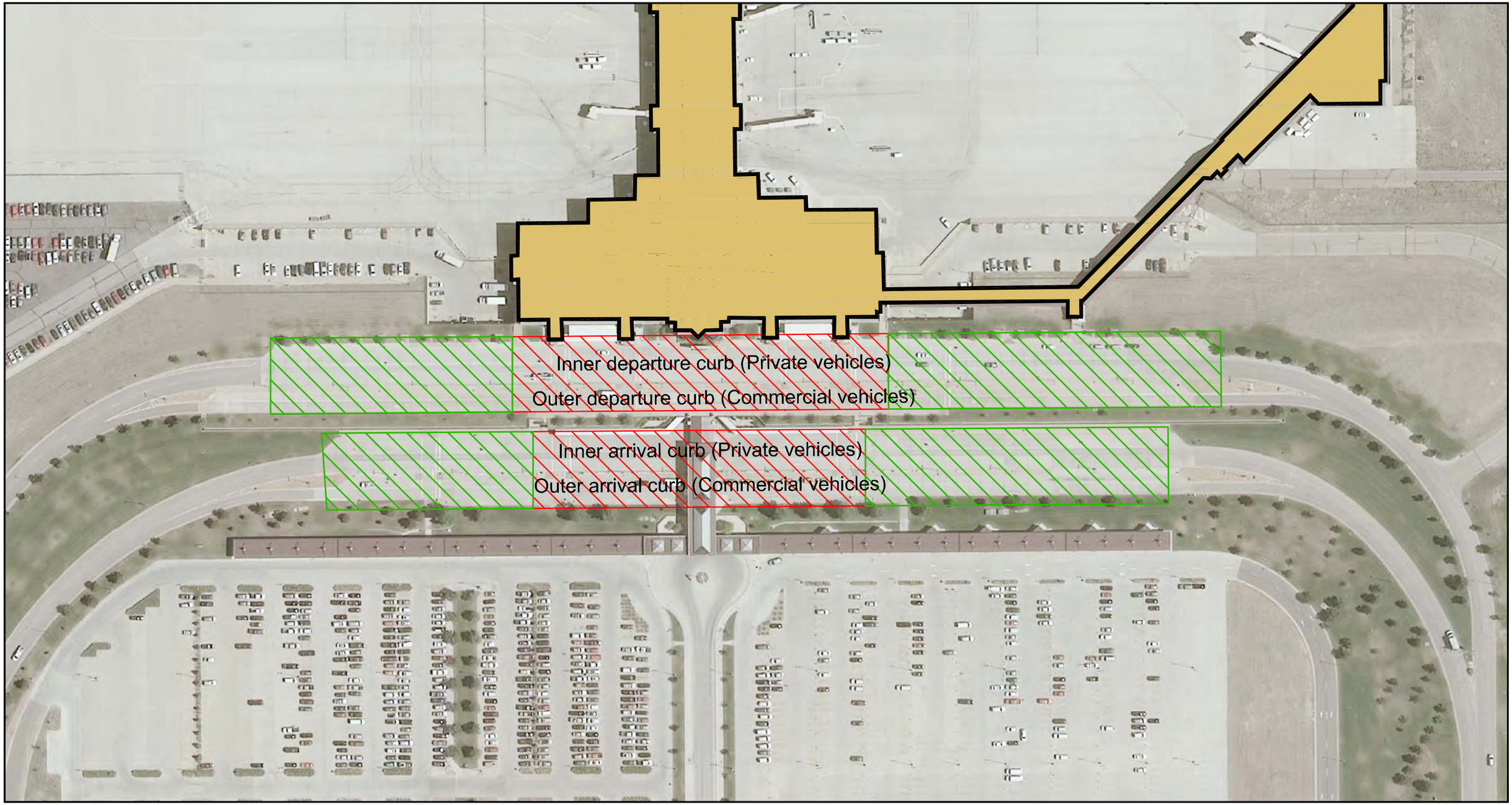

LEGEND

- Airfield pavement
- Passenger terminal
- High curbside utilization
- Low curbside utilization

Figure 2-9
TERMINAL CURBFRONT

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Colorado Springs Airport
July 2013

NORTH

0 60' 120' 240'

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Automobile Parking Facilities

The following summarizes public parking and employee parking facilities on Airport. Each of the parking facilities are shown on Figure 2-3.

Public parking. Approximately 5,510 public parking spaces are provided on-Airport in two surface lots. The Short Term lot provides 716 spaces and the Long Term lot provides 3,919 spaces. For passengers using Long Term parking, the Airport provides a shuttle bus that circulates through the lot and picks up and drops off passengers at the north end of the lot, across from the tunnel leading to the terminal building. An overflow lot is also available during peak periods (e.g. major holidays) which provides approximately 875 additional spaces.

Employee parking. The Airport currently provides employee parking in four surface lots. The East Manager Lot, located adjacent to and east of the terminal building, provides 40 spaces shared by Airport staff, airlines, rental car operators, concessionaires, and public safety agencies. The West Manager Lot, located adjacent to and west of the terminal building, provides 41 spaces shared by Airport staff and other tenants. The West Auxiliary Lot, located to the west of the West Manager Lot provides 193 spaces used by Airport staff, vendors, and ground handlers. The Flight Crew Lot, located west of the West Auxiliary Lot, provides 430 parking spaces and is predominately used by flight crews.

Table 2-7 summarizes the Airport's parking facility supply.

Table 2-7
PARKING FACILITIES INVENTORY
Colorado Springs Airport

Facility	Total spaces
Public parking	
Short-term parking lot	716
Long-term parking lot	3,919
Overflow parking lot	875
Total	5,510
Employee parking	
East manager lot	40
West manager lot	41
West auxiliary lot	193
Flight crew lot	430
Total	704

Source: Colorado Springs Airport records, November 2010.

Rental car facilities. The rental car counters for Advantage, Alamo, Avis, Enterprise, Hertz and National are located at the arrival level of the main passenger terminal. National, Enterprise, Budget, and Avis are located on the east side of the escalators to the departures level, and Thrifty, Hertz, Alamo, and Advantage are located on the west side. The ready/return parking area is located to the west of the short term terminal parking lot. The rental car service areas are located south of the terminal parking lot on parcels leased from the Airport. Presently fourteen lots varying in size from 1.0 to 3.0 acres comprise the rental car service area. Six of these lots are leased to: Advantage, Alamo, Avis, Budget, Enterprise and Hertz. The total rental car revenue for 2008 at the Airport was approximately $28 million.

Commercial vehicle facilities. A variety of ground transportation providers service the Airport on a 24-hour schedule. The providers include charter bus, limousine, and taxi. During the day, taxis and shuttles are available outside the arrivals level of the main passenger terminal, and a24-hour ground transportation hotline provides links to taxis and other transportation providers. In addition, there is a commercial vehicle staging/mobile phone parking lot available to vehicles picking up arriving passengers; the lot includes space for approximately 60vehicles.

AIRLINE SUPPORT FACILITIES

Airline support facilities are dedicated to supporting passenger and cargo airline operations. At the Airport, these facilities include an airline maintenance hangar, fuel storage and distribution facilities, and glycol storage and treatment facilities.

Airline Maintenance and Support

In 1996, the Airport constructed an airline aircraft maintenance hangar on the west side of the airport property, originally intended for use by Western Pacific Airlines. The hangar is approximately 23,300 square feet in size. This facility is shown on Figure 2-2, facility number 19. Skywest Airlines constructed an additional aircraft maintenance hangar in 2006; the hangar is approximately 100,000 square feet in size and is facility number 32 on Figure 2-2.

Fuel Storage and Distribution

The Airport's primary fuel storage facility was constructed in 1995 and is located directly east of the terminal. The fuel storage facilities currently include four 50,000 gallon tanks providing the airport with Jet A fuel, and one 10,000 gallon tank providing non-aviation gasoline for equipment. Also located on the southeastern portion of the airport property is the Diamond Shamrock Terminal and Pipeline facility which provides fuel to the Airport and the region. The Diamond Shamrock facility is shown on Figure 2-2, facility number 33. Additional fuel storage primarily for general aviation aircraft is located on individual tenant sites, including JHW Investment Company, Colorado jetCenter, Cutter Aviation, Colorado Springs Owners Association, facility numbers 15, 18, 20, and 24, respectively.

Glycol Storage and Treatment

During the winter months, deicing fluid is recovered by the apron drainage system surrounding the deicing areas and diverted from the storm sewer system to a glycol solution holding pond, located west of the passenger terminal area and east of the Runway 35L end. This facility is shown on Figure 2-2, facility number 30. The holding pond has a capacity of 16 acre-feet. When the holding pond is approximately two-thirds full, the glycol solution is pumped to a pretreatment pond with a capacity of 4 acre-feet. This transfer is typically completed once per year. Once the glycol solution is treated in accordance with the wastewater discharge permit, the solution can be discharged into the sanitary sewer. De-icing fluid is stored on the west ramp in four storage tanks and approximately 7 glycol totes with a total capacity of approximately 45,160 gallons.

AIR CARGO

The airport has three air cargo facilities on site: a belly cargo facility for passenger airlines, and two facilities capable of serving all-cargo airlines, one of which is currently occupied by FedEx. The belly cargo facility is located directly west of the terminal building. The FedEx air cargo facility is located on the west side of Runway 17R-35L on the north end of the general aviation/cargo apron north of Taxiway A-2. The other all-cargo airline facility is located on the south end of the general aviation/cargo apron directly west of Taxiway A-4. The air cargo facilities are shown on Figure 2-10.

The *1998 Airport Master Plan* proposed the following:

1. Expansion of the cargo facilities to the west. However, the all-cargo facilities were relocated and the original cargo facilities were converted to the existing belly cargo facility.

2. The expansion of the FedEx apron to the north. This expansion was constructed.

3. A new cargo facility south of the former passenger terminal building. This new cargo facility was constructed and previously occupied by Airborne Express and its successor DHL, but is currently available.

GENERAL AVIATION

The general aviation facilities are located along the west side of the Airport, referred to as the Westside Development Area, parallel to Runway 17R-35L, as depicted in Figure 2-10. Three fixed base operators are located on the Airport, Colorado jetCenter, Cutter Aviation, and JHW Aviation. The fixed base operators and general aviation support businesses provide a wide-range of services, including aircraft fueling, aircraft maintenance, engine repair, aircraft parking and tiedowns, ground handling, hangar storage, and crew and passenger lounges.

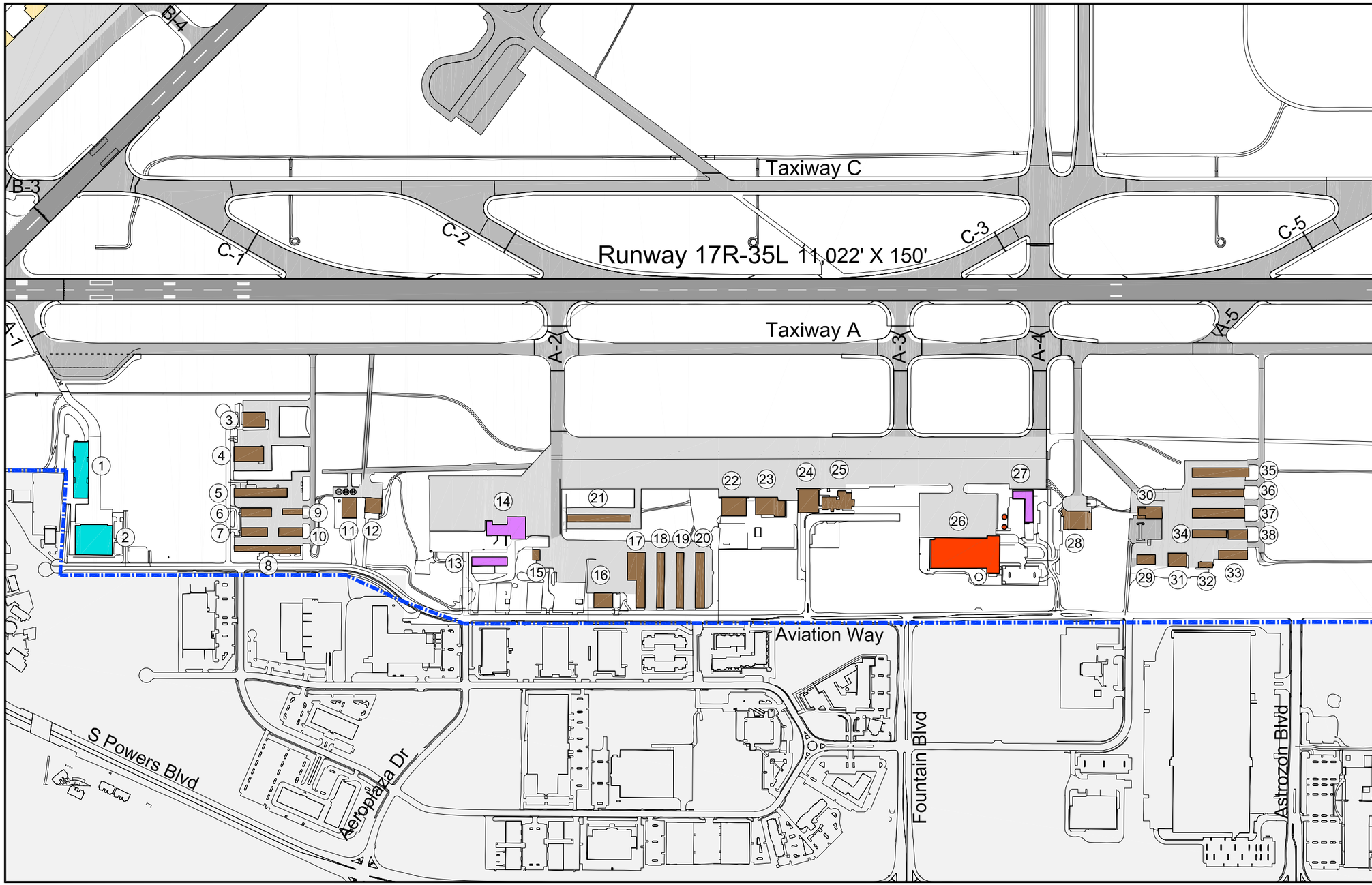
Table 2-8 provides a summary of the general aviation based aircraft. Table 2-9 summarizes the hangars and apron areas of the various general aviation entities on the Airport. The general aviation facilities are shown on Figure 2-10. The *1998 Airport Master Plan* proposed the expansion of the general aviation apron to the south, however, this expansion has not yet been implemented.

Table 2-8
BASED AIRCRAFT SUMMARY
Colorado Springs Airport

Fixed base operator	Single-engine piston	Multi-engine piston	Turbo-prop	Jet	Heli-copter	Total
Colorado jetCenter	31	5	5	3	--	44
Cutter Aviation	38	12	4	7	--	61
JHW Aviation	52	10	4	4	--	70
Peak Aviation Center	4	1	--	--	--	5
Springs Aviation	3	--	--	--	--	3
A-cent Aviation	4	3	--	--	--	6
Colorado Vertical	--	--	--	--	1	1
Colorado Springs Police Department*(a)*	--	--	--	--	2	2
Peterson Air Force Base Aero Club	12	2	--	--	--	14
Business Airpark	16	3	11	3	--	33
Aviation Museum *(b)*	2	1	--	--	--	3
Executive Aviation Services	--	--	--	2	--	2
Total	162	37	24	19	3	245

(a) The police helicopters are not flying missions as of 2010.
(b) Includes WestPac Restorations and Northpoint Aero.

Source: Colorado Springs Airport records, January 2010.



FACILITY INDEX

- National Museum of World War II Aviation ① ②
- Colorado Springs Owners Association ③ - ⑩
- Colorado Springs Police hangar ⑪
- Perry Park Investments hangar ⑫
- FedEx Cargo facilities ⑬ ⑭
- Colorado Division of Wildlife hangar ⑮
- Cutter Aviation ⑯ - ⑳
- Colorado Jet Center ㉑ - ㉓
- Maintenance hangar ㉔
- Former passenger terminal building ㉕
- Skywest maintenance hangar ㉖
- Cargo sort facility ㉗
- Cordillera maintenance hangar ㉘
- A-Cent maintenance hangar (J.H.W) ㉙
- J.H.W. Investment Company ㉚ - ㊳

LEGEND

- Airport property boundary
- Airfield pavement
- Air cargo
- Airline support
- General aviation (GA)
- Commercial use
- Non airport property

NORTH

0 350' 700' 1,400'

Figure 2-10
WESTSIDE AREA FACILITIES

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July 2013

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Table 2-9
GENERAL AVIATION HANGAR AND APRON FACILITIES
Colorado Springs Airport

Facility	Lessee	Hangar / apron space (sq ft)	Figure 2-10 Reference No.
Corporate hangar	Cutter Aviation	34,100	17
Corporate hangars (2)	JHW Aviation	13,700	30,31
Corporate hangar	Perry Park Investments	10,800	12
Total		58,500	
Community hangars (2)	Colorado Jet Center	44,600	22,23
Community hangar	Cutter Aviation	12,600	16
Community hangars (2)	Colorado Springs Owner's Assoc'n	35,700	3,4
Other aircraft storage	Colorado Springs Police Depart't	13,800	11
Total		106,600	
3 T-hangars – 49 units	Cutter Aviation	95,300	17,18,19,20
1 T-hangar – 20 units	Colorado Jet Center	20,000	21
6 T-hangars – 57 units	JHW Aviation	97,600	33,34,35,36,37,38
6 T-hangars	Colorado Springs Owner's Assoc'n	81,600	5,6,7,8,9,10
Total		294,400	
Maintenance hangar	Colorado Jet Center	23,300	24
Maintenance hangar	JHW Aviation (A-cent Aviation)	8,100	29
Maintenance hangar	Cordillera Corporation (ARINC)	24,700	28
Total		56,100	
Aircraft apron	Colorado Jet Center	400,000	-
Aircraft apron	Cutter Aviation	125,700	-
Aircraft apron	JHW Aviation	54,500	-
Total		580,200	-

Source: Colorado Springs Airport records and airport basemap files from The Sanborn Map Company, 2010.

AIRPORT SUPPORT FACILITIES

Airport support facilities include the FAA Airport Traffic Control Tower (ATCT), Aircraft Rescue and Fighting (ARFF) facilities, and Airport maintenance offices. The primary support facilities are shown on Figure 2-1.

FAA Airport Traffic Control Tower

The ATCT, which operates on a 24-hour schedule, is located north of Runway 13-31 on PAFB. The ATCT is centrally located on the airfield and is approximately 200 feet north of the military ramp between the parallel runways and north of crosswind Runway 13-31.

Aircraft Rescue and Fire Fighting Facilities

The primary ARFF is located in the north quadrant of the Airport on PAFB. In addition, a secondary ARFF station exists on the east side of Runway 17L-35R, also located on PAFB. The ARFF facilities are operated by the U.S. Air Force. The firefighting services provided to the Airport include first response medical emergency support, aircraft crash rescue capabilities, structural and brush fire support. Ambulance service is also available at the Airport. The ARFF is has an Index C classification, which accommodates regular operations by aircraft with lengths of 158 feet or less.

Airport Maintenance Facilities

The airport maintenance facility encompasses approximately 11 acres of land and is located on the west side south of the JHW Investment Company general aviation facilities. The facility includes 5 buildings for equipment maintenance, storage, and administrative offices.

Airport Administrative Facilities

The Airport administrative facilities are located in the passenger terminal. The airline ramp operation offices; the TSA operations center, training area, and break room; the facilities maintenance office; and the airport development offices are located on the lower level. The Airport Director's office, the Airport Communications Center, and other airport administrative offices are located on the third level. Airport administrative facilities are shown on Figures 2-6 and 2-7.

MILITARY FACILITIES

The Airport is home to two military facilities: Peterson Air Force Base and an Arrival/Departure Airfield Control Group (A/DACG) facility as described in the following sections.

Peterson Air Force Base

Peterson Air Force Base, located on the north side of the Airport, is home to several military units, hosted by the Air Force 21st Space Wing.* Units at the base include: the Air Force Reserve 302nd Airlift Wing, which operates the C-130 Hercules aircraft and the Colorado National Guard 200th Airlift Squadron and the Air Force 311th Airlift Squadron which both operate the C-21 aircraft. According to a FFY 2009

*Peterson Air Force Base is a tenant of the Colorado Springs Airport.

Economic Impact Analysis prepared by the 21st Space Wing, the total economic impact of the Peterson Complex* was $1.2 billion in FFY 2009, including an annual payroll of over $500.9 million, approximately $516.5 million in annual expenditures for construction services and procurement of materials, equipment and supplies, and an estimated $217.1 million in annual payroll for the indirect jobs created in the regional economy.

A/DACG Facility

The A/DACG facility, constructed in 2008, is used by the Department of Defense to deploy military troops and equipment as needed. Aircraft using the A/DACG facility include a mix of commercial and military aircraft. The commercial aircraft using the facility are operated by charter airlines (e.g., Boeing 737, Boeing 757), and the military aircraft are typically large transport aircraft (e.g., C5, C17). In calendar year 2009, the facility served approximately 316 commercial operations, and 152 military transport operations. The facility is located immediately west of the Runway 35R end.

INFRASTRUCTURE ASSESSMENT

The assessment of airport infrastructure (i.e. airfield pavements, and utilities) was based on professional judgment and did not include site analysis that would require testing of building materials, soils, and pavements.

Airfield Pavements

Detailed pavement inspections were conducted at the Airport in August 2009.The runway, taxiway, and apron sections that are maintained by the airport maintenance staff were inspected. The Pavement Condition Index (PCI) procedure was used to visually assess the pavement condition.** The PCI inspection was conducted following the methodology specified in both the FAA Advisory Circular 150/5380-6B, *Guidelines and Procedures for Maintenance of Airport Pavements* and the American Society for Testing and Materials Standard D5340-04e1, *Standard Test Method for Airport Pavement Condition Index Surveys.*

The PCI procedure provides a numerical indication of overall pavement condition. The survey provides a composite index (PCI number) that represents the overall condition of the pavement in numerical terms, ranging from 0 (failed) to 100 (excellent). Generally, pavements with a PCI of 65 or better would benefit from preventative maintenance, such as crack sealing. Pavements with a PCI of 40 – 65 may require major rehabilitation, such as an overlay, and pavements with a PCI of less than 40 will typically require reconstruction.

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* The Peterson Complex includes Peterson Air Force Base, Cheyenne Mountain Air Station, and four major military headquarters—the North American Aerospace Defense Command (NORAD), the U.S. Northern Command, the Air Force Space Command and the Army Strategic Command.

**The apron was also inspected using the Material Related Distress Rating system; see the Pavement Condition Summary in the appendix for additional detail.

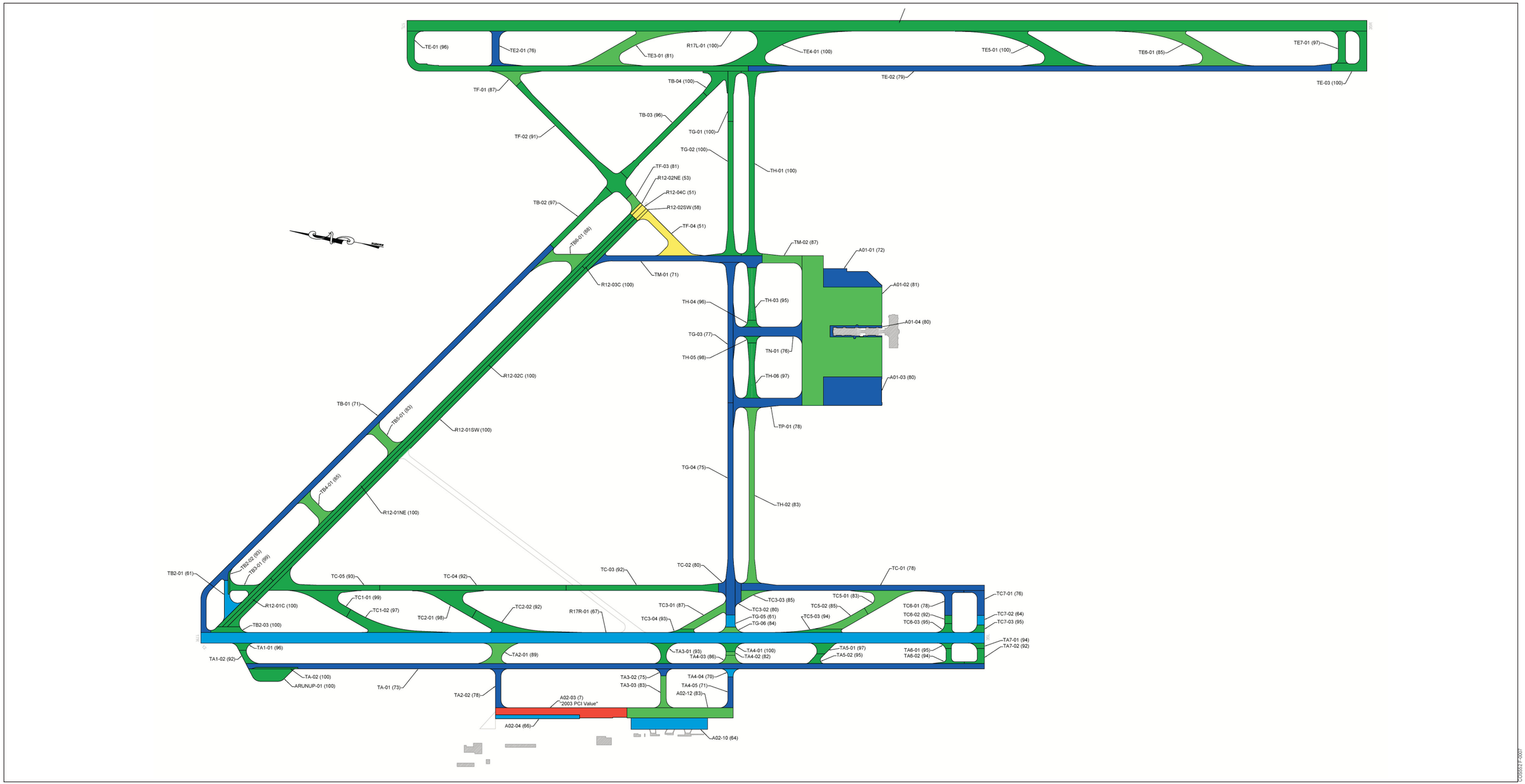
The overall area-weighted PCI for the Airport was 82, with conditions ranging from 7 to 100. The PCI number for each pavement type is shown in Table 2-10. The Airport has approximately 16.6 million square feet of pavement onsite. Table 2-10 also lists an area-weighted age of each pavement branch (e.g. apron, runway and taxiway), as well as the total area comprised of each type of pavement (i.e. asphaltic concrete, Portland cement concrete).

Figure 2-11 depicts the PCI for all airfield pavements. As shown, most of the airfield is in good condition; however, there are some areas which require major rehabilitation, including a significant portion of the general aviation/cargo apron edge taxilane, and sections of Taxiway F. It should be noted that weather conditions in the Colorado Springs region can contribute to pavement deterioration due to weather conditions and pavement treatments. Specifically in Colorado Springs, the akali-silica reaction (ASR) can cause premature deterioration of concrete pavements, due to pavement cracking. A pavement management plan accounting for the local conditions will be developed as part of this master plan, and necessary improvements will be included within the proposed projects. For more information see Appendix A to this document which includes the complete Pavement Condition Summary report.

Table 2-10
AIRFIELD PAVEMENT SUMMARY
Colorado Springs Airport

Pavement	Area (thousands of square feet)	Area-weighted age in years	Area-weighted PCI
Runway	5,000	7	89
Taxiway	8,800	11	85
Apron	2,800	17	77
Portland cement concrete	10,500	11	87
Asphaltic concrete	1,500	14	70
Asphaltic concrete with overlay	4,600	10	72
Pavement condition index			
0 – 40	212	-	-
41 – 55	123	-	-
56 – 70	1,990	-	-
71 – 85	6,678	-	-
86 – 100	7,219	-	-

Source: *Colorado Springs Airport Pavement Condition Summary – Draft*, prepared by Applied Pavement Technology, October 2010.



LEGEND

BRANCH IDENTIFIER
SECTION IDENTIFIER
PCI VALUE
RW1533-R06C02 (67)
SECTION BREAK LINE

PAVEMENT CONDITION INDEX

100
90
80
70
60
50
40
0

Note: This map was obtained from the 2009 Colorado Statewide Airport Pavement Maintenance System Update.
Source: Applied Pavement Technology, November 2010.

Figure 2-11

PAVEMENT CONDITION INDEX MAP

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OFF-AIRPORT LAND USE

The land use of the parcels surrounding the Airport is shown on Figure 2-12. As shown, the area to the east of the Airport is comprised of agricultural land use, whereas the area to the west of the Airport is comprise largely of residential land with some areas of commercial, industrial, and office uses. The City of Colorado Springs and El Paso County also control the land use surrounding the airport with land use codes that define Commercial Airport Overlay Districts. The Commercial Airport Overlay Districts are shown in Figure 2-13.

The City of Colorado Springs Code (Section 7.3.506) defines the following sub-zones:

- Runway Protection Zone sub-zones: inner width of 1,500 feet; outer width of 2,284 feet, and length of 3,000 feet beginning at the landing threshold;[6]
- Accident Potential Zone 1 (APZ-1) sub-zone: width of 3000 feet, length of 5,000 feet beginning at the end of Runway Protection Zone;
- Accident Potential Zone 2 (APZ-2) sub-zone: width of 3000 feet, length of 7,000 feet beginning at the end of the APZ-1;
- Aircraft Navigation (ANAV) sub-zone: defined by extent of FAR Part 77 imaginary surfaces; and
- ADNL sub-zone: defined by noise contours.

Notably, the El Paso County Land Development Code (Sections 4.3.1 and 8.4.2) define the same sub-zones with the exception of the Runway Protection Zone sub-zones as defined by the City code.

ENVIRONMENTAL OVERVIEW

The environmental overview for this Master Plan Update has been prepared in accordance with FAA Advisory Circular150/5070-6B Change 1, *Airport Master Plans*, which states that "the principal objective of an environmental overview is to document environmental conditions that should be considered in the identification and analysis of airport development alternatives."

This section enumerates major environmental conditions that could affect development of Airport facilities. Environmental conditions identified in this chapter follow the guidelines set forth in FAA Order 5050.4B, *National Environmental Policy Act (NEPA) Implementing Instructions for Airport Actions*. Recent environmental studies completed regarding Airport facilities include:

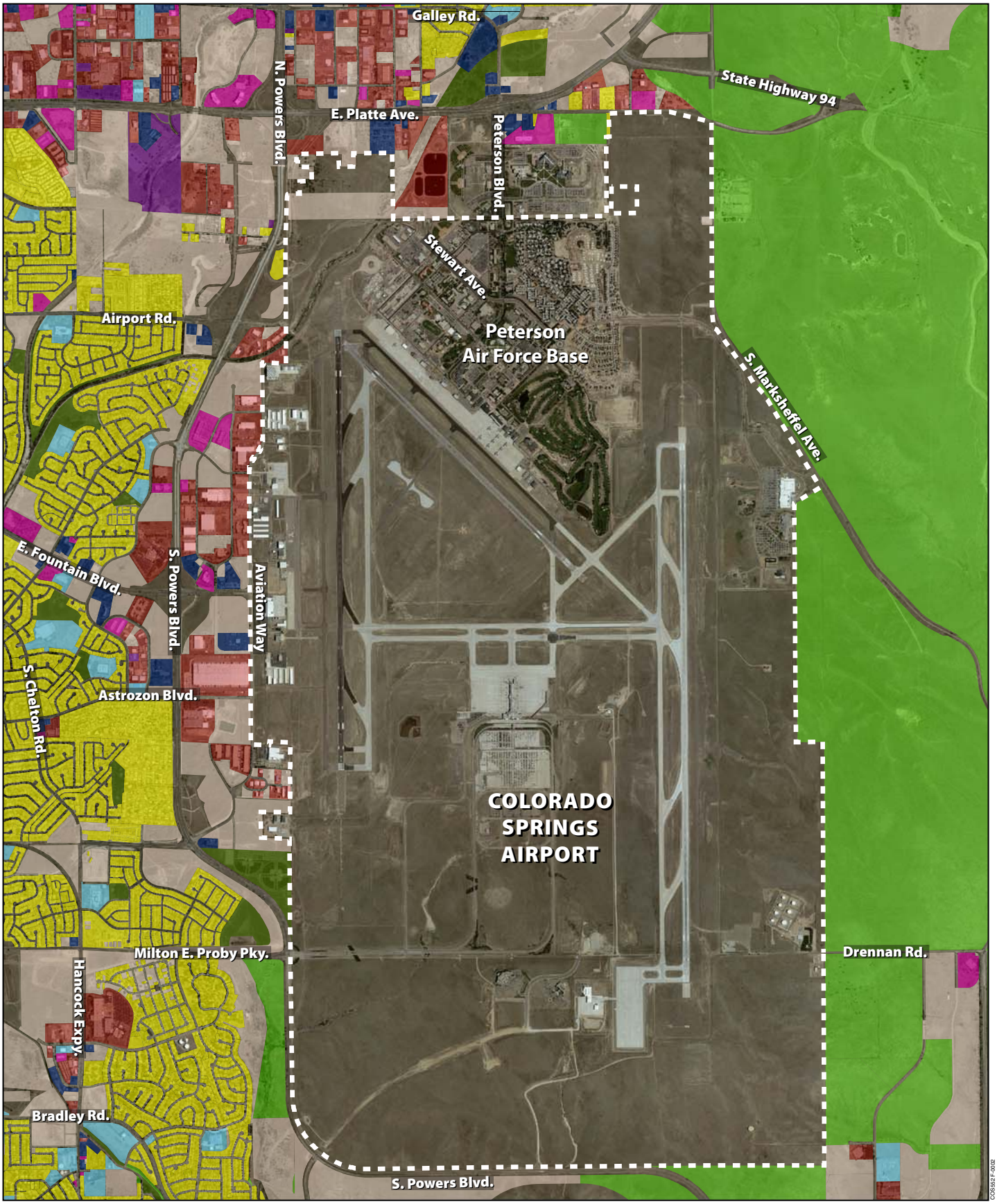
[6] The City code definition of the Runway Protection Zone sub-zone is different than the FAA Runway Protection Zone (RPZ) which vary in size depending on the capability of the runway to accommodate

- *Colorado Springs Airport Business Park, Airbus Point Realignment, Supplemental Environmental Assessment*, CH2M Hill, May 2009.
- *Reconstruction of Runway 12/30, Categorical Exclusion,* December 2008
- *Colorado Springs Open Space Management Plan: A Resource Management Guide,* Colorado Springs Airport, January 2007.
- *Colorado Springs Airport ILS, Environmental Assessment*, Bionomics Environmental, May 2006
- *Colorado Springs Airport Business Park, Environmental Assessment,* CH2M Hill, September 2005.
- *Fort Carson A/DACG Complex, Final Environmental Assessment,* U.S. Army, February 2004.
- *FAR Part 150 Study, Colorado Springs Airport,* Barnard Dunkelberg & Company, August 2001.

Factors Affecting the Man-Made Environment

Airport development projects have the potential to affect the surrounding manmade environment, which includes a diverse mix of neighborhoods, land uses, and established communities.

Noise. Federal guidelines for land use compatibility and associated with airport noise levels are published in Federal Aviation Regulations (FAR) Part 150, Airport Noise Compatibility Planning. FAR Part 150 classifies noise in terms of an average day-night sound level (DNL), deeming any incompatible land use within the area exposed to DNL 65 to be problematic. The most recent Part 150 Study, completed in 2001, concluded that there was no residential land exposed to DNL 65 and higher, for either the existing or future conditions, at the time in 2001 or for forecasted conditions in 2005. It was also determined that there were no noise-sensitive facilities (schools, churches, and other places of public gathering) located within the area exposed to DNL 65 for the existing and future conditions. Updating the Part 150 Study or its noise contours is not included in the scope of this Master Plan Update.



LEGEND

- Airport boundary
- Agricultural
- Commerical
- Industrial
- Government/public
- Office
- Recreational
- Residential
- Parking
- Undeveloped land

N

1,400 0 1,400 2,800

Graphic Scale in Feet

Source: Land use data provided by City of Colorado Springs, December 2011.

Figure 2-12

GENERALIZED OFF-AIRPORT LAND USE

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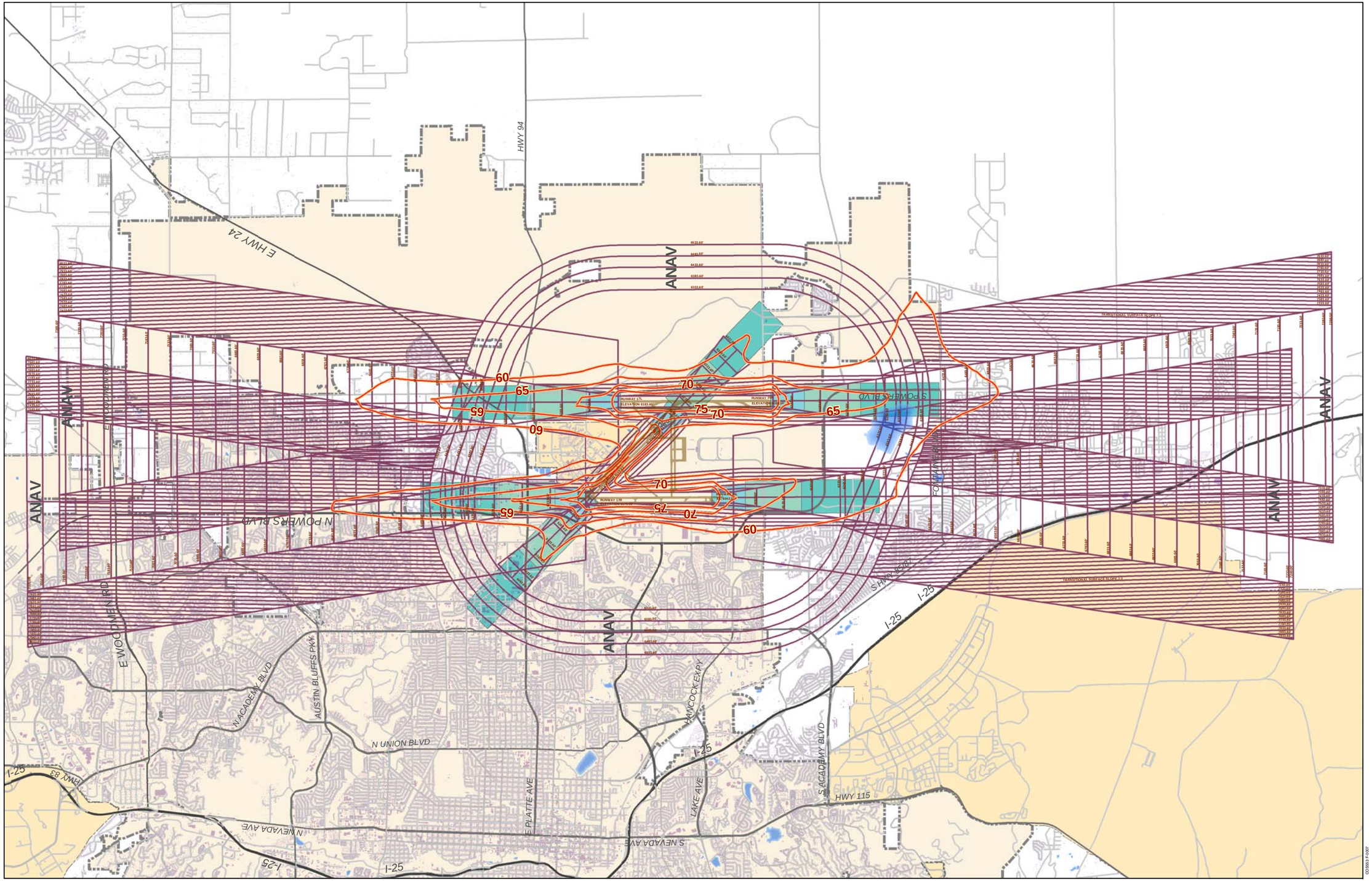

LEGEND

Accident potential zone types

- APZ 1
- APZ 2
- RPZ

- Noise contours
- Part 77 surfaces

Source: City of Colorado Springs on behalf of the Colorado Springs Utilities, 2006.

.75 0 .75 1.5

Graphic Scale in Miles

Figure 2-13

COMMERCIAL AIRPORT OVERLAY DISTRICT

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Historic, Architectural, Archeological, and Cultural Resources. Three primary federal laws mandate the identification and preservation of cultural resources. The National Historic Preservation Act of 1966, as amended, includes directives for the identification, assistance, and protection of historic properties. The Archeological and Historic Preservation Act of 1974 requires the survey, recovery, and preservation of significant and prehistoric data that may be destroyed or irreparably lost as a result of federal, federally funded, or federally licensed projects. Lastly, the Department of Transportation (DOT) Act of 1966, Section 4(f), requires environmental analysis of potential impacts to publicly-owned recreational resources that could be affected by DOT projects.

Nearby Section 4(f) resources include historic resources, recreation areas, and public parks.

- **Historic** – The Old Colorado Springs Municipal Airport on Peterson Air Force Base including five buildings were designated as a Historic District in 1988, and four of the buildings were listed in the National Register of Historic Places (NRHP) in 1996 – City Hangar (Bldg. 979), Municipal terminal (Bldg. 981), Broadmoor Hangar (Bldg. 982) and Spanish House/Caretakers Residence (Bldg. 999). The Utility/Maintenance building (Bldg. 980) is not eligible for the NRHP as it was not considered as a contributing resource due to the building's age, and the building was not used by the original Colorado Springs Airport during the period of 1926-1945.
- **Recreational** – There are two nearby recreational facilities: Peterson Air Force Base Golf Course, located adjacent to Runway 31, and the Skyview Sports Complex, located approximately two miles south of the Airport. Skyview is approximately 41 acres in size and consists of six softball fields, two wheelchair fields, playground, maintenance building, and restrooms.
- **Public parks** – Penstemon Park is located approximately 1.2 miles west of the Airport and consists of approximately 3.2 acres with a basketball court, picnic area, playground, and playfield. Wildflower Park is located approximately 1.25 miles west of the Airport and consists of approximately 21.9 acres with baseball and soccer fields, a basketball/in-line skate court, picnic pavilion, and playground. Sagebrush Park is located approximately 1.5 miles west of the Airport and consists of approximately 4.7 acres with a basketball court, playground, picnic area, soccer field, and trails/sidewalk paths.

Potential impacts to these historic and recreational areas arising from master plan proposed projects would require an analysis to determine if there are alternatives that would avoid impacting these facilities.

Air Quality. The Clean Air Act (CAA) (42 US Code [USC], Sections 7401-7671, et seq., as amended) established federal policy to protect and enhance the quality of the nation's air resources to protect human health and the environment. The 1990

amendments to the CAA require federal agencies to determine the conformity of proposed actions with respect to State Implementation Plans (SIP) for achieving and maintaining attainment of the National Ambient Air Quality Standards. The EPA also set forth regulations under 40 CFR 51, Subpart W that require the proponent of an action potentially affecting air quality to perform an analysis to determine if implementation of the action will conform with the SIP.

Accordingly, any master plan proposed projects that involve federal actions will require an air quality conformity determination. As of November 2010, the City of Colorado Springs including Colorado Springs Airport is in attainment for all criteria pollutants and in maintenance status for carbon monoxide.

Environmental Justice. Executive Order 12898 directed that federal agencies focus attention on the potential impacts of federal actions on minority and low-income populations. Accordingly, any master plan proposed projects that would impact nearby residential neighborhoods would be subject to an analysis assessing potential impacts on minority or low-income populations. Specifically, the analysis would examine U.S. Census data to determine if there would be a disproportionate impact on minority or low-income populations.

Factors Affecting the Natural Environment

Airport development projects have the potential to affect the natural environment; accordingly this section addresses wetlands and Waters of the United States, floodplains, wildlife and plants, and hazardous materials sites.

Wetlands and Waters of the United States. Wetlands and Waters of the United States are regulated under the Clean Water Act, as amended in 1977, and the Rivers and Harbors Appropriations Act of 1899. Additionally, Executive Order 11990, Protection of Wetlands, is implemented by DOT Order 5660.1A, Preservation of the Nation's Wetlands. Any potential impacts to wetlands or Waters of the United States arising from master plan proposed projects would require coordination with Army Corps of Engineers as well as a Section 404 permit. The wetlands in the vicinity of the Airport are shown on Figure 2-14.

Floodplains. Executive Order 11988 "directs Federal agencies to take action to reduce the risk of flood loss, minimize the impact of floods on human safety, health, and welfare, and restore and preserve the natural and beneficial values served by floodplains." Accordingly, any master plan proposed projects will be evaluated to determine if they encroach any floodplains. If so, alternatives will be examined to eliminate or minimize the encroachment. The floodplains on and in the vicinity of the Airport are shown on Figure 2-14.

Wildlife and plants. Coordination with the U.S. Fish and Wildlife Service is required to assess any potential impacts arising from master plan proposed projects on threatened or endangered species. The Airport plant community consists of tall

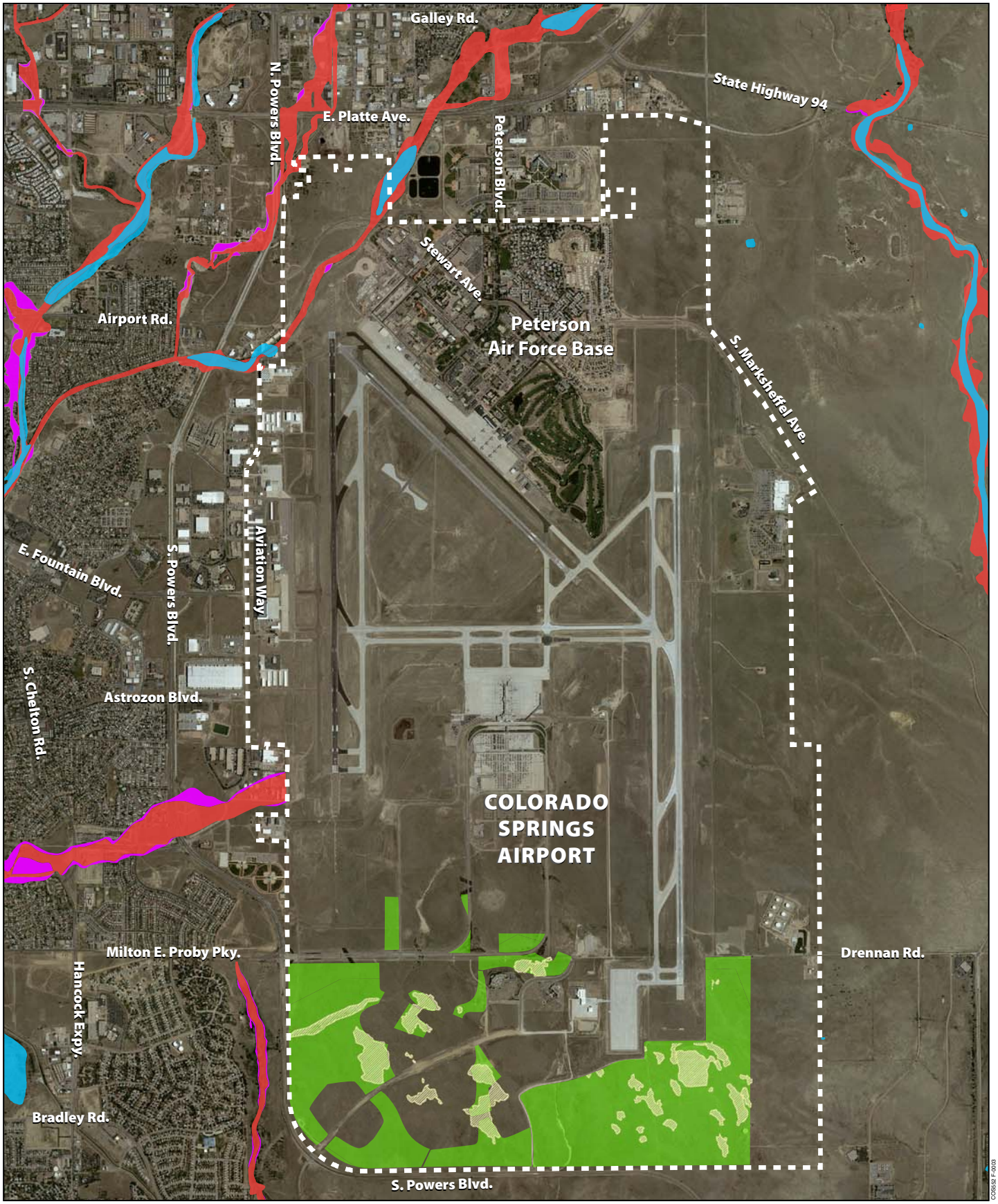
and shortgrass prairie, and there are no plant species in the area that are listed as state or federally threatened or endangered.

As part of the September 2005 Environmental Assessment for the Cresterra Business Park, the Airport committed to development of an open space plan to protect "high-value" stands of plant communities, including big bluestem/prairie sandreed (and a few acres of little bluestem/sideoats grama). Accordingly, the Airport published the *Colorado Springs Airport Open Space Management Plan: A Resource Management Guide* in January 2007.

The plan provides a comprehensive and practical management tool for Airport management including a strategy for protecting the natural, visual, and passive recreational value of the open space on the Airport. The Airport open space serves as a community buffer and aesthetic resource for the cities of Colorado Springs, Fountain, and Security, maintaining outstanding views of Pikes Peak and the Front Range. The open space areas provide valuable habitat for numerous wildlife species including birds, antelope, and small mammals and comprise a critical area of prairie in the City of Colorado Springs's open space system while allowing for limited public access. The Airport open space consists of approximately 383 contiguous acres located south of the Airport's east runway, along with approximately 140 acres of smaller open space parcels interspersed throughout the 500-acre Cresterra Business Park.

Hazardous materials and solid waste. Hazardous materials are regulated by the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA or Superfund) of 1980 and the Resource Conservation and recovery Act (RCRA) of 1976, as amended in 1986. On-airport potentially hazardous sites include (1) several above- and below-ground liquid storage tanks; (2) fuel storage and distribution facilities; (3) the airfield maintenance facility; (4) ARFF facilities, and (5) a former military training area referred to as the Rapier Site described in the following paragraph. Any proposed master plan projects will be evaluated for impacts to hazardous materials sites, including storage tank locations.

South and east of the fuel farm is a former military training area (Rapier Site) formerly used by Peterson AFB that consists of approximately 84 acres. The site was historically used as a skeet range, pistol range, ordinance storage area, lead deposit side, small arms open burn/open detonation area, disposal area, and gas instruction storage area. The site is currently undergoing remedial investigation through the United States Air Force Environmental Restoration Program, Military Munitions Response Program in accordance with the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP).



LEGEND

- Airport boundary
- Wetlands
- High value grass
- Floodplain (100 year)
- Floodplain (500 year)
- Open space

Sources: U.S. Fish and Wildlife Service, National Wetland Inventory.
Federal Emergency Management Agency (FEMA), Map Service Center.
Colorado Springs Airport Business Park, Environmental Assessment, September 2005.

N

1,400 0 1,400 2,800

Graphic Scale in Feet

Figure 2-14

ENVIRONMENTALLY SENSITIVE AREAS

Master Plan Update
Colorado Springs Airport
July 2013

LeighFisher
Management Consultants

Chapter 3

AVIATION DEMAND FORECAST

Colorado Springs Airport

This chapter presents two forecasts of aviation activity in support of the Master Plan Update for Colorado Springs Airport (the Airport or COS). Both forecasts presented are "unconstrained" and, therefore, do not include specific assumptions about physical, regulatory, environmental or other impediments to aviation activity growth. The first was prepared in the summer of 2010, hereafter referred to as the "original forecast," and the second prepared in the summer of 2013, hereafter referred to as the "forecast update."

The original forecast was approved by FAA on September 23, 2010, and in the fall of 2012, the FAA requested that airport management prepare a forecast update given the forecast approval was more than two years past. Airport management agreed that a forecast update was warranted given dramatic changes in air service at the Airport since the original forecast was prepared. The FAA approved the forecast update in August 2013.

This chapter includes a brief summary of the forecast update and the more detailed documentation of the original forecast.

FORECAST UPDATE (2013)

The following three sections summarize the forecast update in terms of enplaned passenger, air cargo tonnage, and aircraft operations. For enplaned passengers and aircraft operations, the forecast update projections are compared to the FAA 2013 Terminal Area Forecast (TAF). Appendix B to this document provides more detail regarding the forecast update, including a detailed listing of assumptions and a more complete comparison to the FAA 2013 TAF.

Enplaned Passengers

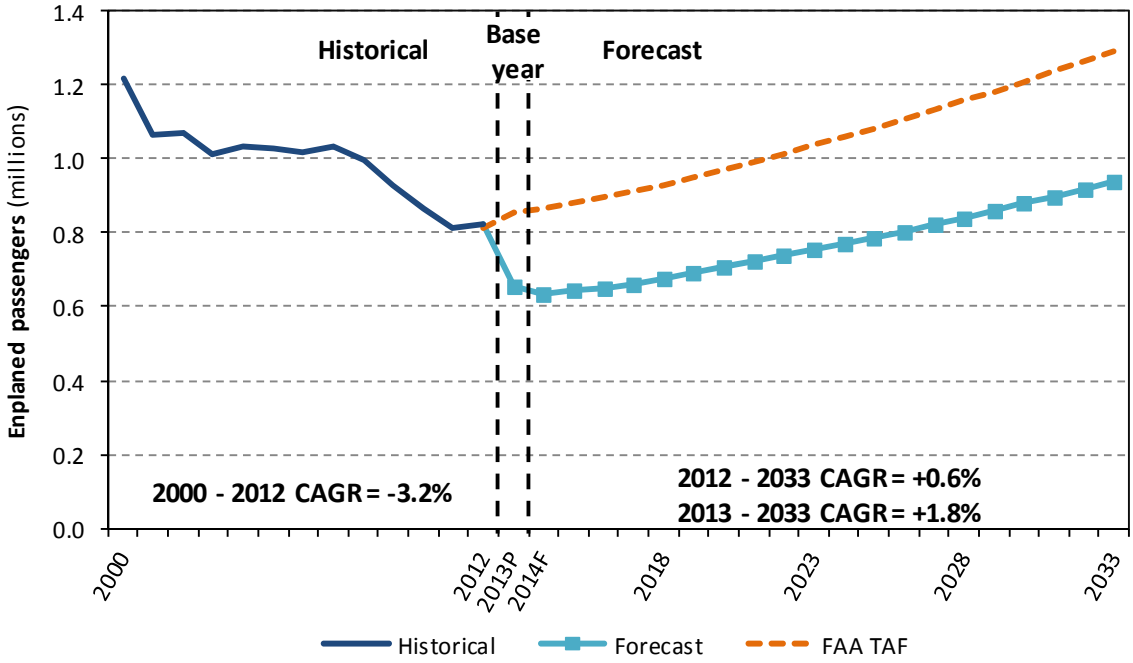
Figure 3-1 presents a chart showing annual enplaned passengers at COS—actuals for 2000 through 2012, a projection for 2013, and forecasts for 2014 through 2033, compared with the FAA 2013 TAF for the Airport.

The enplaned passenger forecasts are substantially lower than the TAF in 2013 and all subsequent years. The primary reason is a projected 20% decline in enplanements in 2013 due largely to the termination of service in April by Frontier Airlines.[1] Because of the 20% decline in 2013 enplanements, 2013 was adopted as the

[1] This forecast update was prepared in advance of the Alaska Airlines announcement of their intention to operate a nonstop flights between Colorado Springs and Seattle beginning in November 2013. Accordingly, the estimate for 2013 does not include the increase that may be expected as a result of this new service offering.

base year of the passenger forecast presented herein.[2]

Figure 3-1
COMPARISON O F ENPLANED PASSENGER F ORECASTS
Colorado Springs Airport



This forecast was prepared on the basis of the information and assumptions given in the text. The achievement of any forecast is dependent upon the occurrence of future events which cannot be assured. Therefore, the actual results may vary from the forecast, and the variance could be material.
CAGR = Compound annual growth rate
P=Projected; F=Forecast.
Sources: Historical: Colorado Springs Airport records.
Projected and Forecast: LeighFisher, June 2013.

The enplaned passenger average growth rate of 1.8% per year from 2013 to 2033 is somewhat lower than the increase forecast by the FAA in its TAF for the Airport—an average of 2.1% per year from Federal Fiscal Year (FFY) 2013 to FFY 2033.[3] The forecast update growth rate is lower as it is based on a "bottom-up" forecast of aviation demand. In other words, the Airport has prepared this forecast evaluating the individual airlines serving Colorado Springs, the markets they serve, and the characteristics of the local and regional economy. A more detailed comparison of the enplaned passenger forecast and the FAA TAF is presented in Appendix B.

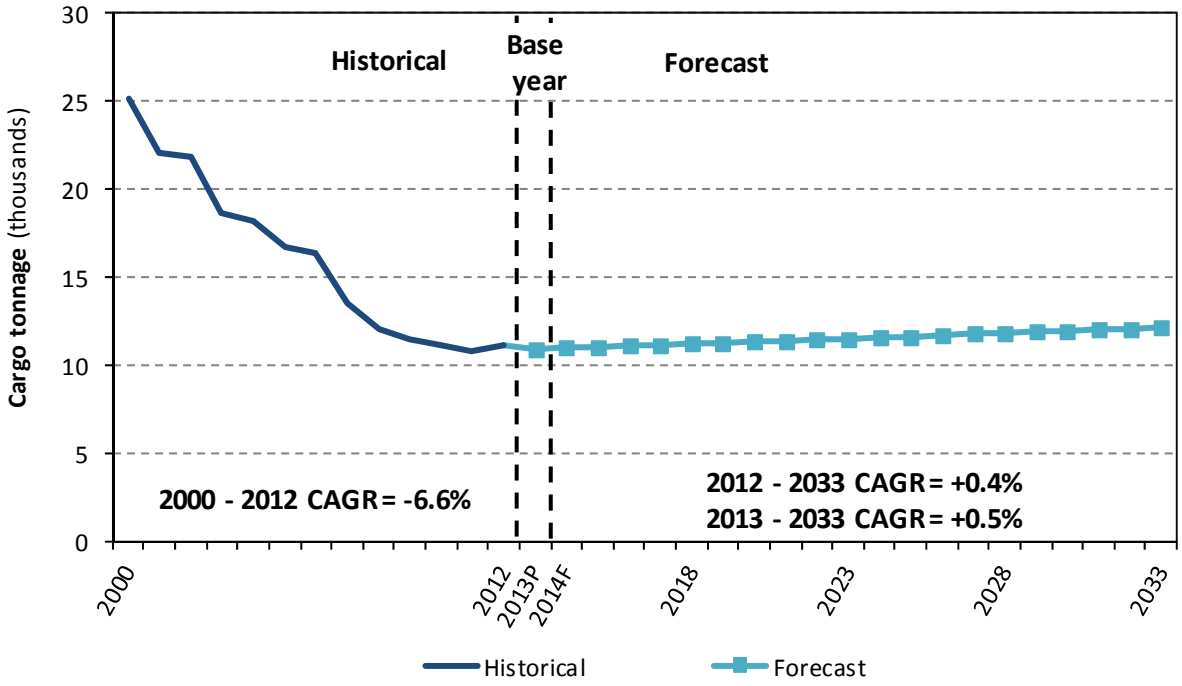
[2] The year 2013 was selected as the base year for the forecast as a more reasonable starting point for future activity given the 20% decline is expected to result in approximately 167 thousand fewer enplanements in 2013 relative to 2012.

[3] The Federal Fiscal Year begins on October 1 and ends on September 30.

Air Cargo

Figure 3-2 presents a chart showing historical air cargo tonnage for 2000 through 2012, a projection for 2013, and forecasts for 2014 through 2033. (The FAA does not prepare cargo forecasts for individual airports as part of the TAF.) Since 2000, the cargo industry nationwide and at COS has experienced significant changes related to: (1) the events of September 11, 2001; (2) the effects of the national and global economic recessions; (3) consolidation in the air cargo industry; (4) replacement of mainline aircraft with flights operated by smaller regional aircraft; and (5) an increasing trend in the volume of cargo transported by truck. All-cargo carriers transported virtually all cargo at the Airport in recent years and are forecast to account for all air cargo at the Airport through 2033. The cargo transported to and from the Airport is forecast to dip slightly (down 1.9%) in 2013 and then increase an average of 0.5% per year from 2013 to 2033.

Figure 3-2
FORECAST OF TOTAL (ENPLANED + DEPLANED) CARGO
Colorado Springs Airport

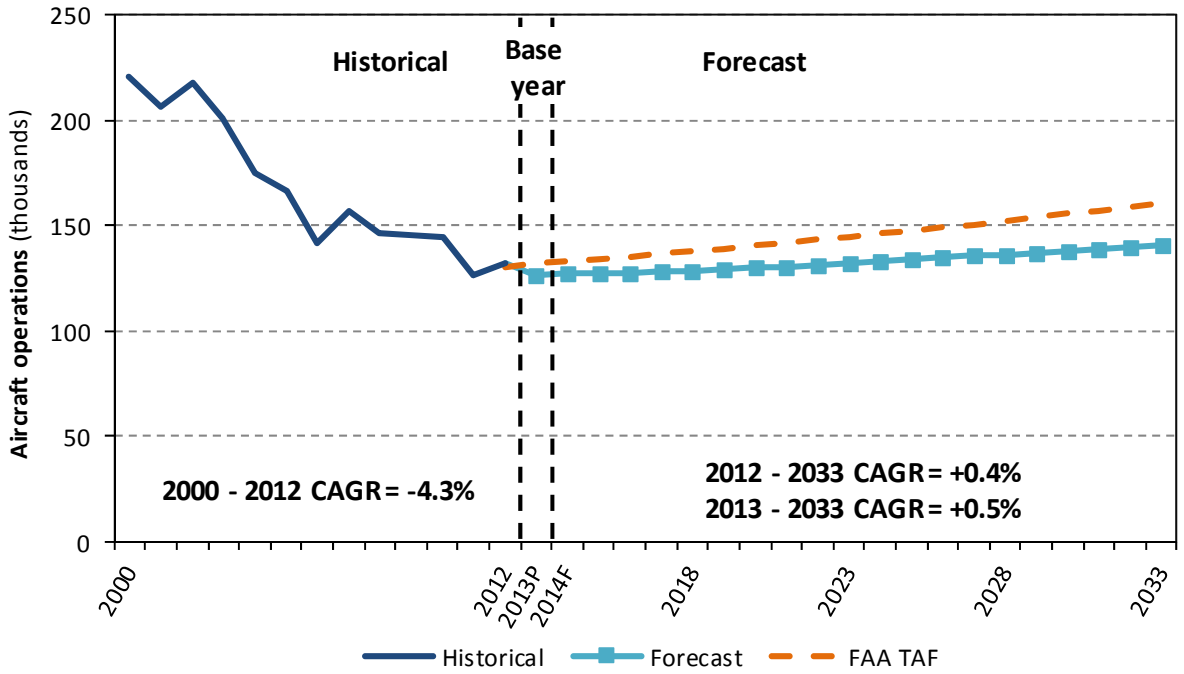


This forecast was prepared on the basis of the information and assumptions given in the text. The achievement of any forecast is dependent upon the occurrence of future events which cannot be assured. Therefore, the actual results may vary from the forecast, and the variance could be material.
CAGR = Compound annual growth rate
P=Projected; F=Forecast.
Sources: Historical: Colorado Springs Airport records.

Aircraft Operations

Figure 3-3 presents a chart showing historical total aircraft operations for 2000 through 2012, a projection for 2013, and forecasts for 2014 through 2033, compared with the FAA TAF for the Airport. (Total aircraft operations include air carrier, air taxi and commuter, general aviation, and military takeoffs and landings.) The aircraft operations forecasts are somewhat lower than the TAF (e.g., -6.8% in 2018 and -8.7% in 2023). The forecast average growth rate in total aircraft operations of 0.5% per year between 2013 and 2033 is lower than the rate forecast by the FAA in its 2013 TAF for the Airport—an average of 1.0% per year from FFY 2013 to FFY 2033. A detailed comparison of the aircraft operations forecasts and the FAA TAF is presented in Appendix B.

Figure 3-3
COMPARISON OF TOTAL AIRCRAFT OPERATION FORECASTS
Colorado Springs Airport



This forecast was prepared on the basis of the information and assumptions given in the text. The achievement of any forecast is dependent upon the occurrence of future events which cannot be assured. Therefore, the actual results may vary from the forecast, and the variance could be material.
CAGR = Compound annual growth rate
P=Projected; F=Forecast.
Sources: Historical: Colorado Springs Airport records.
Projected and Forecast: LeighFisher, June 2013.

Forecast Update Summary

Table 3-1provides a summary of the forecast update in terms of enplaned passengers, air cargo tonnage, and aircraft operations. For further information on each of these individual forecasts, see Appendix B.

Table 3-1
FORECAST UPDATE SUMMARY
Colorado Springs Airport

	Historical		Projected	Forecast			
	2011	2012	2013	2018	2023	2028	2033
Enplaned passengers							
Mainline *(a)*	231,524	232,538	227,200	246,200	266,200	283,200	305,200
Regional affiliate	435,996	395,893	383,000	407,000	457,000	515,000	576,000
Low-cost carriers	146,816	193,577	44,800	21,800	30,800	42,800	58,800
Total	**814,336**	**822,008**	**655,000**	**675,000**	**754,000**	**841,000**	**940,000**
Compound annual growth rate		0.9%	(20.3%)	0.6%	2.2%	2.2%	2.3%
Air cargo (tons)							
All-Cargo airlines							
Integrated carrier	10,683	10,997	10,750	11,030	11,320	11,620	11,920
Regional feeder	143	138	175	180	185	190	195
Total *(b)*	**10,826**	**11,135**	**10,925**	**11,210**	**11,505**	**11,810**	**12,115**
Compound annual growth rate		2.9%	(1.9%)	0.5%	0.5%	0.5%	0.5%
Aircraft operations							
Passenger airlines	29,116	27,500	22,360	22,380	24,700	27,260	30,020
All-cargo airlines	1,760	2,040	1,700	1,860	1,910	1,960	2,020
A/DACG	n.a.	552	500	500	500	500	500
General aviation	54,049	56,094	57,360	58,450	59,580	60,730	61,920
Military	36,444	41,278	41,280	41,280	41,280	41,280	41,280
Other *(c)*	4,773	4,494	4,000	4,250	4,500	4,750	5,000
Total	**126,142**	**131,958**	**127,200**	**128,720**	**132,470**	**136,480**	**140,740**
Compound annual growth rate		4.6%	(3.6%)	0.2%	0.6%	0.6%	0.6%

This forecast was prepared on the basis of the information and assumptions given in the text. The achievement of any forecast is dependent upon the occurrence of future events which cannot be assured. Therefore, the actual results may vary from the forecast, and the variance could be material.

(a) Includes charters. In calendar year 2012, charter enplaned passengers represented less than 0.3% of total enplaned passengers. Accordingly, charters do not materially affect the forecast of passenger activity.
(b) Includes enplaned and deplaned cargo in tons.
(c) Includes nonscheduled and empty flights. Other operations accounted for an average of 3.2% of total operations in 2011 and 2012 and are assumed to account for 3.2%-3.6% in future years.

Source: Historical: Colorado Springs Airport records. Projected and Forecast: LeighFisher, June 2013.

ORIGINAL FORECAST (2010)

Forecasts of aviation activity are presented for enplaned passengers, air cargo tonnage and aircraft operations, including passenger, all-cargo, general aviation, and military operations. Using calendar year 2009 as the base year, annual forecasts were prepared for five future demand years—2011, 2014, 2019, 2029, and 2035.[4] In addition, aviation activity for 2010 was estimated based on year to date activity (January through May 2010) available when this report was prepared.

Forecast Process and Approach

The COS Master Plan forecasts were prepared using a collaborative process which included: (1) a review of the Federal Aviation Administration (FAA) 2009 TAF for the Airport; (2) the collection and analysis of data related to the key issues and trends affecting future aviation demand at COS; (3) the development of statistical models to identify historical causal factors; (4) the analysis of passenger traffic leakage from COS to Denver International Airport; (5) supplemental analyses to evaluate data for benchmark airports; and (6) coordination with representatives of the Airport Project Board[5], the Airport Advisory Commission[6], the FAA, and key stakeholders at the Airport.

The approach used in developing forecasts for COS included consideration of the Airport service region and the role of the Airport in providing commercial passenger service and recent trends in airline service development at the Airport. In particular:

- The enplaned passenger forecasts were developed using a variety of analytical tools, including trend analysis, regression models, and market share analysis, to address the key components of aviation activity and the Airport's share of total regional passenger demand. In addition, recent airline service development at the Airport was considered in the preparation of the passenger forecasts.

- The air cargo forecasts were developed based on a review of the recent trends, an evaluation of key components of air cargo activity (i.e., enplaned and deplaned cargo (freight and mail) for all-cargo and passenger airlines), and coordination with a key cargo tenant.

- The aircraft operations forecasts were derived from the forecasts of passenger and cargo activity for the Airport. Forecasts of aircraft operations were developed by (1) disaggregating the total demand into the

[4] The forecasts were prepared through 2035 to be consistent with local socioeconomic projections prepared by the State of Colorado's Department of Local Affairs (DOLA).

[5] Airport Project Board includes key airport staff, including the Aviation Director, the Assistant Aviation Directors, and the Airport Planning and Development Manager.

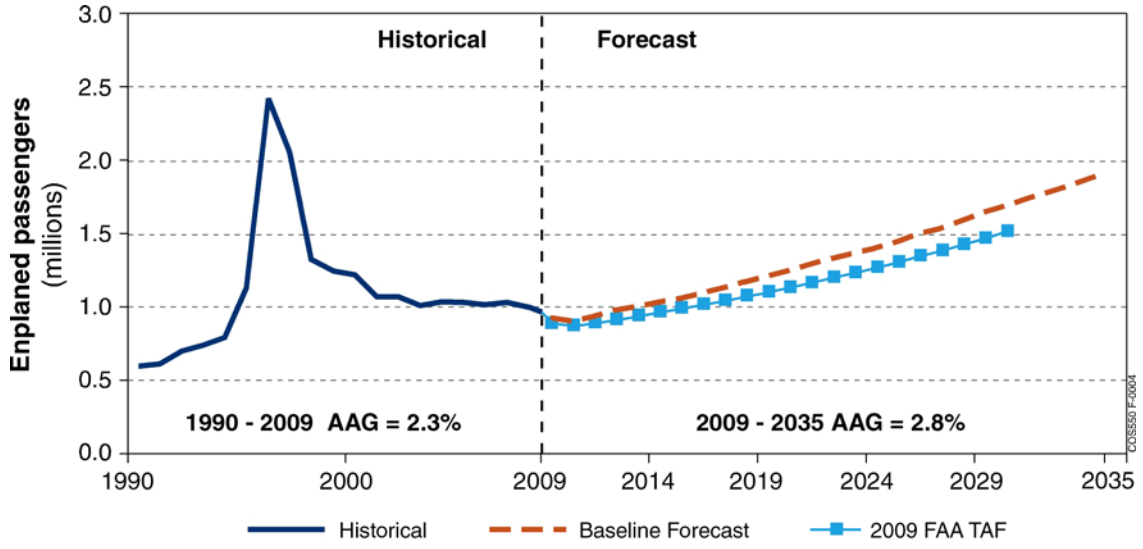
[6] Airport Advisory Commission includes seven members appointed by the City Council who can, among other duties, provide advice relating to the Airport Master Plan and its implementation.

components (i.e., domestic and international, mainline (air carrier) and regional affiliate) and (2) making assumptions about average aircraft size in terms of seats per departure and average enplaned passenger load factors (percentage of seats occupied, on average) for future years. In addition, the future aircraft fleet plans of the airlines serving COS were also considered based on available information.

Enplaned Passengers

Figure 3-4 presents historical enplaned passengers for 1990 through 2009 and forecasts for 2010 through 2035, compared with the FAA 2009 TAF for the Airport. The enplaned passenger forecasts are based on 2009 data and are within 7.2% of the FAA 2009 TAF in 2014 and 10.4% in 2019. The enplaned passenger average growth rate of 2.8% per year between 2009 and 2035 is slightly higher than the rate forecast by the FAA in its 2009 TAF for the Airport—an average of 2.6% per year from Federal Fiscal Year (FFY) 2009 to FFY 2030.[7] A detailed comparison of the enplaned passenger forecasts and the FAA 2009 TAF is presented later in this chapter.

Figure 3-4
ORIGINAL ENPLANED PASSENGER FORECAST V. FAA TAF
Colorado Springs Airport



The forecasts presented in this figure were prepared using the information and assumptions given in the accompanying text. Inevitably, some of the assumptions used to develop the forecasts will not be realized and unanticipated events and circumstances may occur. Therefore, there are likely to be differences between the forecast and actual results, and those differences may be material.

AAG = Average annual compound growth

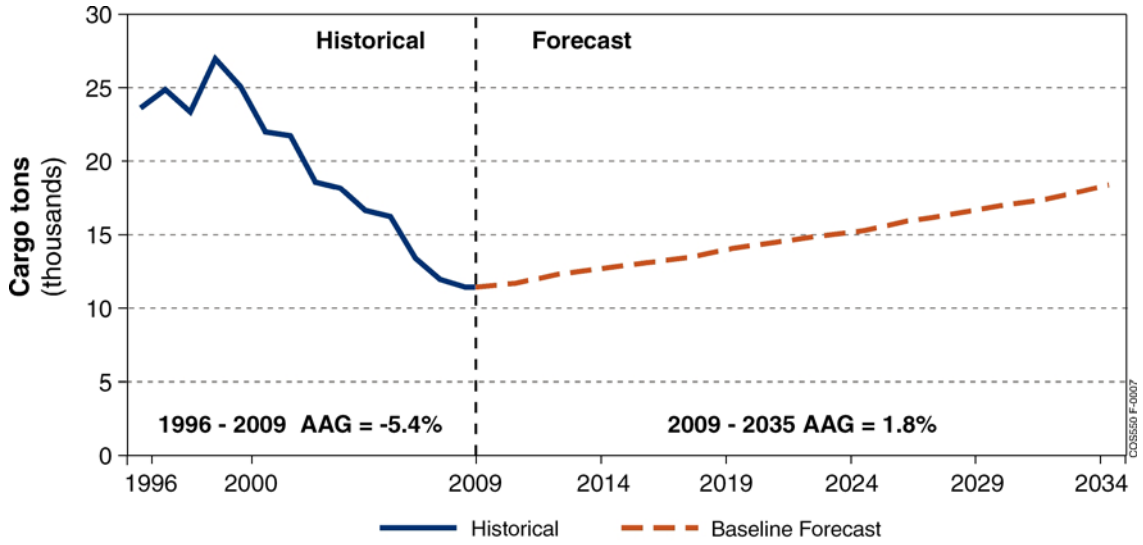
Sources: Historical: Colorado Springs Airport records.
2009 FAA TAF: U.S. Department of Transportation, Federal Aviation Administration, Terminal Area Forecasts, www.faa.gov.
Baseline Forecast: LeighFisher, June 2010.

[7] The Federal Fiscal Year begins on October 1 and ends on September 30.

Air Cargo

Figure 3-5 presents historical air cargo tonnage for 1996 through 2009 and forecasts for 2010 through 2035. (The FAA does not prepare cargo forecasts for individual airports as part of the TAF.) Since 2000, the cargo industry nationwide and at COS has experienced significant changes related to: (1) the events of September 11, 2001; (2) consolidation in the air cargo industry; (3) an increasing trend in the volume of cargo transported by truck; and (4) the current national and global economic recessions. All-cargo airlines are forecast to account for approximately 99% of total air cargo at the Airport through 2035, consistent with historical trends. The cargo transported on all-cargo airlines is forecast to increase an average of 1.8% per year between 2009 and 2035, compared with an average forecast increase of 1.7% per year for passenger airlines during the same period. Together, the total cargo tonnage (both all-cargo and passenger airlines) average increase is 1.8% for the Airport as shown on Figure 3-5.

Figure 3-5
ORIGINAL TOTAL AIR CARGO FORECASTS
Colorado Springs Airport



The forecasts presented in this figure were prepared using the information and assumptions given in the accompanying text. Inevitably, some of the assumptions used to develop the forecasts will not be realized and unanticipated events and circumstances may occur. Therefore, there are likely to be differences between the forecast and actual results, and those differences may be material.

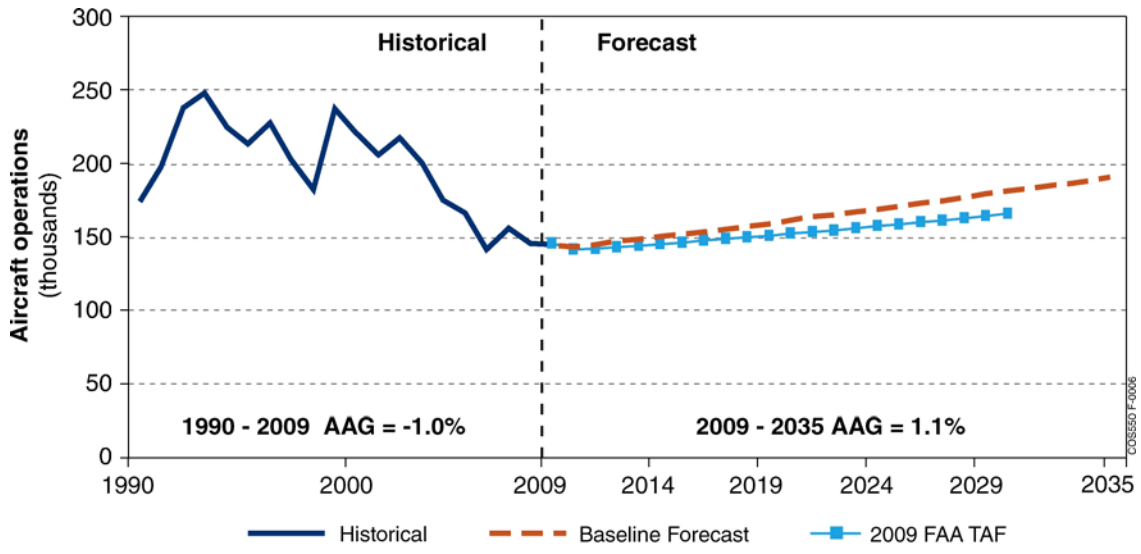
AAG = Average annual compound growth

Sources: Historical: Colorado Springs Airport records.
Forecast: LeighFisher, June 2010.

Aircraft Operations

Figure 3-6 presents historical total aircraft operations for 1990 through 2009 and forecasts for 2010 through 2035, compared with the FAA 2009 TAF for the Airport. (Total aircraft operations include air carrier, air taxi and commuter, general aviation, and military takeoffs and landings.) The aircraft operations forecasts are based on 2009 data and are within 3.6% of the FAA 2009 TAF in 2014 and 6.0% in 2019. The forecast average growth rate in total aircraft operations of 1.1% per year between 2009 and 2035 is higher than the rate forecast by the FAA in its 2009 TAF for the Airport—an average of 0.6% per year from FFY 2009 to FFY 2030. A detailed comparison of the aircraft operations forecasts and the FAA 2009 TAF is presented later in this chapter.

Figure 3-6
ORIGINAL TOTAL AIRCRAFT OPERATION FORECAST V. FAA TAF
Colorado Springs Airport



The forecasts presented in this figure were prepared using the information and assumptions given in the accompanying text. Inevitably, some of the assumptions used to develop the forecasts will not be realized and unanticipated events and circumstances may occur. Therefore, there are likely to be differences between the forecast and actual results, and those differences may be material.

AAG = Average annual compound growth

Sources: Historical: Colorado Springs Airport records.
2009 FAA TAF: U.S. Department of Transportation, Federal Aviation Administration, Terminal Area Forecasts, www.faa.gov.
Baseline Forecast: LeighFisher, June 2010.

Airport Service Region

The primary area of the Airport service region, both in terms of population and geography, is defined as the Colorado Springs Metropolitan Statistical Area (MSA). The population densities of the Colorado Springs MSA are shown on Figure 3-7 and reflect the importance of El Paso and Teller counties in generating passenger

demand at the Airport. In 2009, the population of the Colorado Springs MSA was 626,227 as shown in Table 3-2, with El Paso County accounting for 96.5% of the primary area. Because economic growth and activity within the primary area stimulate a significant portion of passenger demand at the Airport, statistics for the Colorado Springs MSA were used to evaluate aviation activity trends at the Airport.

The secondary area served by the Airport, which includes many of the counties surrounding the Colorado Springs MSA, is defined by the location of and driving distance to other air carrier airports, as well as by the availability, price, and quality of airline service at those other airports. Denver International Airport, located approximately 81 road miles to the north of COS, limits the secondary service area in that direction, and is the only other competitive air carrier airport within a "reasonable" driving distance from Colorado Springs. Denver is a large hub airport with more than 800 daily departures and is served by low cost carriers, including Southwest and Frontier airlines. The northernmost counties in COS's secondary area (Douglas, Elbert, Jefferson, and Park counties) are also part of the primary area of the Airport service region for Denver International Airport.

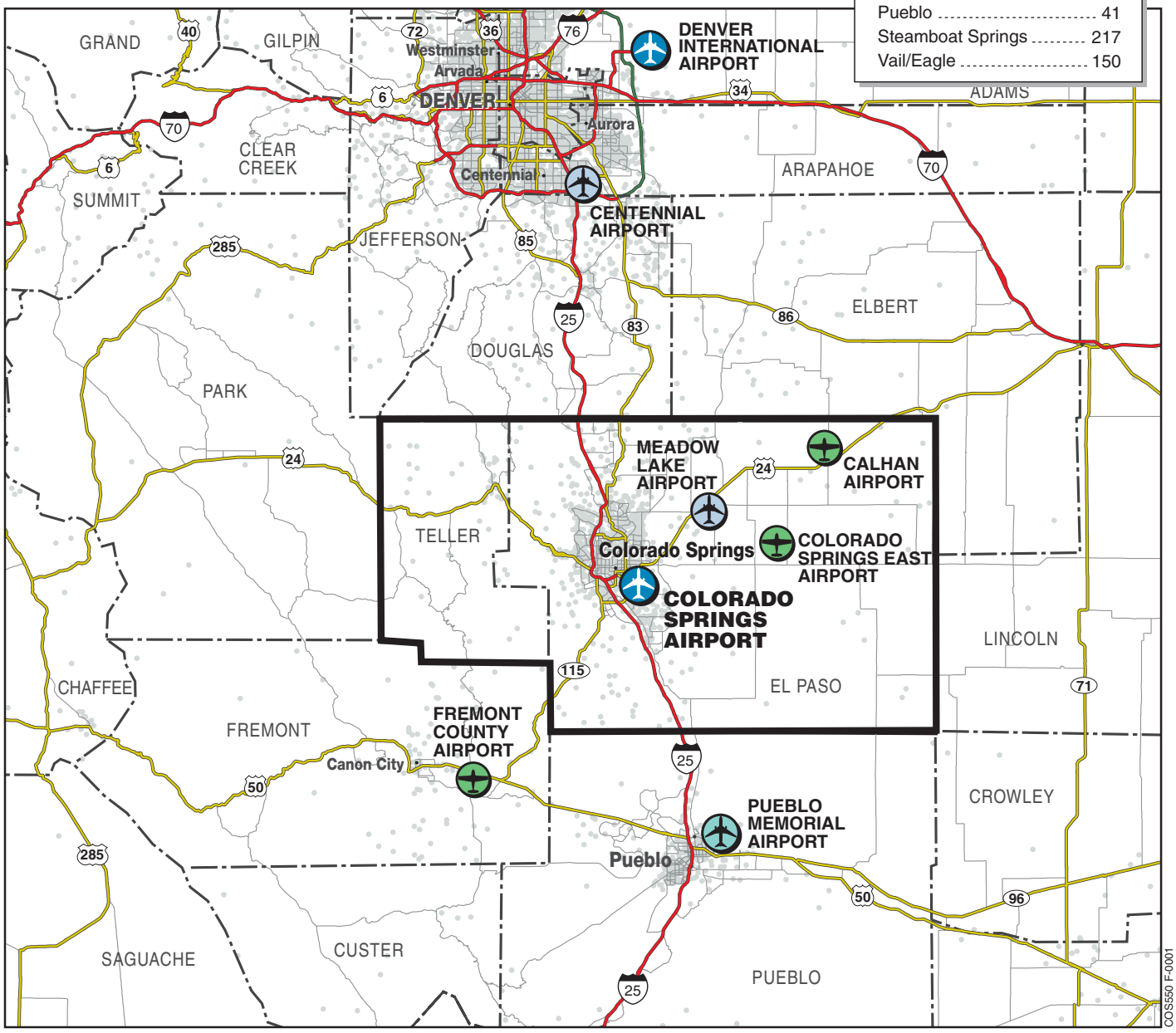
Table 3-2
AIRPORT SERVICE REGION POPULATION

Metropolitan Statistical Area/County	2009 Population	Percent of total
Primary area		
Colorado Springs MSA		
El Paso	604,542	35.4%
Teller	21,685	1.3
	626,227	36.7%
Secondary area		
Jefferson *(a)*	536,922	31.4%
Douglas *(a)*	288,225	16.9
Pueblo	157,224	9.2
Fremont	47,815	2.8
Elbert *(a)*	23,287	1.4
Park *(a)*	16,762	1.0
Lincoln	5,169	0.3
Crowley	6,403	0.4
	1,081,807	63.3%
Total Airport Service Region	1,708,034	100.0%

(a) Included in the primary area of the Airport service region for Denver International Airport.

Source: U.S. Department of Commerce Bureau of the Census, www.census.gov, accessed June 2010.

Road miles from Colorado Springs to:	
Aspen	251
Boulder	108
Centennial	69
Denver	81
Durango	311
Fort Collins	144
Grand Junction	297
Gunnison	169
Loveland	132
Pueblo	41
Steamboat Springs	217
Vail/Eagle	150



LEGEND

- Primary service area
- Population density: 1 dot equals 500 people
- County boundary
- Primary commercial service airport
- Nonprimary commercial service airport
- Reliever airport
- General aviation airport

Source: U.S. 2000 Census data.

Figure 3-7
AIRPORT SERVICE REGION
Colorado Springs Airport
July 2010

Leigh|Fisher
Management Consultants

No other airports within a reasonable driving distance currently provide a competitive level of service. Other than Denver International Airport, the nearest airports providing competitive service are in Wichita (515 miles east), Kansas City (595 miles east), Albuquerque (378 miles south), and Salt Lake City (580 miles west). Other airports in the State of Colorado, such as those in Aspen, Durango, Grand Junction, Gunnison, Montrose, Pueblo, Steamboat Springs, and Vail/Eagle County, currently provide only regional/commuter airline service. Seasonal air carrier service is also provided from some of those airports.

AIRPORT ROLE

Colorado Springs Airport plays an important role in the national, state, and local air transportation systems. Colorado Springs Airport is a primary commercial service airport for the State of Colorado, supports a large origin-destination passenger base, and is home to Peterson Air Force Base. As a result of these different roles, the Airport is a significant catalyst to the regional economy.

Primary Commercial Service Airport in Colorado

Of the 14 commercial service airports in Colorado, the Airport accounted for approximately 4% of the passengers enplaned in the State and is one of the primary commercial service airports in Colorado, as shown in Table 3-3. Denver International Airport is the largest commercial service airport in Colorado, with 23.9 million enplaned passengers in 2009, compared to 929,600 enplaned passengers at Colorado Springs Airport.

Large Origin-Destination Passenger Base

Colorado Springs Airport is primarily an origin-destination (O&D) airport. In 2009, approximately 97% of the Airport's 929,600 enplaned passengers originated in Colorado Springs (i.e., these originating passengers did not connect with another flight at the Airport). The top 20 domestic O&D passenger markets in 2009 are shown on Figure 3-8, which together accounted for 60.9% of the total scheduled airline originating passengers at the Airport. The average number of daily nonstop departures from the Airport by the scheduled airlines in June 2010 is also shown. Washington, D.C. and Las Vegas are the top two destination markets for originating passengers at the Airport, accounting for 7.1% and 6.2%, respectively, of the originating passengers at the Airport in 2009.

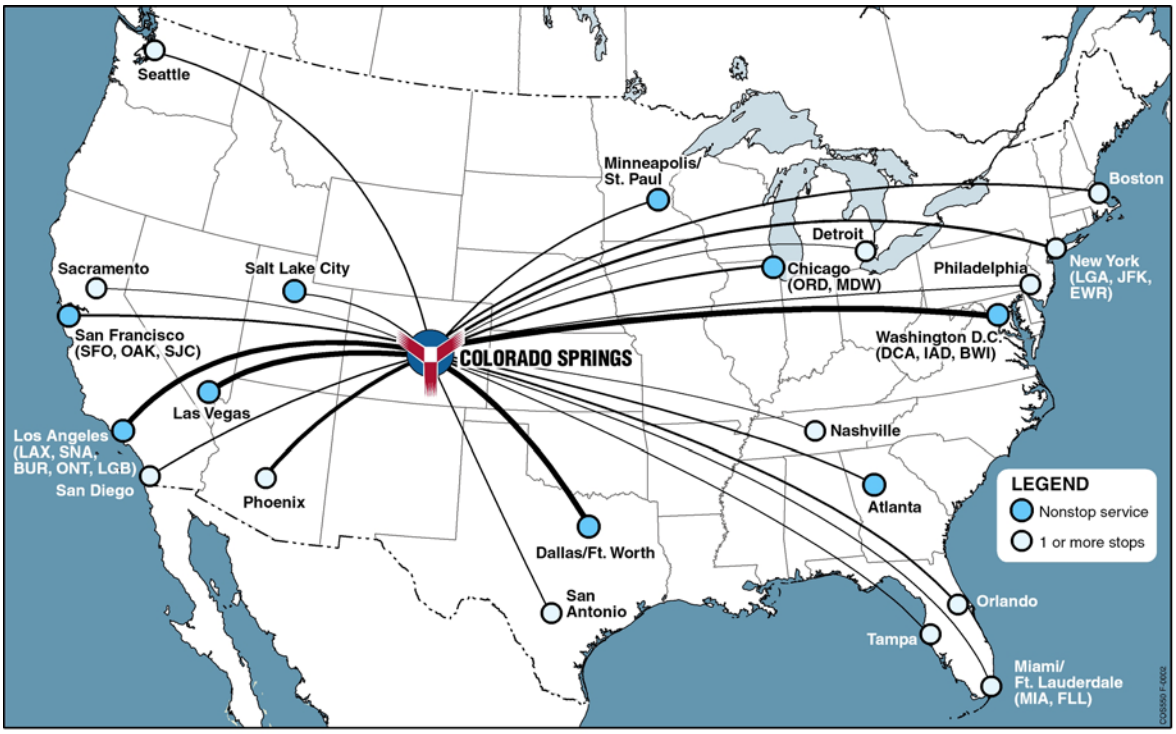
Peterson Air Force Base

Peterson Air Force Base, located on the northside of the Airport, is home to several military units, hosted by the Air Force 21st Space Wing.[8] Units at the base include: the Air Force Reserve 302nd Airlift Wing, which operates the C-130 Hercules aircraft and the Colorado National Guard 200th Airlift Squadron and the Air Force 311th Airlift Squadron which both operate the C-21 aircraft. According to a FFY 2009

[8] Peterson Air Force Base is a tenant of the Colorado Springs Airport.

Economic Impact Analysis prepared by the 21st Space Wing, the total economic impact of the Peterson Complex[9] was $1.2 billion in FFY 2009, including an annual payroll of over $500.9 million, approximately $516.5 million in annual expenditures for construction services and procurement of materials, equipment and supplies, and an estimated $217.1 million in annual payroll for the indirect jobs created in the regional economy.

Figure 3-8
DOMESTIC ORIGIN-DESTINATION PATTERNS AND NONSTOP SERVICE
Colorado Springs Airport



Notes: The thickness of each line corresponds to the number of originating passengers between Colorado Springs and each destination.
Originating passenger data are for the 12 months ended June 30, 2009.
Airline service is as of July 1, 2010.

Source: U.S. Department of Transportation, *Origin-Destination Survey of Airline Passenger Traffic, Domestic*, online (OD1B) database, accessed February 2010 and Official Airline Guides, Inc., online database, accessed June 2010.

9 The Peterson Complex includes Peterson Air Force Base, Cheyenne Mountain Air Station, and four major military headquarters—the North American Aerospace Defense Command (NORAD), the U.S. Northern Command, the Air Force Space Command and the Army Strategic Command.

Table 3-3
COLORADO COMMERCIAL SERVICE AIRPORTS

Colorado Airport	2009 Enplaned passengers	Share of State's passengers	2009 Average daily departures: Air carrier	Regional jet	Turboprop	Total
Colorado Springs	929,600	3.6%	7	30	8	44
Denver International	23,892,109	92.2	480	201	129	810
Grand Junction-Walker Field	228,810	0.9	*(a)*	8	9	17
Aspen-Pitkin County	216,405	0.8	-	9	8	17
Eagle County Regional	181,436	0.7	4	-	2	6
Hayden-Steamboat Springs	122,438	0.5	2	3	1	6
Durango-La Plata County	148,049	0.6	-	3	9	12
Montrose Regional	92,125	0.4	1	2	4	7
Gunnison-Crested Butte Regional	42,104	0.2	*(a)*	1	2	3
Fort Collins-Loveland Municipal	31,050	0.1	*(a)*	--	--	--
Telluride Regional	6,522	0.0	--	--	2	2
Cortez Municipal	7,694	0.0	--	--	3	3
San Luis Valley Regional	6,267	0.0	--	--	3	3
Pueblo Memorial	5,155	0.0	--	--	3	3
Total Colorado airports	25,909,764	100.0%	493	257	181	931

Note: Includes airports with scheduled passenger service in 2009.

(a) Less than one daily departure.

Sources: U.S. Department of Transportation, T-100 database, Colorado Springs Airport records, and Official Airline Guides, Inc., online database, accessed June 2010.

ECONOMIC BASIS FOR AVIATION DEMAND

The economy of the Colorado Springs MSA is an important determinant of long-term passenger demand at the Airport. The development and diversity of the economic base of an airport service region are both important to future passenger traffic growth. The Colorado Springs MSA has a diverse population and economic base and is an important center of business, military and government activity.

The following sections present a discussion of the economic basis for airline traffic at the Airport—the historical population, nonagricultural employment, and per capita income of the Colorado Springs MSA, comparative unemployment rates, the military installations in the Colorado Springs MSA, and tourism. Also provided is a summary of the economic outlook for the United States, Colorado, and the Colorado Springs MSA.

Socioeconomic Trends

Table 3-4 presents comparative trends in population, nonagricultural employment, and per capita personal income in the Colorado Springs MSA, the State of Colorado, and the United States in 1980, 1990, and from 2000 through 2009.

Population

Historically, population growth in the Colorado Springs MSA and the State has exceeded that in the nation. From 1980 to 2009, population in the Colorado Springs MSA increased an average of 2.4% per year, compared with an average increase of 1.9% per year in the State and 1.1% per year in the nation. Since 2000, population growth in the Colorado Springs MSA and the State has slowed—increasing an average of 1.7% per year between 2000 and 2009, compared with an average increase of 1.0% in the nation.

Employment

From 1980 to 2000, nonagricultural employment in the Colorado Springs MSA increased an average of 4.4% per year, faster than that for the State (an average of 2.9% per year) and the nation (an average of 1.9% per year). Since 2000, nonagricultural employment in the Colorado Springs MSA and the nation has decreased an average of 0.1% per year, compared with an average increase of 0.2% per year in the State. Nonagricultural employment growth during the past 9 years reflects the effects of the national economic recession in 2001 and the current economic recession which started in December 2007.

Income

From 1980 to 2000, per capita income in the Colorado Springs MSA, the State, and the nation increased at similar rates—an average of 2.2% per year, 2.1% per year, and 1.8% per year, respectively. Since 2000, the growth in per capita income has slowed. Per capita income in the Colorado MSA increased an average of 0.1% per year between 2000 and 2009, compared with an average decrease of 0.3% per year in the State and an average increase of 0.4% per year in the nation.

Table 3-4
HISTORICAL SOCIOECONOMIC DATA

	Population (thousands) *(a)*			Nonagricultural employment (thousands) *(b)*			Per capita income in 2000 dollars *(c)*		
	Colorado Springs MSA	State of Colorado	United States	Colorado Springs MSA *(d)*	State of Colorado	United States	Colorado Springs MSA *(e)*	State of Colorado	United States
1980	317	2,890	226,546	106	1,251	90,528	19,733	22,536	21,151
1990	409	3,294	248,710	157	1,521	109,487	23,175	25,633	25,593
2000	537	4,301	281,422	250	2,214	131,785	30,371	34,189	30,399
2001	557	4,433	285,082	252	2,227	131,826	30,069	34,319	30,283
2002	566	4,504	287,804	248	2,184	130,341	29,630	33,524	30,115
2003	572	4,549	290,326	244	2,153	129,999	29,248	32,902	30,201
2004	580	4,600	293,046	248	2,180	131,435	29,682	33,412	30,886
2005	588	4,661	295,753	253	2,226	133,703	30,193	33,995	31,234
2006	601	4,753	298,593	259	2,279	136,086	30,521	34,934	32,201
2007	607	4,842	301,580	261	2,331	137,598	31,085	35,254	32,716
2008	617	4,935	304,375	259	2,350	136,790	30,569	34,409	32,125
2009	626	5,025	307,007	248	2,244	130,920	n.a.	33,185	31,414
	Percent increase (decrease)			Percent increase (decrease)			Percent increase (decrease)		
2000-2001	3.6	3.1	1.3	1.0	0.6	0.0	(1.0)	0.4	(0.4)
2001-2002	1.7	1.6	1.0	(1.7)	(1.9)	(1.1)	(1.5)	(2.3)	(0.6)
2002-2003	1.1	1.0	0.9	(1.4)	(1.4)	(0.3)	(1.3)	(1.9)	0.3
2003-2004	1.3	1.1	0.9	1.4	1.2	1.1	1.5	1.5	2.3
2004-2005	1.5	1.3	0.9	2.0	2.1	1.7	1.7	1.7	1.1
2005-2006	2.2	2.0	1.0	2.2	2.4	1.8	1.1	2.8	3.1
2006-2007	1.0	1.9	1.0	1.0	2.3	1.1	1.8	0.9	1.6
2007-2008	1.6	1.9	0.9	(0.8)	0.8	(0.6)	(1.7)	(2.4)	(1.8)
2008-2009	1.5	1.8	0.9	(4.0)	(4.5)	(4.3)	n.a.	(3.6)	(2.2)
	Average annual percent increase (decrease)			Average annual percent increase (decrease)			Average annual percent increase (decrease)		
1980-1990	2.6	1.3	0.9	4.0	2.0	1.9	1.6	1.3	1.9
1990-2000	2.8	2.7	1.2	4.7	3.8	1.9	2.7	2.9	1.7
1980-2000	2.7	2.0	1.1	4.4	2.9	1.9	2.2	2.1	1.8
2000-2009	1.7	1.7	1.0	(0.1)	0.2	(0.1)	0.1	(0.3)	0.4
1980-2009	2.4	1.9	1.1	3.0	2.0	1.3	1.6	1.3	1.4

Note: Colorado Springs MSA includes El Paso and Teller counties.

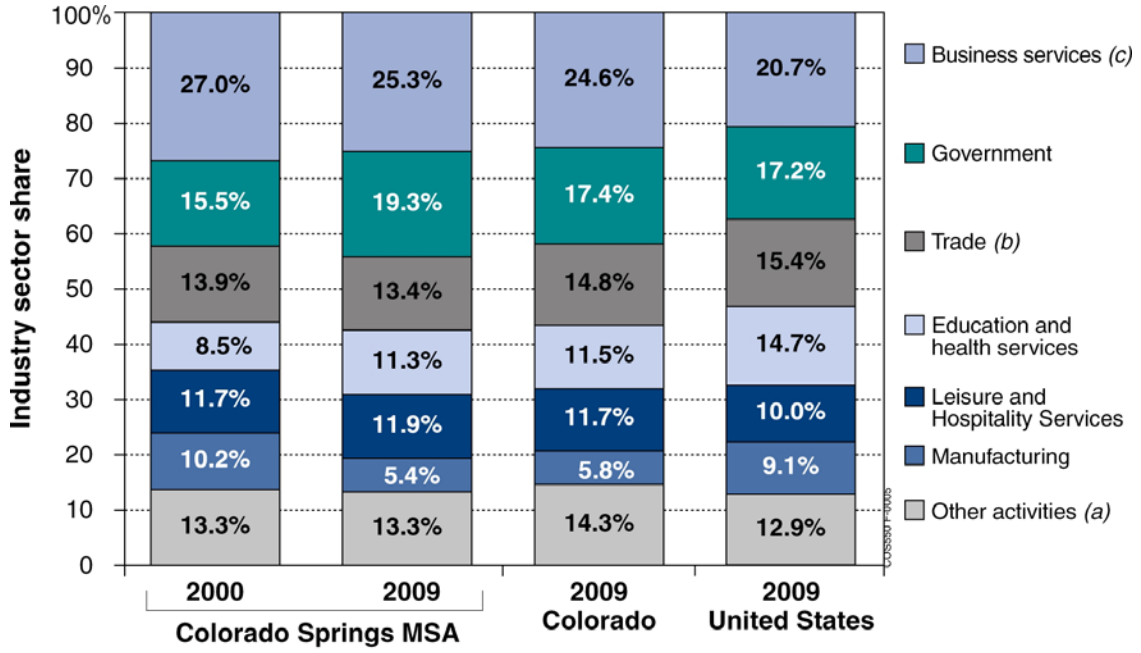
n.a. = Not available.

(a) Historical data from Colorado Department of Local Affairs, State Demography Office, and the U.S. Department of Commerce, Bureau of the Census, www.census.gov.
(b) Historical data from U.S. Department of Labor, Bureau of Labor Statistics, www.bls.gov.
(c) Historical data from U.S. Department of Commerce, Bureau of Economic Analysis, Regional Accounts Data, www.bea.gov.
(d) Data for nonagricultural employment in 1980 includes only El Paso County. Teller County population in 1980 was 8,034.
(e) Represents the average annual percent change through 2008 for per capita income.

Nonagricultural Employment by Industry Sector

Figure 3-9 shows a comparative distribution of nonagricultural employment by industry sector for the Colorado Springs MSA in 2000 and in 2009, and for the State and the nation in 2009.

Figure 3-9
COMPARATIVE DISTRIBUTION OF NONAGRICULTURAL EMPLOYMENT



(a) Other includes mining, logging and construction, transport and utilities, and other services.
(b) Includes wholesale and retail trade.
(c) Includes professional and business services, finance and information.

Source: U.S. Department of Labor, Bureau of Labor Statistics, www.bls.gov, accessed June 2010.

Business Services. Business services in the Colorado Springs MSA accounted for the largest share of nonagricultural employment, with 27.0% in 2000 and 25.3% in 2009. From 2000 to 2009, Colorado MSA employment in business services decreased an average of 0.7% per year, largely as the result of job losses in information services.[10]

Government. Employment by federal, state and local government agencies[11] increased an average of 2.4% per year between 2000 and 2009. The share of

[10] Information services includes traditional, Internet, and software publishing; the motion picture and sound recording industries; the broadcasting industries; the telecommunications industries; Web search portals, data processing industries; and the information services industries.

[11] As reported by the U.S. Department of Labor, Bureau of Labor Statistics, government employment includes only civilian employees.

government employment in the Colorado Springs MSA increased from 15.5% in 2000 to 19.3% in 2009. As discussed in the section "Major Employers", the City of Colorado Springs and El Paso County are among the 20 largest employers in Colorado Springs and are included in this sector.

Trade. Trade is comprised of wholesale and retail trade. From 2000 to 2009, Colorado MSA employment in trade decreased an average of 0.4% per year, reflecting larger decreases in wholesale trade than in retail trade. The share of trade employment in the Colorado Springs MSA decreased from 13.9% in 2000 to 13.4% in 2009.

Education and Health Services. Employment in education and health services in the Colorado MSA increased an average of 3.3% per year between 2000 and 2009 and was the fastest growing industry sector. As discussed in the section "Major Employers", seven of the largest employers in Colorado Springs are included in this sector, including two hospitals, four public school districts, and a university. The share of education and health services employment in the Colorado Springs MSA increased from 8.5% in 2000 to 11.3% in 2009.

Leisure and Hospitality Services. Colorado MSA employment in leisure and hospitality services increased an average of 0.2% per year between 2000 and 2009. The share of leisure and hospitality services in the Colorado MSA increased from 11.7% in 2000 to 11.9% in 2009. The Broadmoor Hotel is one of the 20 largest employers in Colorado Springs, as discussed in the section "Major Employers".

Manufacturing. Manufacturing employment in the Colorado Springs MSA decreased an average of 6.9% per year between 2000 and 2009 and experienced the largest employment losses of any industry sector. The manufacturing sectors in Colorado and the nation also experienced job losses between 2000 and 2009, decreasing an average of 4.1% per year during that period. The share of manufacturing employment in the Colorado MSA decreased from 10.2% in 2000 to 5.4% in 2009.

Other Activities. Other employment in the Colorado MSA decreased an average of 0.1% per year between 2000 and 2009, largely as the result of job losses in mining, logging, and construction. The share of other employment in the Colorado MSA remained unchanged between 2000 and 2009, with a 13.3% share.

Unemployment Rates

In addition to the employment trends cited above, the unemployment rate is also indicative of general economic conditions. Table 3-5 shows comparative annual unemployment rates in the Colorado Springs MSA, the State, and the nation as a whole for 2000 through 2009. The unemployment rate in the Colorado Springs MSA has followed the trends in the State, but exceeded the national rate from 2002 to 2006. Since 2006, the unemployment rates in the Colorado Springs MSA and the State have remained lower than the national rate.

Table 3-5
COMPARATIVE UNEMPLOYMENT RATES

	Colorado Springs MSA	State of Colorado	United States
2000	2.9%	2.7%	4.0%
2001	4.2	3.8	4.7
2002	6.1	5.7	5.8
2003	6.3	6.1	6.0
2004	5.8	5.6	5.5
2005	5.4	5.1	5.1
2006	4.7	4.4	4.6
2007	4.4	3.9	4.6
2008	5.7	4.9	5.8
2009	8.3	7.7	9.3

Note: Unemployment rates are for calendar years and not seasonally adjusted and represent annual averages.

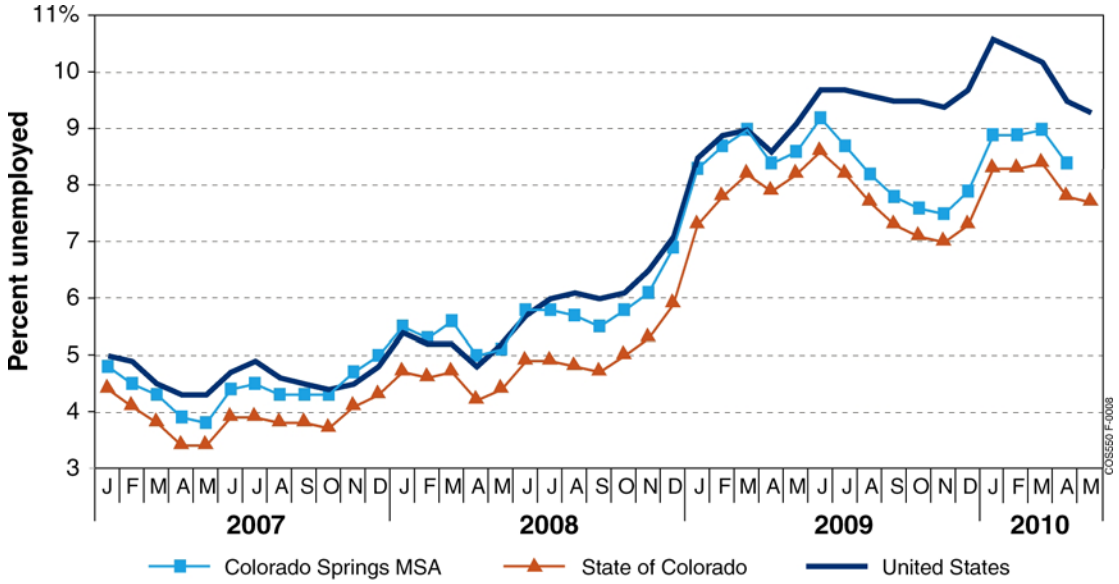
Source: U.S. Department of Labor, Bureau of Labor Statistics, www.bls.gov, accessed June 2010.

Since the beginning of the recession in December 2007, monthly unemployment rates in the Colorado Springs MSA, the State of Colorado, and the United States have increased, as shown on Figure 3-10. In April 2010, the Colorado Springs MSA unemployment rate (unadjusted) was 8.4%, higher than that for the State (7.8%) but lower than that for the nation (9.5%).

Major Employers

Table 3-6 lists the largest employers in Colorado Springs as of 2009. The list reflects the diversity of the companies and organizations in the region.

Figure 3-10
MONTHLY UNEMPLOYMENT RATES



Note: Unemployment rates are not seasonally adjusted.
Source: U.S. Department of Labor, Bureau of Labor Statistics, www.bls.gov, accessed April 2010.

Table 3-6
COLORADO SPRINGS LARGEST 20 EMPLOYERS

Rank	Company	Description
1	Fort Carson	Military installation
2	Peterson Air Force Base	Military installation
3	United States Air Force Academy	Military installation
4	Schriever Air Force Base	Military installation
5	Memorial Health Services	Healthcare
6	School District # 11 - Colorado Springs	Primary and secondary education
7	Penrose-St. Francis Health Services	Healthcare
8	School District # 20 - Air Academy	Primary and secondary education
9	City of Colorado Springs	Government
10	El Paso County	Government
11	Lockheed Martin Corporation	Aeronautical/defense contractor
12	Broadmoor Hotel, The	Hospitality
13	Colorado Springs Utilities	Utility
14	University of Colorado at Colorado Springs	Educational institution
15	Hewlett Packard	Computers/electronics
16	School District # 2 - Harrison	Primary and secondary education
17	Atmel Corporation	Computers/electronics
18	Progressive Insurance Company	Auto insurance
19	School District # 49 - Falcon	Primary and secondary education
20	Verizon Business	Telecommunications

Source: Colorado Springs Economic Development Corporation, December 2009.

Military Installations in the Colorado Springs MSA

The Colorado Springs MSA is home to four major military installations, including Fort Carson, the Peterson Complex, Schriever Air Force Base, and the United States Air Force Academy. The Peterson Complex includes Peterson Air Force Base, Cheyenne Mountain Air Station, and four major military headquarters—the North American Aerospace Defense Command (NORAD), the U.S. Northern Command, the Air Force Space Command and the Army Strategic Command. In addition, Buckley Air Force Base is located in Arapahoe County, 5 miles east of Denver. The four military installations in the Colorado Springs MSA employed 54,294 military and civilian personnel and contractors in 2009, as shown in Table 3-7. From 2001 to 2009, total employment at the four military installations in the Colorado Springs MSA increased an average of 3.4% per year, compared with an average decrease of 0.1% per year in total nonagricultural employment between 2000 and 2009 as discussed in "Employment." In 2009, Fort Carson accounted for the largest share of total employment at Colorado Springs MSA military installations, with 48%, followed by the Peterson Complex with 20%, the U.S. Air Force Academy with 18%, and Schriever Air Force Base with 14%.

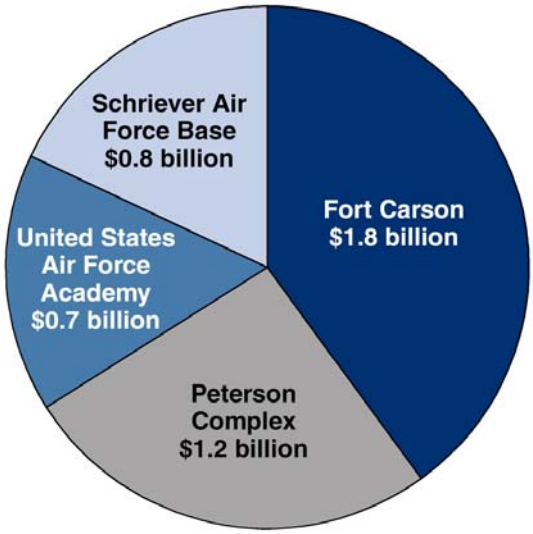
Table 3-7
MILITARY INSTALLATION EMPLOYMENT

	Fort Carson	Peterson Complex	United States Air Force Academy	Schriever Air Force Base	Total
Military personnel					
2001	15,159	5,542	6,410	2,107	29,218
2009	24,300	5,266	6,591	1,999	38,156
Civilian and contractors					
2001	2,888	4,427	3,168	1,971	12,454
2009	1,811	5,474	3,326	5,527	16,138
Total					
2001	18,047	9,969	9,578	4,078	41,672
2009	26,111	10,740	9,917	7,526	54,294
	Average annual percent increase (decrease)				
Military personnel	6.1%	(0.6%)	0.3%	(0.7%)	3.4%
Civilian and contractors	(5.7)	2.7	0.6	13.8	3.3
Total	4.7	0.9	0.4	8.0	3.4

Source: Colorado Springs Convention and Visitors Bureau (2001), Colorado Springs Chamber of Commerce, Department of Military Affairs Division (2009).

Military presence in an area is a significant driver of economic activity. According to the Greater Colorado Springs Chamber of Commerce, the four military installations in the Colorado Springs MSA had a total economic impact of $4.5 billion in FFY 2008, as shown on Figure 3-11. In addition, Buckley Air Force Base had an additional economic impact of $1.1 billion in FFY 2008.

Figure 3-11
TOTAL ECONOMIC IMPACT OF MILITARY INSTALLATIONS IN FFY 2008
Colorado Springs Airport



Total economic impact = $4.5 billion

Note: Includes direct, indirect, and induced economic impact.
The Peterson Complex includes Peterson Air Force Base, Cheyenne Mountain Air Station, and four major military headquarters—the North American Aerospace Defense Command (NORAD), the U.S. Northern Command, the Air Force Space Command and the Army Strategic Command
FFY = Federal Fiscal Year

Source: The Greater Colorado Springs Chamber of Commerce, Military Affairs Division, www.coloradospringschamber.org.

Economic impact is also generated by the military retiree population living in the Colorado Springs MSA. In FFY 2008, according to the U.S. Department of Defense, approximately 19,319 military retirees resided in the Colorado Springs MSA and accounted for 41% of Colorado's retiree population. These retirees generated approximately $512 million per year of total economic impact in the Colorado Springs MSA.

The large military presence in the Colorado Springs MSA also affects the number of enplaned passengers and operations at the Airport. As noted in the "Introduction and Summary," Washington, D.C. is the largest O&D market at the Airport, reflecting, in large part, the presence of the military in the Colorado Springs MSA

and the demand for air travel generated by military personnel, government representatives, and contractors. Demand for air travel is also generated by the families of military personnel stationed at the installations in the Colorado Springs MSA as well as by the large population of military retirees. The number of aircraft operations at the Airport is also affected by military operations performed by transport, fighter, utility, and training aircraft.

Tourism

Tourism represents an increasingly important source of economic activity in the Colorado Springs MSA. According to the 2008 Annual Report published by the Colorado Springs Convention and Visitor's Bureau, the tourism industry generated $350 million in direct economic impact, $1.1 billion in travel-related revenues, and more than $19 million in local tax revenues to the Colorado Springs MSA in 2008.

According to the Colorado Convention and Visitors Bureau, approximately 53% of the leisure travelers to the Pikes Peak region are visiting friends and family. Leisure travelers are also drawn to Pikes Peak region by its attractions, including the Garden of the Gods Park, the U.S. Air Force Academy, and Pikes Peak. In 2008, attendance at the Garden of the Gods Park and Visitor Center totaled approximately 2.6 million[12]. Attendance at the U.S. Air Force Academy and Visitor Center totaled over 1.1 million in 2008[13]. Other visitor attractions in the Colorado Springs MSA include the Cheyenne Mountain Zoo, the Pikes Peak Cog Railway, and the U.S. Olympic Training Center.

Economic Outlook

Economic activity in the Colorado Springs MSA and the State is directly linked to the production of goods and services in the rest of the United States. Both airline travel and the movement of cargo through the Airport depend on the economic linkages between the regional, state, and national economies.

U.S. Economy

The U.S. economy, after expanding from November 2001 to December 2007, entered into a recession, which was triggered by a contraction in the real estate markets combined with a surge in energy and other commodity prices in 2006. As the economy weakened, a number of factors contributed to the intensity and duration of the recession, including:

- A financial system crisis in the United States triggered by a decrease in real estate prices and the value of real estate-backed investment securities and other financial assets during the summer of 2007. This crisis led to a major

[12] Includes 2.0 million tourists to the Gardens of the Gods Park and 0.6 million tourists to the Visitor Center. As many of the visitors likely traveled to both places, the total figure is likely to be lower.

[13] Includes 0.6 million visitors to the US Air Force Academy and 0.5 million visitors to the Visitors Center. As many of the visitors likely traveled to both places, the total figure is likely to be lower.

capital liquidity problem for most large investment and commercial banks during the first half of 2008, the collapse of Lehman Brothers, and the near collapse of the insurer AIG in the second half of 2008.

- National unemployment rates (seasonally adjusted) increased from 5.8% in July 2008 to 10.0% in December 2009, reflecting the loss of 7 million jobs during this period.

- Consumer spending, which historically accounts for about 70% of U.S. GDP, became constrained by the loss of home equity, tight credit, modest income growth, and high unemployment in a weak labor market. Consumer borrowing began declining in the fourth quarter of 2008 and accelerated to an 8.5% annual rate of decline by November 2009.

- A significant decline in U.S. economic performance, measured by decreases in U.S. Gross Domestic Product (GDP) during four consecutive quarters beginning with the third quarter of 2008 through the second quarter of 2009.

- A global economic recession, the fourth since World War II, declared by the International Monetary Fund (IMF) in April 2009, related to the spillover effects from the U.S. recession and financial crisis.

During the fourth quarter of 2008, Congress passed the Emergency Economic Stabilization Act of 2008, which provided government capital to troubled banks and $17.4 billion in loan guarantees for the U.S. auto industry.

Although the National Bureau of Economic Research[14] has not officially announced the end of the current recession, there is general agreement among economists that the recession ended in the second quarter of 2009. Recent trends in U.S. GDP (in 2005 dollars) suggest that economic growth is strengthening, with increases in each of the last three quarters—2.2% in the third quarter of 2009, 5.6% in the fourth quarter of 2009, and 3.2% in the first quarter of 2010. Unemployment rates, however, remain at historically high levels (9.5% in June 2010) and continue to dampen the prospects for an economic recovery.

At its April 2010 meeting, the Federal Open Market Committee (FOMC) indicated its expectation that the economic recovery would continue but at a slower rate of growth in output and employment than past recoveries from deep recessions. The FOMC's April 2010 outlook included the following observations.

- Consumer spending and business outlays for equipment and software were seen as broadly consistent with a moderate pace of economic recovery.

[14] The National Bureau of Economic Research is a nonprofit economic research organization which determines the start and end dates of U.S. economic cycles.

- The labor market appeared to be starting to improve, but job growth was expected to be modest.

- The continued expansion of economic activity would be supported by a number of factors, including accommodative monetary policy and the improved condition of financial markets and institutions.

Table 3-8 presents a comparison of U.S. economic projections prepared by the Congressional Budget Office (CBO), the *Blue Chip* Consensus, and the FOMC. Consistent with the CBO projections, both the *Blue Chip* Consensus and the FOMC projections reflect the effects of fiscal stimulus and Federal Reserve measures to provide support to credit markets. The long-term growth rates for each of three projections (through 2020) do not include assumptions regarding further economic and other shocks, and all three projections show GDP growth ranging from 2.0% to 3.0%. This rate of growth is significantly less than world-wide growth projections, especially in emerging economies like India and China.

Colorado Economy

The Colorado economy experienced continued growth at the beginning of the current national economic recession. In 2008, nonagricultural employment in the State increased 0.8%, compared with a decrease of 0.6% in the nation. However, during the last quarter of 2008, job growth in Colorado slowed as job losses continued nationwide. In March 2009, the unemployment rate in Colorado was 8.2%, lower than the national average (9.0%) but higher than the State rate six months earlier in September 2008 (4.7%). As of May 2010, the unemployment rate in Colorado was 7.7% compared to a national average of 9.3%.

State economists expect the Colorado economy to experience continued declines in activity and project a 0.8% decrease in employment in 2010, as shown in Table 3-9. According to the economic outlook developed by the Center for Business and Economic Forecasting[15] for the Colorado Department of Local Affairs (DOLA), the State's recovery from the current economic recession is expected to be gradual given that:

- The U.S. economic recovery is expected to be slow;
- Small businesses are expected to experience continued difficulty borrowing;
- Colorado bank's share of nonperforming assets is greater than that of other U.S. banks; and
- The energy sector is expected to remain weak.

[15] The Center for Business and Economic Forecasting is a private company specializing in State and regional economic forecasting and assists DOLA with the preparation of its economic forecasts.

DOLA projects Colorado nonagricultural employment growth to increase an average of 1.7% per year between 2009 and 2035 and per capita income (in 2000 dollars) to increase an average of 1.3% per year during the same period.

Colorado Springs MSA Economy

The Colorado Springs MSA economy followed trends in the nation during the current economic recession. In 2008, employment in the Colorado Springs MSA decreased 0.8%, compared with a decrease of 0.6% in the nation. In 2009, all industry sectors, except for education and health services and government, showed declines in employment in the Colorado Springs MSA. State economists expect the Colorado Springs MSA economy to experience a gradual recovery starting in 2010 with a 1.4% increase in employment, as shown in Table 3-9. Projections of economic activity through 2035 (the last year of the forecast period) are summarized below and presented in Table 3-9.

- **Population**—DOLA projects that the Colorado Springs MSA's population will increase an average of 1.6% per year between 2009 and 2035, equal to the rate for the State.

- **Nonagricultural employment**—Nonagricultural employment in the Colorado Springs MSA is projected to increase an average of 2.2% per year between 2009 and 2035, higher than the projection for Colorado (an average of 1.7% per year).

- **Per capita income**—Colorado Springs MSA per capita income (in 2000 dollars) is projected to increase an average of 1.7% per year between 2009 and 2035, higher than the growth projections for the State (an average of 1.3% per year).

Table 3-8
U.S. ECONOMIC PROJECTIONS
2010-2020

	Average annual percent increase (decrease) *(a)*			
	Historical	Projected		
	1980-2009	2009-2010	2010-2011	2009-2020
Real GDP				
CBO	2.8%	2.1%	2.4%	2.9%
Blue Chip Consensus		2.9	3.1	*(b)*
FOMC		2.7 – 4.0	3.0 – 4.6	2.4 – 3.0
CPI-U				
CBO	3.4%	1.6%	1.1%	1.7%
Blue Chip Consensus		1.7	2.0	*(b)*
	Calendar year average rates			
Unemployment rate (percent)				
CBO	6.2% *(c)*	10.1%	9.5%	5.0% *(d)*
Blue Chip Consensus		10.0	9.3	*(b)*
FOMC		8.6 – 9.7	7.2 – 8.7	5.0 – 6.3
3-Month Treasury Bill rate				
CBO	5.5% *(c)*	0.2%	0.7%	4.8% *(d)*
Blue Chip Consensus		0.5	1.8	*(b)*
10-Year Treasury Note rate				
CBO	7.2% *(c)*	3.6%	3.9%	5.6% *(d)*
Blue Chip Consensus		4.0	4.6	*(b)*

CBO= Congressional Budget Office
CPI-U = Consumer price index for all urban consumers
FOMC = Federal Reserve Board, Federal Open Market Committee
GDP = Gross Domestic Product

Note: The *Blue Chip* Consensus is the average of about 50 forecasts by private-sector economists.

(a) Represents the percent change between the fourth quarters of the years indicated, except for 1980 through 2009.
(b) The January 2010 *Blue Chip* Consensus forecasts through 2011.
(c) Represents the average from 1980 through 2009 (estimated).
(d) Level in 2020.

Sources: Congressional Budget Office, *The Budget and Economic Outlook, Fiscal Years 2010 to 2020,* January 2010 (including data for the Blue Chip Consensus). Federal Reserve Board, Federal Open Market Committee, *Summary of Economic Projections*, April 27-28, 2010, published May 19, 2010.

Risks to the Economic Outlook

While the near-term outlook is improving and the mid- to long-term outlook is favorable, there are risks that these results may not be achieved. Key risks include:

- In the near term, the principal risk is that the federal government's policy response to the current financial crisis and recession in the United States may not be effective in providing the foundation for a recovery in the near term.

- Inflation risks still persist due to the sizable amount of liquidity that the Federal Reserve Bank has injected into the banking system, which could eventually trigger upward pressures on prices. Also, increases in oil prices and rapid expansion of U.S. industrial capacity could trigger upward pressure on inflation.

- There is the risk that U.S. consumers may not be able to generate much spending growth due to persistent unemployment and the various reasons described above, especially after the planned expiration of the housing credit and cash-for-clunkers programs.

- In the long-term, the principal risks to U.S. economic performance are the sizable external and fiscal deficits. The continuing deficits in the U.S. balance of payments could result in greater volatility in the currency markets, which would then translate into higher interest rates and, therefore, slower economic growth. These risks could be compounded if the fiscal deficit does not shrink within the next 5 years, thereby leading to much larger financing requirements and subsequent increases in interest rates. Increased interest rates could lead to lower levels of investment and, consequently, slower productivity growth.

Table 3-9
PROJECTED SOCIOECONOMIC GROWTH RATES
Colorado Springs MSA and State of Colorado
2009-2035

	Population (thousands)		Employment		Per capita income in 2000 dollars	
	Colorado Springs MSA	State of Colorado	Colorado Springs MSA	State of Colorado	Colorado Springs MSA	State of Colorado
Historical growth 1980-2009 *(a)*	2.4%	1.9%	3.0%	2.0%	1.6%	1.3%
	Percent increase (decrease)		Percent increase (decrease)		Percent increase (decrease)	
2009-2010	2.9%	1.7%	1.4%	(0.8%)	(0.7%)	(1.4%)
2010-2011	1.5	1.6	3.9	2.9	2.5	1.4
2011-2012	1.3	1.6	4.3	3.5	3.5	2.7
2012-2013	1.3	1.8	4.3	4.2	3.8	3.0
2013-2014	1.7	1.8	4.0	3.6	3.8	3.4
2014-2015	1.9	1.8	3.5	2.9	3.2	2.9
	Average annual percent increase		Average annual percent increase		Average annual percent increase	
2009-2015	1.8%	1.7%	3.6%	2.7%	2.7%	2.0%
2015-2020	1.8	1.9	2.4	1.8	2.1	1.7
2020-2025	1.7	1.7	2.0	1.5	1.5	1.1
2025-2030	1.5	1.5	1.6	1.2	1.1	0.8
2030-2035	1.4	1.3	1.2	1.0	0.7	0.6
2009-2035	1.6	1.6	2.2	1.7	1.7	1.3

Note: Colorado Springs MSA includes El Paso and Teller counties.

(a) See Table 3-4 in this report.

Source: Colorado Department of Local Affairs, www.dola.colorado.gov, except as noted.

Summary of the Economic Basis for Forecast Aviation Demand

The economic outlook for the United States, the State of Colorado, and the Colorado Springs MSA form a basis for anticipated growth in aviation demand at the Airport. Employment and income projections for the Colorado Springs MSA and the State of Colorado prepared by DOLA are for continued economic growth, particularly in health, education, leisure and hospitality services. Factors expected to contribute to economic growth in the Colorado Springs MSA and associated increases in airline travel include: (1) the diversity in the economic base, which lessens its vulnerability to weaknesses in particular industry sectors, (2) the continued stable and large presence of the U.S. military, (3) growth in the existing and emerging Colorado Springs MSA industry sectors described earlier, (4) an educated labor force able to support the development of knowledge-based and service industries, and (5) continued reinvestment to support the development of tourism, conventions, and other businesses.

HISTORICAL AIRLINE TRAFFIC

A review of airline activity at the Airport provided the foundation for the enplaned passenger forecasts and included an analysis of: (1) the airline passenger service and market shares; (2) overall trends in enplaned passengers; (3) originating passengers, including overall trends, top origin-destination markets, and airfares; and (4) monthly airline traffic for enplaned passengers, scheduled departing seats, and passenger airline landings. In addition, a review of air cargo activity is included in this section as a basis for the air cargo forecasts.

Airline Passenger Service and Market Shares

The Airport was served by nine passenger airlines, including six regional affiliates of which two are associated with more than one mainline airline and two cargo airlines as of July 2010, as shown in Table 3-10.

Table 3-10
AIRLINES SERVING COLORADO SPRINGS AS OF JULY 2010

Mainline	Regional affiliates
American Airlines	Continental Express *(a)*
Delta Air Lines	Delta Connection *(b)*
	United Express *(c)*
Low cost carrier	**Cargo airlines**
Allegiant Air	Federal Express
Frontier *(d)*	Key Lime Air

(a) Operated by ExpressJet.
(b) Operated by Mesaba Airlines, Shuttle America, and Skywest Airlines.
(c) Operated by ExpressJet and Skywest Airlines.
(d) Operated by Lynx Aviation and Republic Airlines.

Sources: City of Colorado Springs, Airport records and Official Airline Guides, Inc., online database, accessed July 2010.

The market shares for the passenger airlines serving the Airport are shown in Table 3-11. In 2009, United Airlines (mainline and regional affiliates) had the largest market share of enplaned passengers (33.4%) at the Airport, followed by American Airlines (22.4%), and Frontier Airlines (11.2%). The share of Airport passengers enplaned by United Airlines (mainline and regional affiliates) increased from 28.0% in 2000 to 33.4% in 2009, with regional affiliates accounting for all of United Airlines' passengers in 2009.

Table 3-11
AIRLINE MARKET SHARES OF ENPLANED PASSENGERS
Colorado Springs Airport

	Enplaned passengers			
	2000	2007	2008	2009
United/United Express *(a)*	341,247	321,194	302,857	310,776
American/American Eagle *(b)*	355,960	236,423	213,341	208,535
Frontier/Lynx Aviation	--	--	62,316	103,964
Delta/Delta Connection *(c)*	270,934	137,849	105,057	87,547
Continental/Continental Express *(d)*	57,464	76,534	71,763	71,827
US Airways Express *(e)*	103,552	91,746	82,577	65,448
Northwest/Northwest Airlink *(f)*	79,924	79,368	72,884	48,034
Allegiant Air	--	33,281	33,543	32,673
ExpressJet Airlines *(g)*	--	44,345	48,050	--
Midwest Connect *(h)*	--	11,719	4,793	--
Other *(i)*	11,285	1,127	1,166	796
Total	1,220,366	1,033,586	998,347	929,600

	Share of total			
	2000	2007	2008	2009
United/United Express *(a)*	28.0%	31.1%	30.3%	33.4%
American/American Eagle *(b)*	29.2	22.9	21.4	22.4
Frontier/Lynx Aviation	0.0	0.0	6.2	11.2
Delta/Delta Connection *(c)*	22.2	13.3	10.5	9.4
Continental/Continental Express *(d)*	4.7	7.4	7.2	7.7
US Airways Express *(e)*	8.5	8.9	8.3	7.0
Northwest/Northwest Airlink *(f)*	6.5	7.7	7.3	5.2
Allegiant Air	0.0	3.2	3.4	3.5
ExpressJet Airlines *(g)*	0.0	4.3	4.8	0.0
Midwest Connect *(h)*	0.0	1.1	0.5	0.0
Other *(i)*	0.9	0.1	0.1	0.1
Total	100.0%	100.0%	100.0%	100.0%

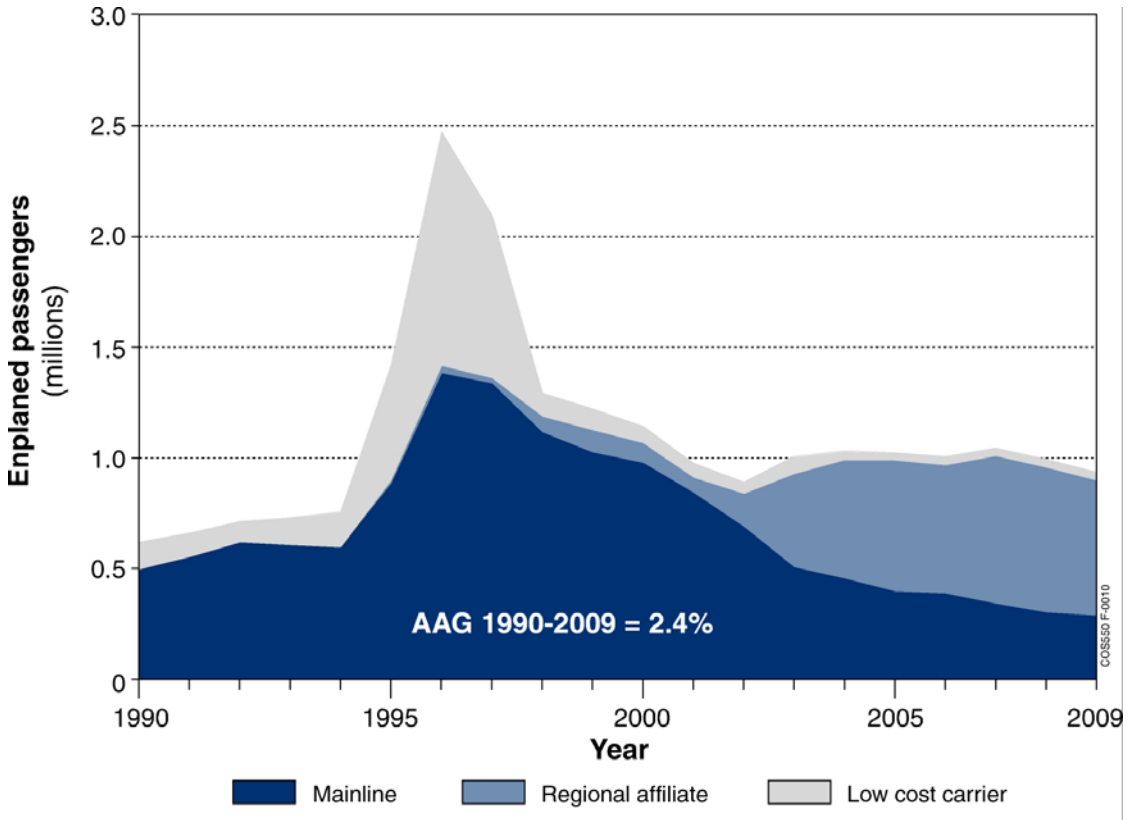
(a) United Express operated by Air Wisconsin in 2000, ExpressJet in 2009 and Mesa and Skywest in 2007 through 2009.
(b) Includes enplanements on TWA during 2000 (TWA merged with American on December 1, 2001).
(c) Delta Connection operated by Comair in all years shown, except for 2009, and by Skywest in all years shown.
(d) Continental Express operated by Chautauqua Airlines in 2007 and ExpressJet in 2007 through 2009.
(e) Includes America West and America West Express (operated by Mesa Airlines) in 2000. US Airways Express operated by Mesa Airlines in FY 2007 through FY 2009.
(f) Northwest Airlink operated by Pinnacle Airlines in 2007 and 2008, and Mesaba Airlines in 2008 and 2009.
(g) ExpressJet operated its branded flying service between April 2007 and September 2008.
(h) Midwest Connect operated by Skywest Airlines.
(i) Includes charter operations in all years shown and Mesa Airlines in 2000.

Source: City of Colorado Springs, Airport records.

Enplaned Passengers

The number of enplaned passengers at the Airport increased an average of 2.4% per year between 1990 and 2009, exceeding growth in the nation as a whole during this period (an average of 2.2% per year), as shown in Table 3-12 and Figure 3-12. This period included the expansion and cessation of service by Western Pacific Airlines at the Airport between 1995 and 1997. Since 1997, much of the growth in passenger traffic at the Airport has been driven by regional affiliates, with mainline activity decreasing an average of 2.8% per year between 1990 and 2009. From 2000 to 2009, the total number of enplaned passengers at the Airport decreased an average of 3.0% per year, reflecting reduced passenger demand related to the two national economic recessions and the continued development of low cost carrier service at Denver International Airport.

Figure 3-12
ENPLANED PASSENGER TRENDS
Colorado Springs Airport



AAG = Average annual compund growth

Source: U.S. Department of Transportation, T100 online database, accessed July 2010.

Table 3-12
HISTORICAL ENPLANED PASSENGERS
Colorado Springs Airport

	Colorado Springs Airport		United States	
Year	Total	Percent increase (decrease)	Total	Percent increase (decrease)
1990	595,996	--%	457,126,741	--%
1991	665,528	11.7	445,582,404	(2.5)
1992	717,653	7.8	467,683,985	5.0
1993	735,329	2.5	480,254,905	2.7
1994	760,311	3.4	521,516,928	8.6
1995	1,417,635	86.5	544,232,232	4.4
1996	2,415,862	70.4	578,144,887	6.2
1997	2,049,190	(15.2)	597,653,608	3.4
1998	1,320,949	(35.5)	619,478,030	3.7
1999	1,243,414	(5.9)	638,596,504	3.1
2000	1,220,366	(1.9)	670,112,980	4.9
2001	1,065,854	(12.7)	624,449,965	(6.8)
2002	1,068,157	0.2	614,742,482	(1.6)
2003	1,011,643	(5.3)	649,546,281	5.7
2004	1,034,747	2.3	703,706,603	8.3
2005	1,030,833	(0.4)	734,955,348	4.4
2006	1,017,016	(1.3)	736,933,510	0.3
2007	1,033,586	1.6	761,133,338	3.3
2008	998,347	(3.4)	732,297,287	(3.8)
2009	929,600	(6.9)	693,485,531	(5.3)
	Average annual percent increase (decrease)		Average annual percent increase (decrease)	
1990-2000	7.4%		3.9%	
2000-2009	(3.0)		0.4	
1990-2009	2.4		2.2	

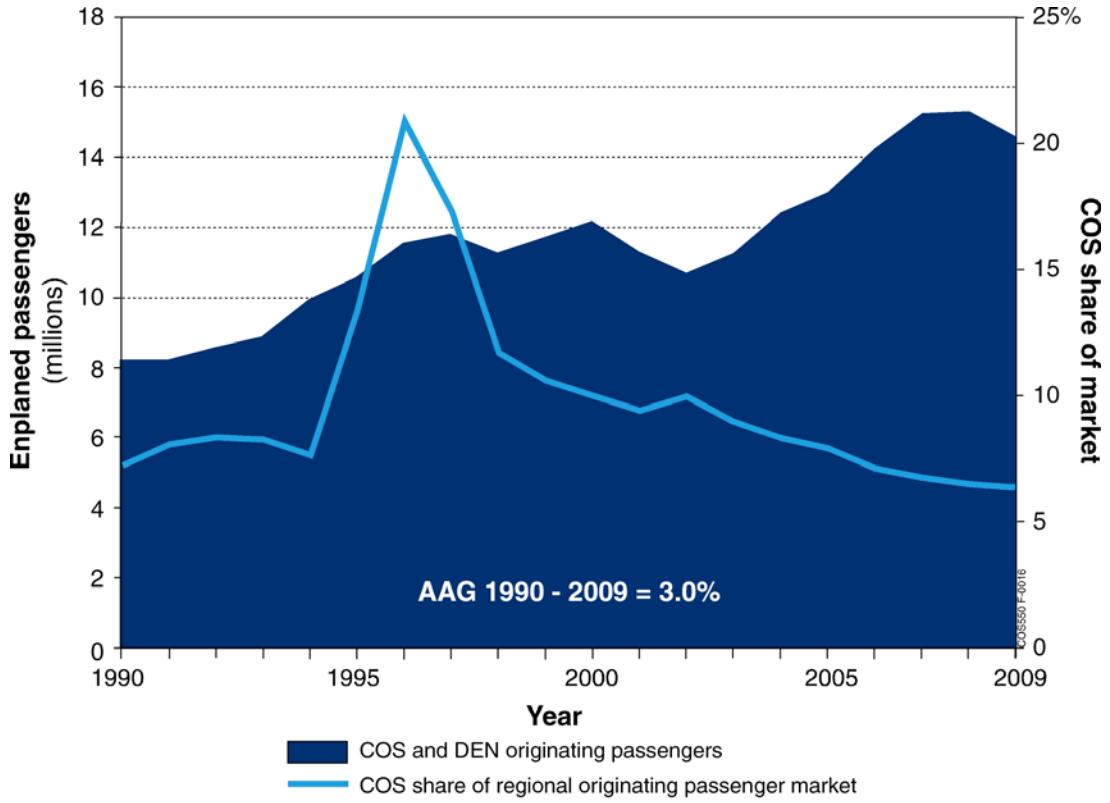
Sources: Colorado Springs Airport: City of Colorado Springs, Airport records (1990, 1996 - 2009) and U.S. Department of Transportation, T100 online database, accessed July 2010 (1991 – 1995). United States: U.S. Department of Transportation, T100 online database, accessed July 2010.

Regional Originating Passenger Market

Figure 3-13 presents historical trends in the regional originating passenger market, including passengers who originate their trips at Colorado Springs and Denver International Airport. From 1990 to 2009, the number of regional originating passengers increased an average of 3.0% per year. Colorado Springs' share of the regional originating passenger market increased from 7% in 1990 to a peak of 21% in 1996, as a result of the development of low cost carrier service by Western Pacific Airlines at the Airport. Since 1996, Colorado Springs' share of regional originating

passengers has decreased to 6% in 2009 with the continued development of airline service at Denver International Airport, including the introduction of low cost carrier service by Southwest Airlines in 2006. As discussed in "Airport Service Region," the northernmost counties in COS's secondary area (Douglas, Elbert, Jefferson, and Park counties) are also part of the primary area of the Airport service region for Denver International Airport.

Figure 3-13
COLORADO SPRINGS AND DENVER REGIONAL ORIGINATING PASSENGER MARKET
Colorado Springs Airport



AAG = Average annual compound growth
Sources: City of Colorado Springs, Airport records and Denver International Airport records.

Origin-Destination Markets

Table 3-13 presents the Airport's top 22 domestic O&D passenger markets in 2009—markets accounting for 1% or more of total originating passengers. Average daily nonstop departures from the Airport by the scheduled airlines in July 2010 are also shown. These 22 markets accounted for 63.1% of the total originating passengers at the Airport in 2009 and 24 of the 46 average daily departures. The Washington, D.C. Metropolitan area was COS's largest originating passenger market in 2009 with 7.1% of total originating passengers and is served with one daily nonstop departure by United Airlines which started on June 9, 2010. The Las Vegas market is the second

largest O&D market, with 6.2% of total originating passengers and is served with five departures per week by Allegiant Air.

In addition to the nonstop departures listed in Table 3-13, Allegiant Air will begin nonstop service from Colorado Springs to Long Beach, California and Mesa, Arizona on September 15, 2010, according to a July 15, 2010 announcement by Allegiant Air. As shown in Table 3-13, the Los Angeles and Phoenix markets rank 3 and 5 in terms of originating passengers, respectively.

Airline Fares and Yields

Fares charged for airline travel to and from Colorado Springs have also been an important determinant of airline passenger traffic at the Airport. Airline profitability can be measured in terms of airline yield, a unit measure of airline fare revenues and trip distance. Table 3-14 presents average annual domestic one-way airline fares and yields at the Airport in 2000 to 2009.[16] In addition, comparative airline fares and yields are presented for Denver International Airport and the United States. A review of airline fares from 2000 to 2009 indicates that:

- From 2000 to 2002, average airline fares at the Airport decreased an average of 5.7% per year, more than the decrease in the nation (an average decrease of 5.3% per year) but less than the decrease at Denver (an average of 9.1% per year). Airline fare decreases during this period were principally intended to stimulate the demand for airline travel.

- From 2002 to 2008, average airline fares at the Airport increased an average of 2.3% per year, less than the increase in the nation (an average increase of 2.7% per year) while average airline fares at Denver continued to decrease (an average decrease of 0.7% per year). Average airline fares at Denver were affected by low cost carrier service by Frontier and Southwest airlines. Southwest Airlines started service at Denver in 2006.

- From 2008 to 2009, average airline fares decreased at the Airport (9.8%), Denver (12.4%), and in the nation (10.4%), largely as the result of the national economic recession which reduced disposable per capita income and overall passenger demand causing airlines to reduce airline fares to stimulate demand.

[16] It should be noted that "average airfare" statistics reported to the U.S. Department of Transportation surveyof airline tickets are becoming less representative of the true "cost of travel." Total airline fare revenue includes ancillary fees (e.g., bag check fees, onboard food and beverage costs, and priority boarding fees), which have proliferated since the mid-2008 fuel price spike. These ancillary fees can represent material additional payments that are not included in the reported "average airfare" figures.

Table 3-13
DOMESTIC PASSENGER ORIGIN-DESTINATION PATTERNS

Origin-destination market	Air miles from Colorado Springs	Percent of originating passengers *(a)*	Average daily nonstop departures in July 2010		
			Mainline	Regional affiliate	Total
Washington DC *(a)*	1,483	7.1%	--	1	1
Las Vegas	603	6.2	1*(b)*	--	1
Los Angeles *(c)*	831	6.0	--	3	3
Dallas/Ft. Worth	609	5.5	6	--	6
Phoenix *(d)*	552	4.4	--	*(d)*	--
New York *(e)*	1,634	3.3	--	--	--
San Francisco *(f)*	960	2.8	--	1	1
Chicago *(g)*	915	2.6	--	5	5
Orlando	1,516	2.6	--	--	--
Boston	1,773	2.4	--	--	--
Atlanta	724	2.2	1	1	2
San Diego	1,182	2.2	--	--	--
San Antonio	814	2.1	--	--	--
Seattle	1,064	2.0	--	--	--
Minneapolis/St. Paul	733	2.0	--	2	2
Tampa	408	1.6	--	--	--
Sacramento	1,476	1.6	--	--	--
Salt Lake City	909	1.5	--	3	3
Miami/Ft. Lauderdale *(h)*	1,677	1.5	--	--	--
Philadelphia	1,569	1.3	--	--	--
Nashville	1,143	1.1	--	--	--
Detroit	1,004	1.1	--	--	--
Top 22 markets		63.1	8	16	24
Other markets					
Denver		0.3%	--	17	17
Houston		0.6	--	5	5
All other markets		36.1	--	--	--
		36.9%	--	22	22
Total		100.0%	8	38	46

Note: Average daily departures are rounded and include flights that operate less than one daily flight, on average.

(a) Reagan Washington National, Baltimore/Washington International Thurgood Marshall, and Washington Dulles International airports.
(b) Allegiant Air offers five departures per week to Las Vegas.
(c) Los Angeles International, Bob Hope, Ontario International, John Wayne (Orange County), and Long Beach airports.
(d) Service to Phoenix was discontinued by US Airways in January 2010.
(e) Newark Liberty International, LaGuardia, and John F. Kennedy International airports.
(f) San Francisco, Oakland, and Mineta San Jose international airports.
(g) Chicago O'Hare and Midway international airports.
(h) Fort Lauderdale-Hollywood and Miami international airports.

Sources: U.S. Department of Transportation, *Origin-Destination Survey of Airline Passenger Traffic, Domestic*, 2009. Official Airline Guides, Inc. online database, accessed June 2010, for domestic destinations.

Since 2000, airline yields at the Airport have been higher than those for the nation as a whole, reflecting a relatively lower share of low cost carrier service at the Airport compared with that for the nation. In 2009, low cost carriers accounted for 14.7% of enplaned passengers at the Airport compared with a 27.2% share of domestic enplaned passengers in the nation.

- Overall, from 2000 to 2009, average airline fares at the Airport decreased an average of 1.0% per year, more than the decrease in the nation (an average decrease of 0.6% per year) but less than the decrease at Denver (an average of 4.0% per year).

The trend in average airline yields between 2000 and 2009 generally followed the trend in airline fares, with variances explained by annual differences in average passenger trip lengths.

Airline Fares and Service to Top 10 COS Markets

Table 3-15 provides airline fare data for the top 10 destinations from the Airport in 2009, compared with airline fares for those same destinations from Denver International Airport. In 2009, airline fares at the Airport for the top 10 destinations were approximately 13.6% higher than those at Denver International Airport. Fares from Colorado Springs to three of the top 10 destinations—Las Vegas, New York, and Boston—are lower at the Airport than at Denver International Airport. Overall, fares from Colorado Springs to all markets are 21.3% higher than for all markets served from Denver International Airport. Nonstop service was provided to six of the top 10 COS markets from Colorado Springs and to all 10 markets from Denver International Airport. Low cost carrier service is provided from Colorado Springs to Las Vegas (by Allegiant Air) and from Denver to all top 10 Colorado Springs markets. The availability of a large number of low cost carrier seats at Denver International Airport, in many cases greater than the total number of seats offered at COS, contributes to passenger traffic leakage from COS to Denver.

Table 3-14

COMPARATIVE AVERAGE DOMESTIC ONE-WAY AIRLINE FARES AND YIELD

Colorado Springs Airport, Denver International Airport, and the United States

	Colorado Springs Airport			Denver International Airport			United States		
Year	Average one-way airfare	Yield (cents per mile)	Average passenger trip distance (miles)	Average one-way airfare	Yield (cents per mile)	Average passenger trip distance (miles)	Average one-way airfare	Yield (cents per mile)	Average passenger trip distance (miles)
2000	$205.07	17.7	1,161	$213.45	19.4	1,099	$176.32	16.1	1,093
2001	193.70	16.4	1,179	198.15	17.7	1,118	164.46	14.7	1,117
2002	182.25	15.4	1,181	176.27	15.6	1,132	157.98	13.8	1,144
2003	185.11	15.5	1,197	167.73	14.8	1,137	160.93	13.8	1,166
2004	185.95	15.4	1,209	161.35	14.3	1,129	157.75	13.4	1,177
2005	195.31	16.4	1,192	169.00	15.0	1,129	161.13	13.8	1,171
2006	198.72	17.1	1,159	166.39	15.4	1,083	174.59	15.0	1,166
2007	197.85	17.0	1,164	163.48	15.1	1,080	174.23	14.9	1,168
2008	208.38	17.8	1,173	169.42	15.9	1,068	185.87	15.9	1,171
2009	188.02	15.8	1,193	148.34	13.9	1,066	166.55	14.1	1,178
	Percent increase (decrease)			Percent increase (decrease)			Percent increase (decrease)		
2000-2001	(5.5)%	(7.0)%	1.5%	(7.2)%	(8.7)%	1.7%	(6.7)%	(8.8)%	2.3%
2001-2002	(5.9)	(6.1)	0.2	(11.0)	(12.1)	1.3	(3.9)	(6.2)	2.4
2002-2003	1.6	0.2	1.3	(4.8)	(5.3)	0.5	1.9	(0.1)	1.9
2003-2004	0.5	(0.5)	1.0	(3.8)	(3.1)	(0.7)	(2.0)	(2.9)	1.0
2004-2005	5.0	6.6	(1.5)	4.7	4.8	(0.1)	2.1	2.7	(0.5)
2005-2006	1.7	4.6	(2.7)	(1.5)	2.5	(4.0)	8.4	8.8	(0.4)
2006-2007	(0.4)	(0.8)	0.4	(1.7)	(1.5)	(0.3)	(0.2)	(0.4)	0.2
2007-2008	5.3	4.5	0.8	3.6	4.9	(1.2)	6.7	6.4	0.3
2008-2009	(9.8)	(11.3)	1.7	(12.4)	(12.4)	(0.2)	(10.4)	(11.0)	0.6
	Average annual percent increase (decrease)			Average annual percent increase (decrease)			Average annual percent increase (decrease)		
2000-2002	(5.7)%	(6.5)%	0.8%	(9.1)%	(10.5)%	1.5%	(5.3)%	(7.5)%	2.3%
2002-2008	2.3	2.4	(0.1)	(0.7)	0.3	(1.0)	2.7	2.3	0.4
2000-2009	(1.0)	(1.3)	0.3	(4.0)	(3.6)	(0.3)	(0.6)	(1.5)	0.8

Note: Average fares include federal ticket tax, but are net of PFCs and ancillary airline fees. Southwest started service at Denver International Airport in January 2006.

Source: U.S. Department of Transportation, Federal Aviation Administration, *Origin-Destination Survey of Airline Passenger Traffic, Domestic,* online OD1B database, accessed June 2010.

Table 3-15

AIRFARES AND DAILY NON-STOP DEPARTURES FOR TOP 10 COLORADO SPRINGS DESTINATIONS

Colorado Springs Airport, Denver International Airport

	Average domestic one-way airfare			Number of average daily scheduled seats		Low cost carrier share of scheduled seats	
Top 10 origin-destination markets	Colorado Springs	Denver International	Colorado Springs vs. Denver (percent variance)	Colorado Springs	Denver International	Colorado Springs	Denver International
Washington, D.C. *(a)*	$213.39	$211.93	0.7%	--	3,070	--%	31%
Las Vegas	95.71	105.90	(9.6)	42	3,106	100	65
Los Angeles *(b)*	202.67	131.52	54.1	136	5,592	--	44
Dallas/Ft. Worth	170.88	138.83	23.1	749	2,929	--	24
Phoenix *(c)*	130.62	99.43	31.4	209	3,373	--	56
New York *(d)*	166.36	192.47	(13.6)	--	2,384	--	23
San Francisco *(e)*	183.09	140.51	30.3	54	4,521	--	49
Chicago *(f)*	201.46	146.02	38.0	287	4,159	--	41
Orlando	166.63	161.31	3.3	--	1,152	--	48
Boston	177.19	214.63	(17.4)	--	959	--	16
Top 10 Colorado Springs markets	$169.82	$149.44	13.6%	1,478	31,246	6%	49%
All markets	$206.53	$170.32	21.3%	3,137	85,469	10%	43%

Notes: n.a.=Not applicable.
Airfares include federal ticket tax, but exclude Passenger Facility Charges and ancillary airline fees.
Low cost carriers include Allegiant, Airtran, Frontier, JetBlue, Southwest, and Spirit airlines.

(a) Reagan Washington National, Baltimore/Washington International Thurgood Marshall, and Washington Dulles International airports.
(b) Los Angeles International, Bob Hope, Ontario International, John Wayne (Orange County), and Long Beach airports.
(c) Service to Phoenix was discontinued in January 2010.
(d) Newark Liberty International, LaGuardia, and John F. Kennedy International airports.
(e) San Francisco, Oakland, and Mineta San Jose international airports.
(f) Chicago O'Hare and Midway international airports.

Sources U.S. Department of Transportation, *Origin-Destination Survey of Airline Passenger Traffic, Domestic*, 2009. Official Airline Guides, Inc. online database, accessed June 2010, for domestic destinations.

Monthly Airline Traffic

Trends in monthly airline traffic, including enplaned passengers, scheduled departing seats, enplaned passenger load factor, and passenger airline landings are presented in the following sections.

Monthly Enplaned Passengers

Table 3-16 presents monthly enplaned passenger data for the Airport for January 2000 through May 2010. The monthly data show the seasonal variation in enplaned passenger traffic, with peak levels occurring from June through August and the lowest monthly activity occurring from November through February. Since June 2008, monthly passenger traffic decreased year-over-year in each month, except for increases from September through November 2009, reflecting the effects of the current economic recession, financial crisis, and airline reductions in seating capacity at the Airport and systemwide.

Monthly Scheduled Departing Seats

Table 3-17 presents monthly scheduled departing seats data for the Airport for January 2000 through December 2010. The trends in the number of scheduled departing seats follow the seasonal variation in enplaned passengers. The peak month shares of annual seats are less than the peak month shares of enplaned passengers, largely because of differences in monthly load factors (the percentage of occupied seats on an aircraft). From July 2008 through June 2010, the number of monthly scheduled departing seats decreased year-over-year in each month, except for October and November 2009 and February and March 2010, reflecting airline capacity reductions. Advance schedule data for last 6 months of 2010 (July through December 2010) show a decrease of approximately 2% in seating capacity in 2010 compared with 2009 (based on schedule data accessed in July 2010).

Monthly Enplaned Passenger Load Factor

As shown on Figure 3-14, enplaned passenger load factors at COS ranged from a low of 69% in January 2010 to a high of nearly 90% during the summer months of 2009. Load factors in recent years decreased as a result of reduced passenger demand related to the national economic recession and financial credit crisis. At the same time, reductions in airline seating capacity have resulted in increased load factors.

Monthly Passenger Airline Aircraft Landings

Table 3-18 presents monthly passenger airline aircraft landings data for the Airport for January 2000 through May 2010. Similar to the trend in scheduled departing seats, the number of monthly passenger airline landings decreased year-over-year in each month from August 2008 through May 2010, except for November 2009, reflecting airline capacity reductions.

Table 3-16
HISTORICAL ENPLANED PASSENGERS BY MONTH
Colorado Springs Airport

Year	January	February	March	April	May	June	July	August	September	October	November	December	Total
	Month												
2000	76,362	77,972	104,998	90,939	105,316	119,859	126,314	122,666	100,855	100,425	97,727	96,933	1,220,366
2001	75,033	67,987	97,608	82,041	98,664	111,785	119,607	114,047	65,726	75,355	76,640	81,361	1,065,854
2002	71,474	69,722	90,742	83,024	98,275	106,170	113,748	103,856	82,363	83,253	75,539	89,991	1,068,157
2003	75,743	70,949	86,020	73,886	84,781	93,174	103,959	97,209	81,555	87,478	74,622	82,267	1,011,643
2004	76,324	68,765	84,089	83,565	88,087	99,454	111,779	94,486	80,952	85,418	75,291	86,537	1,034,747
2005	70,877	68,679	86,899	80,354	88,157	93,872	109,592	101,506	85,358	85,725	77,864	81,950	1,030,833
2006	72,000	71,309	87,288	82,520	90,969	97,773	99,502	96,188	83,295	82,771	80,724	72,677	1,017,016
2007	69,357	63,425	78,068	76,843	89,243	97,864	103,688	103,388	90,857	93,652	87,149	80,052	1,033,586
2008	75,134	72,072	85,211	78,315	93,893	96,288	100,658	96,247	77,288	79,790	68,633	74,818	998,347
2009	62,306	60,048	75,067	70,123	81,024	90,157	95,750	92,400	79,239	79,789	71,224	72,473	929,600
2010	61,296	57,284	69,691	68,588	74,042								
	Percent increase (decrease)												
2000-2001	(1.7%)	(12.8%)	(7.0%)	(9.8%)	(6.3%)	(6.7%)	(5.3%)	(7.0%)	(34.8%)	(25.0%)	(21.6%)	(16.1%)	(12.7%)
2001-2002	(4.7)	2.6	(7.0)	1.2	(0.4)	(5.0)	(4.9)	(8.9)	25.3	10.5	(1.4)	10.6	0.2
2002-2003	6.0	1.8	(5.2)	(11.0)	(13.7)	(12.2)	(8.6)	(6.4)	(1.0)	5.1	(1.2)	(8.6)	(5.3)
2003-2004	0.8	(3.1)	(2.2)	13.1	3.9	6.7	7.5	(2.8)	(0.7)	(2.4)	0.9	5.2	2.3
2004-2005	(7.1)	(0.1)	3.3	(3.8)	0.1	(5.6)	(2.0)	7.4	5.4	0.4	3.4	(5.3)	(0.4)
2007-2008	8.3	13.6	9.1	1.9	5.2	(1.6)	(2.9)	(6.9)	(14.9)	(14.8)	(21.2)	(6.5)	(3.4)
2008-2009	(17.1)	(16.7)	(11.9)	(10.5)	(13.7)	(6.4)	(4.9)	(4.0)	2.5	0.0	3.8	(3.1)	(6.9)
2009-2010	(1.6)	(4.6)	(7.2)	(2.2)	(8.6)								
	Percent of total												
2000	6.3%	6.4%	8.6%	7.5%	8.6%	9.8%	10.4%	10.1%	8.3%	8.2%	8.0%	7.9%	100.0%
2001	7.0	6.4	9.2	7.7	9.3	10.5	11.2	10.7	6.2	7.1	7.2	7.6	100.0
2002	6.7	6.5	8.5	7.8	9.2	9.9	10.6	9.7	7.7	7.8	7.1	8.4	100.0
2003	7.5	7.0	8.5	7.3	8.4	9.2	10.3	9.6	8.1	8.6	7.4	8.1	100.0
2004	7.4	6.6	8.1	8.1	8.5	9.6	10.8	9.1	7.8	8.3	7.3	8.4	100.0
2005	6.9	6.7	8.4	7.8	8.6	9.1	10.6	9.8	8.3	8.3	7.6	7.9	100.0
2006	7.1	7.0	8.6	8.1	8.9	9.6	9.8	9.5	8.2	8.1	7.9	7.1	100.0
2007	6.7	6.1	7.6	7.4	8.6	9.5	10.0	10.0	8.8	9.1	8.4	7.7	100.0
2008	7.5	7.2	8.5	7.8	9.4	9.6	10.1	9.6	7.7	8.0	6.9	7.5	100.0
2009	6.7	6.5	8.1	7.5	8.7	9.7	10.3	9.9	8.5	8.6	7.7	7.8	100.0

Note: Data include domestic and international passengers enplaned on mainline and regional passenger airlines.
Source: City of Colorado Springs, Airport Records.

Table 3-17
HISTORICAL SCHEDULED DEPARTING SEATS BY MONTH
Colorado Springs Airport

Year	January	February	March	April	May	June	July	August	September	October	November	December	Total
	Month												
2000	173,655	163,063	160,545	155,755	160,842	163,929	163,535	164,845	152,148	151,162	151,585	156,948	1,918,012
2001	153,457	136,316	150,819	146,037	158,954	157,416	171,800	171,744	154,931	134,059	126,794	125,356	1,787,683
2002	130,469	121,604	146,725	146,834	153,789	155,527	159,649	156,764	136,416	137,669	132,962	141,584	1,719,992
2003	134,097	121,962	143,392	136,205	131,933	126,178	132,963	132,412	125,063	129,310	112,407	119,889	1,545,811
2004	120,666	115,765	126,780	122,588	129,682	130,320	132,408	131,951	115,313	119,270	115,347	123,775	1,483,865
2005	117,462	100,597	112,648	114,899	119,099	127,803	135,350	133,188	121,692	119,319	112,480	114,963	1,429,500
2006	112,623	100,902	114,636	118,953	118,352	116,501	120,329	120,809	108,906	110,970	102,901	99,895	1,345,777
2007	92,723	83,488	96,095	96,738	111,626	115,174	123,184	123,176	112,522	117,232	109,199	109,210	1,290,367
2008	100,338	96,680	107,060	108,360	117,084	118,268	122,646	120,598	97,908	100,128	92,150	95,788	1,277,008
2009	89,112	81,368	92,788	89,318	93,338	101,900	108,080	106,674	93,620	100,160	93,849	94,660	1,144,867
2010	88,712	81,826	92,872	88,370	91,958	98,818	103,778	101,724	91,910	95,666	93,300	97,036	1,125,970
	Percent increase (decrease)												
2000-2001	(11.6%)	(16.4%)	(6.1%)	(6.2%)	(1.2%)	(4.0%)	5.1%	4.2%	1.8%	(11.3%)	(16.4%)	(20.1%)	(6.8%)
2001-2002	(15.0)	(10.8)	(2.7)	0.5	(3.2)	(1.2)	(7.1)	(8.7)	(12.0)	2.7	4.9	12.9	(3.8)
2002-2003	2.8	0.3	(2.3)	(7.2)	(14.2)	(18.9)	(16.7)	(15.5)	(8.3)	(6.1)	(15.5)	(15.3)	(10.1)
2003-2004	(10.0)	(5.1)	(11.6)	(10.0)	(1.7)	3.3	(0.4)	(0.3)	(7.8)	(7.8)	2.6	3.2	(4.0)
2004-2005	(2.7)	(13.1)	(11.1)	(6.3)	(8.2)	(1.9)	2.2	0.9	5.5	0.0	(2.5)	(7.1)	(3.7)
2005-2006	(4.1)	0.3	1.8	3.5	(0.6)	(8.8)	(11.1)	(9.3)	(10.5)	(7.0)	(8.5)	(13.1)	(5.9)
2006-2007	(17.7)	(17.3)	(16.2)	(18.7)	(5.7)	(1.1)	2.4	2.0	3.3	5.6	6.1	9.3	(4.1)
2007-2008	8.2	15.8	11.4	12.0	4.9	2.7	(0.4)	(2.1)	(13.0)	(14.6)	(15.6)	(12.3)	(1.0)
2008-2009	(11.2)	(15.8)	(13.3)	(17.6)	(20.3)	(13.8)	(11.9)	(11.5)	(4.4)	0.0	1.8	(1.2)	(10.3)
2009-2010	(0.4)	0.6	0.1	(1.1)	(1.5)	(3.0)	(4.0)	(4.6)	(1.8)	(4.5)	(0.6)	2.5	(1.7)
	Percent of total												
2000	9.1%	8.5%	8.4%	8.1%	8.4%	8.5%	8.5%	8.6%	7.9%	7.9%	7.9%	8.2%	100.0%
2001	8.6	7.6	8.4	8.2	8.9	8.8	9.6	9.6	8.7	7.5	7.1	7.0	100.0
2002	7.6	7.1	8.5	8.5	8.9	9.0	9.3	9.1	7.9	8.0	7.7	8.2	100.0
2003	8.7	7.9	9.3	8.8	8.5	8.2	8.6	8.6	8.1	8.4	7.3	7.8	100.0
2004	8.1	7.8	8.5	8.3	8.7	8.8	8.9	8.9	7.8	8.0	7.8	8.3	100.0
2005	8.2	7.0	7.9	8.0	8.3	8.9	9.5	9.3	8.5	8.3	7.9	8.0	100.0
2006	8.4	7.5	8.5	8.8	8.8	8.7	8.9	9.0	8.1	8.2	7.6	7.4	100.0
2007	7.2	6.5	7.4	7.5	8.7	8.9	9.5	9.5	8.7	9.1	8.5	8.5	100.0
2008	7.9	7.6	8.4	8.5	9.2	9.3	9.6	9.4	7.7	7.8	7.2	7.5	100.0
2009	7.8	7.1	8.1	7.8	8.2	8.9	9.4	9.3	8.2	8.7	8.2	8.3	100.0
2010	7.9	7.3	8.2	7.8	8.2	8.8	9.2	9.0	8.2	8.5	8.3	8.6	100.0

Note: Data include domestic and international departing seats on mainline and regional passenger airlines.
Data for the last 5 months of 2010 are based on published airline schedules available at the preparation of this report.

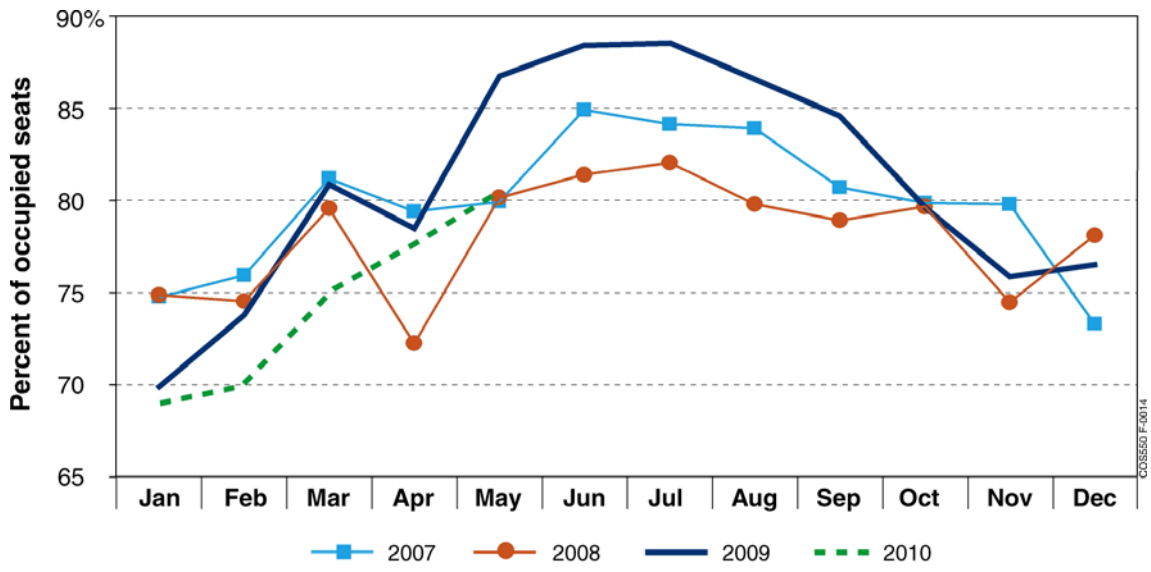
Source: Official Airline Guides, Inc., online database, accessed July 2010.

Table 3-18
HISTORICAL PASSENGER AIRLINE AIRCRAFT LANDINGS BY MONTH
Colorado Springs Airport

Year	January	February	March	April	May	June	July	August	September	October	November	December	Total
	Month												
2000	1,489	1,407	1,471	1,456	1,517	1,478	1,479	1,470	1,414	1,454	1,423	1,437	17,495
2001	1,435	1,131	1,395	1,351	1,533	1,498	1,623	1,610	1,131	1,262	1,346	1,365	16,680
2002	1,417	1,343	1,645	1,658	1,723	1,693	1,771	1,732	1,583	1,645	1,680	1,713	19,603
2003	1,637	1,528	1,690	1,570	1,518	1,471	1,562	1,571	1,507	1,523	1,438	1,518	18,533
2004	1,570	1,527	1,664	1,622	1,682	1,655	1,687	1,751	1,581	1,658	1,600	1,684	19,681
2005	1,606	1,344	1,573	1,516	1,608	1,685	1,718	1,748	1,584	1,611	1,488	1,549	19,030
2006	1,526	1,359	1,586	1,564	1,606	1,611	1,617	1,644	1,417	1,359	1,292	1,262	17,843
2007	1,316	1,162	1,319	1,331	1,584	1,593	1,713	1,710	1,545	1,611	1,503	1,463	17,850
2008	1,453	1,386	1,489	1,508	1,640	1,662	1,777	1,699	1,336	1,367	1,281	1,330	17,928
2009	1,282	1,191	1,354	1,274	1,349	1,477	1,537	1,500	1,311	1,354	1,298	1,327	16,254
2010	1,196	1,132	1,252	1,194	1,300								
	Percent increase (decrease)												
2000-2001	(3.6%)	(19.6%)	(5.2%)	(7.2%)	1.1%	1.4%	9.7%	9.5%	(20.0%)	(13.2%)	(5.4%)	(5.0%)	(4.7%)
2001-2002	(1.3)	18.7	17.9	22.7	12.4	13.0	9.1	7.6	40.0	30.3	24.8	25.5	17.5
2002-2003	15.5	13.8	2.7	(5.3)	(11.9)	(13.1)	(11.8)	(9.3)	(4.8)	(7.4)	(14.4)	(11.4)	(5.5)
2003-2004	(4.1)	(0.1)	(1.5)	3.3	10.8	12.5	8.0	11.5	4.9	8.9	11.3	10.9	6.2
2004-2005	2.3	(12.0)	(5.5)	(6.5)	(4.4)	1.8	1.8	(0.2)	0.2	(2.8)	(7.0)	(8.0)	(3.3)
2005-2006	(5.0)	1.1	0.8	3.2	(0.1)	(4.4)	(5.9)	(5.9)	(10.5)	(15.6)	(13.2)	(18.5)	(6.2)
2006-2007	(13.8)	(14.5)	(16.8)	(14.9)	(1.4)	(1.1)	5.9	4.0	9.0	18.5	16.3	15.9	0.0
2007-2008	10.4	19.3	12.9	13.3	3.5	4.3	3.7	(0.6)	(13.5)	(15.1)	(14.8)	(9.1)	0.4
2008-2009	(11.8)	(14.1)	(9.1)	(15.5)	(17.7)	(11.1)	(13.5)	(11.7)	(1.9)	(1.0)	1.3	(0.2)	(9.3)
2009-2010	(6.7)	(5.0)	(7.5)	(6.3)	(3.6)								
	Percent of total												
2000	8.5%	8.0%	8.4%	8.3%	8.7%	8.4%	8.5%	8.4%	8.1%	8.3%	8.1%	8.2%	100.0%
2001	8.6	6.8	8.4	8.1	9.2	9.0	9.7	9.7	6.8	7.6	8.1	8.2	100.0
2002	7.2	6.9	8.4	8.5	8.8	8.6	9.0	8.8	8.1	8.4	8.6	8.7	100.0
2003	8.8	8.2	9.1	8.5	8.2	7.9	8.4	8.5	8.1	8.2	7.8	8.2	100.0
2004	8.0	7.8	8.5	8.2	8.5	8.4	8.6	8.9	8.0	8.4	8.1	8.6	100.0
2005	8.4	7.1	8.3	8.0	8.4	8.9	9.0	9.2	8.3	8.5	7.8	8.1	100.0
2006	8.6	7.6	8.9	8.8	9.0	9.0	9.1	9.2	7.9	7.6	7.2	7.1	100.0
2007	7.4	6.5	7.4	7.5	8.9	8.9	9.6	9.6	8.7	9.0	8.4	8.2	100.0
2008	8.1	7.7	8.3	8.4	9.1	9.3	9.9	9.5	7.5	7.6	7.1	7.4	100.0
2009	7.9	7.3	8.3	7.8	8.3	9.1	9.5	9.2	8.1	8.3	8.0	8.2	100.0

Note: Data include aircraft landings by mainline and regional passenger airlines.
Source: City of Colorado Springs, Airport Records.

Figure 3-14
ENPLANED PASSENGER LOAD FACTOR
Colorado Springs Airport



Sources: City of Colorado Springs, Airport records and Official Airline Guides, Inc., online database, accessed July 2010.

Air Cargo

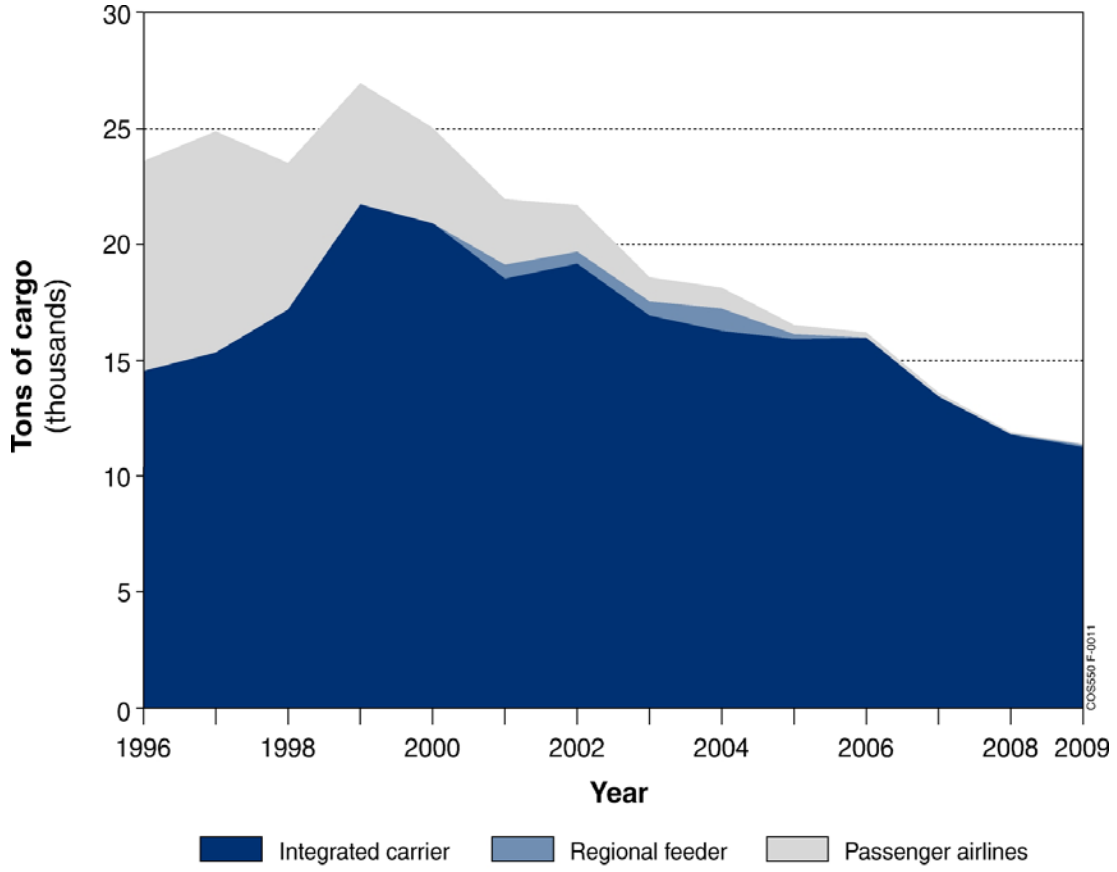
Table 3-19 presents data on total air cargo (enplaned and deplaned) at the Airport from 1996 through 2009. Enplaned air cargo at the Airport accounted for 37% of total cargo tonnage (enplaned plus deplaned) in 2009, although, historically, enplaned air cargo has accounted for nearly 50% of total air cargo. The decrease in the share of enplaned cargo at COS in 2009 reflects: (1) a 26.1% decrease in enplaned cargo related to the national economic recession and (2) a 16.1% increase in deplaned cargo, most likely related to increased military activity in the Colorado Springs MSA during this period. Total air cargo tonnage decreased an average of 5.4% per year between 1996 and 2009, and has decreased each year since 2000, reflecting:

- The economic recession in 2001 and the current recession that began in December 2007
- A reduction in available belly-cargo capacity on passenger airlines as a result of increases in the use of regional jet aircraft and low cost carrier operations which have less cargo capacity than larger air carrier aircraft
- The availability of reduced-cost belly-cargo capacity, particularly on widebody aircraft designed for containerized cargo, and direct international freighter service at other gateway airports, such as Chicago O'Hare, Los Angeles, and Dallas/Fort Worth international airports

- An increasing trend among freight forwarders to bypass airports and truck cargo to gateways that have available reduced-cost belly-cargo capacity
- The reorganization and consolidation in the cargo industry in response to the increase in fuel prices in 2008 and the national economic recession.

In 2009, about 99% of total air cargo at COS was transported by all-cargo airlines (integrated carriers and regional feeders), with the remaining 1% handled by the passenger airlines as belly cargo. From 1996 to 2009, air cargo tonnage on all-cargo airlines decreased an average of 1.9% per year, compared with an average decrease of 32.2% in air cargo handled by passenger airlines during the same period.

Figure 3-15
HISTORICAL TRENDS IN AIR CARGO
Colorado Springs Airport



Source: City of Colorado Springs, Airport records.

Table 3-19
HISTORICAL AIR CARGO TONNAGE
Colorado Springs Airport

	Freight	Mail	Total	Average annual percent increase (decrease)
1996	18,316	5,389	23,705	--%
1997	17,684	7,306	24,990	5.4
1998	18,432	4,996	23,428	(6.3)
1999	22,832	4,238	27,070	15.5
2000	21,817	3,337	25,154	(7.1)
2001	19,842	2,221	22,063	(12.3)
2002	20,291	1,513	21,804	(1.2)
2003	18,161	527	18,688	(14.3)
2004	17,754	482	18,236	(2.4)
2005	16,568	157	16,725	(8.3)
2006	16,301	1	16,302	(2.5)
2007	14,190	0	13,477	(13.0)
2008	11,994	1	11,996	(15.5)
2009	11,484	0	11,484	(4.3)

	Average annual percent increase (decrease)		
1996-2000	4.5%	(11.3%)	1.5%
2000-2009	(6.9)	(67.0)	(8.3)
1996-2009	(3.5)	(55.2)	(5.4)

Notes: Sum of enplaned and deplaned cargo.
Totals may not add due to rounding.
March 2007 Airport records were supplemented by U.S. Department of Transportation, T100 online database, accessed October 2010.

Source: City of Colorado Springs, Airport records, except where noted.

HISTORICAL AIRCRAFT OPERATIONS

This section summarizes historical total aircraft operations at the Airport from 1990 through 2009. Aircraft operations include the total number of departures and arrivals by air carrier, air taxi and commuter, general aviation, and military aircraft. An aircraft operation is defined as either a takeoff or a landing at the Airport.

Air Carrier

Air carrier operations are those performed in revenue service by the passenger and all-cargo airlines serving the Airport. Included are scheduled flights, charter flights (including those commercial aircraft destined for the Department of Defense's Arrival/Departure Airfield Control Group (A/DACG) facility), diverted flights, and ferry operations (empty flights). The FAA defines an air carrier aircraft, for traffic counting purposes, as capable of carrying more than 60 passengers and provides a list of model types that are counted as air carrier operations (Appendix 3 in Order JO 7210.3W), even if the aircraft is conducting air freight operations.[17] As shown in Table 3-20, air carrier aircraft operations decreased an average of 0.5% per year between 1990 and 2009, including an average decrease of 4.4% per year between 2000 and 2009.

Air Taxi and Commuter

Air taxi and commuter operations consist of unscheduled operations of "for hire" air taxis and the scheduled operations of commuter airlines, including regional affiliate airlines operating aircraft with less than 60 seats. The FAA defines air taxi and commuter operations as those performed by aircraft other than those listed in Appendix 3 noted above and which use three-letter company designators. Fractional ownership and management companies and corporate flight departments that use a three-letter company designator are included in air taxi operations. As shown in Table 3-20, air taxi and commuter aircraft operations increased an average of 4.6% per year between 1990 and 2009, the fastest growing category of aircraft operations.

General Aviation

General aviation operations include all civil aircraft operations not classified as air carrier or air taxi and commuter operations. As shown in Table 3-20, general aviation aircraft operations decreased an average of 1.9% per year between 1990 and 2009. According to the City of Colorado Springs Airport records, a total of 235 general aviation aircraft were based at the Airport in 2009, including 164 single engine piston, 32 multi-engine piston, 16 turboprop engine, 19 jet engine, and 4 helicopters.

[17] U.S. Department of Transportation, Federal Aviation Administration, Order JO 7210.3W, February 11, 2010, http://www.faa.gov/air_traffic/publications.

Military

Military aircraft operations at the Airport have averaged approximately 32,500 operations per year from 1990 through 2009. In 2009, military operations totaled 38,459, exceeding the 19-year average. Historically, military operations have varied with geopolitical trends and changes to the mission.

Table 3-20
HISTORICAL AIRCRAFT OPERATIONS
Colorado Springs Airport

	Commercial flights						
	Air carrier *(a)*	Commuter/ air taxi *(b)*	Subtotal	General aviation	Military	Total	Percent increase (decrease)
1990	21,920	7,821	29,741	99,300	45,330	174,371	--%
1991	24,755	4,159	28,914	129,814	39,697	198,425	13.8
1992	22,869	3,848	26,717	166,918	44,541	238,176	20.0
1993	23,853	7,440	31,293	174,540	42,169	248,002	4.1
1994	22,700	11,379	34,079	151,325	40,029	225,433	(9.1)
1995	35,899	9,845	45,744	133,268	35,024	214,036	(5.1)
1996	59,745	10,564	70,309	127,063	30,228	227,600	6.3
1997	51,377	23,575	74,952	103,184	24,248	202,384	(11.1)
1998	29,309	17,243	46,552	110,260	25,919	182,731	(9.7)
1999	32,295	18,358	50,653	162,196	24,921	237,770	30.1
2000	30,138	15,584	45,722	149,920	25,097	220,739	(7.2)
2001	25,783	17,423	43,206	140,954	22,061	206,221	(6.6)
2002	22,932	26,381	49,313	144,024	24,829	218,166	5.8
2003	19,982	28,609	48,591	105,525	46,831	200,947	(7.9)
2004	18,479	30,681	49,160	92,228	33,914	175,302	(12.8)
2005	20,656	27,509	48,165	88,694	29,647	166,506	(5.0)
2006	20,270	23,622	43,892	75,044	22,722	141,658	(14.9)
2007	20,465	21,581	42,046	88,699	25,596	156,341	10.4
2008	22,882	20,399	43,281	73,463	29,109	145,853	(6.7)
2009	20,077	18,349	38,426	68,411	38,459	145,296	(0.4)
	Average annual percent increase (decrease)						
1990-2000	3.2%	7.1%	4.4%	4.2%	(5.7%)	2.4%	
2000-2009	(4.4)	1.8	(1.9)	(8.3)	4.9	(4.5)	
1990-2009	(0.5)	4.6	1.4	(1.9)	(0.9)	(1.0)	

Notes: Sum of takeoffs and landings.

(a) Includes all-cargo carrier operations.
(b) Includes scheduled and for-hire service passenger and cargo service on aircraft with less than 60 seats.

Source: Federal Aviation Administration, Air Traffic Activity Data System (ATADS), accessed January 11, 2010.

Monthly Aircraft Operations

Table 3-21 presents monthly total aircraft operations data for the Airport for January 2000 through May 2010. The monthly data show the seasonal variation in total aircraft operations, with June and August each accounting for 10.4% of annual operations in 2009. From 2000 through 2009, August accounted for the peak share of annual aircraft operations at the Airport, with an average of 10.0% of annual operations.

Table 3-21
HISTORICAL AIRCRAFT OPERATIONS BY MONTH
Colorado Springs Airport

Year	January	February	March	April	May	June	July	August	September	October	November	December	Total
	Month												
2000	13,816	17,310	15,737	17,205	19,393	22,414	19,720	22,844	21,607	18,587	16,569	15,537	220,739
2001	14,985	11,877	13,197	13,412	15,533	21,979	21,132	22,164	14,392	21,364	20,144	16,042	206,221
2002	16,313	18,101	17,846	15,942	17,690	21,782	21,840	23,169	17,636	18,119	16,236	13,492	218,166
2003	17,465	13,870	17,657	15,392	13,948	18,991	17,033	21,031	18,013	17,732	16,754	13,061	200,947
2004	13,826	13,962	14,726	11,944	13,525	14,780	16,395	15,851	18,151	15,586	13,612	12,944	175,302
2005	12,565	12,903	12,935	13,466	13,473	15,285	16,207	15,471	14,919	14,640	12,915	11,727	166,506
2006	11,232	10,719	10,383	10,717	11,711	13,081	13,826	13,826	13,461	11,717	11,269	9,716	141,658
2007	10,550	10,718	11,471	10,698	13,630	14,599	16,339	16,520	13,650	14,355	13,780	10,031	156,341
2008	9,994	11,031	11,294	12,610	10,745	13,220	16,678	12,085	13,432	13,790	11,363	9,611	145,853
2009	11,197	9,953	11,181	10,929	11,671	15,110	14,230	15,119	11,567	11,668	11,713	10,958	145,296
2010	12,166	10,191	13,264	11,147	10,272								
	Percent change												
2000-2001	8.5%	(31.4%)	(16.1%)	(22.0%)	(19.9%)	(1.9%)	7.2%	(3.0%)	(33.4%)	14.9%	21.6%	3.3%	(6.6%)
2001-2002	8.9	52.4	35.2	18.9	13.9	(0.9)	3.4	4.5	22.5	(15.2)	(19.4)	(15.9)	5.8
2002-2003	7.1	(23.4)	(1.1)	(3.5)	(21.2)	(12.8)	(22.0)	(9.2)	2.1	(2.1)	3.2	(3.2	(7.9)
2005-2006	(10.6)	(16.9)	(19.7)	(20.4)	(13.1)	(14.4)	(14.7)	(10.6)	(9.8)	(20.0)	(12.7)	(17.1)	(14.9)
2006-2007	(6.1)	0.0	10.5	(0.2)	16.4	11.6	18.2	19.5	1.4	22.5	22.3	3.2	10.4
2007-2008	(5.3)	2.9	(1.5)	17.9	(21.2)	(9.4)	2.1	(26.8)	(1.6)	(3.9)	(17.5)	(4.2)	(6.7)
2008-2009	12.0	(9.8)	(1.0)	(13.3)	8.6	14.3	(14.7)	25.1	(13.9)	(15.4)	3.1	14.0	(0.4)
2009-2010	8.7	2.4	18.6	2.0	(12.0)								
	Percent of total												
2000	6.3%	7.8%	7.1%	7.8%	8.8%	10.2%	8.9%	10.3%	9.8%	8.4%	7.5%	7.0%	100.0%
2001	7.3	5.8	6.4	6.5	7.5	10.7	10.2	10.7	7.0	10.4	9.8	7.8	100.0
2002	7.5	8.3	8.2	7.3	8.1	10.0	10.0	10.6	8.1	8.3	7.4	6.2	100.0
2003	8.7	6.9	8.8	7.7	6.9	9.5	8.5	10.5	9.0	8.8	8.3	6.5	100.0
2004	7.9	8.0	8.4	6.8	7.7	8.4	9.4	9.0	10.4	8.9	7.8	7.4	100.0
2005	7.5	7.7	7.8	8.1	8.1	9.2	9.7	9.3	9.0	8.8	7.8	7.0	100.0
2006	7.9	7.6	7.3	7.6	8.3	9.2	9.8	9.8	9.5	8.3	8.0	6.9	100.0
2007	6.7	6.9	7.3	6.8	8.7	9.3	10.5	10.6	8.7	9.2	8.8	6.4	100.0
2008	6.9	7.6	7.7	8.6	7.4	9.1	11.4	8.3	9.2	9.5	7.8	6.6	100.0
2009	7.7	6.9	7.7	7.5	8.0	10.4	9.8	10.4	8.0	8.0	8.1	7.5	100.0
10-year average	7.4	7.3	7.7	7.5	8.0	9.6	9.8	10.0	8.9	8.9	8.1	6.9	100.0

Note: Data include passenger and cargo airline, general aviation, military, and air taxi operations.

Source: Federal Aviation Administration, Air Traffic Activity Data System (ATADS), online database, accessed May 2010.

ORIGINAL AVIATION DEMAND FORECASTS

This section summarizes the forecasts of enplaned passengers, air cargo, and total aircraft operations for COS, including the forecast approach, methodology, and assumptions. The forecasts are prepared for five future demand years, including an estimate for 2010 (based on year to date activity—January through May 2010—available when this report was prepared), a near-term forecast for 2011, and long-term forecasts for 2014, 2019, 2024, and 2030. The base year for the forecasts is 2009.

Enplaned Passengers

This section summarizes the key elements considered in the preparation of enplaned passenger forecasts for COS.

Forecast Approach and Methodology

The forecast methodology incorporated a multi-tiered approach to evaluate passenger traffic in the Colorado Springs MSA, including: (1) a historical trend analysis of enplaned passengers, (2) a regression analysis of COS originating passengers, including consideration of passenger traffic leakage from the Colorado Springs Airport service region to Denver International Airport, (3) an analysis of low cost carrier and other airline service at COS and Denver International Airport, and (4) supplemental analyses to evaluate data for peer airports. It was recognized that a single approach would not adequately account for all of the key factors that affect passenger demand.

Enplaned Passenger Trends

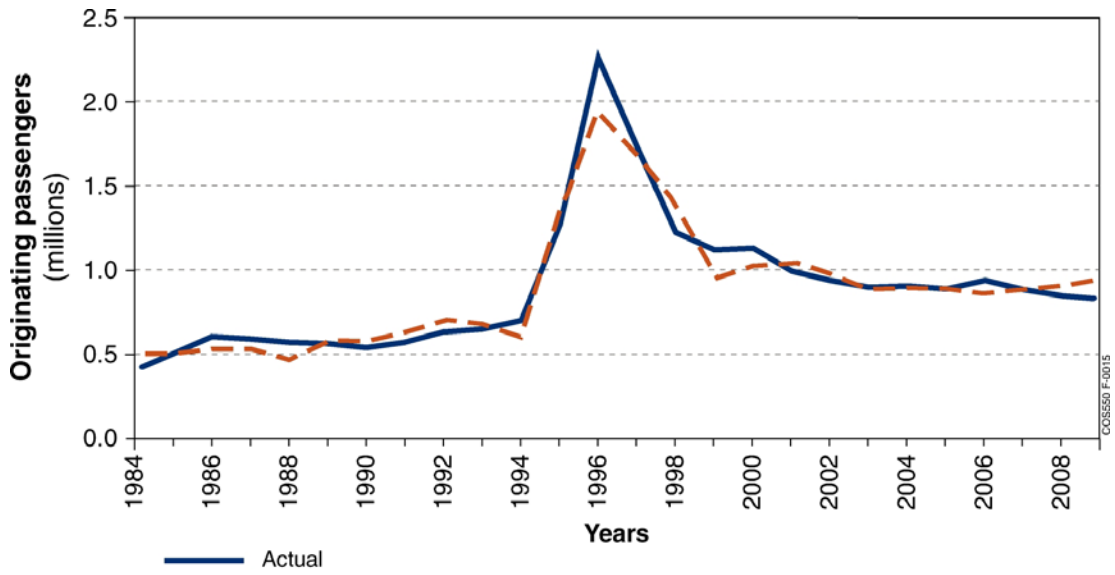
The number of enplaned passengers at the Airport increased an average of 2.4% per year between 1990 and 2009, exceeding the growth rate for the nation as a whole during this period (an average of 2.2% per year). This period included the expansion and cessation of service by Western Pacific Airlines at the Airport between 1995 and 1997. Since 1997, much of the growth in passenger traffic at the Airport has been driven by regional affiliates, with mainline activity decreasing an average of 2.8% per year between 1990 and 2009. Although the number of enplaned passengers at the Airport decreased between 2000 and 2009, a recovery in passenger traffic is expected, given the positive economic outlook for the Colorado Springs MSA, Colorado, and the United States as described in "Economic Basis for Aviation Demand," with a return to a rate of increase consistent with the long-term historical trends.

Originating Passengers

As discussed previously in "Regional Originating Passenger Market," COS shares its overall Airport service region with Denver International Airport. The overall Airport service region is defined by the location of and driving distance to other air carrier airports, as well as by the availability, price, and quality of airline service at those other airports. The trend in COS originating passengers can be explained by a regression analysis relating passenger trends to economic and airline industry

metrics. As shown on Figure 3-16, the historical trend in COS originating passengers relates strongly to the predicted values from a regression model which includes Colorado Springs MSA total personal income (in 2009 dollars) and COS airline yields (cents per passenger-mile, in 2009 dollars).[18] The relationship is strongest, however, when a variable for the development and cessation of service by Western Pacific Airlines at the Airport is included for 1995 through 1998. In addition, a variable for airline yields at Denver International Airport (in 2009 dollars) reflecting passenger traffic leakage also strengthened the model. Appendix C presents a summary of the regression model and statistics.

Figure 3-16
HISTORICAL AND PREDICTED DOMESTIC ORIGINATING PASSENGERS
Colorado Springs Airport



Sources: U.S. Department of Transportation, *Origin-Destination Survey, Domestic*, online database and U.S. Department of Commerce, Bureau of Economic Analysis, www.bea.gov, accessed July 2010.

[18] The statistical reliability of regression models is typically measured by a statistic known as "R-squared." An R-squared of 1.0 would represent a perfect historical correlation; this model has an R-squared of 0.92.

Airline Service

As discussed previously in "Airline Fares and Service to Top 10 COS Markets," enplaned passenger trends at the Airport have been affected by changes in airline service, including the introduction and continued development of low cost carrier service at Denver International Airport and the replacement of mainline service with the increasing use of regional affiliates. The availability of a large number of low cost carrier seats at Denver International Airport contributes to passenger traffic leakage from COS to Denver. Historical and projected economic activity in the Colorado Springs MSA suggests that organic growth in economic activity will support future development in airline service at the Airport and a growing O&D passenger base.

Peer Airports

As part of the preparation of aviation demand forecasts, a comparison with other small hub airport peers was conducted. The objective was to better understand the performance of Colorado Springs Airport relative to some of its peers and to evaluate the key drivers at peer airports in preparing forecasts of aviation demand for the Airport. Appendix C presents a summary of the peer airports analysis, including each characteristic or metric used to compare Colorado Springs Airport to that of 11 peer airports, the average of the 12 airports, and the average of the top 30 small hub airports in the United States according to passenger activity. Enplaned passenger load factors and airline yield (both important metrics used by airlines to compare the revenue performance of airports and markets) were two metrics used in this analysis that demonstrated the strength of the COS passenger market. In particular:

- COS outperforms nearly all small hubs in terms of enplaned passenger load factor, whether evaluating all small hubs or the 11 peer airports.
- COS airline yields[19] have been consistently above national average and that for other small hub airports.

With strong load factors and airline yields, airlines will likely continue to consider additional air service to Colorado Springs because the market has historically outperformed other similar markets with respect to generating airline revenue.

Forecast Assumptions

Forecasts of enplaned passengers were developed taking into account analyses of the economic basis for airline traffic, analyses of historical airline traffic, and an assessment of the key factors that may affect future airline traffic, as discussed previously. In general, it was assumed that, in the long term, changes in airline traffic at the Airport will occur largely as a function of growth in the population and economy of the Airport service region and changes in airline service. It was also

[19] "Yield" is the average price someone pays to fly one mile, excluding government taxes and ancillary fees.

assumed that continued development of airline service at the Airport will not be constrained by the availability of aviation fuel, long-term limitations in airline fleet capacity, limitations in the capacity of the air traffic control system or the Airport, or government policies or actions that restrict growth. Also considered were recent and potential developments in the national economy and in the air transportation industry as they have affected or may affect airline traffic at the Airport.

In the near term, it was assumed that:

- Slow recovery from the economic recession, weak growth in the U.S. and Colorado Springs MSA economies, and reduced disposable income will depress the demand for airline travel through 2010.
- Aviation fuel prices will stabilize at levels that are historically high, but lower than the record prices reached in mid-2008.
- Airlines will reduce domestic and international seat capacity consistent with airline schedules published in July 2010.

From 2011 through 2035, passenger numbers at the Airport are forecast to increase gradually on the basis of the assumptions that:

- The U.S. economy will recover from the recession and experience sustained GDP growth averaging between 2.0% and 2.5% per year, consistent with the historical trends and long-term growth in GDP projected by the Congressional Budget Office (see Table 3-8).
- The economy of the Colorado Springs MSA (as measured by employment and per capita income) will increase at a rate comparable to that of the U.S. as a whole as projected by the Colorado Department of Local Affairs (see Table 3-9).
- A generally stable international political environment and safety and security precautions will ensure airline traveler confidence in aviation without imposing unreasonable inconveniences.
- There will be no major disruption of airline service or airline travel behavior as a result of international hostilities or terrorist acts or threats.
- The Airport will continue to be the principal O&D airport for the Colorado Springs MSA and to have a low cost carrier presence.
- The airlines serving the Airport will be financially viable and capable of adding the seating capacity required to accommodate additional demand.
- Competition among the airlines serving the Airport will ensure the continued availability of competitive airfares.

Estimated Enplaned Passengers in 2010

In 2010, the number of enplaned passengers at the Airport is estimated to total 921,700, a 0.8% decrease from the 2009 total, reflecting actual data for the first 5 months of 2010 (January through May), published flight schedules for the Airport, announced airline service additions at the Airport, and airline industry guidance regarding reductions in seating capacity for 2010.

Enplaned Passenger Forecasts

The number of enplaned passengers at COS is forecast to increase an average of 2.8% per year between 2009 and 2035, from 929,600 in 2009 to 1.9 million in 2035, as shown in Table 3-22. The forecasts of enplaned passengers at COS were based on:

- A review of historical trends in enplaned passengers at COS as summarized in "Enplaned Passengers" and shown in Table 3-12
- A regression analysis of historical originating passengers at COS that relates the changes in passenger demand to changes in the key explanatory variables, as discussed previously in the "Originating Passengers" and shown on Figure 3-16
- Regional projections of Colorado Springs MSA per capita income by the Colorado Department of Local Affairs, as shown in Table 3-9
- An average increase of 0.5% per year in COS real airline yield (in 2009 dollars) reflecting the current mix of airlines serving the Airport and an average decrease of 0.4% per year in real airline yield at Denver International Airport reflecting the current share of low cost carrier service. The FAA forecasts U.S. domestic yield to decrease an average of 0.8% per year between 2009 and 2030.[20]
- An evaluation of low cost carrier service trends at COS and Denver International Airport and the effect of that service on domestic originating passenger demand
- Professional judgment in evaluating the reasonableness of the forecast results

[20] U.S. Department of Transportation, Federal Aviation Administration, FAA Aerospace Forecasts: FFY 2009 – 2030, March 2010.

Table 3-22
FORECASTS OF ENPLANED PASSENGERS: BASELINE
Master Plan Update
Colorado Springs Airport
2009 – 2035

	Historical 2009	Estimated 2010 *(b)*	Baseline forecast 2011	2014	2019	2029	2035
Enplaned passengers							
Mainline *(a)*	255,950	258,400	258,000	271,000	306,500	392,000	445,200
Regional affiliate	640,977	625,600	657,800	716,300	849,500	1,141,700	1,308,500
Low cost carriers	32,673	37,700	38,200	44,200	59,200	111,200	156,800
	929,600	921,700	954,000	1,031,500	1,215,200	1,644,900	1,910,500
Average annual percent change		(0.8%)	3.5%	2.6%	3.3%	3.1%	2.5%
Passenger airline aircraft departures							
Mainline *(a)*	2,287	2,250	2,250	2,360	2,640	3,310	3,710
Regional affiliate	13,718	12,810	13,340	14,250	16,100	19,400	20,700
Low cost carriers	249	280	330	380	500	930	1,310
	16,254	15,340	15,920	16,990	19,240	23,640	25,720
Average annual percent change		(5.6%)	3.8%	2.2%	2.5%	2.1%	1.4%
Average daily passenger airline aircraft departures							
Mainline *(a)*	6	6	6	6	7	9	10
Regional affiliate	38	35	37	39	44	53	57
Low cost carriers	1	1	1	1	1	3	4
	45	42	44	47	53	65	70
Average annual percent change		(5.7%)	3.8%	2.2%	2.5%	2.1%	1.4%

The forecasts presented in this table were prepared using the information and assumptions given in the accompanying text. Inevitably, some of the assumptions used to develop the forecasts will not be realized and unanticipated events and circumstances may occur. Therefore, there are likely to be differences between the forecast and actual results, and those differences may be material.

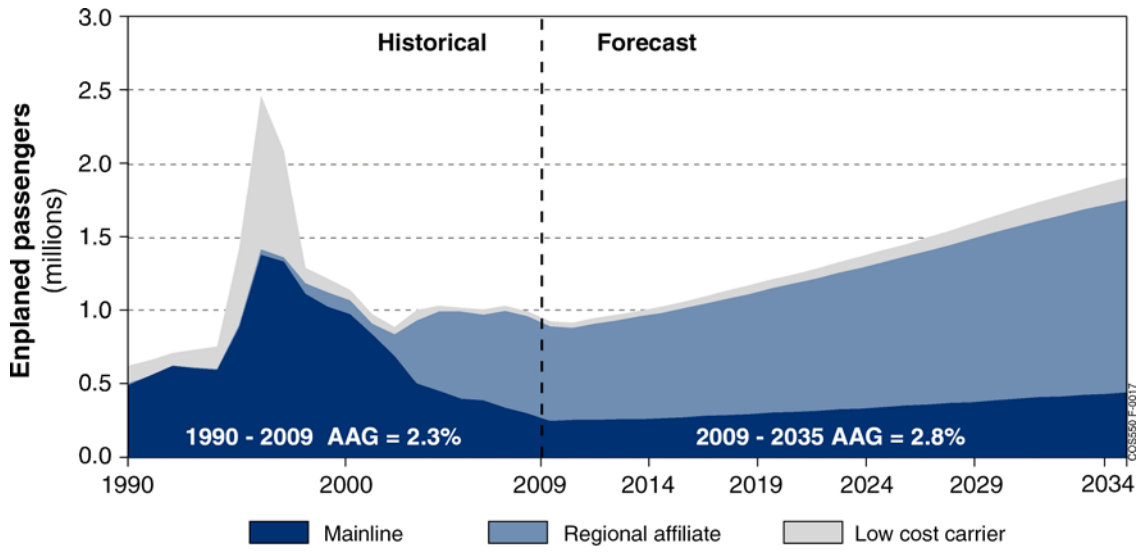
Note: The base year for the forecasts is 2009. Totals may not add due to rounding.

(a) Includes charters.
(b) Includes nonstop CRJ7 service from Colorado Springs Airport to Washington Dulles International Airport which started on June 9, 2010.

Sources: Historical: Colorado Springs Airport records. Forecast: LeighFisher, June 2010.

Total enplaned passengers at COS are forecast to increase an average of 2.8% per year between 2009 and 2030, greater than the annual growth rate forecast in the FAA 2009 TAF for the Airport—2.6% from FFY 2009 to FFY 2030. The number of main-line airline passengers enplaned at the Airport is forecast to increase an average of 2.2% per year between 2009 and 2035, compared with an average increase of 2.8% per year for regional affiliates and 6.2% per year for low cost carriers. Figure 3-17 presents the enplaned passenger forecasts for COS from 2009 through 2030.

Figure 3-17
HISTORICAL AND BASELINE FORECAST ENPLANED PASSENGERS
Colorado Springs Airport



The forecasts presented in this figure were prepared using the information and assumptions given in the accompanying text. Inevitably, some of the assumptions used to develop the forecasts will not be realized and unanticipated events and circumstances may occur. Therefore, there are likely to be differences between the forecast and actual results, and those differences may be material.

AAG = Average annual compound growth

Sources: Historical: Colorado Springs Airport records.
Forecast: LeighFisher, July 2010.

Air Cargo

This section summarizes the key elements considered in the preparation of air cargo forecasts for COS.

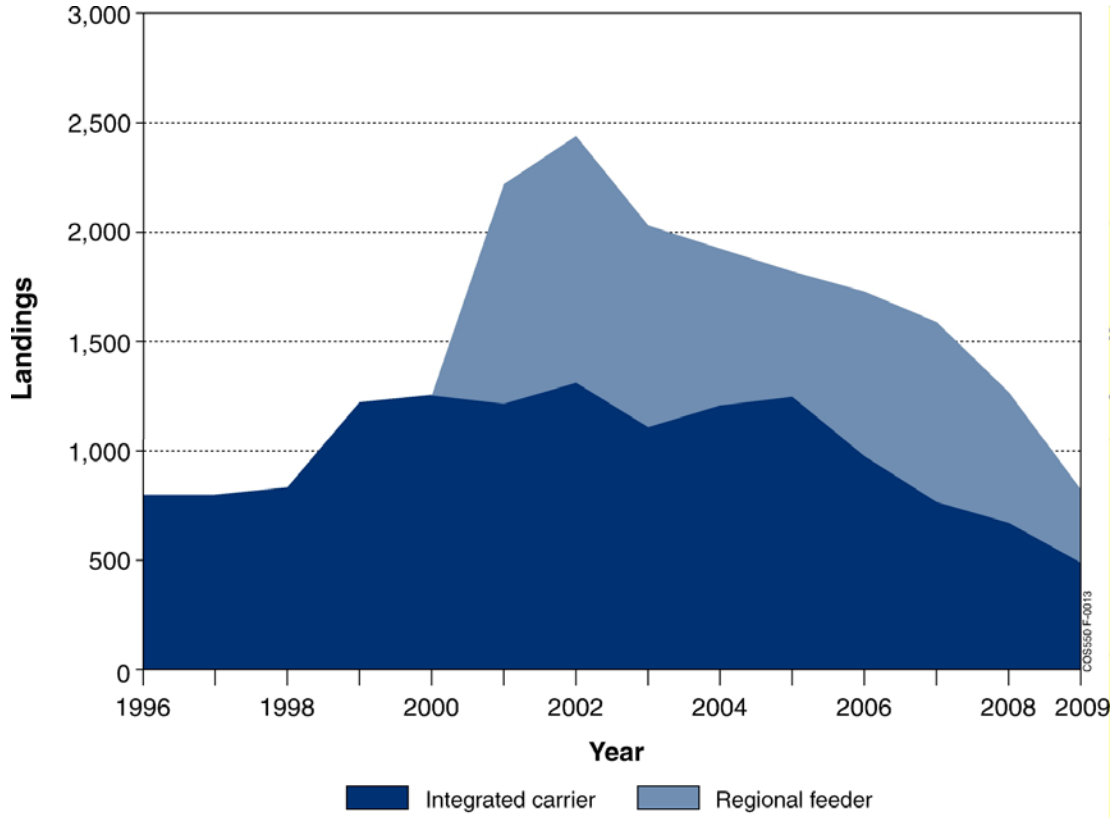
Forecast Approach and Methodology

The forecasts of air cargo were based on a combination of inputs, including: (1) an evaluation of the passenger airlines and cargo carriers providing cargo service at COS in relation to trends in the nation; (2) an analysis of historical air cargo at COS by major component (enplaned and deplaned cargo, freight and mail); (3) monthly trends in air cargo at COS in recent years; and (4) a review of cargo forecasts prepared by Boeing and Airbus.

Air Cargo Service

As discussed previously, about 99% of total air cargo at COS was transported by all-cargo airlines (integrated carriers and regional feeders), with the remaining 1% handled by the passenger airlines as belly cargo. As shown on Figure 3-18, integrated carriers such as FedEx that operate air carrier aircraft (e.g., FedEx recently up-gauged from a Boeing 727 to a Boeing 757 aircraft at the Airport) accounted for about 59% of all-cargo airline landings in 2009, with regional feeders operating commuter aircraft (e.g., Piper PA-31, Cessna 404, and Metroliner aircraft) accounting for the remaining 41%. The current routing of integrated carrier service at the Airport is for an incoming flight from Memphis to COS to depart to Grand Junction to enplane additional cargo before returning to COS and then departing for Memphis. This routing has been consistent and is expected to be the same in the foreseeable future.

Figure 3-18
ALL-CARGO AIRLINE LANDINGS
Colorado Springs Airport



Source: City of Colorado Springs, Airport records.

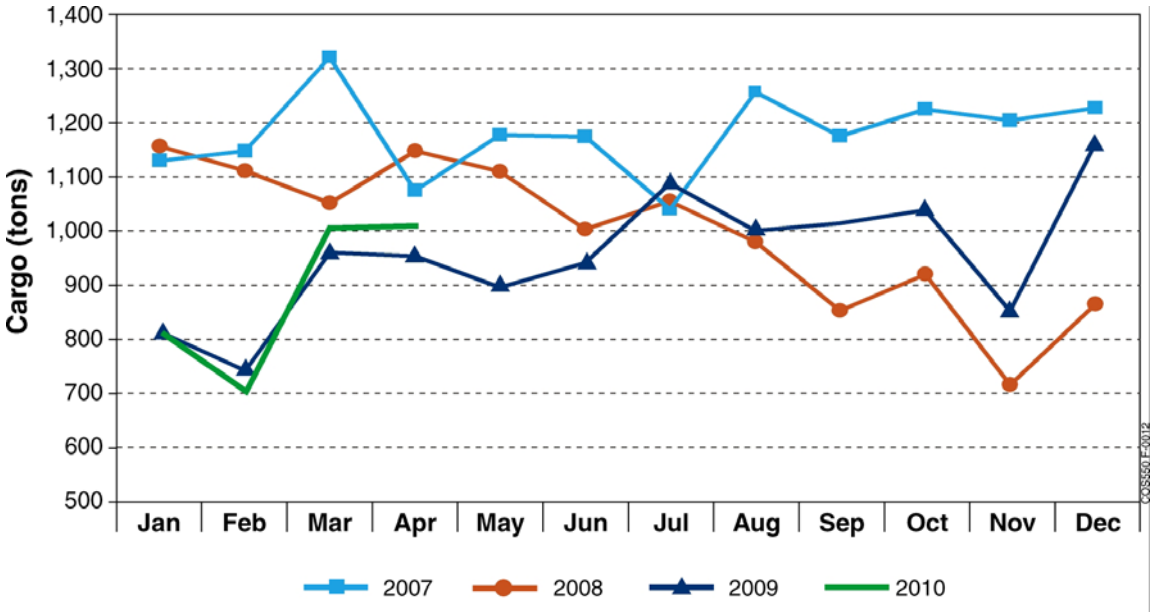
Air Cargo Trends

As discussed previously, air cargo tonnage on all-cargo airlines decreased an average of 1.9% per year between 1996 and 2009, compared with an average decrease of 32.2% in air cargo handled by passenger airlines during the same period. Given the dedicated capacity of all-cargo airlines at the Airport and the large share of regional affiliates providing passenger service, it is expected that all-cargo airlines will continue to account for about 99% of air cargo tonnage at COS during the forecast period.

Monthly Trends in Air Cargo

The air cargo industry, both nationally and globally, recorded double-digit decreases in cargo activity in 2008 and 2009 as a result of increased fuel prices and the national and global economic recessions. Cargo tonnage at COS showed similar declines. As shown on Figure 3-19, monthly data for cargo tonnage at COS through May 2010 suggest that cargo volumes have stabilized in recent months.

Figure 3-19
MONTHLY AIR CARGO TRENDS
Colorado Springs Airport



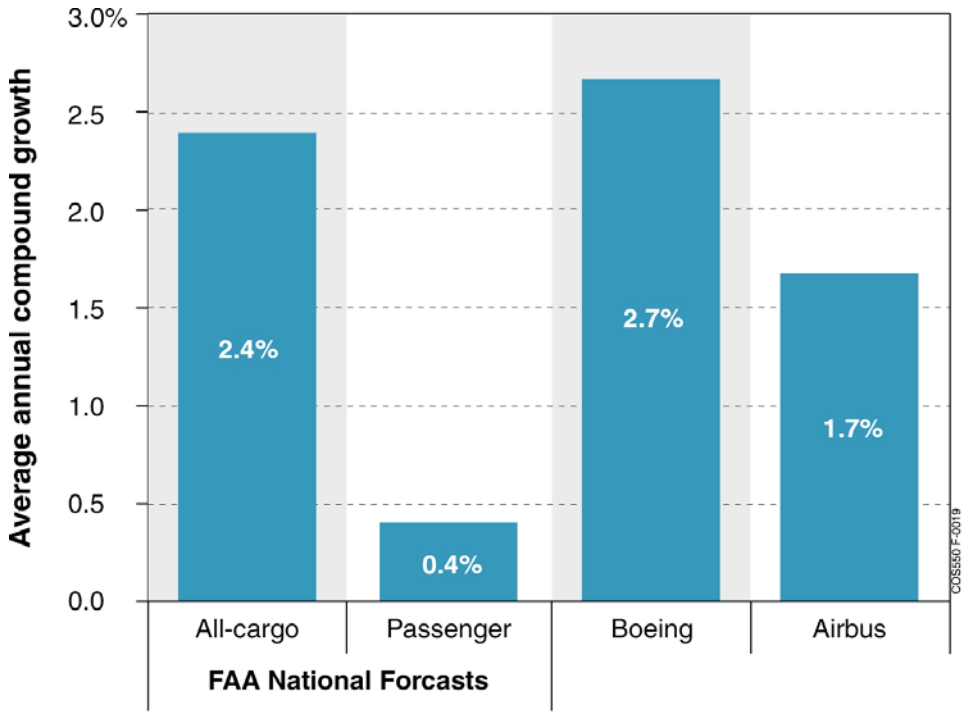
Note: The March 2007 Airport records were supplemented with U.S. Department of Transportation, T100 online database , accessed October 2010.

Source: City of Colorado Springs, Airport records, except where noted.

Air Cargo Industry Forecasts

A review of independent industry cargo forecasts of world cargo traffic by region prepared by Boeing and Airbus provided an indication of the range of growth expected in air cargo, as shown on Figure 3-20. In addition, the FAA prepares forecasts of cargo revenue ton miles as part of the national aerospace forecasts; as noted previously, it does not prepare air cargo forecasts for individual airports as part of the TAF.

Figure 3-20
SELECTED AIR CARGO INDUSTRY FORECASTS
Colorado Springs Airport



Note: FAA forecasts are in Revenue Ton Miles. Boeing forecasts are in Revenue Ton Kilometers.; Airbus forecasts are in Freight Ton Kilometers. Forecast growth rates are for domestic or intra-North America.

Sources: U.S. Department of Transportation, Federal Aviation Administration, FAA *Aerospace Forecasts*, FFY2009 - 2030.
The Boeing Company, World Air Cargo Forecast, 2008-2009, www.boeing.com.
Airbus, *Global Market Forecast*, 2009-2028, www.airbus.com.

Forecast Assumptions

Forecasts of air cargo were developed taking into account analyses of the economic basis for airline traffic, analyses of historical air cargo, and an assessment of the key factors that may affect future airline traffic, as discussed in previous sections. In general, it was assumed that, in the long term, changes in air cargo at the Airport

will occur largely as a function of growth in the population and economy of the Airport service region and changes in all-cargo airline service.

Estimated Air Cargo in 2010

In 2010, air cargo at the Airport is estimated to total 11,672 tons, a 1.6% increase from the 2009 number, reflecting actual data for the first 5 months of 2010 (January through May) and a review of historical trends in air cargo.

All-Cargo Airline Air Cargo Forecasts

All-cargo airlines accounted for 99% of total air cargo tonnage at COS in 2009. Air cargo handled by all-cargo airlines at COS is forecast to increase an average of 1.8% per year between 2009 and 2035, from 11,426 tons in 2009 to 18,240 tons in 2035, as shown in Table 3-23. The forecasts of all-cargo airline air cargo at COS were based on:

- A review of historical trends in all-cargo airline air cargo (integrated carrier and regional feeder) at COS.
- Input from key stakeholders at the Airport.
- A review of independent industry forecasts of world cargo traffic by region prepared by the FAA, Boeing, and Airbus.
- Forecast assumptions for air cargo growth at COS, based on a review of historical trends, recent data for air cargo, particularly in the context of a national and global economic recession, independent industry forecasts, and professional judgment in evaluating the reasonableness of the forecast results.

Passenger Airline Air Cargo Forecasts

Passenger airlines accounted for 1% of total air cargo tonnage at COS in 2009. Air cargo handled by passenger airlines at COS is forecast to increase an average of 1.7% per year between 2009 and 2035, from 58 tons in 2009 to 91 tons in 2035, as shown in Table 3-23. The forecasts of air cargo transported by passenger airline at COS are related to the growth in passenger airline aircraft operations and the availability belly cargo space.

Total Air Cargo Forecasts

Total cargo tonnage at COS is forecast to increase an average of 1.8% per year between 2009 and 2035, from 11,484 tons in 2009 to 18,331 tons in 2030, as shown in Table 3-23 and on Figure 3-21. All-cargo airline cargo tonnage is forecast to account for 99% of total cargo tonnage during the forecast period.

Table 3-23
FORECASTS OF TOTAL AIR CARGO: BASELINE
Master Plan Update
Colorado Springs Airport
2009 – 2030

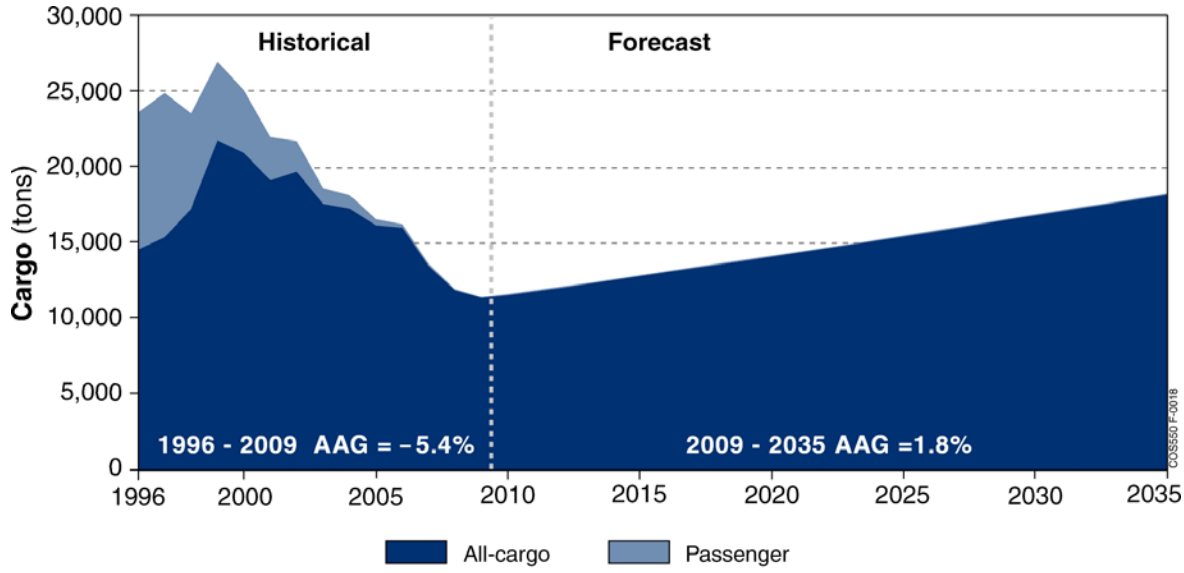
	Historical	Estimated	Baseline forecast				
	2009	2010	2011	2014	2019	2029	2035
Total air cargo (tons)							
All-Cargo airlines							
Integrated carrier	11,310	11,490	11,720	12,480	13,770	16,470	18,110
Regional feeder	116	110	110	120	120	130	130
	11,426	11,600	11,830	12,600	13,890	16,600	18,240
Passenger airlines	58	72	72	74	78	86	91
Total Airport—air cargo	11,484	11,672	11,902	12,674	13,968	16,686	18,331
Average annual percent change	--	1.6%	2.0%	2.1%	2.0%	1.8%	1.6%
All-cargo airline aircraft departures							
All-Cargo airlines							
Integrated carrier	491	480	480	480	480	490	490
Regional feeder	335	340	340	340	340	340	340
	826	820	820	820	820	830	830
Average annual percent change	--	(0.7%)	0.0%	0.0%	0.0%	0.1%	0.0%
Cargo per operation (tons)							
All-Cargo airlines							
Integrated carrier	11.5	12.0	12.2	13.0	14.3	16.8	18.5
Regional feeder	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Total	6.9	7.1	7.2	7.7	8.5	10.0	11.0

The forecasts presented in this table were prepared using the information and assumptions given in the accompanying text. Inevitably, some of the assumptions used to develop the forecasts will not be realized and unanticipated events and circumstances may occur. Therefore, there are likely to be differences between the forecast and actual results, and those differences may be material.

Note: Includes enplaned and deplaned cargo in tons.

Sources: Historical: Colorado Springs Airport records. Forecast: LeighFisher, June 2010.

Figure 3-21
HISTORICAL AND BASELINE FORECAST AIR CARGO
Colorado Springs Airport



The forecasts presented in this figure were prepared using the information and assumptions given in the accompanying text. Inevitably, some of the assumptions used to develop the forecasts will not be realized and unanticipated events and circumstances may occur. Therefore, there are likely to be differences between the forecast and actual results, and those differences may be material.

AAG = Average annual compound growth

Sources: Historical: Colorado Springs Airport records.
Forecast: LeighFisher, July 2010.

Aircraft Operations

This section summarizes the forecasts of total aircraft operations, including passenger airline, all-cargo airline, general aviation, and military operations.

Forecast Approach and Methodology

The forecasts of total aircraft operations are derived from the forecasts of passenger and cargo demand described previously and an evaluation of general aviation and military operations. In particular:

- The forecasts of passenger airline aircraft departures are based on the enplaned passenger forecasts and assumptions regarding average aircraft size and enplaned passenger load factor.
- The forecasts of all-cargo airline aircraft departures are based on the air cargo forecasts and assumptions regarding average cargo tonnage per operation and type of all-cargo service (integrated carrier or regional feeder).

- The forecasts of general aviation aircraft operations are based on historical trends, the number of aircraft based at the Airport, the average daily utilization of those aircraft, assumptions regarding aircraft utilization in the future, and industry forecasts of general aviation activity such as those prepared by the FAA.

- The forecasts of military aircraft operations are based on data for the base year of the forecasts and carried forward through the forecast period. Military operations typically increase and decrease with geopolitical trends and therefore this activity may vary in a given year.

Forecast Assumptions

Table 3-24 presents the forecast assumptions for passenger airline aircraft operations, including assumptions for the average number of passengers per departure, the average number of seats per departure, and the average enplaned passenger load factor. The assumptions for the average cargo tonnage per operation are presented in Table 3-23.

Estimated Aircraft Operations in 2010

In 2010, the number of aircraft operations at the Airport is estimated to total 143,840, a 1.0% decrease from the 2009 total, reflecting actual data for the first 5 months of 2010 (January through May).

Passenger Airline Aircraft Operations Forecasts

Passenger aircraft operations include total departures and arrivals performed by mainline and regional affiliate aircraft in the service of transporting passengers, as shown in Table 3-25. Passenger airline aircraft operations were calculated by dividing the enplaned passenger forecasts by category (e.g., mainline, regional affiliate, and low cost carrier) by the estimated number of passengers enplaned per departure. In 2009, the average number of passengers enplaned per departure for the Airport as a whole was approximately 57, as shown in Table 3-24. This number is expected to increase slowly over the forecast period based on an estimated increase in the average number of seats per aircraft and an estimated load factor, or percent of available seats filled with passengers. The average number of passengers enplaned per departure is expected to reach approximately 74 in 2035. Dividing the enplaned passenger forecasts by the forecast number of passengers enplaned per departure yields passenger airline aircraft departures. The forecast departures were then multiplied by two to yield passenger airline aircraft operations for each category of activity.

Passenger airline aircraft operations at COS are forecast to increase from 32,508 in 2009 to 51,440 operations in 2035, an average increase of 1.8% per year, as shown in Table 3-25. Mainline airline aircraft operations at the Airport are forecast to increase an average of 1.9% per year between 2009 and 2035, compared with an average

increase of 1.6% per year for regional affiliates and an average increase of 6.6% per year for low cost carriers.

Table 3-24
ASSUMPTIONS FOR PASSENGER AIRLINE AIRCRAFT DEPARTURE FORECASTS
Master Plan Update
Colorado Springs Airport
2009 – 2035

	Historical	Estimated	Baseline forecast				
	2009	2010	2011	2014	2019	2029	2035
Enplaned passengers per departure							
Mainline *(a)*	112.2	114.7	114.7	115.1	116.2	118.6	120.0
Regional affiliate	46.7	48.9	49.3	50.2	52.7	58.9	63.2
Low cost carriers	131.2	135.0	116.8	117.2	117.8	119.0	119.7
Total Airport	57.2	60.1	59.9	60.7	63.1	69.6	74.3
Seats per departure							
Mainline *(a)*	143.0	142.8	142.8	142.8	143.5	145.0	145.9
Regional affiliate	58.6	59.9	60.4	61.3	64.1	70.8	75.6
Low cost carriers	150.0	150.0	150.0	150.0	150.0	150.0	150.0
Total Airport	71.9	73.7	73.9	74.5	77.2	84.3	89.5
Enplaned passenger load factor							
Mainline *(a)*	78.4%	80.3%	80.3%	80.6%	81.0%	81.8%	82.3%
Regional affiliate	79.7	81.5	81.7	81.9	82.3	83.1	83.6
Low cost carriers	87.5	90.0	77.9	78.1	78.5	79.3	79.8
Total Airport	79.6	81.5	81.1	81.4	81.8	82.5	83.0

The forecasts presented in this table were prepared using the information and assumptions given in the accompanying text. Inevitably, some of the assumptions used to develop the forecasts will not be realized and unanticipated events and circumstances may occur. Therefore, there are likely to be differences between the forecast and actual results, and those differences may be material.

Note: The base year for the forecasts is 2009.

(a) Includes charter airlines.

Sources: Historical: Colorado Springs Airport records. Forecast: LeighFisher, June 2010.

Table 3-25
FORECASTS OF TOTAL AIRCRAFT OPERATIONS BY TYPE: BASELINE
Master Plan Update
Colorado Springs Airport
2009 – 2035

	Historical 2009	Estimated 2010	Baseline forecasts 2011	2014	2019	2029	2035
Passenger airline aircraft operations							
Mainline *(a)*	4,574	4,500	4,500	4,720	5,280	6,620	7,420
Regional affiliate *(b)*	27,436	25,620	26,680	28,500	32,200	38,800	41,400
Low cost carriers *(c)*	498	560	660	760	1,000	1,860	2,620
Total passenger operations	32,508	30,680	31,840	33,980	38,480	47,280	51,440
Average annual percent change	--	(5.6%)	3.8%	2.2%	2.5%	2.1%	1.4%
All-cargo airline aircraft operations							
Air carrier	982	960	960	960	960	980	980
Air taxi	670	680	680	680	680	680	680
Total all-cargo operations	1,652	1,640	1,640	1,640	1,640	1,660	1,660
Average annual percent change	--	-0.7%	0.0%	0.0%	0.0%	0.1%	0.0%
A/DACG aircraft operations	318	500	500	500	500	500	500
Average annual percent change	--	57.2%	0.0%	0.0%	0.0%	0.0%	0.0%
General aviation operations							
Itinerant	34,739	35,090	35,520	36,870	39,350	44,870	48,590
Local	33,672	33,670	34,090	35,370	37,630	42,760	46,330
Total general aviation operations	68,411	68,760	69,610	72,240	76,980	87,630	94,920
Average annual percent change	--	0.5%	1.2%	1.2%	1.3%	1.3%	1.3%
Military operations							
Itinerant	19,100	19,100	19,100	19,100	19,100	19,100	19,100
Local	19,359	19,360	19,360	19,360	19,360	19,360	19,360
Total military operations	38,459	38,460	38,460	38,460	38,460	38,460	38,460
Other activity *(d)*	3,948	3,800	3,900	4,000	4,200	4,700	5,000
Total Airport—aircraft operations	145,296	143,840	145,950	150,820	160,260	180,230	191,980
Average annual percent change	--	(1.0%)	1.5%	1.1%	1.2%	1.2%	1.1%

The forecasts presented in this table were prepared using the information and assumptions given in the accompanying text. Inevitably, some of the assumptions used to develop the forecasts will not be realized and unanticipated events and circumstances may occur. Therefore, there are likely to be differences between the forecast and actual results, and those differences may be material.

Note: Aircraft operations include departures and arrivals.

(a) Includes charter airlines.
(b) Includes Frontier Airline regional affiliates Lynx Aviation and Republic Airlines.
(c) Allegiant Air was the only low cost carrier serving the Airport in 2009.
(d) Includes nonscheduled and empty flights. Other operations accounted for 2.7% of commercial airline (passenger and all-cargo) operations in 2009 and are assumed to account for this share in future years.

Sources: Historical: City of Colorado Springs records and U.S. Department of Transportation, Federal Aviation Administration, ATADS online database. Forecast: LeighFisher, June 2010.

All-Cargo Airline Aircraft Operations Forecasts

Cargo airline operations at COS include the flight activity by airlines dedicated exclusively to the transportation of freight such as FedEx and by commuter/regional size aircraft. Air carrier size aircraft that perform all-cargo operations at the airport include aircraft models such as the Boeing 727 and 757. Commuter or regional aircraft that perform all-cargo operations at the airport include small piston and turboprop aircraft such as the Piper PA-31, Cessna 404, and Metroliner aircraft. In 2009, there were 1,652 cargo airline operations performed at the Airport.

The forecast of all-cargo operations was developed by first estimating the share of future cargo tonnage expected to be carried by air carrier and commuter aircraft. The cargo tonnage expected to be carried by all-cargo carriers was then divided by an estimated cargo tons per departure ratio to yield total air carrier cargo operations. For example, air carrier all-cargo aircraft carried approximately 11.5 tons (24,000 pounds) per operation in 2009. The ratio of tons per operation is expected to increase gradually over the forecast period to account for expected growth in cargo related to economic activity

Cargo airline aircraft operations at COS are forecast to increase slightly from 1,652 in 2009 to 1,660 operations in 2035, as shown in Table 3-25.

General Aviation Aircraft Operations Forecasts

General aviation (GA) activity includes all flight operations by aircraft other than scheduled or charter passenger aircraft and military aircraft. GA includes not only pilot training and recreational flights on small single engine or multi-engine propeller driven aircraft, but also operations on large business jet aircraft.

On a nationwide basis, the number of general aviation aircraft operations has been in slow decline due to factors such as increases in aircraft, fuel, and insurance costs, as well as increased avionic instrument requirements. The current economic recession and the financial credit crisis further reduced general aviation activity nationwide. For the future, the FAA expects general aviation traffic to recover slowly.

The flight operations of GA aircraft are categorized as local or itinerant operations. Local operations are flights that operate within visual range or close proximity of the airport. Itinerant operations typically include those flights that leave the airport destined for another airport and require the filing of flight plans with the local air traffic control authorities. Historically, itinerant operations have accounted for 40% to 50% of GA operations at the Airport and in 2009 accounted for 51% of GA operations, as shown in Tables 3-25 and 3-26.

The current distribution of GA operations between itinerant and local operations is anticipated to remain constant over the forecast horizon. The total number of general aviation operations is forecast to increase an average of 1.3% per year from

2009 through 2035, which includes an estimated increase of 0.5% in 2010 based on actual data for January through May 2010. The GA aircraft operations forecast growth rate is higher than the annual growth rate forecast in the FAA 2009 TAF for the Airport—an average increase of 0.5% per year from FFY 2009 to FFY 2030—but equal to the FAA Aerospace forecast growth rate for national general aviation operations.

In 2009, a total of 235 general aviation aircraft were based at the Airport, including 164 single-engine, 32 multi-engine, 16 turboprop, 19 jets, and 4 helicopters, as shown in Table 3-26. The total number of based aircraft at the Airport is forecast to increase an average of 1.4% per year between 2009 and 2035.

Arrival/Departure Airfield Control Group Operations Forecasts

Arrival/Departure Airfield Control Group (A/DACG) facility, constructed in 2008, is used by the Department of Defense to deploy military troops and equipment as needed. Aircraft using the A/DACG facility include a mix of commercial and military aircraft. The commercial aircraft using the facility are operated by charter airlines (e.g., Boeing 737, Boeing 757), and the military aircraft are typically large transport aircraft (e.g., C5, C17). In calendar year 2009, the facility served approximately 316 commercial operations, and 152 military transport operations. In calendar year 2010, the A/DACG facility is expected to serve over 500 commercial operations and 288 military operations. In Table 3-25, the aircraft operations for the A/DACG facility include only commercial aircraft; military aircraft using the facility are classified within the military aircraft operations forecasts category.

Military Aircraft Operations Forecasts

The number of military operations at the Airport ranged from 20,000 to nearly 50,000 from 1990 through 2009 and averaged approximately 32,500 operations per year during that period. In 2009, military operations totaled 38,459, exceeding the 19-year average. Military operations are expected remain at a level of about 38,500 operations from 2009 through 2035, as shown in Table 3-25.

Total Aircraft Operations Forecasts

Total aircraft operations at COS are forecast to increase from 145,296 in 2009 to 191,980 operations in 2035, an average increase of 1.1% per year, as shown in Table 3-25 and on Figure 3-22.

Table 3-26
FORECASTS OF GENERAL AVIATION ACTIVITY
Master Plan Update
Colorado Springs Airport
2009 – 2035

	Historical 2009	Estimated 2010	Baseline 2011	2014	2019	2029	2035
General aviation operations							
Itinerant	34,739	35,090	35,520	36,870	39,350	44,870	48,590
Local	33,672	33,670	34,090	35,370	37,630	42,760	46,330
General aviation operations	68,411	68,760	69,610	72,240	76,980	87,630	94,920
Average annual percent change	--	0.5%	1.2%	1.2%	1.3%	1.3%	1.3%
Based aircraft *(a)*							
Single engine (nonjet)	164	162	161	160	159	168	172
Multi engine (nonjet)	32	37	37	37	37	37	38
Jet engine	19	19	20	22	28	42	52
Turboprop	16	24	25	28	35	53	66
Helicopter	4	3	3	3	4	5	6
Other	--	--	--	--	--	--	--
Total based aircraft	235	245	246	251	263	305	334
Average annual percent change	--	4.3%	0.4%	0.7%	1.0%	1.5%	1.5%
General aviation operations per based aircraft	**291**	**281**	**283**	**288**	**293**	**287**	**284**
Average annual percent change	--	(3.6%)	0.9%	0.6%	0.3%	(0.2%)	(0.2%)

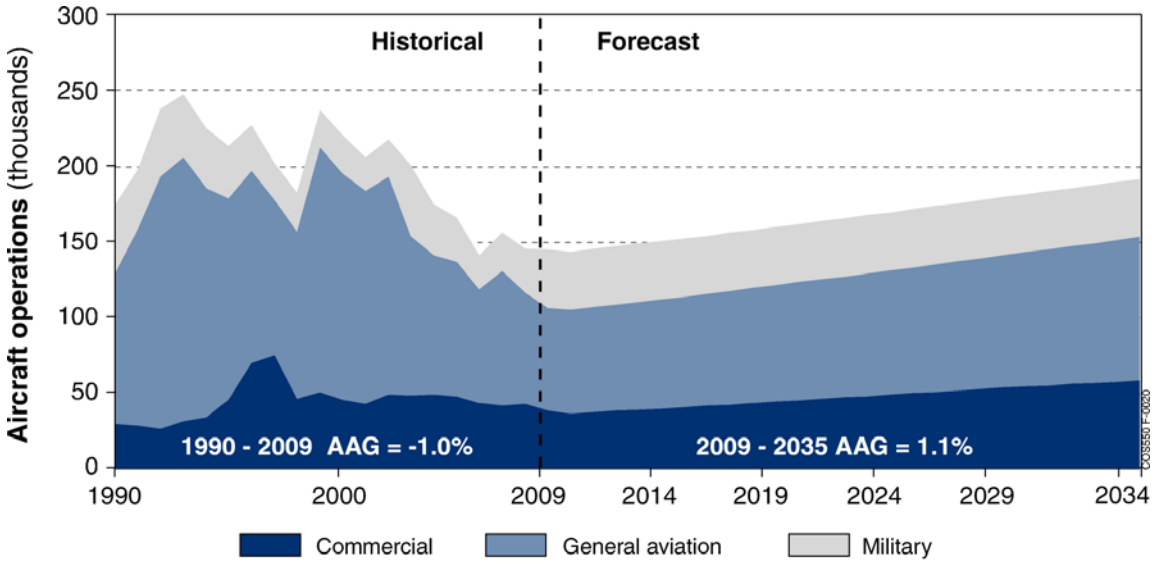
The forecasts presented in this table were prepared using the information and assumptions given in the accompanying text. Inevitably, some of the assumptions used to develop the forecasts will not be realized and unanticipated events and circumstances may occur. Therefore, there are likely to be differences between the forecast and actual results, and those differences may be material.

Note: Aircraft operations include departures and arrivals.

(a) Excludes military based aircraft which totaled 24 in 2009 and 2010.

Sources: Historical: City of Colorado Springs records and U.S. Department of Transportation, Federal Aviation Administration, ATADS online database. Forecast: LeighFisher, June 2010.

Figure 3-22
HISTORICAL AND BASELINE FORECAST TOTAL AIRCRAFT OPERATIONS
Colorado Springs Airport



The forecasts presented in this figure were prepared using the information and assumptions given in the accompanying text. Inevitably, some of the assumptions used to develop the forecasts will not be realized and unanticipated events and circumstances may occur. Therefore, there are likely to be differences between the forecast and actual results, and those differences may be material.

AAG = Average annual compound growth

Commercial operations include air carrier and air taxi/commuter operations.

Sources: Historical: Colorado Springs Airport records.
Forecast: LeighFisher, July 2010.

COMPARISON WITH THE FAA 2009 TAF

Table 3-27 presents a comparison of the aviation demand forecasts prepared for COS and the Federal Aviation Administration's 2009 Terminal Area Forecast (FAA 2009 TAF) for the Airport. The forecasts are compared for the components of total enplaned passengers, commercial aircraft operations and total aircraft operations. The format of Table 3-27 is based on the template provided by the FAA for the comparison of airport planning forecasts and the FAA TAF.[21] As required, the results are presented for the base year of 2009 and forecast horizons years which are equal to the base year, plus 1, 5, 10 and 15 years (2010, 2014, 2019, and 2024). The COS aviation demand forecasts have been compared graphically with the FAA 2009 TAF in the figures presented throughout this chapter, including Figures 3-4 and 3-6.

The key findings of the comparison of the COS aviation demand forecasts with the FAA 2009 TAF are:

[21] U.S. Department of Transportation, Federal Aviation Administration, *Forecasting Aviation Activity by Airport*, July 2001, and *Review and Approval of Aviation Forecasts*, June 2008, http://www.faa.gov.

- The forecast of enplaned passengers for COS is higher than the TAF. The variance between the COS enplaned passenger forecast and the FAA 2009 TAF is 7.2% in 2014 and 10.4% in 2019, as shown in Table 3-27.

- The forecast of commercial operations for COS varies from the FAA 2009 TAF by 10.0% or less (0.0% in 2014 and 4.2% in 2019).

- The forecast of total aircraft operations for COS varies from the FAA 2009 TAF by 10.0% or less (3.6% in 2014 and 6.0% in 2019).

- Overall, the COS aviation demand forecasts are similar to the FAA 2009 TAF for the Airport and "differ by less than 10 percent in the 5-year forecast period, and 15 percent in the 10-year forecast period", as stipulated in the FAA forecast guidance.

Table 3-28 presents a summary of the COS aviation demand forecasts using a second template provided by the FAA.

Table 3-27
FAA TAF FORECAST COMPARISON
Master Plan Update
Colorado Springs Airport
2009 – 2024

	Year *(a)*	Colorado Springs Master Plan Update	FAA 2009 TAF	COS MPU vs. 2009 TAF (percent variance)
Passenger enplanements				
Base yr.	2009	929,600	883,461	5.2%
Base yr. + 5yrs.	2014	1,031,500	962,277	7.2
Base yr. + 10yrs.	2019	1,215,200	1,100,743	10.4
Base yr. + 15yrs.	2024	1,412,500	1,266,817	11.5
Commercial operations *(b)*				
Base yr.	2009	38,426	38,304	0.3%
Base yr. + 5yrs.	2014	40,120	40,105	(0.0)
Base yr. + 10yrs.	2019	44,820	43,029	4.2
Base yr. + 15yrs.	2024	49,290	46,384	6.3
Total operations *(c)*				
Base yr.	2009	145,296	145,721	(0.3%)
Base yr. + 5yrs.	2014	150,820	145,524	3.6
Base yr. + 10yrs.	2019	160,260	151,213	6.0
Base yr. + 15yrs.	2024	169,880	157,526	7.8

(a) The Colorado Springs Master Plan Update was prepared on a calendar year basis and the FAA 2009 TAF was prepared on a U.S. government fiscal year basis (October through September).
(b) Commercial operations include operations by passenger airlines, all-cargo airlines, and air taxi operators.
(c) Total operations include commercial operations plus operations by general aviation and military.

Sources: Base year 2009 (actual)—City of Colorado Springs, Airport records.
COS MPU Forecasts—LeighFisher, June 2010.
FAA 2009 TAF for COS—U.S. Department of Transportation, Federal Aviation Administration, online database, accessed January 2010.

Table 3-28
SUMMARY OF COS MPU FORECASTS USING FAA TEMPLATE
Master Plan Update
Colorado Springs Airport

		Forecast				Average annual compound growth rates			
	Base year 2009	Base year + 1 year 2010	Base year + 5 years 2014	Base year + 10 years 2019	Base year + 15 years 2024	Base year to +1 year 2009 - 2010	Base year to +5 years 2009 - 2014	Base year to +10 years 2009 - 2019	Base year to +15 years 2009 - 2024
Passenger enplanements									
Air carrier *(a)*	288,623	296,100	315,200	365,700	427,700	2.6%	1.8%	2.4%	2.7%
Commuter *(b)*	640,977	625,600	716,300	849,500	984,800	(2.4)	2.2	2.9	2.9
Total	929,600	921,700	1,031,500	1,215,200	1,412,500	(0.8)	2.1	2.7	2.8
Aircraft operations									
Itinerant									
Air carrier	22,127	22,020	24,410	28,330	32,480	(0.5%)	2.0%	2.5%	2.6%
Commuter/air taxi	16,299	14,600	15,710	16,490	16,810	(10.4)	(0.7)	0.1	0.2
Total commercial operations	38,426	36,620	40,120	44,820	49,290	(4.7)	0.9	1.6	1.7
General aviation	34,739	35,090	36,870	39,350	42,020	1.0	1.2	1.3	1.3
Military	19,100	19,100	19,100	19,100	19,100	0.0	0.0	0.0	0.0
Local									
General aviation	33,672	33,670	35,370	37,630	40,110	0.0%	1.0%	1.1%	1.2%
Military	19,359	19,360	19,360	19,360	19,360	0.0	0.0	0.0	0.0
Total operations	145,296	143,840	150,820	160,260	169,880	(1.0)	0.7	1.0	1.1
Cargo/mail (enplaned + deplaned tons)	11,484	11,667	12,666	13,973	15,267	1.6%	2.0%	2.0%	1.9%
Based Aircraft *(c)*									
Single-engine (nonjet)	164	162	160	159	164	(1.2%)	(0.5%)	(0.3%)	0.0%
Multiengine (nonjet)	32	37	37	37	37	15.6	3.0	1.5	1.0
Jet engine *(d)*	35	43	50	63	77	22.9	7.6	6.0	5.4
Helicopter	4	3	3	4	5	(25.0)	(2.9)	0.0	0.8
Other	--	--	--	--	--	0.0	0.0	0.0	0.0
Total	235	245	251	263	282	4.3	1.3	1.1	1.2
Operational factors									
Average aircraft size (seats)									
Air Carrier *(a)*	143.6	143.6	143.8	144.6	145.3				
Commuter *(b)*	58.6	59.9	61.3	64.1	67.3				
Average enplaning load factor									
Air Carrier *(a)*	79.3%	81.4%	80.2%	80.5%	80.9%				
Commuter *(b)*	79.7%	81.5%	81.9%	82.3%	82.7%				
GA operations per based aircraft	291	281	288	293	291				

Note: The Colorado Springs Master Plan Update was prepared on a calendar year basis and the FAA 2009 TAF was prepared on a U.S. government fiscal year basis (Oct. through Sep.).
(a) Includes mainline, low cost carrier, and charter airline activity as summarized in the previous tables in this report.
(b) Includes regional affiliate airline activity, which includes flights using regional aircraft with more than 60 seats.
(c) Excludes military based aircraft which totaled 24 in 2009 and 2010.
(d) Includes turboprop aircraft.
Sources: Base year 2009 (actual)—City of Colorado Springs, Airport records. COS MPU Forecasts—LeighFisher, June 2010. FAA 2009 TAF for COS—U.S. Department of Transportation, Federal Aviation Administration, online database, accessed January 2010.

FORECASTS OF PEAK PERIOD DEMAND AND AIRCRAFT FLEET DISTRIBUTION

This section summarizes the forecasts of peak period demand for the average day peak month (ADPM) at the Airport for 2014, 2019, 2029, and 2035. The forecasts of ADPM aircraft operations are derived from the annual forecasts of enplaned passengers and aircraft operations presented in Tables 3-22 and 3-25. In addition, forecasts of aircraft fleet distribution by activity type for the Airport are presented.

Forecast Approach and Methodology

The forecasts of peak period demand and aircraft fleet were based on a 2009 base year distribution of operations by equipment type (e.g., Airbus 319, Boeing 737-800). The 2009 distribution was developed using a combination of source data, including: published passenger airline schedules; FlyteTrax data; the FAA's databases including the Enhanced Traffic Management System Counts (ETMSC), Operations Network (OPSNET), Air Traffic Activity Data System (ATADS), and Air Traffic Control (ATC)/FAA data for the Airport. In addition, interviews with key stakeholders were conducted to validate fleet mix assumptions.

Peak Period Demand Forecasts

Peak period demand forecasts were prepared for the ADPM and the peak hour forecasts of passenger airline aircraft operations for the ADPM.

ADPM Forecasts

The peak month for passenger airline activity at COS is July. In 2009, July accounted for 10.3% of enplaned passengers, 9.2% of passenger airline scheduled departing seats, and 9.5% of passenger airline landings, as shown in Tables 3-16, 3-17, and 3-18. A 10-year average for 2000 through 2009, shows a similar peak month pattern—July accounted for an average of 10.4% of enplaned passengers, 9.2% of passenger airline scheduled departing seats, and 9.1% of passenger airline landings.

As discussed in "Monthly Aircraft Operations", June and August each accounted for 10.4% of annual operations in 2009. From 2000 through 2009, August accounted for the peak share of total aircraft operations at the Airport, with an average of 10.0% of annual operations.

Table 3-29 presents a summary of the ADPM forecasts of enplaned passengers, 2009 through 2035. The peak month shares of annual activity are assumed to represent future peak demand. The ADPM is the mathematical average of peak month activity (i.e., the peak month number of operations divided by 31 days in the peak month). The ADPM level of activity serves as the "control total" for the ADPM flight schedules which are used as input to detailed technical analyses such as facility requirements analysis and demand capacity modeling.

Table 3-29
HISTORICAL AND FORECAST PEAK PERIOD DEMAND
Master Plan Update
Colorado Springs Airport
2009 – 2035

	Historical	Baseline forecast			
	2009 *(a)*	2014	2019	2029	2035
Enplaned passengers					
Annual passengers	929,600	1,031,500	1,215,200	1,644,900	1,910,500
Peak month *(b)*	95,750	106,240	125,170	169,420	196,780
Peak month percent of annual	10.3%	10.3%	10.3%	10.3%	10.3%
Average day peak month (ADPM)	3,089	3,427	4,038	5,465	6,348
Peak hour passengers	617	642	760	994	1,269
Passenger airline scheduled aircraft operations					
Annual operations	32,508	34,000	38,500	47,300	51,400
Peak month *(b)*	3,090	3,230	3,660	4,490	4,880
Peak month percent of annual	9.5%	9.5%	9.5%	9.5%	9.5%
Average day peak month (ADPM)	100	104	118	146	158
Peak hour operations	9	9	11	13	15
Total aircraft operations *(c)*					
Annual operations	145,296	150,820	160,260	180,230	191,980
Peak month *(b)*	15,110	15,690	16,670	18,740	19,970
Peak month percent of annual	10.4%	10.4%	10.4%	10.4%	10.4%
Average day peak month (ADPM)	487	506	538	605	644

The forecasts presented in this table were prepared using the information and assumptions given in the accompanying text. Inevitably, some of the assumptions used to develop the forecasts will not be realized and unanticipated events and circumstances may occur. Therefore, there are likely to be differences between the forecast and actual results, and those differences may be material.

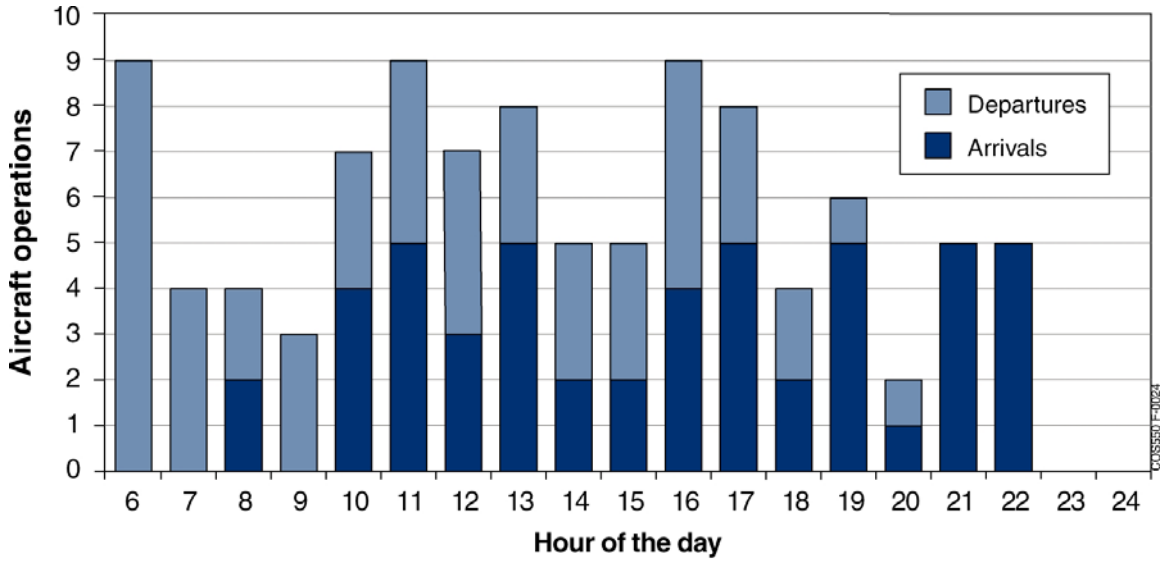
(a) The base year for the forecasts is 2009.
(b) Estimated using the peak month percent of annual and the annual totals.
(c) Includes passenger, cargo, general aviation, and military operations.

Sources: Historical: City of Colorado Springs records and Federal Aviation Administration, Air Traffic Activity Data System (ATADS), online database. Forecast: LeighFisher, July 2010.

Passenger Airline Peak Hour Forecasts

The peak hour for passenger airline aircraft operations (arrivals and departures) at COS in July 2009 occurred at 6 am, 11 am, and 4 pm—with each hour accounting for approximately 9% of ADPM total operations, as shown on Figure 3-23.

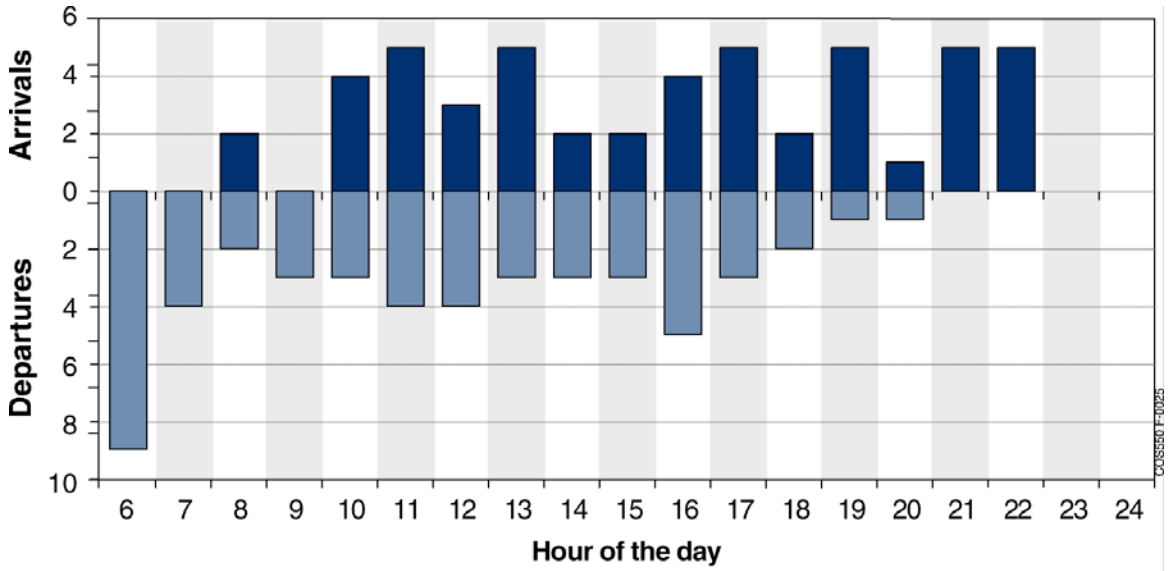
Figure 3-23
DISTRIBUTION OF PASSENGER AIRLINE SCHEDULED OPERATIONS BY HOUR IN 2009
Colorado Springs Airport



Source: Official Airline Guides, Inc., online database, accessed March 2010.

The peak hour for aircraft departures at COS in July 2009 was the 6 am hour, accounting for approximately 18% of ADPM departures, as shown on Figure 3-24. The peak hour for aircraft arrivals at COS in July 2009 occurred during a number of hours during the day, each accounting for approximately 10% of ADPM total arrivals.

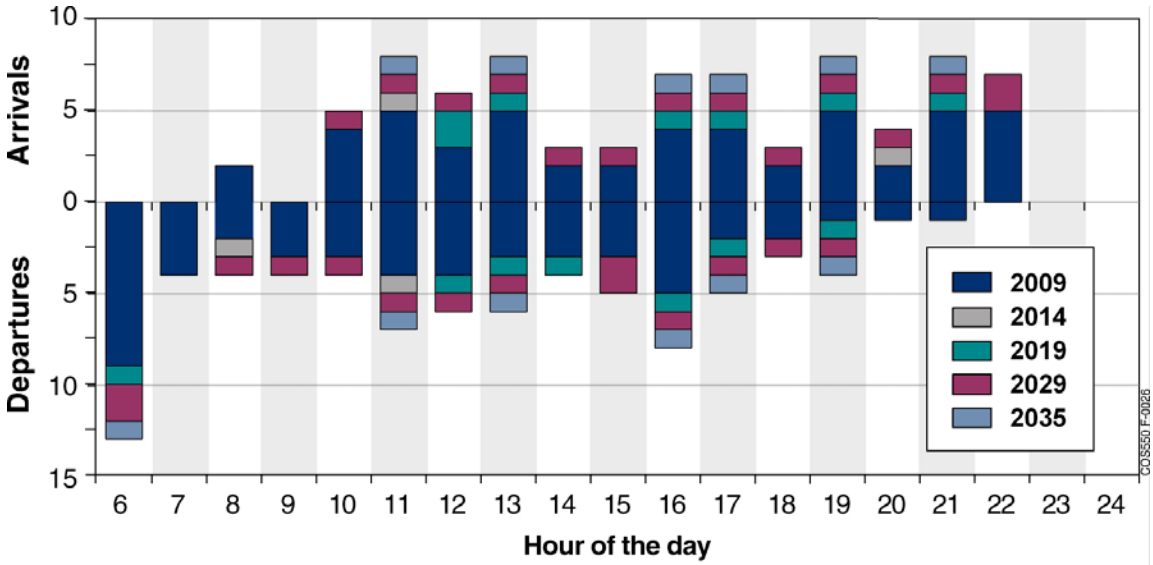
Figure 3-24
ARRIVALS AND DEPARTURES BY HOUR IN 2009
Colorado Springs Airport



Source: Official Airline Guides, Inc., online database, accessed March 2010.

Future passenger airline schedules were developed using published airline schedules for July 2009. Additional flights (arrivals and departures) were added to the July 2009 schedule to reflect: (1) the ADPM operations for each forecast year (the "control totals" mentioned earlier) which relate directly to the annual forecasts, (2) the hourly percentage distribution of arrivals and departures represented by the July 2009 schedule, (3) the fleet mix of the airlines serving COS and their future fleet plans, and (4) the markets currently served at COS and the potential for new markets. The hourly distribution of operations from the flight schedules obtained for July 2009 was assumed to remain relatively unchanged during the forecast period. Figure 3-25 summarizes the future airline schedules.

Figure 3-25
BASELINE FORECAST DISTRIBUTION OF PASSENGER AIRLINE SCHEDULED OPERATIONS BY HOUR
Colorado Springs Airport



Sources: Historical: Official Airline Guides, Inc., online database, accessed March 2010.
Forecast: LeighFisher, July 2010.

Aircraft Fleet Forecasts

Tables 3-30 and 3-31 present the ADPM passenger airline fleet mix in July 2009 and for the future schedules for 2014, 2019, 2029, and 2035 in terms of the number of ADPM passenger airline aircraft operations and seats. The ADPM shares of seats by fleet type (narrowbody, small capacity jets and turboprops) are somewhat higher than the annual averages.

Table 3-30
ADPM PERCENT DISTRIBUTIONS OF PASSENGER AIRLINE AIRCRAFT OPERATIONS
Colorado Springs Airport

Fleet type	Seats	Historical 2009	Baseline forecast 2014	2019	2029	2035
Narrowbody aircraft						
A319	120	0.0%	1.9%	3.4%	1.4%	1.3%
A320	138	0.0	0.0	0.0	4.1	5.1
B-738	160	2.0	1.9	6.8	15.1	15.2
M80	136	8.0	7.7	5.1	0.0	0.0
M83	142	6.0	5.8	3.4	0.0	0.0
		16.0%	17.3%	18.6%	20.5%	21.5%
Small capacity jets and turboprop (60 seats or less)						
CRJ-200	50	28.0%	19.2%	11.9%	6.8%	3.8%
DH2	37	6.0	0.0	0.0	0.0	0.0
ERJ	50	10.0	15.4	10.2	6.8	3.8
		44.0%	34.6%	22.0%	13.7%	7.6%
Small capacity jets and turboprop (more than 60 seats)						
C SERIES	110-130	0.0%	0.0%	1.7%	6.8%	7.6%
CR7	66	22.0	25.0	28.8	28.8	25.3
CR9	76	8.0	7.7	10.2	15.1	21.5
DH4	74	10.0	3.8	3.4	2.7	2.5
E190	99	0.0	5.8	6.8	5.5	6.3
E70	70	0.0	5.8	8.5	6.8	7.6
		40.0	48.1	59.3	65.8	70.9
Total		100.0%	100.0%	100.0%	100.0%	100.0%

ADPM = Average day peak month
Totals may not add due to rounding.

Sources: Historical—Official Airline Guides, Inc., online database, accessed March 2010.
Forecast—LeighFisher, July 2010.

Table 3-31
ADPM PERCENT DISTRIBUTIONS OF PASSENGER AIRLINE SEATS
Colorado Springs Airport

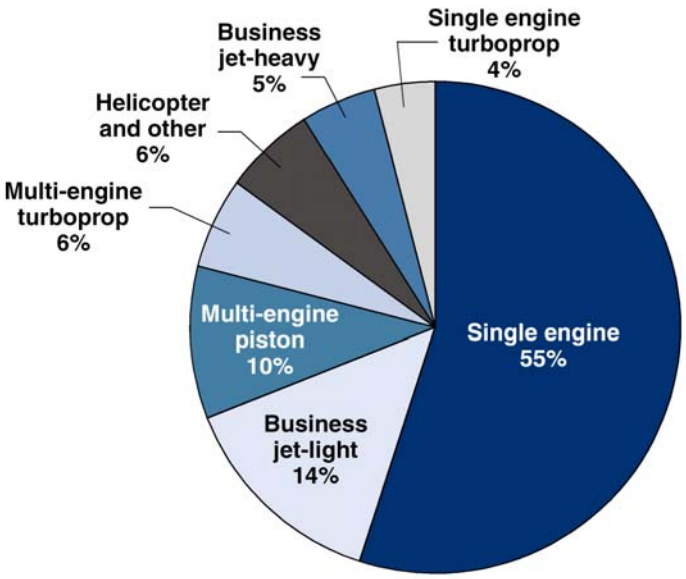
Fleet type	Seats	Historical 2009	Baseline forecast 2014	2019	2029	2035
Narrowbody aircraft						
A319	120	0.0%	3.0%	5.0%	1.9%	1.7%
A320	138	0.0	0.0	0.0	7.0	8.3
B-738	160	4.2	3.8	12.4	25.3	24.5
M80	136	16.0	14.4	9.2	0.0	0.0
M83	142	11.8	10.6	5.9	0.0	0.0
		32.0%	31.8%	32.6%	34.2%	34.4%
Small capacity jets and turboprop (60 seats or less)						
CRJ-200	50	19.6%	12.6%	7.3%	3.9%	2.1%
DH2	37	3.0	0.0	0.0	0.0	0.0
ERJ	50	7.0	10.1	6.3	3.9	2.1
		29.7%	22.7%	13.6%	7.7%	4.1%
Small capacity jets and turboprop (more than 60 seats)						
C SERIES	110-130	0.0%	0.0%	2.6%	9.7%	10.3%
CR7	66	20.2	21.5	23.4	21.4	18.1
CR9	76	8.4	7.5	9.2	13.4	18.8
DH4	74	9.8	3.3	2.8	2.0	1.8
E190	99	0.0	7.4	8.0	5.8	6.4
E70	70	0.0	5.8	7.8	5.7	6.0
		38.4%	45.5%	53.8%	58.1%	61.4%
Total		100.0%	100.0%	100.0%	100.0%	100.0%

ADPM = Average day peak month
Totals may not add due to rounding.

Sources: Historical—Official Airline Guides, Inc., online database, accessed March 2010.
Forecast—LeighFisher, July 2010.

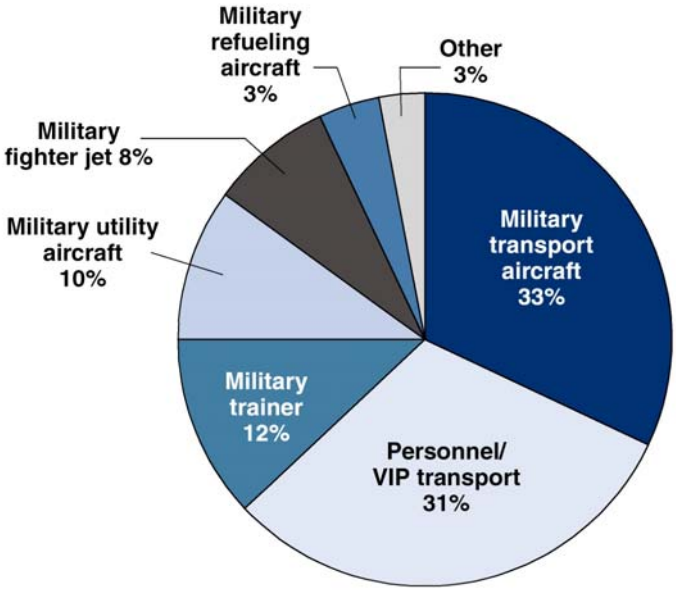
The fleet mix for general aviation and military aircraft operations were estimated using a combination of source data, including FlyteTrak data, the FAA's databases including the Enhanced Traffic Management System Counts (ETMSC), Operations Network (OPSNET), and Air Traffic Activity Data System (ATADS), and Air Traffic Control (ATC)/FAA data for the Airport. In addition, interviews with key stakeholders were conducted to validate fleet mix assumptions. Figures 3-26 and 3-27 present the estimated fleet mix for general aviation and military aircraft operations at the Airport. Figure 3-28 presents the estimated fleet mix of commercial aircraft using the A/DACG facility. As shown, commercial aircraft comprise 65% of the fleet, with military transport comprising the remaining 35%.

Figure 3-26
ESTIMATED GENERAL AVIATION FLEET MIX
Colorado Springs Airport



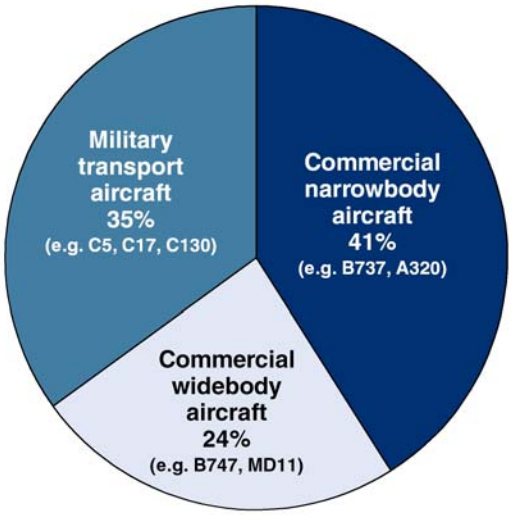
Source: Estimated by LeighFisher, July 2010, based on data from U.S. Department of Transportation, Federal Aviation Administration, ETMSC, www.faa.gov., FlyteTrak data, FAA Tower data at COS, and stakeholder input.

Figure 3-27
ESTIMATED MILITARY FLEET MIX
Colorado Springs Airport



Source: Estimated by LeighFisher, July 2010, based on data from U.S. Department of Transportation, Federal Aviation Administration, ETMSC, www.faa.gov.

Figure 3-28
ARRIVAL/DEPARTURE AIRFIELD CONTROL GROUP FLEET MIX
Colorado Springs Airport



A/DACG = Arrival Departure Airfield Control Group

Source: Estimated by LeighFisher, July 2010, based on data from Colorado Springs Airport records.

Chapter 4
FACILITY REQUIREMENTS
Colorado Springs Airport

INTRODUCTION

This chapter summarizes the facilities and associated land areas required to accommodate the forecast aviation demand presented in Chapter 3. Facility requirements were developed for the airfield (runways, taxiways, and navigational aids), the passenger terminal complex, ground access, air cargo, general aviation, and aviation support facilities.

Planning Activity Levels

Forecasts of enplaned passengers, air cargo tonnage and aircraft operations were developed for the forecast horizon years. However, many variables can affect the achievement of forecasts such as regional, national, and international economic conditions and changes in airline service patterns. For the Master Plan, it is prudent to use a strategic planning approach whereby Planning Activity Levels (PALs) are used to determine the timing for future airport development projects. Table 4-1 depicts the PALs for major forecasted activity components.

PAL 1, PAL 2, PAL 3 correspond to the original baseline aviation demand forecast for 2019, 2029, and 2035.[1] The aviation demand associated with each planning activity level is summarized in Table 4-1.

Future Flight Schedules

Detailed aircraft flight schedules provide a planning-level synopsis of future aviation activity (peak periods, time-of-day, departures and arrivals, fleet mix, etc.) and are used to support analytical and simulation modeling efforts. Flight schedules were developed for this analysis to generate, as appropriate, the facility requirements contained in this report.

A detailed flight schedule representing Airport activity in the base year (2009) was prepared using existing patterns of aviation activity and operational assumptions developed for the Master Plan Update. Future flight schedules for each PAL were derived from the base year flight schedule by applying growth rate factors based on forecast assumptions.

[1] Appendix D to this document provides a summary of the planning implications associated with PAL4. PAL4 is based on an alternate scenario of forecast demand, as described in Appendix D of this master plan.

Table 4-1
SUMMARY OF PLANNING ACTIVITY LEVELS
Colorado Springs Airport

	2009	PAL 1 (2019)	PAL 2 (2029)	PAL 3 (2035)
Enplaned passenger				
Mainline	255,950	306,500	392,000	445,200
Regional affiliate	640,977	849,500	1,141,700	1,308,500
Low cost carrier	32,673	59,200	111,200	156,800
Total	929,600	1,215,200	1,644,900	1,910,500
Passenger airline departures				
Mainline	2,287	2,640	3,310	3,710
Regional affiliate	13,718	16,100	19,400	20,700
Low cost carrier	249	500	930	1,310
Total	16,254	19,240	23,640	25,720
Air cargo tonnage				
Integrated carrier	11,310	13,770	16,470	18,110
Regional feeder	116	120	130	130
Total	11,426	13,890	16,600	18,240
Aircraft operations				
Passenger airline				
Mainline	4,574	5,280	6,620	7,420
Regional affiliate	27,436	32,200	38,800	41,400
Low cost carrier	498	1,000	1,860	2,620
Subtotal	32,508	38,480	47,280	51,440
All-cargo airline	1,652	1,640	1,660	1,660
General aviation				
Itinerant	34,739	39,350	44,870	48,590
Local	33,672	37,630	42,760	46,330
Subtotal	68,411	76,980	87,630	94,920

Note: According to the original baseline forecast, PAL1 would occur around 2019, PAL 2 at 2029 and PAL3 at 2035; based on the 2013 forecast update, PAL1 would occur beyond the end of the planning horizon.
Source: Master Plan Update forecasts—LeighFisher, October 22, 2010.

Summary of Requirements

Facility requirements are organized according to functional areas of the Airport, as summarized in Table 4-2. As shown in Table 4-2, many Airport facilities currently have sufficient capacity to accommodate forecast activity levels throughout the planning period. However, a number of facilities will need to be modified or expanded throughout the planning period to accommodate future activity, improve Airport operational capabilities

or levels of service, or meet key design standards. Potential deficiencies in facilities are highlighted in blue on Table 4-2.

Notable requirements over the course of the forecast period include:

- **Airfield –** The existing airfield facilities provide sufficient capacity to accommodate baseline forecast aircraft operations through PAL 3. Existing air traffic control facilities at the Airport are sufficient to effectively support airfield and airspace operations at the Airport through the end of the planning period. The intersection of Runway 17R-35L and Runway 13-31 should also be addressed from a geometrical perspective because the unique layout could lead to potential runway incursions. In addition, an extension to Runway 17R-35L should be considered to better serve the Airport when Runway 17L-35R is unavailable. Analyses of weather data for the Airport indicate a need to enhance the instrument landing systems to Category II/III capability.

- **Passenger terminal –** The existing passenger terminal footprint is adequate to serve the projected needs of the Airport throughout the planning period. Future requirements project the need for targeted improvements to specific functional elements such as the passenger security screening facilities.

- **Ground transportation –** The public parking lot may need to be expanded as PAL2 is realized. In addition, the rental car ready/return lot may need expansion at or around PAL3. Other ground transportation facilities appear to be adequate throughout the planning period.

- **Air cargo –** No cargo expansion is likely to be required for the duration of the planning period. However, to ensure that additional carriers can be accommodated should market demand prove necessary, additional cargo space should be reserved on the Airport.

- **General aviation –** Forecast general aviation demand will not necessitate an increase in total land area dedicated to general aviation, although additional hangar capacity may be needed to accommodate growth in demand, as early as PAL 1. In addition, general aviation administrative space and automobile parking may need to be expanded sequentially at PAL1 and PAL2, respectively.

- **Aviation support –** Aviation support facilities appear to be capable of accommodating PAL 3 demand with only minor improvements over the planning period, as necessary.

Additional facility requirements and more robust discussions of assumptions and findings are provided in each of the following sections. In summary, the Airport is in excellent condition to accommodate PAL 3 demand with selected improvements to be made throughout the planning period.

Table 4-2
FACILITIES REQUIREMENTS SUMMARY
Colorado Springs Airport

	Existing	PAL 1	PAL 2	PAL 3
AIRFIELD				
Critical aircraft—airfield design	B-757-200	B-757-200	B-757-200	B-757-200
Airport Reference Code (ARC)	C-IV	C-IV	C-IV	C-IV
Runway length (lf)	13,500	13,500	13,500	13,500
Instrument approach capability	Category I	Category II/III	Category II/III	Category II/III
PASSENGER TERMINAL				
Terminal processor				
Ticketing check-in positions (ea) *(a)(b)*	30	-	-	29
Ticketing lobby area (sf) *(c)*	7,500	-	-	3,800
Security screening lanes	4	5	7	7
Security screening queue area *(c)*	800	1,600	2,300	2,400
Baggage claim				
Baggage claim circulation area *(c)*	15,500	-	-	5,000
Baggage claim frontage (lf)	600	-	-	350
Passenger concourse				
Aircraft parking active positions *(d)*	12	-	-	12
Remain-overnight aircraft positions	16	-	-	15
Concessions space				
Airside	8,359	8,400	11,400	13,300
Landside	9,863	4,400	5,900	6,800
GROUND TRANSPORTATION				
Public parking spaces *(e)*	4,635	3,600	4,850	5,650
Rental car ready/return spaces	768	545	735	855
Rental car service center area (acres)	22.0	12.9	17.4	20.3
Employee parking spaces	704	450	580	650
Departures curbfront				
Inner curb (lf)	950	365	480	560
Outer curb (lf)	1,065	170	170	170
Arrivals curbfront *(f)*				
Inner curb (lf)	925	345	440	480
Outer curb (lf)	975	290	290	290

Notes: Blue shading highlights potential functional deficiencies; lf = linear feet; sf = square feet; ea = each
(a) Check-in positions include agent desks, electronic kiosks, and baggage drop positions.
(b) Assuming that facilities are dedicated to exclusive use by individual airlines.
(c) Areas based on level of service C.
(d) Twelve gates does not include the 4 aircraft parking positions at the east unit terminal.
(e) Inventory of 4,635 spaces does not include the overflow lot which provides approximately 875 spaces.
(f) Assuming existing dwell times; dwell times could be significantly reduced through curbfront enforcement.

Source: LeighFisher, November 2010.

Table 4-2
FACILITIES REQUIREMENTS SUMMARY *(continued)*
Colorado Springs Airport

	Existing	PAL 1	PAL 2	PAL 3
GENERAL AVIATION				
Itinerant apron (sf)	342,900	104,700	119,400	129,300
Tie-down apron (sf)	237,300	130,000	137,000	140,000
Hangar space				
T-hangars (sf)	264,200	184,000	194,000	198,000
Corporate/community hangars (sf)	200,300	306,000	426,000	541,000
General aviation terminal space	17,000	24,500	31,000	35,600
Automobile parking (sf)	171,000	147,800	186,000	213,600
Fueling apron (sf)	59,000	11,700	12,800	13,500
Land area (acres)	42.3	22.5	27.5	31.0
AIR CARGO				
Aircraft apron (sf)	371,900	115,000	115,000	115,000
Building warehouse (sf)	48,600	20,800	24,900	27,400
Landside area (sf)	90,800	20,800	24,900	27,400
Total cargo area (acres)	13.8	5.8	6.1	6.2
AVIATION SUPPORT				
Ten-day fuel supply				
Storage requirement (gal)	200,000	119,000	148,000	160,000
Land are requirements (acres)	0.50	0.29	0.36	0.38

Notes: Blue shading highlights potential functional deficiencies; sf = square feet; gal = gallons

Source: LeighFisher, November 2010.

AIRFIELD AND AIRSPACE

The assessment of airfield and airspace facility requirements consisted of the following tasks:

- Assessment of the airfield capacity using FAA annual service volume methodology.
- Assessment of the required runway length for the existing and forecast fleet mix of aircraft.
- Assessment of the need for new or modified airfield facilities to meet airport design standards or eliminate existing modifications of standards.
- Evaluation of the potential impacts of technology, airline fleet mix changes, and other industry trends on the need for new or modified airfield facilities.

- Evaluation of Terminal Instrument Procedures (TERPS) and Federal Requirements, per 14 CFR Part 77, for obstacle clearance surfaces and identification of existing objects that penetrate these surfaces.

- Evaluation of the need and timing for additional or enhanced navigational aids, marking, and lighting.

Runway Use

There are two principal runway use configurations that are employed at the Airport—north flow and south flow. North flow runway use involves use of Runways 35L, 35R, and 30 (crosswind permitting). South flow runway use involves use of Runways 17R, 17L, and 12 (crosswind permitting). In accordance with current operating procedures, south flow is the preferred runway use configuration, meaning that it is used when winds are calm (e.g., less than 5 knots).

Airfield Capacity

In long-range airport planning studies, the annual capacity of a particular runway system can be estimated using annual service volume (ASV). ASV expresses the estimated number of aircraft operations that can be accommodated annually on an airport's runway system at reasonable levels of delay. ASV takes into account differences in runway use, weather conditions, and mix of aircraft over a one year period. The ASV was estimated for 2035 based on methodology defined in Chapter 3 of Advisory Circular 150/5060-5, *Airport Capacity and Delay*. ASV is calculated by the following formula:

$$ASV = Cw \times D \times H \text{ , where:}$$

- C^w is the weighted average hourly capacity of the runway usage

- D is the ratio of annual demand to average daily demand during the peak month

- H is the ratio of average daily demand to average peak hour demand during the peak month

The weighted capacity of the airfield was estimated to be 108 operations per hour. The D and H factors were estimated at 298 and 10.5, respectively, based on the aviation activity forecasts for 2035. The D factor is calculated by dividing the annual total of aircraft operations by the number of operations estimated to occur in the average day of the peak month; the H factor is calculated by dividing the average daily demand in the peak month by the average peak hour demand in the peak month.

The capacity of the Airport's runway system is estimated to be approximately 340,000 annual operations, using the PAL 3 fleet mix. Approximately 191,980 aircraft operations are expected at PAL 3; therefore, the existing runway system has sufficient capacity to accommodate the number of aircraft operations forecast through the planning period.

Assessment of Runway Length Requirements

This section summarizes the evaluation of runway length requirements. The evaluation involved (1) assessment of manufacturer's published takeoff and landing length criteria, as reported in aircraft planning manuals and (2) a more detailed evaluation of the aircraft takeoff performance capabilities (measured by takeoff weights and payloads) and the presence of obstacles near the extended runway ends.

Requirements Based on Manufacturer's Published Planning Criteria

The landing and takeoff runway length requirements associated with common commercial jet aircraft were evaluated using planning data published by the aircraft manufacturers. The objectives of this evaluation were to:

- Determine the approximate runway length necessary to serve the current and future fleet mix of aircraft.
- Establish which aircraft types require a more detailed performance analysis.

The aircraft types considered were from the *Aviation Demand Forecasts* prepared for the master plan, as well as the Official Airline Guides (OAG) published flight schedules. The takeoff and landing runway length requirements for the resulting set of aircraft types were evaluated using charts provided in the aircraft planning manuals published by Airbus Industries, the Boeing Company, and Bombardier Aerospace. The analysis of takeoff and landing runway length requirements incorporated the following assumptions:

- Ambient temperatures of 83°F, reflecting the mean maximum temperature of the hottest month.
- Balanced field length, meaning that the takeoff run available (TORA), takeoff distance available (TODA), and accelerate-stop distance available (ASDA) would be identical.
- Use of the most common engine types used by the airlines currently serving or expected to serve the Airport.
- Departure initial climb areas (ICAs) that are free of obstacles that would impose departure climb or payload restrictions.
- Zero wind, unless otherwise noted.
- Existing runway gradients, 0.6% for Runway 17L-35R, and 1.2% for Runway 17R-35L.
- Runway 35L and 35R departures were evaluated for takeoff requirements (as opposed to Runway 17R and 17L departures), due to the runway's uphill gradients and rising terrain to the north of the Airport.

- Both dry and wet conditions were considered when estimating landing runway length requirements.

Landing length requirements. Table 4-3 presents the results of the landing runway length evaluation. Landing runway length requirements are shown for both dry and wet conditions—length required under wet conditions is greater than the length required under dry conditions because surface friction is reduced. FAA Advisory Circular 150/5325-4B, Paragraph 508, specifies that runways be designed for wet landing conditions; therefore, runway landing length requirements for wet runways are presented in Table 4-3. The aircraft listed in Table 4-3 represent a subset of the commercial aircraft fleet mix that were selected based on their aircraft performance characteristics. These aircraft represent the most demanding aircraft in terms of landing length requirements, and therefore, it is unnecessary to evaluate additional aircraft.

The evaluation indicates that the existing landing lengths of between 11,022 (Runway 17L-35R) and 13,501 feet (Runway 17R-35L) are sufficient to accommodate the aircraft fleet mix. Further, takeoff length requirements (as opposed to landing length requirements) would govern any future decisions regarding the provision of additional runway length.

Table 4-3
RUNWAY LANDING LENGTH SUMMARY
Colorado Springs Airport

Aircraft	Landing length requirement (ft)		Flap setting (degrees)
	Dry runway	Wet runway	
CRJ-700ER	5,930	n/a	45
MD-83	6,130	6,980	28
B737-800	6,740	7,780	30
B757-200	5,430	6,330	30

(a) Requirements based on standard day temperature, airport elevation of 6,187 and maximum design landing weight.
(b) Landing length estimated for minimum published flap setting.

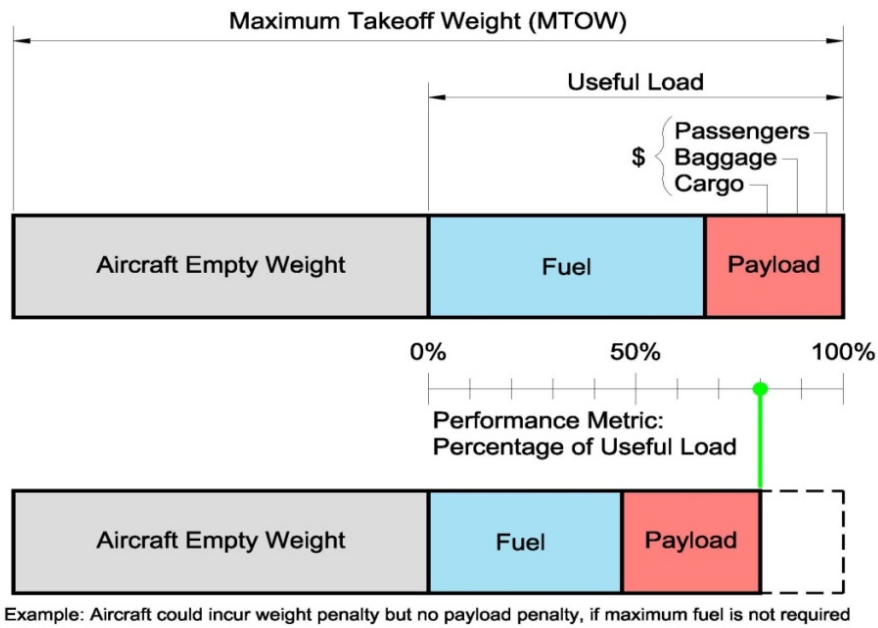
Source: Aircraft characteristics for airport planning, published by Boeing and Bombardier.

Takeoff length requirements. Table 4-4 presents the results of the takeoff runway length evaluation. The left side of the table presents the Runway 35R takeoff requirements for the fleet mix assuming a 0.6% runway gradient; the right side presents the same for the 1.2% gradient of Runway 35L. As shown on the left hand side of the table, each of the aircraft analyzed can be accommodated on Runway 35R with its existing length of 13,501 feet. Conversely, Runway 35L with its shorter length of 11,022 feet and gradient cannot accommodate each of their aircraft at 100% of their useful load. On the right side, Table 4-4 shows that each of the aircraft can be accommodated by Runway 35L up to 80% of their

"useful load"; whereas at 90% or above, the following aircraft would not be able to depart: the MD80, MD83, B737-800, and the B757-200 (highlighted in blue).

Useful load is defined as the aircraft maximum takeoff weight minus the aircraft empty weight, as shown in Figure 4-1. An aircraft's useful load can be used to transport either fuel or payload (i.e., passengers, baggage, and cargo) and, within certain limits, useful load can be allocated between fuel and passengers. The takeoff lengths that exceed the length of Runway 35L are shaded in blue. Notably, each of these aircraft could takeoff operating at 90% of their useful load from Runway 35R which has both a lesser runway gradient and greater length when compared to Runway 35L.

Figure 4-1
DEFINITION OF USEFUL LOAD



Figures 4-2 and 4-3 presents the takeoff length required for the same aircraft types for Runway 35L and Runway 35R departures. Runway 35R and 35L departures were evaluated in order to be conservative (as opposed to Runways 17L and 17R), as the runway gradient is uphill from south to north. Figure 4-1 includes an adjustment made to account for the existing gradient of 1.2% on Runway 35L, while Figure 4-2 has an adjustment for the 0.6% gradient of Runway 35R. The takeoff lengths required are represented by bars, which are shaded to indicate the length necessary for specific aircraft types to takeoff with different percentages of their maximum useful loads (e.g., 80% to 90%). Because Runway 35R has both a lower runway gradient and greater length than Runway 35L, Runway 35R accommodates more aircraft operating a higher useful loads.

Table 4-4

RUNWAY TAKEOFF LENGTH SUMMARY

Colorado Springs Airport

		Takeoff runway length requirement adjusted for gradient of 0.6% (Runway 35R)				Takeoff runway length requirement adjusted for gradient of 1.2% (Runway 35L)			
	Engine type	70%	80%	90%	100%	70%	80%	90%	100%
Passenger narrowbody									
MD80	JT8D-217	8,681	10,301	13,341	-	9,154	10,774	13,814	-
MD83	JT8D-219	8,781	10,781	13,341	-	9,254	11,254	13,814	-
A319	CFM56	5,911	6,641	8,111	10,151	6,384	7,114	8,584	10,624
A320	CFM56	6,681	7,341	8,011	9,081	7,154	7,814	8,484	9,554
B737-800	CFM56-7B26	8,901	10,251	13,391	-	9,374	10,724	13,864	-
Passenger regional									
CRJ-200LR	CF34-3B1	8,081	8,951	9,841	-	8,554	9,424	10,314	-
CRJ-700ER	CF34-8C1	6,781	7,831	8,731	-	7,254	8,304	9,204	-
CRJ-900	CF34-8C5	8,251	9,281	10,111	-	8,724	9,754	10,584	-
All-cargo									
B757-200	RB211-535E4	8,201	9,661	11,261	13,341	8,674	10,134	11,734	13,814
A310-200	CF6-80A3	6,551	7,131	7,871	10,441	7,024	7,604	8,344	10,914

Note: the takeoff lengths that exceed the length of Runway 35L are shaded in blue.

(a) Takeoff length requirements are shown for a temperature of 83 degrees F (mean maximum temperature of the hottest month at the Airport) and airport elevation of 6,187 feet. Calm winds assumed.

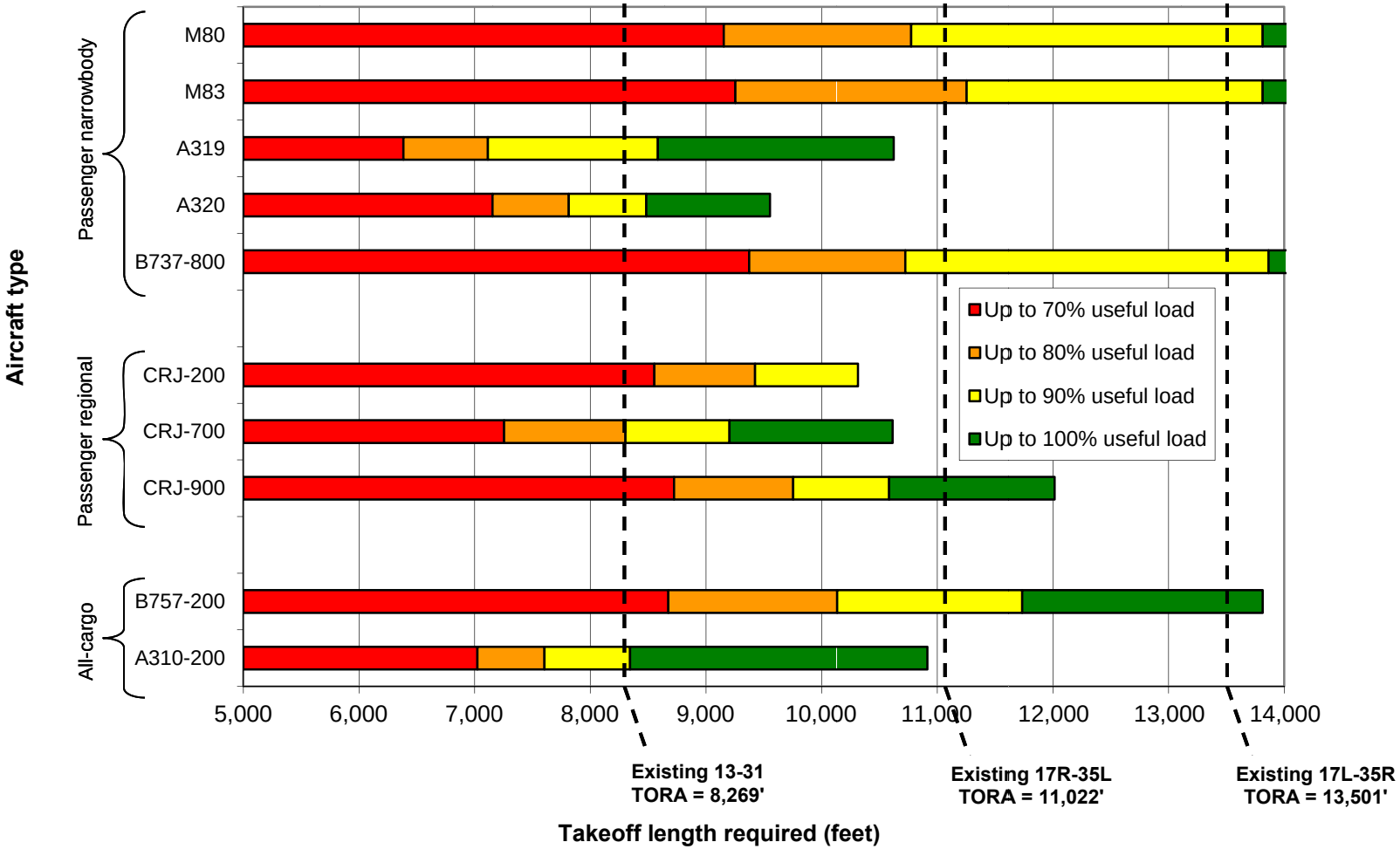
(b) Gradient adjustment per FAA AC 150/5325-B: increase requirement by 10 feet for every 1 foot of difference between high and low points of the runway.

(c) Obstacles which may limit payload are not considered within these results.

(d) Aircraft which reach brake energy limit or tire speed limit before reaching maximum payload are denoted with "-".

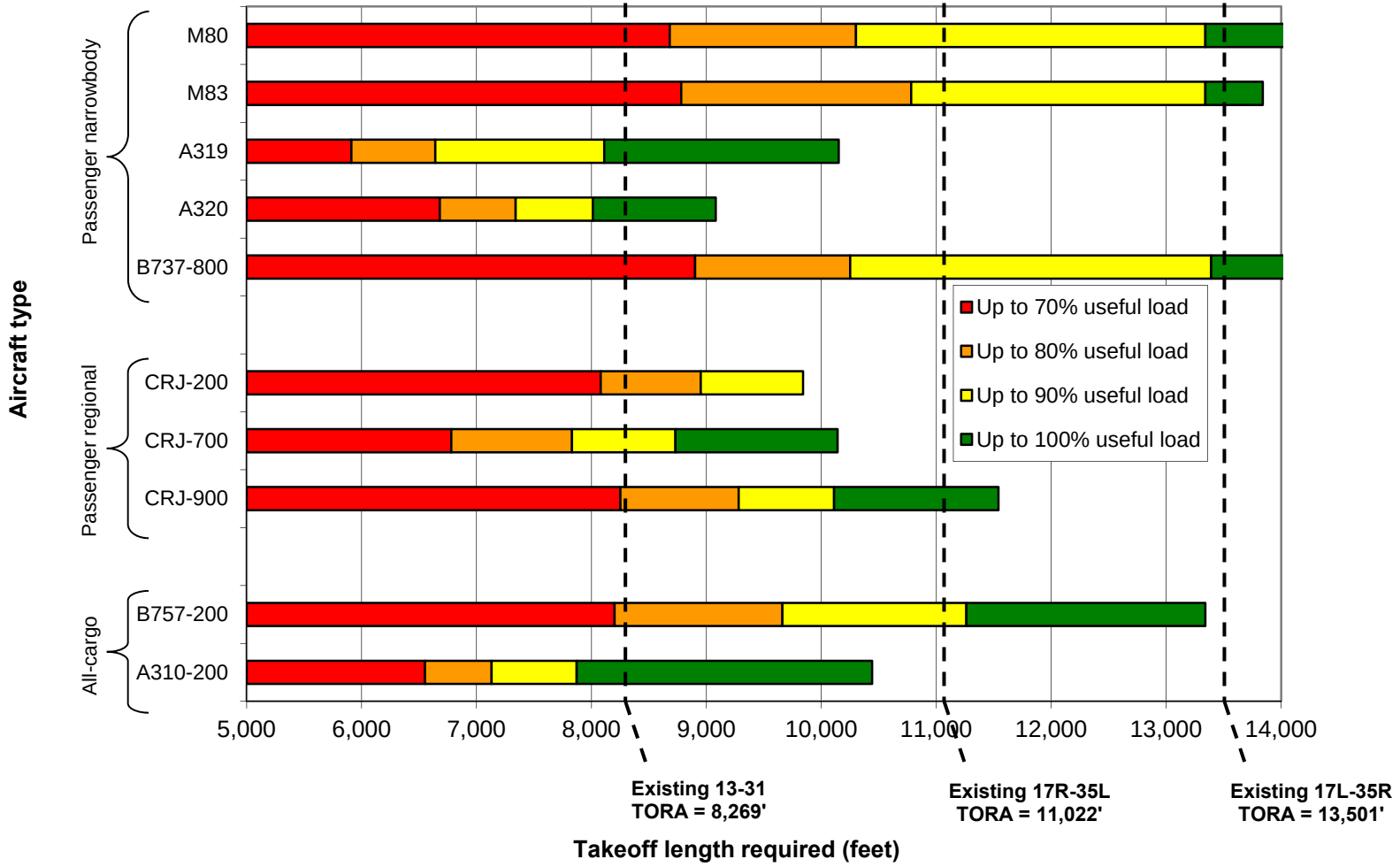
Source: Aircraft Characteristics for Airport Planning, Boeing Company, Airbus Industries, and Bombardier; JP Airline-Fleets International, 2007/2007, and FAA Advisory Circular 150/5325-4B, *Runway Length Requirements for Airport Design.*

Figure 4-2
AIRCRAFT MANUFACTURER'S TAKEOFF LENGTH REQUIREMENTS FOR RUNWAY 35L—ISA+13ºC (83ºF)
Colorado Springs Airport



Note: Field limits, such as obstacle limitations, are not reflected in these requirements; dry runway assumed; runway gradient of 1.2% assumed.

Figure 4-3
AIRCRAFT MANUFACTURER'S TAKEOFF LENGTH REQUIREMENTS FOR RUNWAY 35R—ISA+13ºC (83ºF)
Colorado Springs Airport



Note: Field limits, such as obstacle limitations, are not reflected in these requirements; dry runway assumed; runway gradient of 0.6% assumed.

Aircraft do not typically operate at 100% of their useful load for practical reasons: (1) the aircraft may not be accommodating a full passenger load and (2) the aircraft may not be traveling sufficient distance to require a full load of fuel. Accordingly, it is prudent to examine representative aircraft types coupled with potential destinations to determine the percentage of useful load that would be realistic for a typical flight.

Table 4-5 presents runway length requirements for select destinations. As shown, the aircraft would be operating between 45% and 84% of useful load to travel to the destinations shown (based on fuel requirements). For example, the CRJ-200LR traveling to San Francisco would be operating at approximately 84% of its useful load. Using Figures 4-2 and 4-3, it would appear the CRJ-200LR could depart on either runway.

Table 4-5
RUNWAY LENGTH REQUIREMENTS FOR SELECT DESTINATIONS
Colorado Springs Airport

	CRJ-200LR	CRJ-700ER	B737-800	B757-200
Destination	SFO	ORD	ATL	MEM
Range (nm)	837	792	1,029	742
Passenger capacity (ea)	50	66	160	n/a
Maximum takeoff weight (lbs)	53,000	75,000	174,200	255,000
Operating empty weight (OEW) (lbs)	30,500	43,000	91,300	136,940
Total available useful load (lbs) (a)	22,500	32,000	82,900	118,060
Typical fuel (lbs)	10,000	10,700	24,500	27,500
Typical payload (lbs) (b)	9,000	11,880	28,800	25,560
Fuel and payload as percent of useful load	84%	71%	64%	45%
OEW plus payload (lbs)	39,500	54,880	120,100	162,500
Brake release gross weight (lbs)	49,500	65,580	144,600	190,000
Percent of maximum takeoff weight	93%	87%	83%	75%
Takeoff length (lf) (c)	8,570	5,970	7,440	5,470

Notes: SFO – San Francisco International Airport; ORD – O'Hare International Airport (Chicago); ATL – Hartsfield-Jackson Atlanta International Airport; MEM – Memphis International Airport

(a) Useful load is defined as the aircraft maximum takeoff weight minus the operating empty weight.

(b) Assumes 90% load factor, 200 lbs for each passenger plus baggage, and zero belly cargo for CRJ2, CRJ7 and B738. The typical payload used for the B752 is based on a typical cargo load.

(c) Takeoff length requirements are shown for a temperature of 83ºF and airport elevation of 6,187 feet. Takeoff length requirements do not account for obstacle limitations or other field limitations.

Source: Aircraft Characteristics for Airport Planning, Boeing Company and Bombardier.

Detailed Aircraft Takeoff Performance Analysis

Following completion of the preliminary aircraft takeoff and landing length requirements analyses, as summarized in the previous section, a detailed analysis of the takeoff performance capability of critical aircraft at the Airport was conducted. In the detailed analysis, aircraft takeoff weight computation methodologies prescribed in *Airplane Characteristics for Airport Planning* manuals that are used by the airlines for flight planning purposes were used to compute maximum allowable takeoff weights for specific aircraft types.

This analysis, takes into consideration the following factors that can affect aircraft takeoff performance:

- Environmental and physical characteristics, including "hot day" temperature (83 degrees F), runway end elevations, runway gradient, and wind conditions.
- Standard aircraft operating procedures, operating weights, and engine types.
- The effects of close-in obstacles on takeoff performance.

In this analysis, maximum allowable takeoff weights were estimated for three critical aircraft, as shown in Table 4-5. Aircraft types were selected for this analysis based on the following reasons:

- These aircraft types represent important components of the existing and/or future fleets of aircraft that are currently using or can be reasonably expected to use the Airport in the future.
- These aircraft types are prone to be affected by takeoff-related payload restrictions, according to recent experience at the Airport.
- The results of the preliminary runway length analysis described in the previous section indicate that the performance of these aircraft types should be considered at a higher level of detail.

Tables 4-6 and 4-7 also show the engine type assumptions for the aircraft. These assumptions generally reflect engine types that are used most frequently by the airlines that serve the Airport, as determined using airline fleet data reported in *JP Airline-Fleets International*. The maximum structural takeoff weights and maximum useful loads for each the aircraft are also shown in the table.

The final set of assumptions used in this analysis is associated with the location and disposition of close-in obstacles beyond the departure ends of both Runway 35L and Runway 35R. The locations of obstacles that have a potential to adversely affect aircraft

takeoff performance were determined using a one-engine inoperable (OEI) procedure that is the representative of the typical OEI procedure used by the airlines operating at the Airport.

As shown in Table 4-6, the takeoff weight of each of the aircraft is limited by the obstacles located in the departure corridor off the end of the runway. For example, using the aircraft performance manuals to estimate the takeoff length required for a CRJ700ER, it would appear that the aircraft could depart operating at 98% of its useful load; however, obstacle limitations reduce performance to 71% of useful load. As shown in Table 4-5, a CRJ-700ER traveling to ORD would be expected to operate at about 71% of its useful load, so that flight could theoretically occur. Conversely, Table 4-5 shows that a B737-800 traveling to ATL would operate at about 64% of its useful load, while Table 4-6 shows that the obstacles limit the aircraft to 56% of its useful load.

Table 4-6
AIRCRAFT TAKEOFF WEIGHT COMPARISON – 35L DEPARTURES
Colorado Springs Airport

	CRJ-200LR	CRJ-700ER	B737-800	B757-200
Engine type	CF34-3B1	CF34-8C1	CFM56-7B26	RB211-535E4
Maximum takeoff weight (lbs)	53,000	75,000	174,200	255,000
Operating empty weight (lbs)	30,500	43,000	91,300	136,940
Maximum useful load (lbs)	22,500	32,000	82,900	118,060
With obstacle limitation (a)				
Allowable takeoff weight (lbs)	46,470	65,800	137,900	209,300
Percent of useful load	71%	71%	56%	61%
Without obstacle limitation (b)(c)				
Allowable takeoff weight (lbs)	50,500	74,500	165,200	243,500
Percent of useful load	89%	98%	89%	90%

Note: Yellow shading denotes a tire speed/brake energy limitation; green shading denotes limitation on takeoff weight based on obstacle limitation.

(a) Assumptions: 83 degrees Fahrenheit; dry runway conditions; 10 knot headwind; and bleeds open/on.

(b) CRJ200, CRJ700 and B737 assumptions: 83 degrees Fahrenheit; dry runway conditions; calm winds; and bleeds closed/off.

(c) B757 assumptions: 82 degrees Fahrenheit; dry runway conditions; 10 knot headwind.

Source: AeroData/FedEx for allowable takeoff weights with obstacle limitation; LeighFisher for allowable takeoff weights without obstacle limitation.

Table 4-7 presents the same data for Runway 35R. Runway 35R, as shown, permits greater takeoff weights. However, the higher takeoff weights are still governed by obstacles for each of the aircraft with the exception of the B757-200 (which is governed by tire speed/

brake energy limits). Given the allowable takeoff weights in Tables 4-6 and 4-7, which account for obstacles, it is apparent that additional runway length may not increase the allowable takeoff weight during hot days.

Table 4-7
AIRCRAFT TAKEOFF WEIGHT COMPARISON – 35R DEPARTURES
Colorado Springs Airport

	CRJ-200LR	CRJ-700ER	B737-800	B757-200
Engine type	CF34-3B1	CF34-8C1	CFM56-7B26	RB211-535E4
Maximum takeoff weight (lbs)	53,000	75,000	174,200	255,000
Operating empty weight (lbs)	30,500	43,000	91,300	136,940
Maximum useful load (lbs)	22,500	32,000	82,900	118,060
With obstacle limitation *(a)*				
Allowable takeoff weight (lbs)	48,240	66,800	142,100	221,300
Percent of useful load	79%	74%	61%	71%
Without obstacle limitation *(b)(c)*				
Allowable takeoff weight (lbs)	50,500	74,500	165,200	243,500
Percent of useful load	89%	98%	89%	90%

Note: Yellow shading denotes a tire speed/brake energy limitation; green shading denotes limitation on takeoff weight based on obstacle limitation.

(a) Assumptions: 83 degrees Fahrenheit; dry runway conditions; 10 knot headwind; and bleeds open/on.
(b) CRJ200, CRJ700 and B737 assumptions: 83 degrees Fahrenheit; dry runway conditions; calm winds; and bleeds closed/off.
(c) B757 assumptions: 82 degrees Fahrenheit; dry runway conditions; 10 knot headwind.

Source: AeroData/FedEx for allowable takeoff weights with obstacle limitation; LeighFisher for allowable takeoff weights without obstacle limitation.

Table 4-8 presents similar data to Tables 4-6 and 4-7; however, the environmental conditions considered are different. For Table 4-8, a temperature of 32 degrees Fahrenheit was evaluated coupled with contaminated runway conditions (in which the runway would be covered by rain, slush, or snow). As Table 4-8 shows, the CRJ-200LR and CRJ-700ER would be limited by the available runway length of Runway 35L. However, the B737-800 and B757-200 would be limited by obstacles. Table 4-8 also shows that the longer Runway 35R would limit only the CRJ-200ER takeoff weight due to available runway length; whereas the other three aircraft would be limited by obstacles.

Table 4-8

AIRCRAFT TAKEOFF WEIGHT COMPARISON – CONTAMINATED RUNWAYS 35L/35R

Colorado Springs Airport

	CRJ-200LR	CRJ-700ER	B737-800	B757-200
Engine type	CF34-3B1	CF34-8C1	CFM56-7B26	RB211-535E4
Maximum takeoff weight (lbs)	53,000	75,000	174,200	255,000
Operating empty weight (lbs)	30,500	43,000	91,300	136,940
Maximum useful load (lbs)	22,500	32,000	82,900	118,060
Runway 35L departures				
Level 1 contamination				
Allowable takeoff weight (lbs)	44,410	68,000	141,900	210,400
Percent of useful load	62%	78%	61%	62%
Runway 35R departures				
Level 1 contamination				
Allowable takeoff weight (lbs)	48,450	69,900	150,500	226,100
Percent of useful load	80%	84%	71%	76%

Notes:

Blue shading denotes a field length limitation.
Green shading denotes limitation on takeoff weight based on obstacle limitation.
Assumptions: 32 degrees Fahrenheit; 10 knot headwind, includes wing and engine anti-ice penalties.

Source: AeroData/FedEx for allowable takeoff weights under contaminated runway conditions.

Runway Length Summary

Based on the assessment of runway length analysis, lengthening Runway 17R-35L could increase the allowable takeoff weights for certain aircraft when operating with contaminated runway conditions in north flow. The analysis also shows that some of the takeoff weight restrictions are governed by obstacles rather than by available runway length for both runways. These obstacles should be identified, and to the extent practical removed to facilitate higher takeoff weights, thereby eliminating potential operating weight penalties. As an additional mitigation tool, further analysis could be conducted to ensure that the one-engine out departure procedures in use by the various airlines are optimized to minimize takeoff weight penalties for north flow operations.

Ideally Runway 17R-35L would be the same length or longer than Runway 17L-35R for the purposes of redundancy (e.g. when Runway 17L-35R is closed for maintenance or snow removal). Although extending 17R-35L to 13,500 feet is not likely to be considered as a feasible solution due to known site constraints, extensions of various lengths should be considered to the extent practical for Runway 17R-35L.

Wind and Weather Analysis

An analysis of Airways Hourly Surface Observations (TD-3280) data from the National Climatic Data Center (NCDC) was conducted to assess the annual percent occurrence of weather conditions and runway use configurations. This weather data is collected using instruments located on the airport, such as the automated weather observation system (AWOS). Weather conditions—namely cloud ceiling and visibility—determine the ATC procedures that can be used at an airport, which in turn affect runway capacity and aircraft delay. Cloud ceiling and visibility levels that govern changes in ATC procedures at the Airport were identified during conversations with representatives from the FAA Airport Traffic Control Tower and Airport staff.

For purposes of the wind and weather analysis, visual meteorological conditions (VMC) and instrument meteorological conditions (IMC) are defined in accordance with FAA guidance, as follows:

- VMC weather is defined as cloud ceilings at least 1,000 feet above ground level (AGL) *and* visibility at least 3 miles.
- IMC weather is defined as cloud ceilings below 1,000 feet AGL *or* visibility less than 3 miles

In addition, varying levels of IMC were analyzed: Category I, Category II, and Category III conditions, defined as follows:

- Category I is defined as cloud ceilings at least 200 feet but less than 1,000 feet above ground level (AGL) *or* visibility at least 1/2 mile but less than 3 miles.
- Category II is defined as cloud ceilings at least 100 feet but less than 200 feet above ground level (AGL) *or* visibility at least 1/4 mile but less than 1/2 mile.
- Category III is defined as cloud ceilings of less than 100 feet above ground level (AGL) *or* visibility less than 1/4 mile.

Weather Conditions

The percent occurrence of weather conditions that would require the use of Category I, Category II, and Category III instrument landing systems (ILS) was examined for a 10-year period ended in October 2009, as summarized in Table 4-9. As shown, it was determined that the provision of a Category II/III ILS would have enabled the Airport to remain open up to 2.6% more of the year (the equivalent of approximately 9.5 days).

Table 4-9
SUMMARY OF WEATHER CONDITIONS
Colorado Springs Airport

Weather condition	Minimums: Cloud ceiling (feet)	Minimums: Visibility (miles)	Ten-year Average Occurrences: 24-hour occurrence	Ten-year Average Occurrences: Daytime occurrence	Ten-year Average Occurrences: Nighttime occurrence
VMC	1,000	3	92.6%	93.6%	91.0%
IMC	<1,000	<3	7.4	6.4	9.0
Category I	200-1,000	½ to 3	4.7	4.3	5.4
Category II	100-200	¼ to ½	2.0	1.5	2.9
Category III	<100	<¼	0.6	0.6	0.7
Additional coverage with Category II/III ILS			2.6	2.1	3.8

Source:
LeighFisher's analysis of Hourly Surface Airways Observations data obtained from the NCDC for the 10-year period November 1, 2000, to October 31, 2009.

Runway Wind Coverage

Runway wind coverage refers to the percent of time that the crosswinds associated with a particular runway orientation are within an acceptable level. Airport wind coverage is determined by considering all runways simultaneously. Crosswinds—which are the components of wind that flow in a direction perpendicular to a runway's orientation—can effectively close a runway for use. The maximum allowable crosswind components for a particular aircraft are determined largely by aircraft size, aircraft weight, and pilot capabilities. In general, larger, heavier air carrier aircraft can land and take off in higher crosswinds than smaller, lighter general aviation aircraft.

The FAA provides the following guidance regarding wind coverage in AC 150/5300-13, *Airport Design*:

> The desirable wind coverage for an airport is 95 percent, based on the total numbers of weather observations. This value of 95 percent takes into account various factors influencing operations and the economics of providing the coverage.[2]

Based on this guidance, wind coverage for the airfield was estimated using the following maximum allowable crosswind component conditions:

[2] Federal Aviation Administration, Advisory Circular 150/5300-13 (Change 11), *Airport Design*, March 28, 2007, p. 87.

- 10.5-knot crosswind component, which represents the crosswind component at which pilots of small, light general aviation aircraft would be unable to use the runway
- 13-knot crosswind component, which represents the crosswind component at which pilots of twin-engine propeller aircraft would be unable to use the runway
- 16-knot crosswind component, which represents the crosswind component at which pilots of larger commuter propeller aircraft and smaller business jet aircraft would be unable to use the runway
- 20-knot crosswind component, which represents the crosswind component at which pilots of regional and air carrier jets would be unable to use the runway

Table 4-10 summarizes the wind coverage of the Airport's runways at these crosswind speeds. In this table, wind data for daytime hours was presented. Separate coverage estimates are provided for visual meteorological conditions (VMC), instrument meteorological conditions (IMC), and all weather conditions.

These results indicate that the Airport's current runway system provides wind coverage in excess of the FAA's 95% coverage criteria for all four crosswind components that were evaluated. In addition, the results of the wind analysis indicate that Airport's primary runway—Runway 17L-35R—could be used 96% of the time with a 10.5-knot crosswind component. For further detail regarding wind coverage at the Airport, including coverage during Category II/III conditions, see Appendix E.

Table 4-10
WIND DATA SUMMARY DAYTIME HOURS (7 AM – 10 PM)
Colorado Springs Airport

	% Calm	10.5	13.0	16.0	20.0
All weather	15.7				
35R/35L - north flow *(a)*		85.54	85.68	86.12	86.50
17L/17R - south flow		11.27	12.01	12.55	12.84
31 - northwest flow		1.92	1.76	1.23	0.47
13 - southeast flow		1.27	0.56	0.10	0.00
Total		100.00	100.00	100.00	99.81
VMC *(b)*					
35R/35L - north flow *(a)*	15.0	85.19	85.30	85.77	86.18
17L/17R - south flow		11.50	12.26	12.81	13.11
31 - northwest flow		1.98	1.82	1.29	0.52
13 - southeast flow		1.33	0.61	0.13	0.00
Total		100.00	100.00	100.00	99.81
IMC *(c)*	25.6				
35R/35L - north flow *(a)*		90.11	90.59	90.95	91.25
17L/17R - south flow		7.70	8.17	8.49	8.65
31 - northwest flow		1.66	1.24	0.57	0.10
13 - southeast flow		0.53	0.00	0.00	0.00
Total		100.00	100.00	100.00	100.00

Notes:
(a) North flow includes the percentage of calm weather. Calm weather includes all winds below 5 knots; analysis assumed 10-knot tailwind component.
(b) VMC (Visual Meteorological Conditions) weather is defined as a cloud ceiling of at least 1,000 feet and reported visibility of at least 3 miles.
(c) IMC (Instrument Meteorological Conditions) weather is defined as a cloud ceiling less than 1,000 feet or reported visibility less than 3 miles.

Source: LeighFisher, January 2010 based on Surface Airways Hourly Data (TD-3280) for November 1, 2000, through October 31, 2009, from the National Climatic Data Center.

Airport Design Standards

As part of the airfield facilities requirements work effort, the Airport's existing airfield facilities were evaluated to assess their compliance with current FAA airport design standards defined in FAA Advisory Circular 150/5300-13 (Change 13), *Airport Design*. The following paragraphs summarize the most important findings of this review.

Runway Safety Areas (RSAs)

RSAs are rectangular areas that encompass runways and the land areas immediately around them. For runways serving Airplane Design Group (ADG) IV aircraft (i.e. the critical aircraft group), standard RSAs are 500 feet wide, centered on the runway, and extend 1,000 feet beyond each of the runway's physical ends. RSAs are required to be

cleared, graded, and capable of supporting aircraft without causing damage to them. RSAs are intended to minimize damage to aircraft and injury to passenger and flight crew in the event of an aircraft excursion from the runway. Objects taller than three inches above grade are not permitted within RSAs unless they are (1) fixed by function and (2) mounted on frangible couplings, to the extent practicable, that are no higher than three inches above grade.

At the Airport, localizer antennas serving Runways 17L, 35R, and 35L are all outside of the RSA. All RSAs at the airport meet the current design standards.

Runway Protection Zones (RPZs)

RPZs are trapezoidal areas beyond the ends of runways, centered on the extended runway centerline, intended to protect people and property on the ground. For precision instrument runways serving Airport Design Group IV aircraft with approaches capable of accommodating operations with visibility of less than 0.75 mile, RPZs are 2,500 feet long, 1,000 feet wide at their inner edge (i.e., closest to the runway), and 1,750 feet wide at their outer edge. The RPZs begin 200 feet beyond the physical end of their respective runways.

As stated in Paragraph 212 of *Airport Design*,

> *Land uses prohibited from the RPZ are residences and places of public assembly. (Churches, schools, hospitals, office buildings, shopping centers, and other uses with similar concentrations of persons typify places of public assembly.) Fuel storage facilities may not be located in the RPZ.*

The RPZs associated with each of the Airport's runways meet these land use requirements. However, the RPZ associated with Runway 31 encompasses land located beyond the Airport's property line. The use of this land is subject to local land use controls (Commercial Airport Overlay District, Ordinance 06-89) which effectively prevents incompatible development within the Runway 31 RPZ.

Modifications of Standards

Table 4-11 on the following page includes all published Modifications of Standards (MOS). Each of these MOS is included in the Airport Layout Plan. In addition, there are a number of potentially non-standard conditions that may require correction or additional MOS as shown in Table 4-12. These conditions along with the published MOS are also included in the Airport Layout Plan and should be subject to corrective measures when the pavement is next rehabilitated or the subject of a future MOS submittal to the FAA.

Table 4-11
PUBLISHED MODIFICATIONS OF STANDARDS
Colorado Springs Airport

Item	Standard	Existing	Approved	Notes
Taxiway F longitudinal gradient between Taxiway M and Taxiway B (between Sta. 358+25 and Sta. 352+61.95 and between Sta. 351+18.76 to Sta. 352+61.95)	+/- 1.5%	1.7% to 2.0% between Sta. 358+25 and Sta. 352+61.95 and 1.73% between Sta. 351+18.76 to Sta. 352+61.95	Submitted to FAA 05/22/2012; awaiting approval	
Runway 13 end RSA longitudinal gradient for first 200 feet beyond threshold	0% to -3%	0.75%	Submitted to FAA 11/03/2011; awaiting approval	Update to approved MOS on record; Airspace Case 93-ANM/D-063-NRA
Runway 31 longitudinal gradient and vertical curve length in first quarter of runway	+/- 0.8% longitudinal grade and minimum vertical curve length of 1,000 feet for each 1% of grade change	1.87% longitudinal grade and 500-foot vertical curve at Sta. 82+50	Submitted to FAA 11/03/2011; awaiting approval	Update to approved MOS on record; Airspace Case 93-ANM/D-012-NRA
Taxiway MIL longitudinal grade at Runway 13/31	+/- 1.5%	-2.25%	Submitted to FAA 11/03/2011; awaiting approval	Update to approved MOS on record; Airspace Case 93-ANM/D-063-NRA. Remove Taxiway B4 from approved MOS on record as it now meets longitudinal grade requirements.
Taxiway MIL length of lead-in to fillets at Runway 13/31	250-foot lead-in length to fillets	0-foot lead-in length to fillets	Submitted to FAA 11/03/2011; awaiting approval	
Taxiway G longitudinal gradient from centerline to north edge at Taxiway B (between Sta. 176+00 and 173+75)	+/- 1.5%	-1.9%	FAA approved 09/06/2007.	

Source: Airport Layout Plan data sheet, July 2013.

Table 4-12
ADDITIONAL NON-STANDARD CONDITIONS
Colorado Springs Airport

Item	Standard	Existing	Notes	Source
Taxiway A length of lead-in to fillet at southwest corner of Taxilane south of Taxiway A4	250-foot lead-in length to fillets	0-foot lead-in length to fillets	To be addressed in "Realignment of Taxiway "A" to 500′ from Runway 17R-35L" Project	AIP#19 Engineer's Report
Taxiway A2, A3, and A4 west of Taxiway A fillet width	85-foot fillet radius (cockpit over centerline)	105-foot fillet radius (judgmental oversteering)	To be addressed in "Realignment of Taxiway "A" to 500′ from Runway 17R-35L" Project	AIP #25 Engineer's Report
Runway 17R/35L longitudinal gradient for the last quarter of runway length at both ends	+/- 0.8% longitudinal grade	0.9% to 1.21 % in north quarter 0.7% to 1.36% in south quarter	Reconstruct Runway 17R/35L and eliminate a non-standard gradient whenthe runway is extended.	AIP#32 Engineer's Report
Taxiway A2 longitudinal grade at Runway 17R/35L	+/- 1.5%	1.80%	To be addressed in "Realignment of Taxiway "A" to 500′ from Runway 17R-35L" Project	AIP#32 Engineer's Report
Taxiway A3 longitudinal grade at Runway 17R/35L	+/- 1.5%	1.81%	To be addressed in "Realignment of Taxiway "A" to 500′ from Runway 17R- 35L" Project	AIP#32 Engineer's Report
Taxiway A4 longitudinal grade at Runway 17R/35L	+/- 1.5%	2.21%	To be addressed in "Realignment of Taxiway "A" to 500′ from Runway 17R-35L" Project	AIP#32 Engineer's Report
Taxiway A4 Longitudinal grade break	Minimum vertical curve length of 100 feet for each 1% of grade change	Grade break at the runway edge of 0.71% without a vertical curve	To be addressed in "Realignment of Taxiway "A" to 500′ from Runway 17R-35L" Project	AIP#32 Engineer's Report

Table 4-12
ADDITIONAL NON-STANDARD CONDITIONS *(continued)*
Colorado Springs Airport

Item	Standard	Existing	Status	Source
Taxiway H transverse gradient between Taxiway M and Taxiway E (between Sta. 159+00 and 176+00)	Crowned pavement section with 1% to 1.5% cross slope	Transverse pavement section with 1.5% cross slope	Conditions to be re-assessed at the time of next rehabilitation.	AIP#51 Engineer's Report
Taxiway E-1, E-7, and E-8 transverse gradient	Crowned pavement section with 1% to 1.5% cross slope	Transverse pavement section with cross slope	Conditions to be re-assessed at the time of next rehabilitation.	AIP#38/#40 Engineer's Report
Runway 17L/35R and Taxiway E Connectors Lighting	Counterpoise shall not be connected to light fixture base can or mounting stake, except for on fixture bases of runway TDZ lights, runway CL lights, and taxiway CL lights installed in rigid pavement. A safety ground must be installed at each light fixture.	Counterpoise connected to each light fixture base can for all lights. No safety ground wire installed.	Conditions to be re-assessed at the time of next rehabilitation.	AIP#38/#40 Engineer's Report

Source: Airport Layout Plan data sheet, July 2013.

Navigation Aids and Airfield Lighting

A review of navigational and visual aid needs at the Airport was conducted as part of the airfield facility requirements evaluation. Weather and runway use configuration data indicated that it may be prudent to enhance the instrument landing systems that are currently in place. As noted in the Existing Conditions chapter, Runways 17L and 35L are each equipped with Category I instrument landing systems, which enable trained pilots flying equipped aircraft to land when visibility is a low as 0.5 mile and the cloud ceiling is as low as 200 feet. Runways 35R also has an ILS which enables trained pilots flying equipped aircraft to land when visibility is a low as 0.75 mile.

Provision of a Category II/III approach on one (or both) of the parallel runways would be beneficial as it would allow the Airport to remain open for an additional 9.5 days or 228 hours per year. For further detail regarding weather conditions at the Airport, including when Category II/III conditions are most prevalent, see Appendix E.

Obstacle Clearance Surface Assessment

For the obstacle clearance assessment, FAA United States Standard for Terminal Instrument Procedures (TERPS) approach and instrument departure obstacle clearance surfaces (OCSs) were evaluated. The potential obstacles considered in this assessment were taken from the aerial obstruction survey, based on the orthophotography from June 2010, flown by The Sanborn Map Company.

Potential Impact of Future Technologies

Over the 25 year planning period considered in this study, there are a variety of technological advancements and industry changes that could have an impact on the airfield. Key among these are technological improvements to the air traffic control system that are part of FAA's Next Generation Air Transportation System (NextGen) development program. The FAA's NextGen program has been underway since the late 1990s.[3]

One of the central facets of NextGen is the transformation of the U.S. air traffic control system from ground-based navigation aids to satellite-based navigation aids. This transformation, which is currently underway in the en-route airspace and at select airports, promises to increase the accuracy of aircraft navigation and provide more flexible, robust air traffic procedure design. The transformation to satellite-based navigation will also ultimately reduce or eliminate the need for space-consuming ground based navigational aids such as VOR antennas, glide slope antennas, and localizer antennas.

Another planned component of NextGen is increased availability and currency of air traffic data to all users of the air transportation system. This includes providing pilots with in-

[3] A complete and current description of proposed NextGen program improvements, enabling technologies, and implementation timelines is presented in the report, Next Generation Air Transportation System Integrated Work Plan: A Functional Outline, Version 1.0, published by the Joint Planning and Development Office (JPDO), on September 30, 2008.

cockpit displays of air traffic information, so pilots can react to such information directly, and providing air traffic controllers with instantaneous aircraft position information obtained via satellite-based navigation systems, rather than via ground-based radar systems. A technology known as "automated dependent surveillance-broadcast" (ADS-B) is central to this effort. ADS-B utilizes radio transponders which broadcast detailed information regarding aircraft position, speed, altitude, type, and other information to ADS-B receivers. Such receivers can be located aboard aircraft and in air traffic control facilities. As ADS-B use among aircraft operators and within the FAA increases in the coming decade, it is expected to supplement and eventually replace radar systems as the primary source of air traffic information.

A third important facet of NextGen is to automate and optimize traffic flows both in the terminal and en-route airspace environments, enabling pilots and controllers to make more efficient use of the same volume of airspace. This optimization, which relies in part on the other two facets of NextGen that have already been mentioned, is expected to allow controllers to sequence aircraft to arrival and departure runways more effectively, helping to ensure that available airspace and airfield capacity is not wasted because aircraft are not fed through the air traffic system effectively enough to use it.

Other NextGen improvements that may improve the Airport's functionality include the following:

- Satellite-based approach procedures that can facilitate instrument approach procedures in low visibility to runways not currently equipped with CAT II/III instrument landing systems.
- Wake vortex detection and avoidance systems that enable wake-turbulence related in-trail separations and runway dependencies to be reduced when wind and weather conditions are favorable.
- ADS-B-based flight procedures and air traffic control rules that enable pilots to assume responsibility for their own separations from other aircraft, even in instrument meteorological conditions, facilitating "near-visual" operations in poor weather.
- Use of optimized descent profile (ODP) approach procedures to reduce fuel burn, aircraft emissions, and possibly noise impacts associated with Airport arrivals.
- Optimized taxiway routing and taxiway conflict management, utilizing data obtained from the Airport Surface Detection Equipment, Model X (ASDE-X) ground surveillance system.

Some of these improvements will be enabled via facility and equipment improvements. However, many of the improvements will depend on the rate at which aircraft operators equip their aircraft to take advantage of NextGen technology.

Some of the improved flight procedures, associated with NextGen technology, are already in place at the Airport. Specifically, the Airport has four area navigation (RNAV) procedures in place that are designated as Required Navigation Procedures (RNP) for Runways 17L, 35R, 17R, and 35L. These RNP provide a number of benefits over conventional navigation including: (1) lower minimums; (2) improved operational performance including fuel efficiency and time savings; and (3) improved safety with clearly defined and predictable flight paths. In addition to the four RNP, the Airport also has five RNAV global positioning system (GPS) procedures in place. These procedures provide approach minimums similar to those provided by conventional instrument landing system (ILS) approaches. For example, the Runway 17R GPS approach can accommodate operations with visibility as low as 0.75 mile.

To prepare itself for further NextGen flight procedures and operational capabilities, the Airport should develop a comprehensive map of airspace obstructions in the vicinity of the Airport, including obstructions that impact one-engine inoperative departure surfaces. In the long term, it is recommended that the Airport monitor the progress of the FAA's NextGen program and actively collaborate with both the FAA and the air carriers to determine when additional new technologies should be installed at the Airport and who should be responsible for their implementation.

PASSENGER TERMINAL

The following summarizes general planning factors and assumptions used to derive facility requirements for key functional areas of the passenger terminal. Requirements were determined based on a multitude of factors, including Airport staff input, simulation modeling, facilities provided at comparable airports, knowledge of industry-wide trends, airline data, and guidelines published in the International Air Transport Associations (IATA's) *Airport Development Reference Manual*; FAA Advisory Circular (AC) 150/5360-13, *Planning and Design Guidelines for Airport Terminal Facilities*; and FAA AC 150/5300-13, *Airport Design*. Requirements were generated for aircraft gates, parking positions, passenger departure lounges, ticketing and check-in positions, passenger security screening, and baggage handling facilities.

Gates and Aircraft Parking

At present, 12 individual gates are provided on the apron surrounding the primary passenger concourse. Four additional gates are provided on the satellite concourse. Demand for active gate positions is summarized in Table 4-2 and estimated based on the following planning guidelines and assumptions:

- Because the aircraft gates are equivalent in terms of their capability to accommodate the aircraft within the fleet mix, any flight can be placed on any gate. However, preferential use of the gates was assumed to establish an upper bound for aircraft gate requirements.

- Gate occupancy times were set equal to those given in the future flight schedules in order to accurately simulate the duration that a given operation will require use of a

gate. Gate occupancy times include schedule buffers to account for variability in the actual arrival and departure times of aircraft operations.

- A maneuver buffer of 5 minutes between aircraft for a particular gate was applied to represent the time required to park or push back from the gate.

Gate requirements are presented above in Table 4-2, Facilities Requirements Summary (see pages 4-5). As shown in Table 4-2, the existing twelve aircraft gates can accommodate the level of activity associated with PAL 3. Eleven of the twelve aircraft gates would be leased by airlines, and one gate would be "common use" serving a mix of airlines throughout the day. With the additional four gates on the satellite concourse, it is not expected that additional aircraft gates will be required within the planning period.

While the number of gates is adequate to accommodate demand, the loading bridges serving the gates may require modification. Analysis of the loading bridges indicates that the slopes are greater than the required standard of 8.3% for most regional jet and propeller aircraft. Alternatives to address the non-standard slopes should be explored.

Passenger Holdrooms

Requirements for holdrooms are directly related to the design aircraft size for each gate. Because each gate has the capability of serving each of the aircraft within the existing and projected fleet mix, each holdroom should be assumed to serve the largest aircraft that would likely serve the Airport. To establish an upper bound for the holdroom requirement, it was assumed that each gate would need to accommodate the Boeing 757-200 aircraft, with approximately 180 seats.

The number of passengers that were assumed to be accommodated in each holdroom is calculated assuming 80% of the design aircraft's passengers, with 65% of them requiring seats, and that standing and seated passengers occupy 10.8 and 16.6 square feet each, respectively. Using these assumptions, a Boeing 757-200 would require approximately 2,100 square feet of space; and a Boeing 737-900 would require approximately 1,700 square feet.

As shown in Table 4-2, the Airport will not require additional holdroom capacity throughout the planning horizon. The total required area for passenger holdrooms is approximately 25,000 square feet.

Ticketing Lobby

Approximately 30 passenger check-in positions are provided in the lobby areas on the upper level of the terminal. Future check-in facility requirements were based on the following assumptions and guidelines:

- Check-in positions will continue to be allocated on an exclusive-use basis to individual airlines (i.e. no sharing of facilities).

- Check-in positions process passengers at different rates. The rate at which passengers are processed with an agent or at kiosk when checking baggage is assumed to be 23.1 passengers per hour. The rate for passengers checking in at a kiosk without checking baggage is assumed to be 32.7 passengers per hour. Process rates are assumed to remain constant over the planning period, which is a conservative assumption given recent trends to separate check-in and boarding pass retrieval from baggage check. However, because of ongoing changes in airline check-in procedures and use of electronic kiosks, conservative assumptions are used to develop check-in requirements.

- Approximately 60% of passengers will require check-in facilities at the Airport at PAL 3 and beyond. The remaining 40% are assumed to check-in online or off-site.

- To maintain current passenger service levels, it was assumed that passengers can wait a maximum of ten minutes for check-in. Passengers will occupy 19.35 square feet per person at a level of service A.

As shown in Table 4-2, the Airport currently provides a total of 30 check-in positions, which is sufficient for activity levels up to PAL 3. The ticketing lobby has sufficient area to meet the spatial requirements for queues of passengers waiting to check-in for departing flights, provided that the EDS machines currently located in the lobby are removed when checked baggage security improvements are completed.

Passenger Security Screening

At present the security checkpoints provides four lanes for screening of passengers and their carry-on baggage. Future passenger security screening checkpoint requirements are based on the following planning guidelines and assumptions:

- Based on observations at the Airport, an average throughput of 135 persons per lane per hour was assumed. While technological improvements have the potential to increase passenger throughput over the planning period, enhanced security measures have also decreased passenger screening throughput (e.g. millimeter wave technology imaging versus the traditional magnetometer).

- Employee/crew screening demand was added to the passenger volumes at all checkpoints and was assumed to be 10% of daily enplanements.

- To provide desired levels of passenger service, it was assumed that passengers would wait a maximum of ten minutes for security screening. Passengers will occupy between approximately 14 and 19 square feet per person of space while waiting in the queue.

Table 4-13 shows that under these assumptions the existing capacity of the checkpoint is sufficient to meet the existing demand in terms of the number of lanes provided.[4] Approximately 800 square feet of space was provided for passenger queuing area at the front of the checkpoint at the time this analysis was completed. While the number of lanes may be adequate, the queue space is inadequate for the existing condition with four lanes. An expansion of the security screening checkpoint was since constructed that provides approximately 1,800 square feet of total queue space, as well as additional space for additional lanes.

With regard to future lane requirements, Table 4-13 shows that up to four additional lanes would be required over the planning horizon, with the first coming online at PAL 1, and the remaining three being required as early as PAL 2. At both PAL 2 and PAL 3, the model demonstrated that for nearly the entire day three additional lanes would satisfy demand; the fourth additional lane was only required to maintain the maximum ten minute wait time for approximately 30 minutes during the peak hour. It is important to note, however, that screening requirements vary depending on the prevailing security requirements enforced at any given time by the TSA. To that end, it is recommended that passenger checkpoints be reassessed regularly.

With regard to queue space, Table 4-13 provides requirements based on two levels of service (LOS A and C). The requirements are rooted in the International Air Transport Association (IATA) spatial requirements for ticketing and check-in. Table 4-13 also references the TSA's *Checkpoint Design Guide* which recommends a minimum of 300 square feet of queue per lane.

To better understand how the security checkpoint would function if it were constrained to a certain number of lanes, an additional model run was completed. The model applied the PAL 3 schedule to a security checkpoint limited to 6 lanes, which resulted in a maximum wait time of 25 minutes, with a queue of 337 passengers requiring about 4,700 square feet of queue space (at a level of service C). Typical wait time throughout the day (outside of the morning departure peak) was less than 10 minutes.

[4] Note: in the existing condition, the wait time occasionally exceeds 10 minutes, especially during peak periods. When the wait times exceed 10 minutes, the queue length is longer than optimal given the space allocated to queuing passengers.

Table 4-13
SECURITY CHECKPOINT REQUIREMENTS
Colorado Springs Airport

	Existing	Requirements PAL1	PAL2	PAL3
Forecast demand				
Annual enplaned passengers	929,600	1,215,200	1,644,900	1,910,500
ADPM passengers *(a)*	3,089	4,038	5,465	6,348
Peak hour passengers	617	760	994	1,269
Requirements				
Security lanes (ea)	4	5	7 - 8	7 - 8
Max queue (passengers)	170	115	166	173
Queue area (sf) *(b)*				
Level of service A	800	2,200	3,200	3,400
Level of service C	800	1,600	2,300	2,400
TSA CDG *(c)*	-	1,500	2,400	2,400

Notes: Blue shading highlights potential deficiencies.

(a) ADPM = average day, peak month
(b) Queue areas based on International Air Transport Association (IATA) levels of service (LOS) for ticketing and check-in queue: LOS A: 19.4 sf / passenger; LOS C: 14.0 sf / passenger
(c) TSA CDG recommends a minimum of 300 square feet per lane for passenger queuing.

Baggage Handling Systems

The four components of baggage handling systems assessed included: checked baggage security screening system, outbound baggage makeup, inbound baggage handling, and baggage claim lobby.

Checked Baggage Security Screening System

The Airport is currently designing a new checked baggage conveyance system which will replace the existing system. The explosive detection system (EDS) equipment currently in the ticketing lobby will be removed from the lobby, and the explosive detection procedures will be completed after baggage is checked. This system will be fully operational in late 2012. The system provides four zones, each with two EDS. Each EDS has the capacity to screen approximately 225 bags per hour. Using the TSA's methodology, it was determined that the system should be capable of serving the PAL 3 demand.

Outbound Baggage Makeup

As part of the checked baggage system, upgrades to the outbound baggage makeup capability were made. Most notably, the belt frontage for baggage carts is provided by four make-up units with a total linear frontage of 332 feet. With each baggage cart being approximately 12 feet in length, the new frontage provides for approximately 27 baggage carts at any one time. Assuming narrowbody aircraft require approximately 3 carts per departure, the system accommodates as many as 9 simultaneous departures. Notably, the forecast for PAL 3 estimates approximately 7 departures in the peak hour by a mix of narrowbody and regional jet aircraft.

Inbound Baggage Handling

The requirements for this functional element focused on identifying the linear frontage of belt required for offloading inbound baggage by airline baggage handlers. The existing baggage claim devices are direct feed devices. Therefore, a section of frontage of each device is exposed to the public (i.e. presentation frontage) and a non-public section is exposed to baggage handlers (i.e. offload frontage). Requirements were estimated using a planning ratio of 0.30 linear foot of offload frontage for every foot of presentation frontage. The existing offload frontage of over 200 feet is sufficient for the total presentation frontage of approximately 600 feet (a ratio of approximately 0.33).

Baggage Claim Lobby

Baggage claim facilities currently occupy approximately 15,000 square feet of space on the lower level of the terminal, providing approximately 600 linear feet of retrieval frontage on 6 different devices. Requirements for total baggage claim area and claim frontage were estimated based on the following guidelines and assumptions:

- Each baggage claim device would be allocated on a common use basis.
- Passengers unload from the aircraft at a rate of 6.3 seconds per passenger and the walk from the gate to the claim is approximately 7 minutes.
- Bags would be unloaded at a rate of 6.9 seconds per bag and take 10 minutes to reach the claim device for regional jets, and 15 minutes for narrowbody aircraft.
- Passengers that arrive ahead of their bags would accumulate around the claim device.
- Approximately 70% of passengers in the claim area would approach the device and the remaining 30% would be set back from the device.
- Each person in the baggage claim area requires 21.50 square feet of space in the claim area and two linear feet of the claim device.

Table 4-2 summarizes the requirements for baggage claim area. As shown, there is abundant device frontage and claim area provided throughout the planning period.

Concessions Space

Concessions space in the terminal totals approximately 18,100 square feet. Of the 18,100 square feet, 8,300 is airside (post-security) and 9,800 is landside (pre-security). At a small hub airport such as Colorado Springs, it is preferable to have the split between airside and landside at 65 percent airside and 35 percent landside in accordance with *ACRP Report 54: Resource Manual for Airport In-Terminal Concessions*. Concessions space should grow with passengers, and a planning factor of eight square feet per 1000 passengers, specific to the Airport was used to estimate future requirements. As shown in Table 4-2, the landside

concessions space is adequately sized through PAL3. However, the airside concessions will require expansion after PAL1, growing to over 13,000 square feet by PAL3.

GROUND TRANSPORTATION AND PARKING

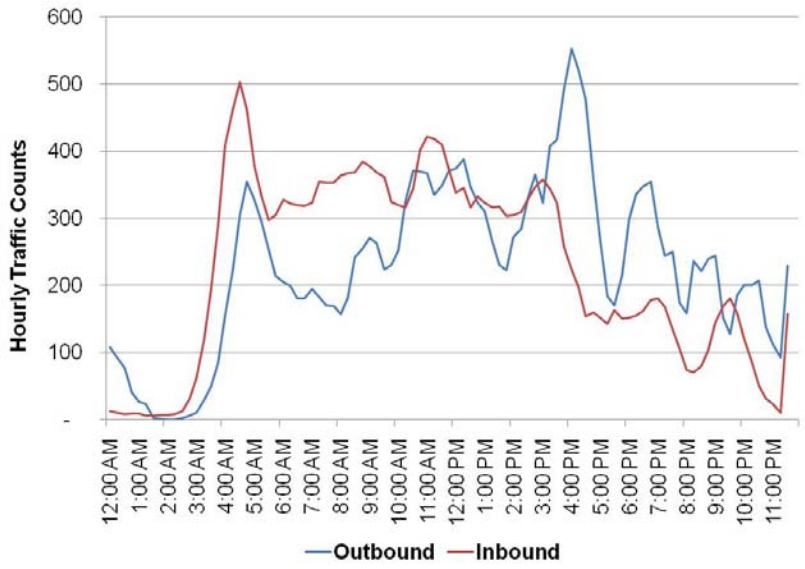
This section summarizes estimated requirements for ground transportation facilities including airport access roadways, curbsides, parking, and rental car facilities at the Airport. These requirements were developed based on data collected as part of the Airport's on-going data collection program, surveys conducted specifically for this Master Plan, anecdotal information from Airport staff, experience at comparable airports, and assumptions regarding desired service levels throughout the planning period.

Airport Access

Access roadway requirements are based on an analysis of current and projected design-hour traffic volumes for Milton E. Proby Boulevard. The projected design-hour volume was compared to the assumed hourly capacity to determine whether an acceptable level-of-service is and will continue to be provided. Using traffic counts obtained during June and July 2010, a peak hour demand was established recognizing that while a limited number of hours during the year may experience higher volumes, the selected hour is representative of traffic volumes experienced during a typical busy, but not holiday, period.

Figure 4-4 depicts the typical traffic volumes observed during the July 2010 traffic counts.

Figure 4-4
HOURLY TRAFFIC COUNTS FOR MILTON E. PROBY
Colorado Springs Airport



Source: LeighFisher analysis of Airport data from July 2010.

Projected traffic volumes for future PALs were calculated assuming that roadway traffic on Milton E. Proby Boulevard would increase at the same growth rate as average day peak month passengers. The future volumes were compared to the existing capacity to calculate a volume/capacity ratio that is indicative of level-of-service. A volume/capacity ratio of 0.6 or lower would indicate that roadways are performing at an acceptable level-of-service—during peak periods, traffic flows smoothly but vehicles are traveling close together and individual motorists find it more difficult to change lanes without other motorists' cooperation in providing a gap. This volume/capacity ratio threshold reflects a more-stringent standard than may be used for typical urban transportation planning because for roadways used by airline passengers, the potential result of congestion is that passengers may miss time-certain flights, whereas delays on regional roads are more likely to be merely an inconvenience.

As shown in Table 4-14, the current number of lanes on Milton E. Proby Boulevard (2 in each direction) is sufficient to accommodate peak hour demands at an acceptable level-of-service through PAL 3.

Table 4-14
ROADWAY REQUIREMENTS: MILTON E. PROBY BOULEVARD
Colorado Springs Airport

	Existing conditions	Future requirements		
		PAL 1	PAL 2	PAL 3
Demand				
Average day peak month passengers	3,089	4,038	5,465	6,348
Inbound peak hour volume (morning peak)	500	650	885	1,025
Outbound peak hour volume (afternoon peak)	515	675	910	1,060
Facility requirements				
Traffic lanes				
Inbound (morning peak)	2	2	2	2
Outbound (afternoon peak)	2	2	2	2

Source: LeighFisher, September 2010.

Curbside Facilities

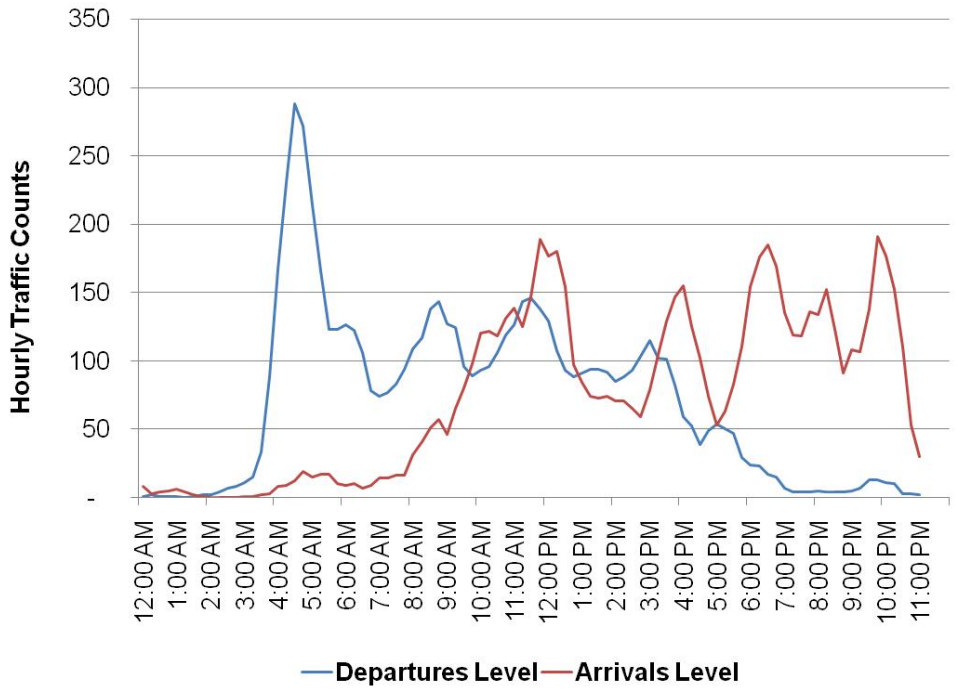
The terminal curbside is configured in a two-level arrangement, with departing passengers dropped off on the departures level outside the ticketing lobby and arriving passengers picked up on the arrivals level. On both levels, the curbside area consists of an inner

roadway predominately used by private vehicles and an outer roadway reserved for commercial vehicles.

Peak period demands for the departures and arrivals levels were determined using (a) traffic counts collected in June 2010, (b) vehicle classification surveys that estimated the portion of the volume comprised of different vehicle modes (e.g. private vehicles, taxicabs, courtesy vehicles), (c) commercial vehicle volume data collected by the Airport's automatic vehicle identification (AVI) system, and (d) surveys of dwell times for each mode.

Figure 4-5 summarizes the hourly volumes observed using the curbsides during busy days during the survey period. As shown, the departure level experienced one pronounced peak of 288 hourly vehicles from 4:30 a.m. to 5:30 a.m. while the arrivals level experienced several peak periods of similar magnitude (the highest peak, with an hourly volume of 191, occurred from 9:45 p.m. to 10:45 p.m.).

Figure 4-5
ROLLING 60-MINUTE CURBSIDE VOLUMES, TYPICAL BUSY DAY
Colorado Springs Airport



Source: LeighFisher analysis of Airport data from June 2010.

Table 4-15 summarizes the vehicle classification observed during the surveys. The results shown for the arrivals level reflect adjustments made to incorporate data provided by the

AVI system (which provided monthly volumes for all commercial vehicles, by service type). Given that the AVI data supporting the arrivals level classification provided a significantly larger sample size (and thus, a more reliable result) than the visual survey conducted for both levels (which was conducted over a limited number of hours over four days), it was determined that the arrivals level vehicle classification should be applied to the departures level as well.

Table 4-15
VEHICLE CLASSIFICATION SURVEY RESULTS
Colorado Springs Airport

	Upper Level	Lower Level
Private vehicles *(a)*	89.3%	84.3%
Taxicab	4.2%	10.4%
Limousine	0.6%	0.5%
Hotel van	4.5%	3.2%
Rental car van	< 0.1%	< 0.1%
Scheduled	0.3%	1.0%
Military	0.3%	0.5%
Charter van/bus	0.3%	0.1%
Airport vehicle	0.3%	0.1%
Total	100.0%	100.0%

(a) Includes rental cars.

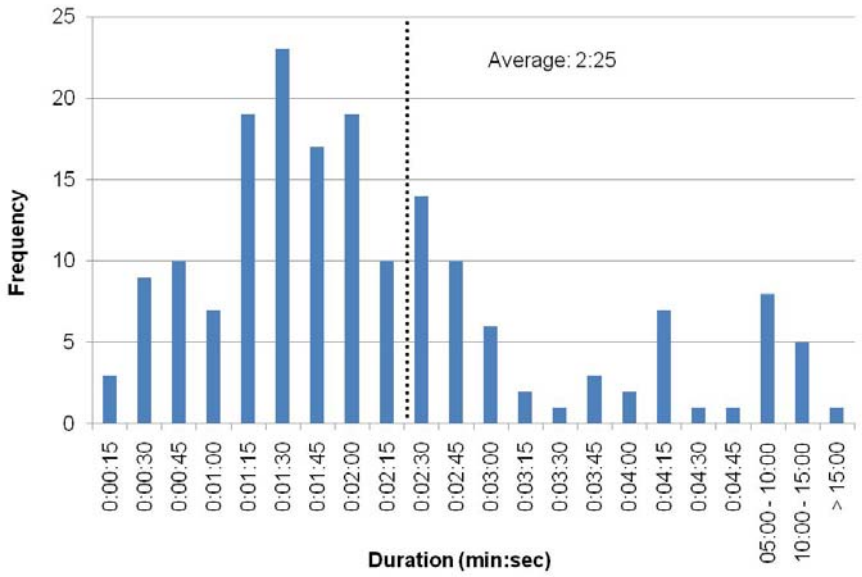
Source: LeighFisher analysis; data provided by Colorado Springs Airport.

Figures 4-6 and 4-7 summarize the distribution of dwell times observed on the curbsides during the surveys conducted in May 2010. As shown, the average dwell times for private vehicles on the departures and arrivals levels were 2.25 minutes and 3.41 minutes, respectively. Average surveyed dwell times for commercial vehicles on the departures level were 2.18 minutes for taxicabs and 1.32 minutes for hotel/motel courtesy vehicles. On the arrivals level, dwell times were measured for hotel/motel courtesy vehicles and large buses. On-demand services, such as taxicabs, were not surveyed because these vehicles are expected to be stationed at the curbside waiting for passengers. The average arrivals level dwell time for hotel/motel courtesy vehicles was 6.43 minutes.

Figure 4-6

DWELL TIME DISTRIBUTION—PRIVATE VEHICLES UPPER DRIVE (n-178)

Colorado Springs Airport

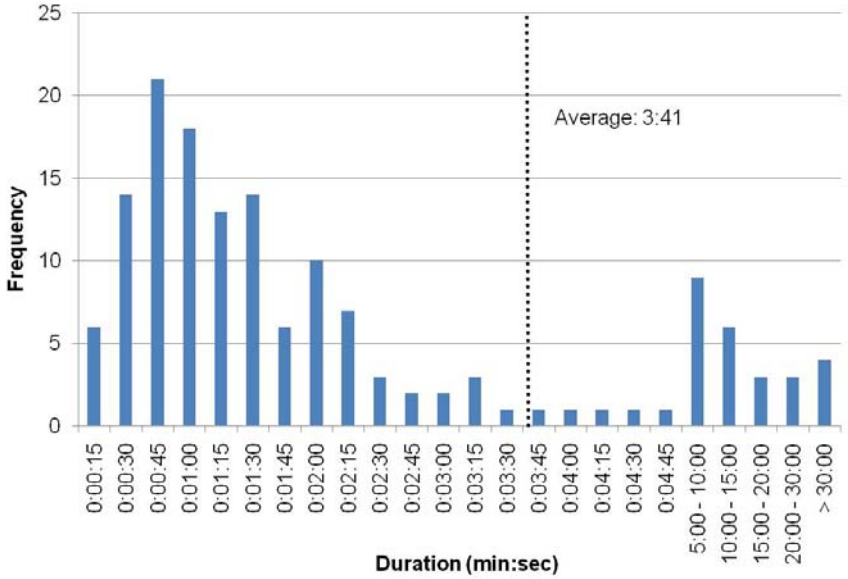


Source: LeighFisher analysis of Airport data from March 2010 – May 2010.

Figure 4-7

DWELL TIME DISTRIBUTION—PRIVATE VEHICLES LOWER DRIVE (n=150)

Colorado Springs Airport



Source: LeighFisher analysis of Airport data from March 2010 – May 2010.

Based on the passenger forecasts provided in Chapter 3, curbside traffic volumes for the future PALs were calculated assuming that volumes would increase at the same growth rate as average day peak month (ADPM) passengers. Curbside requirements were then calculated as follows:

- Volumes were combined with the average dwell times and vehicle classification information to determine the average number (50th percentile) of vehicles stopped simultaneously on each curb during the busy hours.

- The curbside requirement was then estimated using a Poisson distribution to determine the amount of curbside needed to meet the demand with a 95th percentile confidence.

- For the inner lanes of the upper and ground level, the requirement was adjusted to assume approximately 30% double-parking. On the outer lanes where curbside space is reserved for specific commercial vehicle modes, no double-parking was assumed.

- For the arrivals level, curbside requirements were recalculated assuming a shorter dwell time recognizing that (a) 3.41 minutes is excessive compared to dwell times observed at other airports and (b) shorter dwell times can be achieved through active and visible enforcement of curbside rules.

Table 4-16 summarizes the required curbside length throughout the planning period. The departures level provides approximately 950 linear feet of curbside on the inner lanes and 1,065 feet of curbside on the outer lanes. The arrivals level provides approximately 925 linear feet of curbside on the inner lanes and 975 feet of curbside on the outer lanes. As shown, the existing curbsides have sufficient capacity to meet demand through PAL 3. However, on both levels, almost all curbside activity occurs in a 300-foot-long area immediately in front of the building. As demand exceeds 300 feet, congestion will increase in front of the terminal and drivers will increasingly pick up and drop off passenger further from the building.

Table 4-16
ESTIMATED CURBFRONT REQUIREMENTS
Colorado Springs Airport

	Existing	PAL1	PAL2	PAL3	Dwell time assumption (minutes)
Departures curbfront					
Inner curb (private vehicles, taxis)	290	365	480	560	2:25
Outer curb (courtesy vehicles)	85	170	170	170	varies
Arrivals curbfront					
Inner curb (private vehicles)	270	345	440	480	3:40
Outer curb (commercial vehicles) *(a)*	290	290	290	290	varies
Arrivals curbfront reduced dwell times					
Inner curb (private vehicles)	190	210	290	345	2:25
Outer curb (commerical vehicles) *(a)*	290	290	290	290	varies

(a) Requirements for outer arrivals curb is governed by functional needs of commercial operators as opposed to peak period demand.

Source: LeighFisher analysis; data provided by Colorado Springs Airport.

Parking

The Airport operates parking facilities on-Airport for both the traveling public and Airport employees. The following paragraphs describe future requirements for vehicular parking throughout the planning period.

Public parking

The Airport currently provides a total of 4,635 public parking spaces: 716 in the short term surface lot, and 3,919 in the long term surface lot. The Airport currently does not offer covered parking on-Airport.

Table 4-17 presents the estimated public parking requirements throughout the planning levels. Public parking requirements are presented for:

- Design day demand – Used to estimate future needs for permanent parking facilities, the two on-Airport surface lot, "design day" parking demand is based on the observed peak parking occupancy on an average peak day (Thursday) in a busy month (June). Parking demand is expected to increase at a rate proportional to the increase in peak month passenger level. Design day parking requirements also include a 10% circulation factor to account for a typical parker's ability to locate the last available spaces in a parking facility.

- Holiday/overflow demand – Used to estimate future needs during particularly busy holiday travel periods, holiday/overflow demand is based on the highest observed

occupancy in 2009 and is expected to increase at a rate proportional to the increase in peak month passenger level. Holiday/ overflow demand does not include a circulation factor. Often, holiday/overflow demand that cannot be accommodated in the permanent parking facilities can be accommodated in temporary surface lots or within parking facilities usually reserved for other uses (such as employee parking).

As shown in Table 4-17, the existing parking facilities are adequate for the current parking demand. Parking demand during the "design day" is expected to grow from 2,750 to 5,650 at PAL 3. The existing parking facilities will provide sufficient public parking spaces until just prior to PAL 2. Holiday parking demand will exceed public parking capacity beyond PAL 1.

Table 4-17
ESTIMATED PUBLIC PARKING REQUIREMENTS
Colorado Springs Airport

		Estimated requirements (number of spaces)		
	Existing *(c)*	PAL 1	PAL 2	PAL 3
Demand				
Annual enplaned passengers	929,600	1,215,200	1,644,900	1,910,500
Average day, peak month passengers	3,089	4,038	5,465	6,348
Requirements				
Design day parking *(a)*	2,750	3,600	4,850	5,650
Holiday period long-duration parking *(b)*	3,200	4,200	5,650	6,550

(a) Design day requirements include a 10% surplus to account for a parker's inability to locate the last parking space.
(b) Does not include 10% surplus.
(c) The existing design day requirement of 2,750 parking spaces and holiday requirement of 3,200 parking spaces is less than provided at the Airport today (4,635).

Notes: Public parking requirements based on 2009 activity.
Holiday period long-duration parking requirements based on 2009 Christmas season peak occupancies in the public parking facilities.
Requirements were assumed to increase at the same rate as the number of enplaned passengers.

Source: LeighFisher, July 2010.

Employee parking

The Airport currently provides a combined 704 employee parking spaces in the East Manager Lot, the West Manager Lot, the West Auxiliary Lot, and the Far West Employee Overflow Lot. Employee parking requirements were calculated as follows:

- Surveys conducted by Airport staff during August 2010 indicated that during typical busy periods of the week, approximately 340 vehicles were parked in the Airport's employee parking facilities.
- It was assumed that future employee parking demand would increase in direct proportion to the combined growth rate of annual passengers and annual aircraft operations.
- Requirements were calculated by adding 5% to the anticipated peak demand recognizing a driver's difficulty in locating the last available spaces in a parking facility approaching capacity.

Table 4-18 presents the estimated employee parking requirements through PAL 3. As shown, existing facility capacity is expected to be sufficient to meet future requirements beyond PAL 3.

Table 4-18
ESTIMATED EMPLOYEE PARKING REQUIREMENTS
Colorado Springs Airport

	Existing *(a)*	PAL 1	PAL 2	PAL 3
Annual enplaned passengers	929,600	1,215,200	1,644,900	1,910,500
Annual aircraft operations	32,508	38,500	47,300	51,400
Blended growth rate from prior PAL		24.6%	29.1%	12.4%
Employee parking requirements	360	450	580	650

(a) Requirements based on 2009 activity; requirements include a 5% surplus to account for a parker's inability to locate the last parking space. The existing requirement of 360 parking spaces is less than provided today at the Airport (704).

Source: LeighFisher, July 2010.

Rental Car Facilities

Rental car facility requirements are based on (1) existing activity of the rental car companies serving the Airport, (2) interviews with Airport management and rental car company staff conducted as part of rental car analyses conducted in prior years for the Airport, and (3) industry standards and observations of rental car operations at comparative airports, including recently completed operating models. Requirements for future PALs are based on the projected growth of enplaned passengers.

At present, seven rental car companies operate from on-Airport property with their ready/return facility next to the short term parking lot and one brand operates from off-Airport site. Future rental car requirements assume (1) the on-Airport companies will continue to operate from counters inside the terminal and ready/return facilities in the

same location throughout the planning period and (2) space is reserved for the off-Airport operator to move on-Airport.

Table 4-19 summarizes the rental car requirements and details the size and timing of growth in future facilities. Approximately 545 spaces are required at PAL 1, with 855 spaces required at PAL 3. The capacity of the existing ready/return facilities is 768 spaces, which would provide adequate spaces through PAL 2. The current 22 acres reserved for services centers is sufficient to meet service center demand beyond PAL 3.

Table 4-19
RENTAL CAR REQUIREMENTS
Colorado Springs Airport

	Existing	PAL 1	PAL 2	PAL 3
Ready/return stalls	768	545	735	855
Service centers (acres) *(a)*	22.00	12.88	17.40	20.27

Note: Blue shading highlights potential functional deficiencies.
(a) Includes fuel, wash, support, storage, and administration facilities.

Source: LeighFisher, July 2010.

AIR CARGO AND GENERAL AVIATION

This section provides an overview of airport facilities required to accommodate air cargo and general aviation aircraft operations at the Airport throughout the 25-year planning period.

Air Cargo

Estimated requirements are provided for cargo warehousing, aircraft parking, and land. Estimates are based on industry best practices related to cargo planning. The following assumptions were developed to identify general aviation spatial requirements:

- The aircraft cargo apron should be capable of accommodating the total number of average daily departures;
- To be conservative, mainline aircraft were assumed to require 50,000 square feet of apron; and feeder aircraft were assumed to require 15,000 square feet of apron;
- A cargo warehouse space utilization factor of 1.5 square feet per ton was used for future warehouse requirements;
- Total land required for cargo use is equivalent to the apron, landside, and warehouse spatial requirements with a 15 percent factor applied.

As shown Table 4-20, the existing land allocation of 13.8 acres is sufficient to accommodate the increased demand. This finding is consistent with expectations, as cargo aircraft operations are not expected to grow over the planning horizon. While cargo tonnage is expected to grow over the planning horizon, aircraft operations are not expected to grow as there is additional lift capacity to ship additional cargo tonnage on the aircraft currently operating in the market, and the cargo airlines would likely up-gauge the aircraft before adding flights. In addition, warehouse space currently available on the airport appears to be capable of accommodating the increase in cargo tonnage.

Table 4-20
CARGO FACILITY REQUIREMENTS
Colorado Springs Airport

	Existing	PAL 1	PAL 2	PAL 3
Demand				
Annual cargo tonnage				
All-cargo	11,426	13,890	16,600	18,240
Belly cargo	58	78	86	91
Total	11,484	13,968	16,686	18,331
Annual departures				
Mainline aircraft	491	480	490	490
Feeder aircraft	335	340	340	340
Total	826	820	830	830
Average daily departures				
Mainline aircraft	2	2	2	2
Feeder aircraft	1	1	1	1
Total	3	3	3	3
Facility Requirements				
Belly cargo				
Aircraft apron *(a)*	15,200	15,200	15,200	15,200
Building warehouse *(b)*	10,300	10,300	10,300	10,300
Landside area *(c)*	39,300	39,300	39,300	39,300
All-cargo (Other) *(d)*				
Aircraft apron *(a)*	79,400	15,000	15,000	15,000
Building warehouse *(b)*	18,700	1,000	1,200	1,400
Landside area *(c)*	27,500	1,000	1,200	1,400
All-cargo (FDX)				
Aircraft apron *(a)*	292,500	100,000	100,000	100,000
Building warehouse *(b)*	29,900	19,800	23,700	26,000
Landside area *(c)*	63,300	19,800	23,700	26,000
Total all-cargo				
Aircraft apron *(a)*	371,900	115,000	115,000	115,000
Building warehouse *(b)*	48,600	20,800	24,900	27,400
Landside area *(c)*	90,800	20,800	24,900	27,400
Total cargo area (acres) *(e)*	13.8	5.8	6.1	6.2

(a) Mainline aircraft assumed to require 50,000 square feet of apron and feeder aircraft, 15,000 square feet.
(b) A cargo warehouse building utilization of 1.5 square foot per ton was assumed.
(c) Landside area is considered to be approximately equivalent to building warehouse area required.
(d) Cargo carriers, other than Fedex, would be accommodated at "Other" all facilities.
(e) Total cargo area = apron + warehouse + landside areas with a 15% factor applied.

Source: LeighFisher, October 2010.

General Aviation

General aviation requirements are expressed in terms of the total land area and the location/site needs that will be required over the planning period. The following assumptions were developed to identify general aviation spatial requirements:

- For itinerant aircraft parking, fifty percent of the average day, peak month departures should be accommodate simultaneously.
- For based aircraft parking, hangar storage should be provided in accordance with the forecast of based aircraft.

General aviation facilities and future total land area requirements are summarized in Table 4-21. As presented, forecast demand does not necessitate an increase in total land area dedicated to general aviation beyond the existing 42 total acres; however, there is a need to provide additional hangars for the projected increase in the high-end general aviation turbojet fleet mix.

Table 4-21
GENERAL AVIATION REQUIREMENTS
Colorado Springs Airport

	Existing	PAL1	PAL2	PAL3
Demand (itinerant aircraft operations)				
Annual total	34,739	39,350	44,870	48,590
Peak month	3,821	4,329	4,936	5,345
Average day, peak month (ADPM)	123.27	139.63	159.22	172.42
ADPM departures	62	70	80	86
Facility requirements				
Itinerant aircraft apron requirement (sf)*(a)*	342,900	104,722	119,412	129,312
Based aircraft storage (sf)				
Tie-down *(b)*	237,300	130,000	137,000	140,000
T-hangar *(c)*	264,200	184,000	194,000	198,000
Corporate/community hangar *(d)*	200,300	306,000	426,000	514,000
Subtotal hangar space	464,500	490,000	620,000	712,000
Total aircraft storage space	701,800	620,000	757,000	852,000
GA terminal/administrative space (sf)*(e)*	17,000	24,500	31,000	35,600
Automobile parking (sf) *(f)*	171,000	147,000	186,000	213,600
Fuel storage (sf) *(g)*	59,000	11,700	12,800	13,500
Land (acres) *(h)*	42.3	20.8	25.4	28.6

Note: Blue shading highlights potential functional deficiencies.
(a) Assumed 3,000 square feet per aircraft and 50% of ADPM aircraft simultaneously at airport.
(b) Assumed 2,700 sf for single-engine, multi-engine and helicopters.
(c) Assumed 1,500 sf per single-engine aircraft; 2,500 sf for multi-engine aircraft.
(d) Assumed 2,500 sf per multi-engine aircraft, turboprops, and helicopters; 5,100 sf per jet engine aircraft.
(e) Terminal and administrative space estimated at 5% of the total hangar space.
(f) Automobile parking based on existing ratio between parking and hangar space, approximately 30%.
(g) Fuel storage estimated at 5% of total apron requirement (itinerant and storage).
(h) Total acreage estimated by adding apron space, buildings, parking, and fuel storage.

Source: LeighFisher, October 2010.

AVIATION SUPPORT FACILITIES

The following identifies the size, general configuration, and approximate location of land areas that should be reserved for aviation support functions, including aircraft rescue and fire fighting facilities (ARFF); Airport administration facilities; Airport maintenance; aircraft maintenance facilities; and glycol and deicing fluid storage; and fuel storage facilities.

Aircraft Rescue and Fire Fighting

The Airport is certificated by the FAA to serve certain air carrier operations, under 14 CFR Part 139, Certification of Airports. Part 139 requires airport operators comply with safety and emergency response requirements, including aircraft rescue and firefighting (ARFF) services. ARFF requirements are grouped into indexes and the type of ARFF services required for each index depends on the type of air carrier aircraft serving the airport. As the largest air carrier aircraft the Airport services is less 158 feet long, FAA requires the Airport to comply with Index C ARFF requirements. Based on the projected fleet mix and existing ARFF services provided, it is not expected that additional ARFF facilities or equipment will be required throughout the planning period. In addition, the ARFF stations currently are sited so that emergency response times meet FAA requirements.

Airport Administration

Airport management offices encompass a total of approximately 16,000 square feet, and are located among the three levels of the passenger terminal building. The Airport staff comprises approximately 120 employees. The administration space requirements are well understood, and the administrative space on the third level of the terminal building (approximately 10,000 square feet) is to be reconfigured and expanded to provide more efficient space in 2012. No additional space is needed over the planning period.

Airport Equipment and Maintenance

Airport maintenance equipment is housed on a ten-acre site with five buildings used for the storage and maintenance of airfield and airport maintenance equipment. Airport and airfield maintenance facilities needs do not necessarily increase proportionally to activity but are more a function of the overall pavement and grassy areas requiring maintenance and climatic conditions (for snow/ice removal). In addition, the condition of airside facilities dictates maintenance requirements, as pavements in poor condition require more maintenance equipment and personnel than do those in good condition.

The current facility is in good condition and adequately sized to accommodate the existing maintenance fleet; however, the facility is located on the southwest corner of the Airport immediately west of the Runway 35L end. Based on anecdotal information from Airport staff and an inventory of existing facilities, an additional maintenance facility may be warranted to house snow removal equipment (SRE) on the east side of the airport. The goal of constructing additional SRE is to achieve increased efficiency for snow removal operations that occur on the east side of the Airport. Due to its length and the fact that Runway 17L-35R is equipped with an ILS on both ends, it is most capable of handling aircraft during inclement weather. However, the existing SRE facility is located on the southwest side of the airport and results in time-consuming preparation and travel to the Airport's primary runway.

Aircraft Maintenance

Requirement for facilities that are leased by or directly support airline operations are typically established based on airline business decisions. Nevertheless, the following provides a general overview of future airline support requirements.

Skywest Airlines, a United Airlines regional/commuter affiliate, operates from a 100,000 square-foot maintenance facility located off Taxiway A. This facility is sized for the maintenance of multiple commuter and regional aircraft. To provide the potential for long-term airline maintenance requirements, a site of similar size should be reserved that would be capable of accommodating an aircraft maintenance facility for a new generation Boeing 737 or equivalent narrowbody aircraft. In addition, the former Western Pacific maintenance hangar (building number 24 on Figure 2-10 in Chapter 2) provides additional capacity for aircraft maintenance. The facility, currently leased to the Colorado jetCenter FBO, is approximately 23,000 square-feet with a 120 foot door span.

De-icing Fluid Storage and Processing

During the spring and summer months when deicing is typically not required, the runoff from the terminal apron is collected via the apron drainage system and discharged directly into the storm sewer system. During the winter months, deicing fluid is recovered by the apron drainage system surrounding the deicing areas and diverted from the storm sewer system to a glycol solution holding pond, located west of the passenger terminal area and east of the Runway 35L end. The holding pond has a capacity of 16 acre-feet. When the holding pond is approximately two-thirds full, the glycol solution is pumped to a pretreatment pond with a capacity of 4 acre-feet. This transfer is typically completed once per year. Once the glycol solution is treated in accordance with the wastewater discharge permit, the solution can be discharged into the sanitary sewer.

De-icing fluid is stored on the west ramp in four storage tanks and approximately 19 glycol totes with a total capacity of approximately 47,190 gallons (based on data from 2010). The deicing fluid consists of Propylene glycol Type I (mixture of water and glycol) and Propylene glycol Type IV (100% glycol). Over the last ten-years, the average number of glycol solution gallons used annually was approximately 75,000 gallons with a maximum of 114,000 gallons, which correspond to approximately 6% and 9% of the 4 acre-foot pretreatment pond. The peak usage would only require about 2% of the holding pond's capacity, and the holding pond could be emptied more than once a year, should circumstances require as much. Even if glycol solution usage doubled from its peak of 114,000 gallons to 228,000, only 17% of the capacity of the pretreatment pond would be required. Accordingly, no additional capacity is expected to be required throughout the planning period.

Airport Beacon

The Airport Rotating Beacon is planned to be relocated in the near future. Currently, it is mounted on top of Peterson Air Force Base Building 979. The existing beacon has reached the end of its useful life and does not meet current clearance requirements that are outlined

in the FAA Advisory Circular 150/5300-13A, *Airport Design*. Additionally, it is shadowed by multiple obstructions and is not visible from certain parts of the airfield and air in the vicinity of the Airport.

PAFB Building 979 has been designated as a Colorado State historical structure and cannot be modified to raise the elevation of the beacon, so the Airport must designate a new location. A site survey will be completed to determine a suitable location and the Airport will work with a selected contractor to develop specifications and plans to have a new beacon procured and installed.

Fuel Storage and Distribution

The following paragraphs describe the requirements for Airport fuel storage facilities. Fuel storage requirements are not addressed for the military, since the Air Force assumes responsibility for their own fueling. For the passenger airlines, fuel storage requirements are expressed both in terms of gross tank storage volume and land area required.

Passenger Terminal Fuel Farm

Jet fuel used by the airlines is stored in four 50,000-gallon tanks located directly east of the passenger terminal building. Requirements for fuel storage are based on historical analysis of fuel flowage and aircraft operations data from 2010, as well as the following planning guidelines and assumptions:

- In 2010, an average of 10,512 gallons of jet fuel per day was dispensed from the passenger terminal fuel farm for approximately 52 daily aircraft departures. On average, each departure uploaded 202 gallons of fuel.
- Historical aviation fuel reserves (in days' supply) were estimated by dividing the net usable storage capacity by the average daily fuel dispensed.[5] The net usable storage capacity was assumed to be 90% of the gross storage capacity of the tanks and equals 180,000 gallons. The farm typically had over 17 days' supply of reserve fuel during 2010.
- Future jet fuel requirements are estimated by applying average jet fuel dispensed per aircraft departure to the forecast average day peak month (ADPM) commercial operations forecast. As described in the Aviation Demand Forecasts chapter, APDM activity accounts for 9.5% of the annual total.
- At present, approximately 200,000 gallons of jet fuel are stored on a 0.5 acre site that includes areas for storage tanks and facilities to support the fueling operation.

[5] The number of days' worth of fuel stored on-site in reserve is an airline business decision and it is difficult to estimate which reserve period is most appropriate in determining fuel storage requirements. In addition, the number and configuration of the tanks provided are ultimately determined by the airlines based on operating considerations, such as the tank filling and fuel settling process, as well as the reserve supply desired.

This amounts to a planning factor of 0.104 square feet of land per gallon of storage, which is assumed to remain constant over the planning period. While conservative, this assumption ensures the sufficient area for ancillary facilities relating to fuel storage (load racks, truck parking, etc) is preserved.

Table 4-22 summarizes the gross volumetric storage and land area requirements for future fueling facilities. As shown, the existing fuel farm easily exceeds the demand throughout the planning period. At PAL 3, storage requirements range from approximately 112,000 gallons for a 7-day reserve supply to 160,000 gallons for a 10-day reserve supply, occupying land areas between approximately 0.27 and 0.38 acres. Given the size of the site and the amount of storage available, no fuel farm improvements are warranted over the planning period.

Table 4-22
PASSENGER TERMINAL FUEL FARM STORAGE REQUIREMENTS
Colorado Springs Airport

	Estimated requirement			
	Baseline	PAL 1	PAL 2	PAL 3
7-day reserve supply				
Storage requirement (gal)	74,000	83,000	103,000	112,000
Land are requirements (acres)	0.18	0.20	0.25	0.27
10-day reserve supply				
Storage requirement (gal)	105,000	119,000	148,000	160,000
Land are requirements (acres)	0.25	0.29	0.36	0.38

Notes: The number and configuration of fuel tanks are a business and operations decision, determined by the airlines or fuel farm operator.

Source: LeighFisher, February 2010.

General Aviation Fuel Farms

Cutter Aviation, Colorado jetCenter, and JHW each store and provide aviation fuels at their facilities. In addition to serving general aviation aircraft, Colorado jetCenter provides fuel to commercial and transient military aircraft. It is not expected that additional general aviation fuel storage capacity will be required during the planning period because:

- None of the three FBOs expressed concern regarding fuel storage capacities during discussions regarding future needs.
- Growth in operations by smaller general aviation aircraft that are fueled by AvGas is expected to be minimal as overall general aviation operations are expected to grow at 1.1% per year with much of the growth in the business general aviation aircraft fueled by Jet A fuel.

- The existing capacity for AvGas of 44,000 gallons is likely sufficient to accommodate the modest growth, as the peak month required approximately 22,000 gallons in 2009 and 16,000 gallons in 2010.

- Finally, the existing area dedicated to general aviation fuel storage is likely adequate to accommodate additional AvGas or Jet A tanks if the FBOs desired additional storage capacity.

Table 4-23 provides a summary of the estimated future demand and existing capacity of the general aviation fuel storage tanks.

Table 4-23
GENERAL AVIATION FUEL STORAGE
Colorado Springs Airport

	Average day, peak month demand *(a)*	Cutter Aviation	Colorado jetCenter	JHW	Total
Jet A					
Number of tanks	-	1	4	2	7
Tank capacities (gallons)	-	12,000	50,000	10,000/12,000	-
Total storage capacity	15,203	12,000	200,000	22,000	234,000
AvGas					
Number of tanks	-	1	1	1	3
Tank capacities (gallons)	-	12,000	20,000	12,000	-
Total storage capacity	719	12,000	20,000	12,000	44,000

Source: Colorado Springs Airport records.

SUMMARY

In summary, most Airport facilities currently have sufficient capacity to accommodate forecast activity levels throughout the planning period. However, a number of facilities will need to be modified or expanded throughout the planning period to accommodate future activity, improve Airport operational capabilities or levels of service, or meet key design standards. Notable requirements over the course of the forecast period include:

- **Airfield –** The existing airfield facilities provide sufficient capacity to accommodate baseline forecast aircraft operations through PAL 3. Existing air traffic control facilities at the Airport are sufficient to effectively support airfield and airspace operations at the Airport through the end of the planning period. The intersection of Runway 17R-35L and Runway 13-31 should also be addressed from a geometrical perspective because the unique layout could lead to potential runway incursions. In addition, an extension to Runway 17R-35L should be considered to better serve the Airport when Runway 17L-35R is unavailable. Analyses of weather data for the

Airport indicate a need to enhance the instrument landing systems to Category II/III capability.

- **Passenger terminal –** The existing passenger terminal footprint is adequate to serve the projected needs of the Airport throughout the planning period. Future requirements project the need for targeted improvements to specific functional elements such as the passenger screening facilities.

- **Ground transportation –** The public parking lot may need to be expanded as PAL2 is realized. In addition, the rental car ready/return lot may need expansion at or around PAL3. Other ground transportation facilities appear to be adequate throughout the planning period.

- **Air cargo –** No cargo expansion is likely to be required for the duration of the planning period. However, to ensure that additional carriers can be accommodated should market demand prove necessary, additional cargo space should be reserved on the Airport.

- **General aviation –** Forecast general aviation demand will not necessitate an increase in total land area dedicated to general aviation, although additional hangar capacity may be needed to accommodate growth in demand, as early as PAL 1. In addition, general aviation administrative space and automobile parking may need to be expanded sequentially at PAL1 and PAL2, respectively.

- **Aviation support –** Aviation support facilities appear to be capable of accommodating PAL 3 demand with only minor improvements over the planning period, as necessary.

In summary, the Airport is in excellent condition to accommodate PAL 3 demand with selected improvements to be made throughout the planning period.

Chapter 5
ALTERNATIVES
Colorado Springs Airport

Various development alternatives were identified and evaluated in the Master Plan to meet the projected facility requirements identified in Chapter 4. The alternatives evaluation covered the following major areas:

- **Airfield facilities –** including deconflicting Runway End 13 from Runway End 17R and the associated changes in runway length and taxiway layout.
- **Passenger terminal facilities –** specifically passenger loading bridges, docking and aircraft compatibility at each of the twelve active gates at the Airport.
- **Ground transportation facilities –** additional space for public parking should be identified to accommodate future demand for public parking, especially during peak periods.
- **General aviation, air cargo and airport support facilities –** additional space should be set aside for expanded and/or new facilities to accommodate demand as the need arises.

Detailed descriptions of the alternatives considered and supporting analyses are provided in the following sections.

AIRFIELD ALTERNATIVES

The facility requirements analysis indicates that the airfield provides sufficient capacity to accommodate the baseline forecast aircraft operations through PAL3. However, the requirements analysis further indicated that the Runway 17R-35L intersection with Runway 13-31 should be addressed from a geometrical perspective. Accordingly, the alternatives effort identified a number of alternatives as described in the following sections.

Airfield Goals and Objectives

At the outset of the master plan, the airport administration identified the following goal, related to the airfield: plan for a safe, operationally efficient airfield that meets FAA standards. Accordingly, the master plan team identified several objectives associated with that goal to provide: (1) insight into the formulation of alternatives and (2) evaluation criteria to screen alternatives and identify the alternative best able to meet the goal.

The objectives are as follows:

- Reduce the risk of wrong runway departures;
- Address airfield hot spots as identified on FAA Airport Diagram;

- Reduce the number of runway crossings to the extent practical;
  - Eliminate the movement in which aircraft taxi on Runway 17R-35L between the military and general aviation ramps;
  - Seek to minimize runway crossings for primary aircraft movements on the airfield (e.g. between the primary runway and terminal area);
- Improve operational capability of the airfield;
  - Maintain or improve operational capability of Runway 17R-35L, i.e. reduce takeoff weight limitations that sometimes occur when the primary Runway 17L-35R is unavailable;
  - Maintain the primary function of Runway 13-31, which is accommodation of arrivals during high-crosswind conditions;
- Improve taxiway geometry to prevent potential confusion.

The objective regarding wrong runway departures was a priority of the Airport management given the proximity of the Runway 17R and Runway 13 ends. In 2007, the Federal Aviation Administration's Aviation Safety Information Analysis and Sharing center conducted a review of event reports that involved airplanes departing from or taxiing into position on a wrong runway. The review involved gathering data from multiple databases; identifying event reports of interest; reviewing those reports to find contributing factors; and identifying, assigning, and scoring mitigations. The review showed that wrong runway events occurred at many airports and under varying circumstances. The report identified two factors contributing to potential wrong runway departures at the Airport:

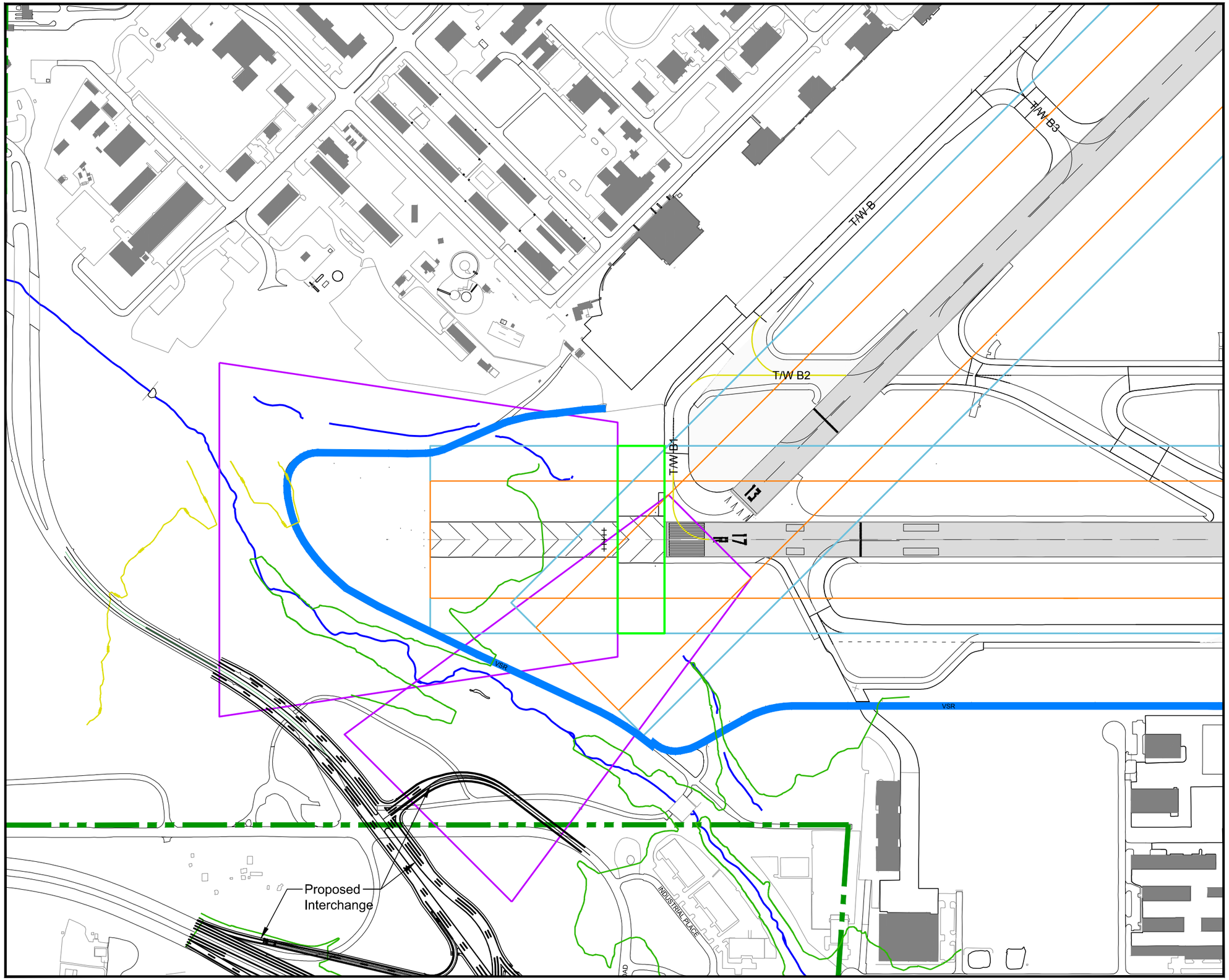
- One taxiway to multiple runways (Taxiways B1, A1)
- Close proximity of multiple departure runway ends (Runway 17R, Runway 13)

Figure 5-1 shows the existing condition at the northwest corner of the airfield including Runways 17R and 13, as well as Taxiways A1 and B1 that serve the runway ends.

FAA *Advisory Circular 150/5300-13A, Airport Design,* paragraph 304e, regarding non-intersecting runways states*:*

> *Runway separation must take into account the fill dimensional requirements of the safety areas of the runway and taxiway systems on the airport. If possible, safety areas should not overlap, since work in the overlapping area would affect both runways. In addition, operations on one runway may violate the critical area of a NAVAID on the other runway. This condition should exist only at existing constrained airports where non-overlapping safety areas are impracticable. Configurations where runway thresholds are close together should be avoided, as they can be confusing to pilots, resulting in wrong-runway takeoffs. If the RSA of one runway overlaps onto the full strength pavement of a second runway or taxiway, the chance of runway/taxiway incursion incident is increased. The angle between the extended runway centerlines should not be less than 30 degrees. This configuration will minimize the possibility of confusing marking and lighting schemes being used to identify the limits of the safety area that overlaps onto runway or taxiway pavement.*

Given this guidance, the master plan team identified several alternatives that would deconflict Runways 17R and 13. Several alternatives were identified to address the risk of wrong runway departures, while meeting the other objectives. However, none of the alternatives, as is typically the case, provides a perfect solution. A description of the alternatives and their evaluation follows.



LEGEND

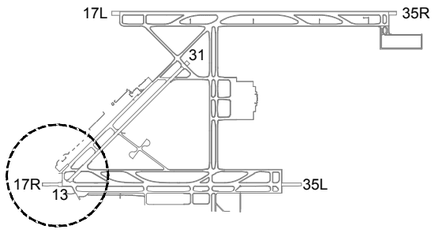
- Pavement to be demolished
- Proposed pavement
- Existing runway
- Vehicle service road
- Airport property line
- Runway / taxiway centerline
- Localizer (relocated)

FAA Airport Design Standards

- Runway Safety Area (RSA)
- Runway Object Free Area (ROFA)
- Departure Runway Protection Zone
- Approach Runway Protection Zone
- Precision Obstacle Free Zone (POFZ)

Source: Airport Layout Drawing - Jacobs Engineering, April 2011

KEY PLAN



NORTH

0 200' 400' 800'

Figure 5-1
Runway Ends 13 and 17R
Existing Condition

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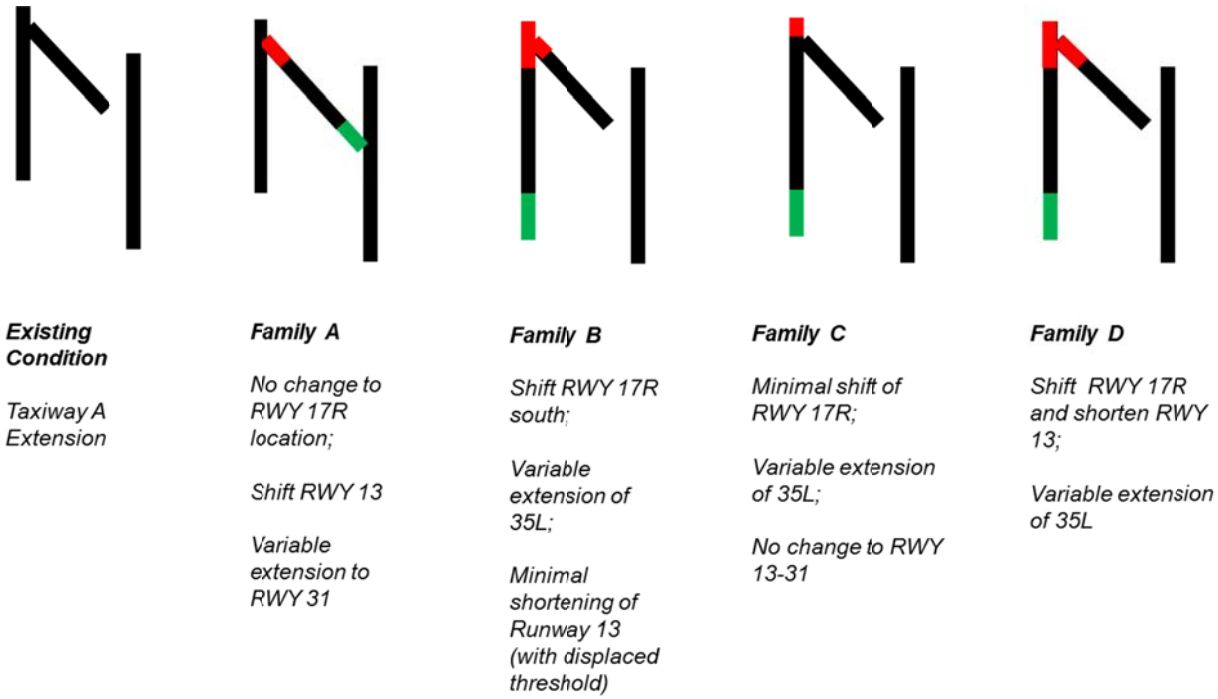
Initial Alternatives

Generally, the airfield alternatives involved various combinations of shifting Runway 17R-35L to the south and/or shortening Runway 13-31. Figure 5-2 presents a generalized decpiction of each family of alternatives.

Figure 5-2
ALTERNATIVE FAMILIES



Black = existing runway; Green = runway extension; Red = runway pavement removal.

Source: LeighFisher, May 2013.

Family A. Alternatives within Family A involved changes primarily to Runway 13-31. Shifting the runway to the southeast, shortening the runway on the northwest end, and extending it on the southwest end all were considered. The commonality among the derivations of Family A is a 910 foot shift in the Runway 13 threshold to the southeast; the 910 foot shift was the amount that the runway could be shifted and still be served by Taxiway C. The northwest corner of the Airport for a typical Family A alternative is depicted in Figure 5-3.

Family B. Alternatives within Family B involved changes primarily to Runway 17R-35L. Shifting the runway to the south approximately 1,500 feet was considered. The commonality among the derivations of Family B is a 1,500 foot shift in the Runway 17R threshold to the south; the 1,500 foot shift was the amount necessary that Runway 13 pavement would be clear of the Runway 17R Runway Safety Area (RSA). The northwest corner of the Airport for a typical Family B alternative is depicted in Figure 5-4.

Family C. Alternatives within Family C involved changes primarily to Runway 17R-35L. The commonality among the derivations of Family C is a 620 foot shift in the Runway 17R threshold to the south; the 620 foot shift was the amount necessary such that each runway would be served by their own taxiway connector. In the existing condition, Taxiways A1 and B1 serve both runways. The northwest corner of the Airport for a typical Family C alternative is depicted in Figure 5-5.

Family D. Alternatives within Family D involved changes to both Runway 17R-35L and Runway 13-31. Essentially, Family D alternatives combined Family B and C, involving both the 1,500 foot shift in Runway 17R and the 910 foot shift in Runway 13. The northwest corner of the Airport for a typical Family D alternative is depicted in Figure 5-6.

The two extensions considered for Runway 35L are shown in Figures 5-7 and 5-8; Figure 5-7 depicts a 1,800 foot extension and Figure 5-8 a 2,500 foot extension. As shown in Figure 5-8, the 2,500 foot extension involves a displaced threshold of approximately 775 feet for Runway 35L, such that the approach RPZ for Runway 35L arrivals is clear and the departure RPZ for Runway 17R departures is clear.

The two extensions considered for Runway 31 are shown in Figures 5-9 and 5-10; Figure 5-9 depicts a 440 foot extension and Figure 5-10 a 910 foot extension. As shown in Figure 5-9, the 440 foot extension involves a displaced threshold of approximately 796 feet for Runway 31 to maintain the current Runway 31 threshold in its current location. Likewise, Figure 5-10 shows the 910 foot extension involves a displaced threshold of approximately 1,266 feet for Runway 31.

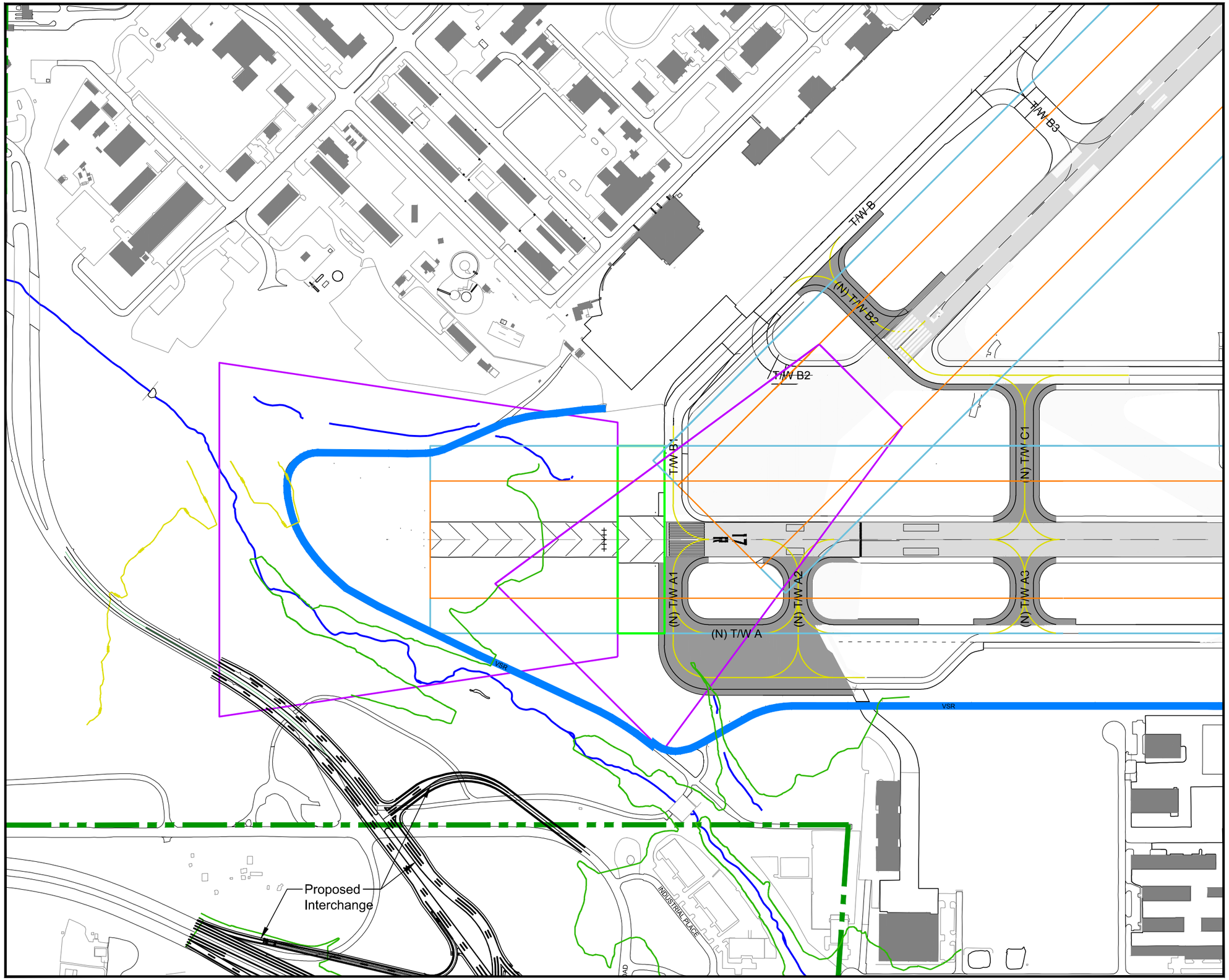
Because the alternatives primarily involve various runway shifts and extensions, they may be summarized in terms of the change in length to the runways in question as shown in Table 5-1.

Table 5-1
CHARACTERISTICS OF INITIAL ALTERNATIVES

	Increase / (decrease) in runway length			
Alternative	**17R**	**35L**	**13**	**31**
Existing	-	-	-	-
A1	-	-	(910)	-
A2	-	1,800	(910)	-
A3	-	2,500	(910)	-
A4	-	-	(910)	440
A5	-	1,800	(910)	440
A6	-	2,500	(910)	440
A7	-	-	(910)	910
A8	-	1,800	(910)	910
A9	-	2,500	(910)	910
B1	(1,500)	-	(220)	-
B2	(1,500)	1,200	(220)	-
B3	(1,500)	1,800	(220)	-
B4	(1,500)	2,500	(220)	-
C1	(620)	-	-	-
C2	(620)	1,800	-	-
C3	(620)	2,500	-	-
D1	(1,500)	-	(910)	-
D2	(1,500)	1,200	(910)	-
D3	(1,500)	1,800	(910)	-
D4	(1,500)	2,500	(910)	-

Note: Reductions in runway field length are shown in parentheses.

Source: LeighFisher, December 2012.



LEGEND

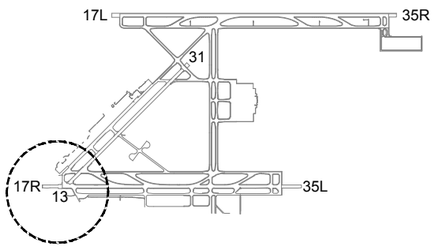
- Pavement to be demolished
- Proposed pavement
- Existing runway
- Vehicle service road
- Airport property line
- Runway / taxiway centerline
- Localizer (relocated)

FAA Airport Design Standards

- Runway Safety Area (RSA)
- Runway Object Free Area (ROFA)
- Departure Runway Protection Zone
- Approach Runway Protection Zone
- Precision Obstacle Free Zone (POFZ)

Source: Airport Layout Drawing - Jacobs Engineering, April 2011

KEY PLAN



NORTH

0 200' 400' 800'

Figure 5-3
Alternative A
Runway 13 - Shorten 910 Feet

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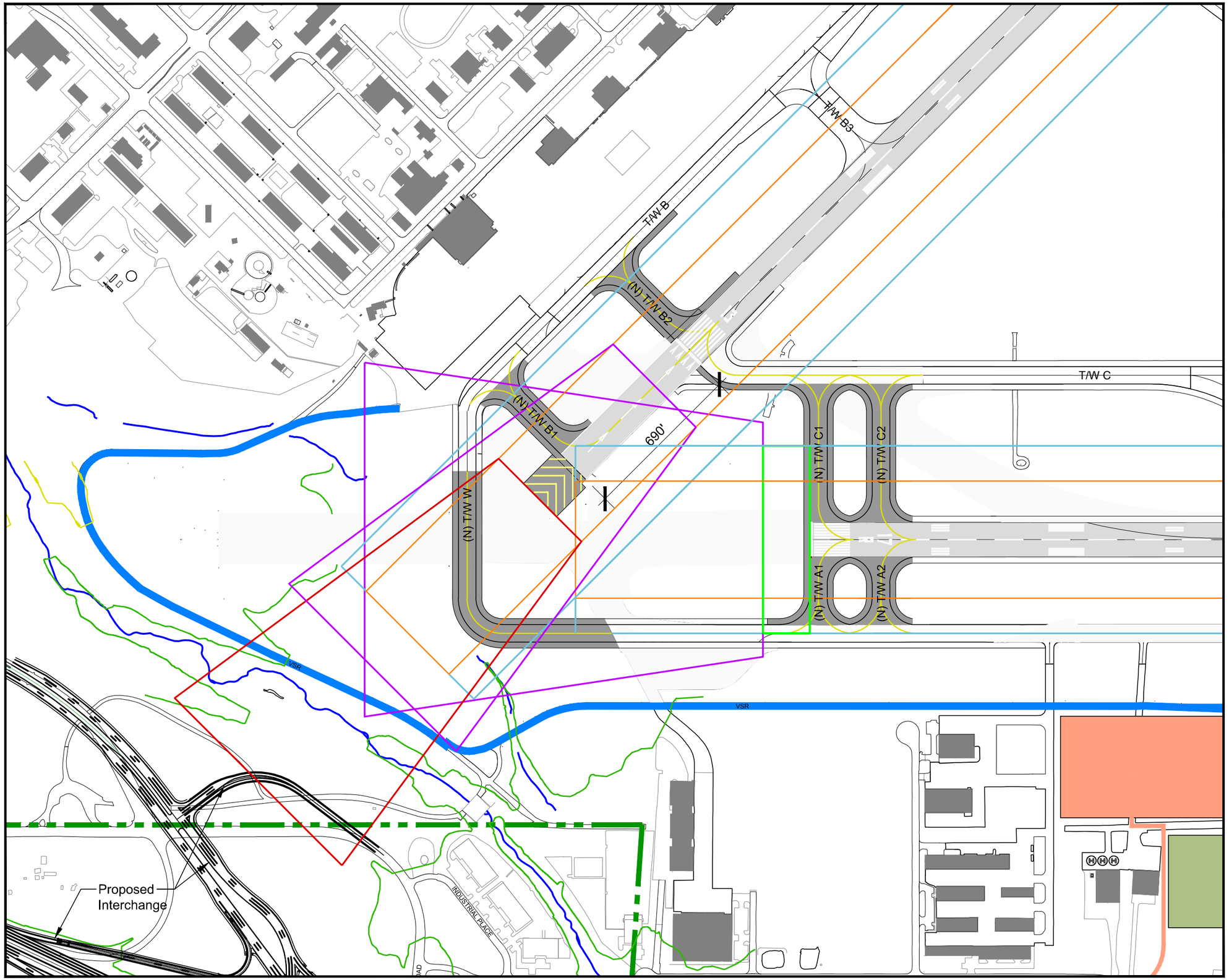


LEGEND

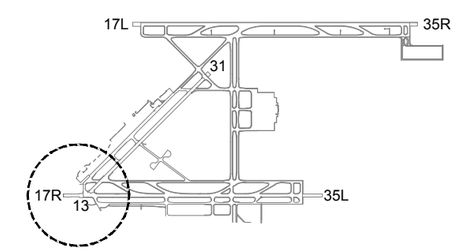
- Pavement to be demolished
- Proposed pavement
- Existing runway
- Vehicle service road
- Airport property line
- Runway / taxiway centerline
- Localizer (relocated)

FAA Airport Design Standards

- Runway Safety Area (RSA)
- Runway Object Free Area (ROFA)
- Departure Runway Protection Zone
- Approach Runway Protection Zone
- Precision Obstacle Free Zone (POFZ)

Source: Airport Layout Drawing - Jacobs Engineering, April 2011

KEY PLAN



NORTH

0 200' 400' 800'

Figure 5-4
Alternative B
Runway 13 - Shorten 220 Feet
Runway 17R - Shorten 1,500 Feet
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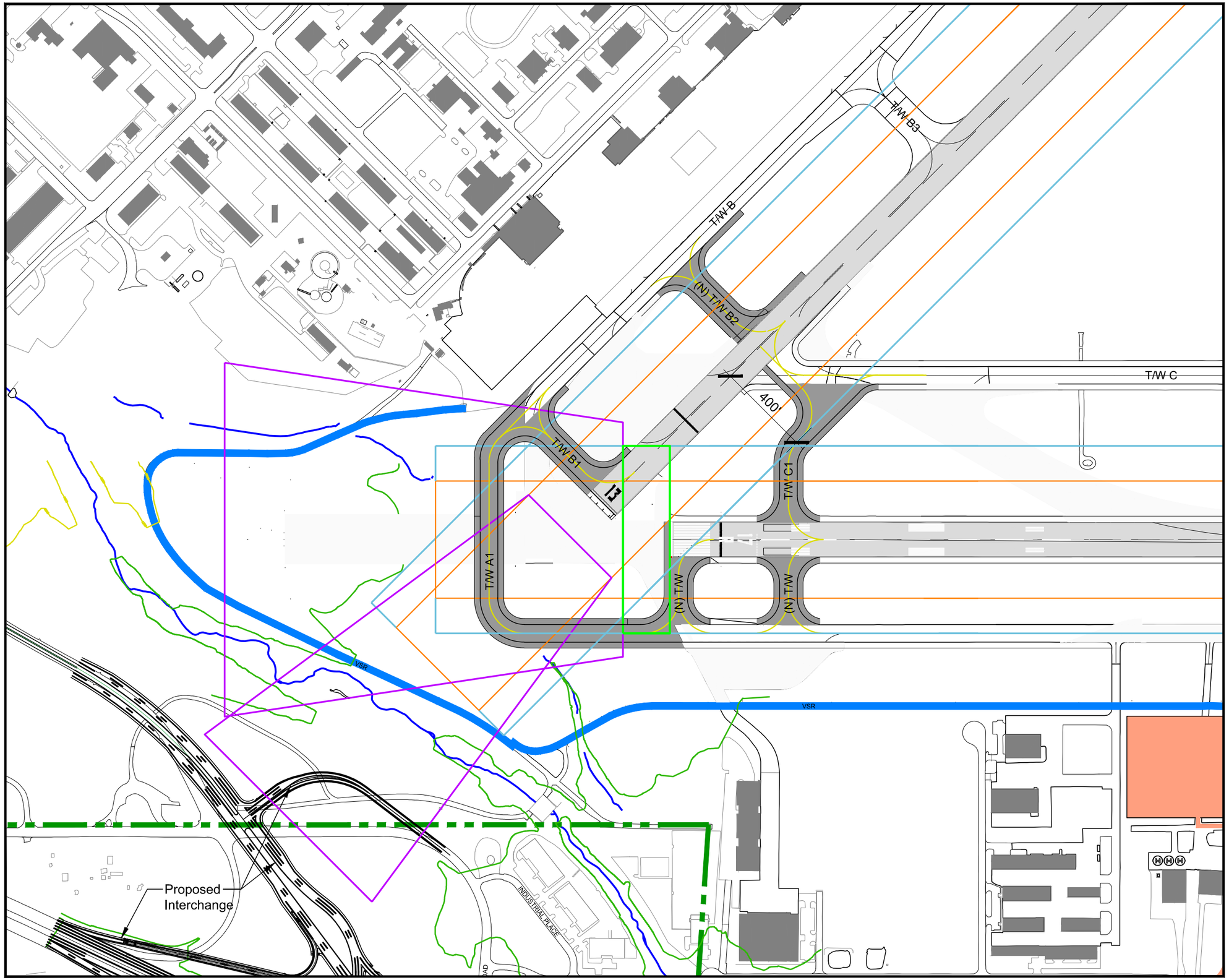


LEGEND

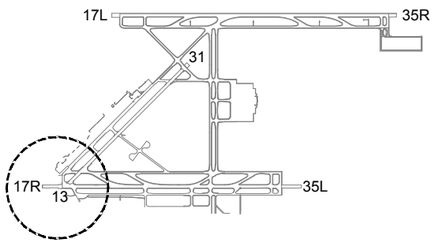
- Pavement to be demolished
- Proposed pavement
- Existing runway
- Vehicle service road
- Airport property line
- Runway / taxiway centerline
- Localizer (relocated)

FAA Airport Design Standards

- Runway Safety Area (RSA)
- Runway Object Free Area (ROFA)
- Departure Runway Protection Zone
- Approach Runway Protection Zone
- Precision Obstacle Free Zone (POFZ)

Source: Airport Layout Drawing - Jacobs Engineering, April 2011

KEY PLAN



NORTH

0 200' 400' 800'

Figure 5-5
Alternative C
Runway 17R - Shorten 620 Feet

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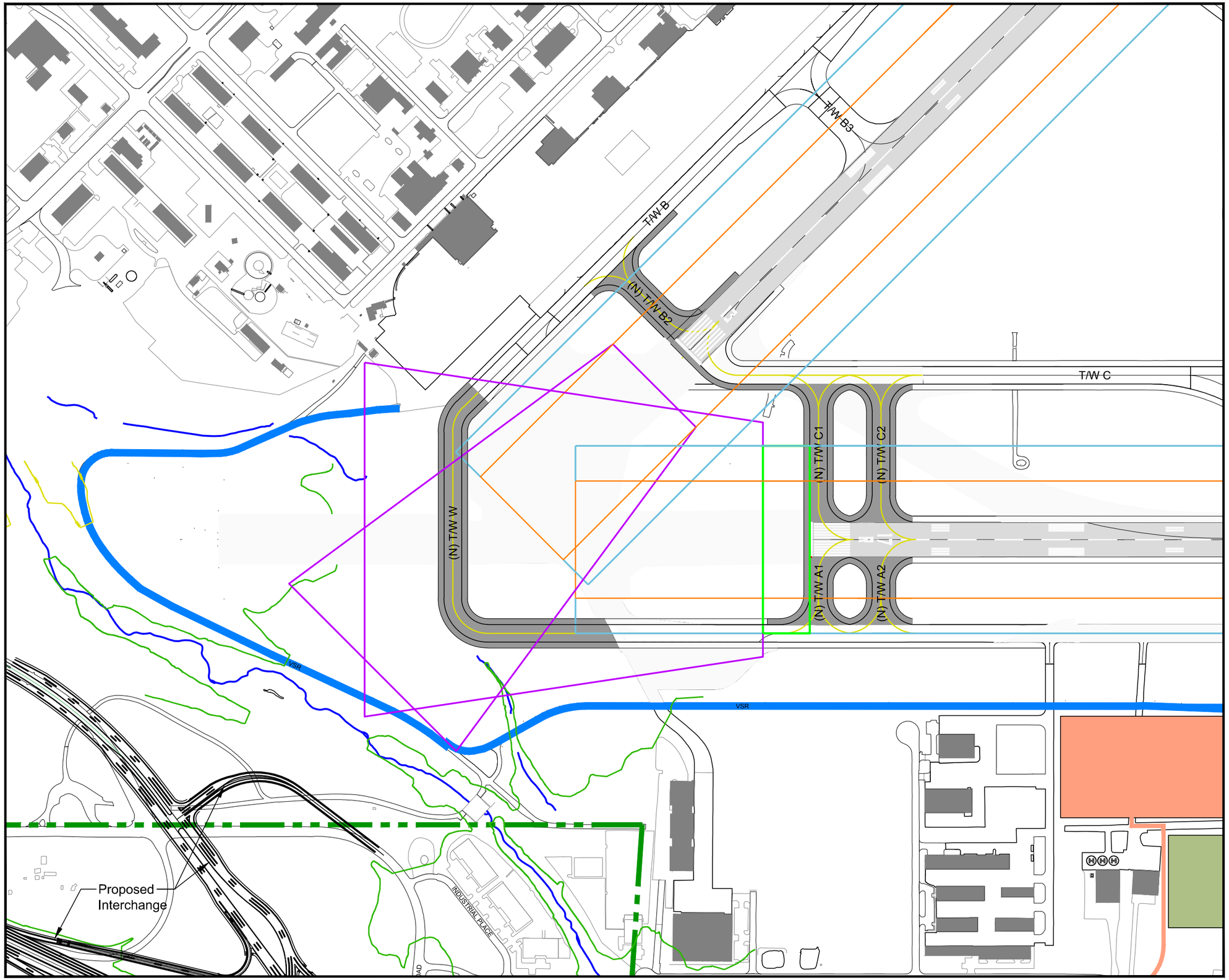


LEGEND

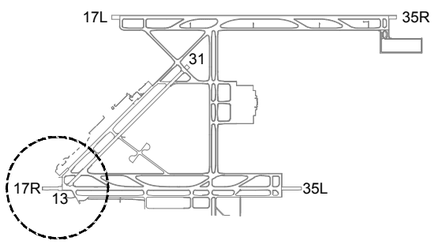
- Pavement to be demolished
- Proposed pavement
- Existing runway
- Vehicle service road
- Airport property line
- Runway / taxiway centerline
- Localizer (relocated)

FAA Airport Design Standards

- Runway Safety Area (RSA)
- Runway Object Free Area (ROFA)
- Departure Runway Protection Zone
- Approach Runway Protection Zone
- Precision Obstacle Free Zone (POFZ)

Source: Airport Layout Drawing - Jacobs Engineering, April 2011

KEY PLAN



NORTH

0 200' 400' 800'

Figure 5-6
Alternative D
Runway 13 - Shorten 910 Feet
Runway 17R - Shorten 1,500 Feet
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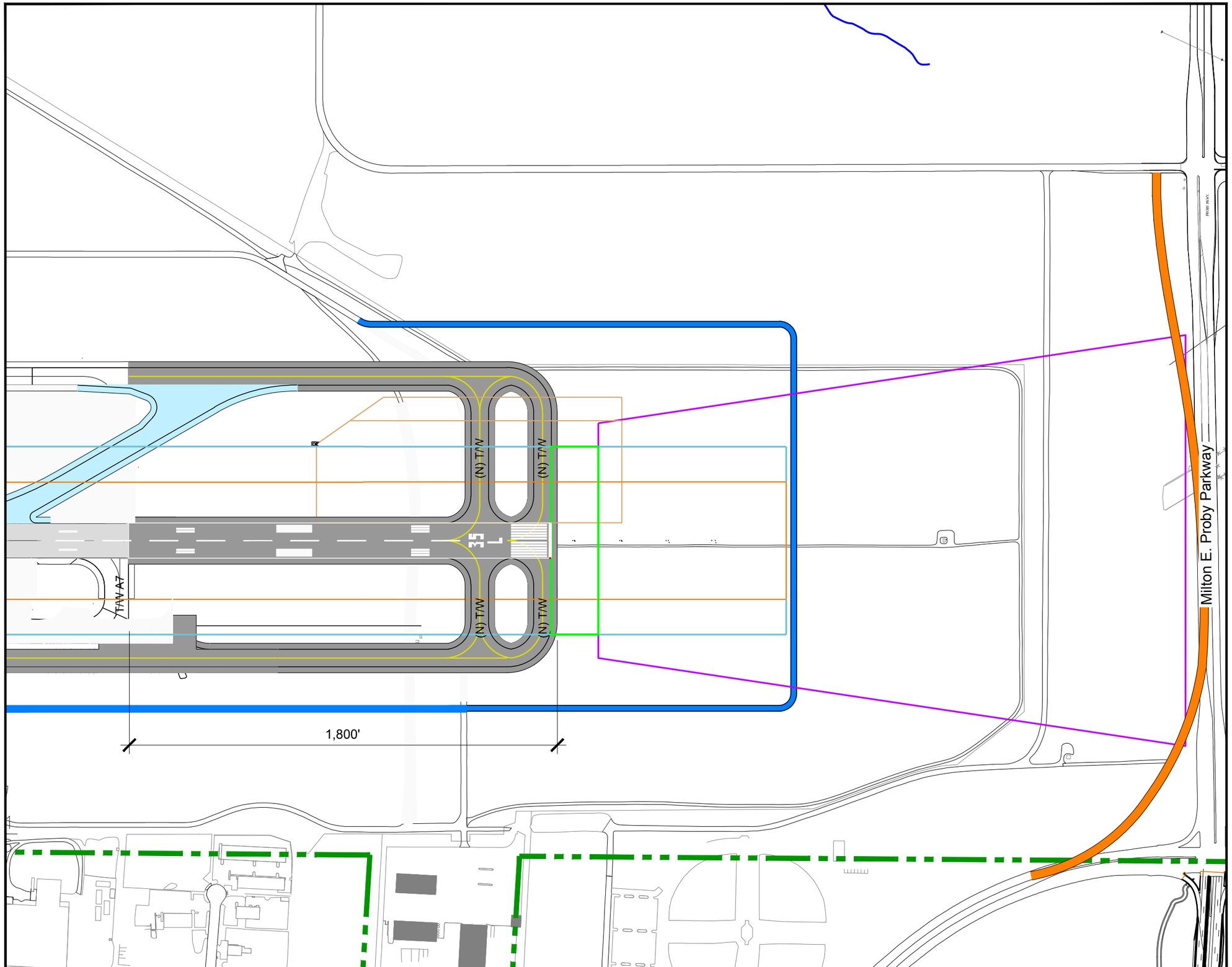


LEGEND

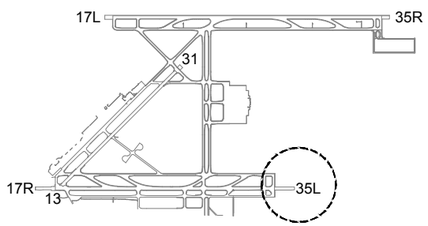
- Pavement to be demolished
- Proposed pavement
- Existing runway
- Vehicle service road
- Airport property line
- Runway / taxiway centerline
- Localizer (relocated)

FAA Airport Design Standards

- Runway Safety Area (RSA)
- Runway Object Free Area (ROFA)
- Departure Runway Protection Zone
- Approach Runway Protection Zone
- Precision Obstacle Free Zone (POFZ)

Source: Airport Layout Drawing - Jacobs Engineering, April 2011

KEY PLAN



NORTH

0 200' 400' 800'

Figure 5-7

Runway 35L - Extend 1,800 Feet

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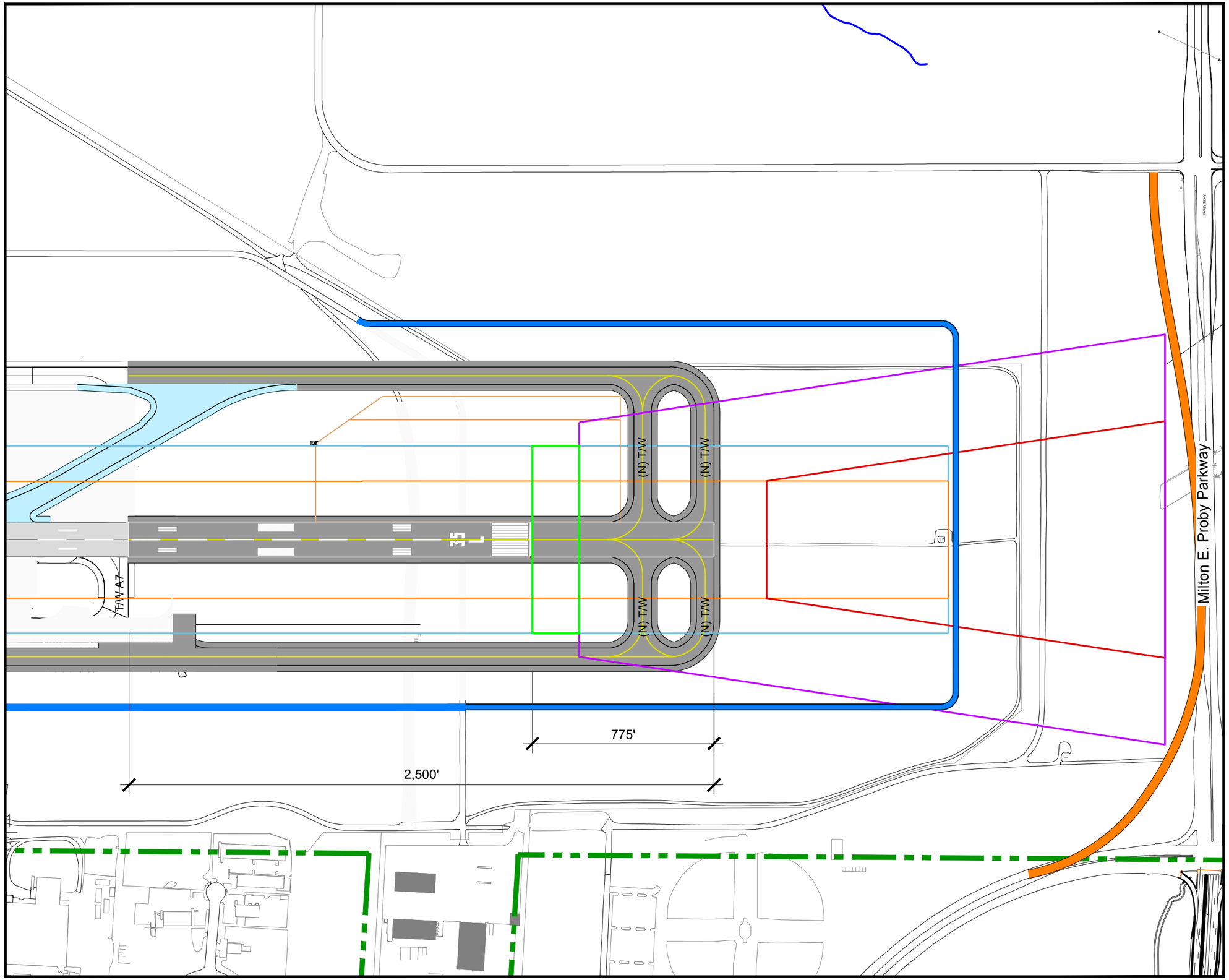


LEGEND

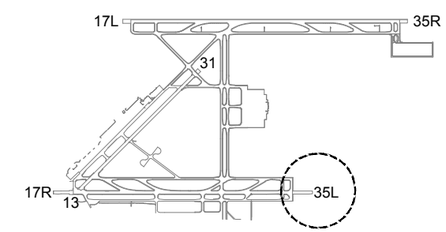
- Pavement to be demolished
- Proposed pavement
- Existing runway
- Vehicle service road
- Airport property line
- Runway / taxiway centerline
- Localizer (relocated)

FAA Airport Design Standards

- Runway Safety Area (RSA)
- Runway Object Free Area (ROFA)
- Departure Runway Protection Zone
- Approach Runway Protection Zone
- Precision Obstacle Free Zone (POFZ)

Source: Airport Layout Drawing - Jacobs Engineering, April 2011

KEY PLAN



NORTH

0 200' 400' 800'

Figure 5-8

Runway 35L - Extend 2,500 Feet

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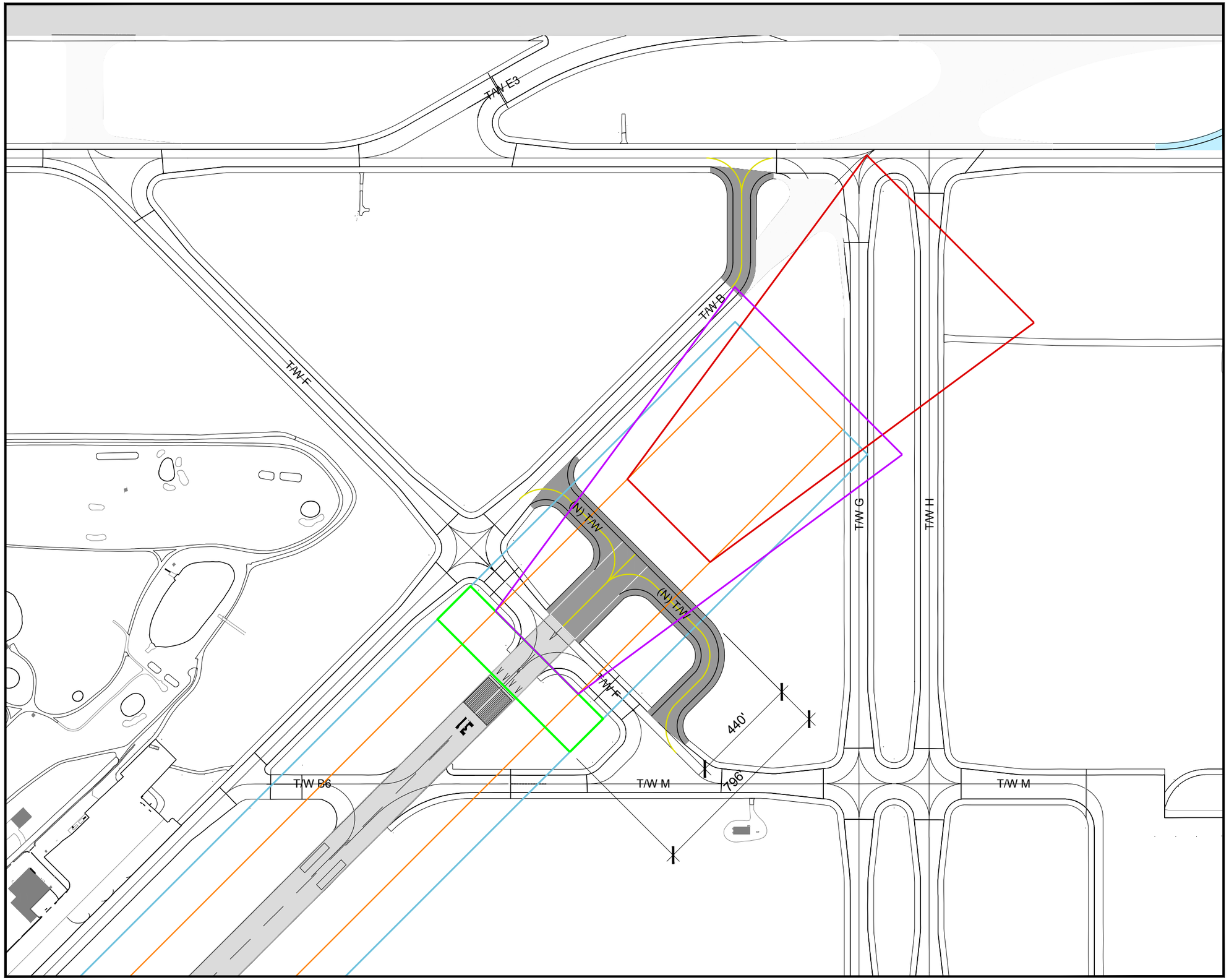


LEGEND

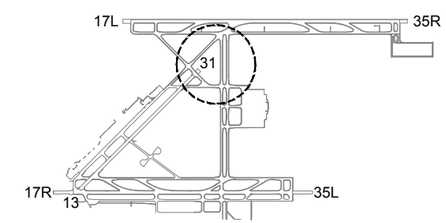
- Pavement to be demolished
- Proposed pavement
- Existing runway
- Vehicle service road
- Airport property line
- Runway / taxiway centerline
- Localizer (relocated)

FAA Airport Design Standards

- Runway Safety Area (RSA)
- Runway Object Free Area (ROFA)
- Departure Runway Protection Zone
- Approach Runway Protection Zone
- Precision Obstacle Free Zone (POFZ)

Source: Airport Layout Drawing - Jacobs Engineering, April 2011

KEY PLAN



NORTH

0 200' 400' 800'

Figure 5-9

Runway 31 - Extend 440 Feet

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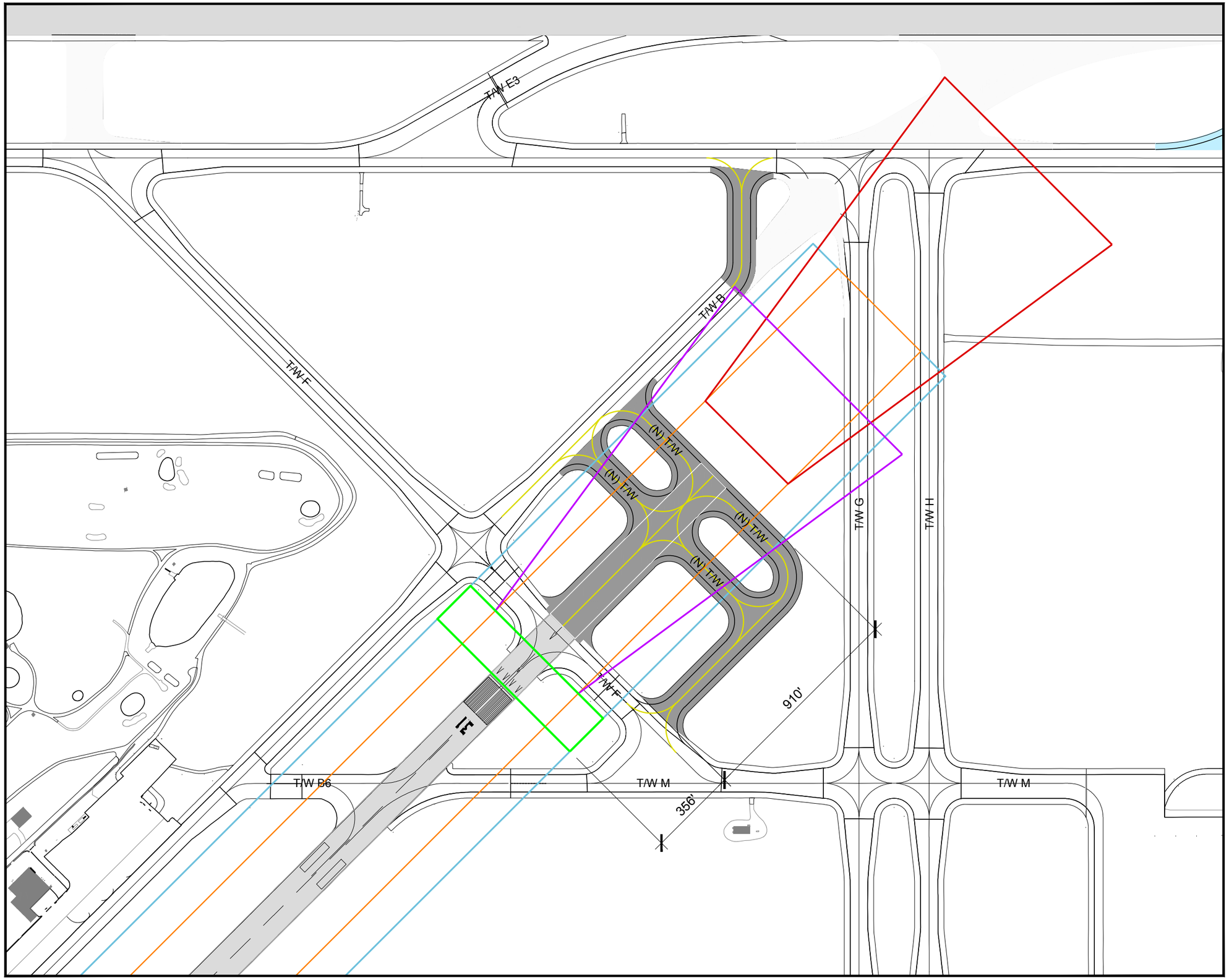


LEGEND

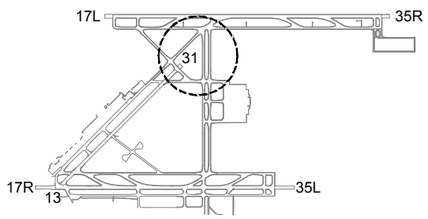
- Pavement to be demolished
- Proposed pavement
- Existing runway
- Vehicle service road
- Airport property line
- Runway / taxiway centerline
- Localizer (relocated)

FAA Airport Design Standards

- Runway Safety Area (RSA)
- Runway Object Free Area (ROFA)
- Departure Runway Protection Zone
- Approach Runway Protection Zone
- Precision Obstacle Free Zone (POFZ)

Source: Airport Layout Drawing - Jacobs Engineering, April 2011

KEY PLAN



NORTH

0 200' 400' 800'

Figure 5-10

Runway 31 - Extend 910 Feet

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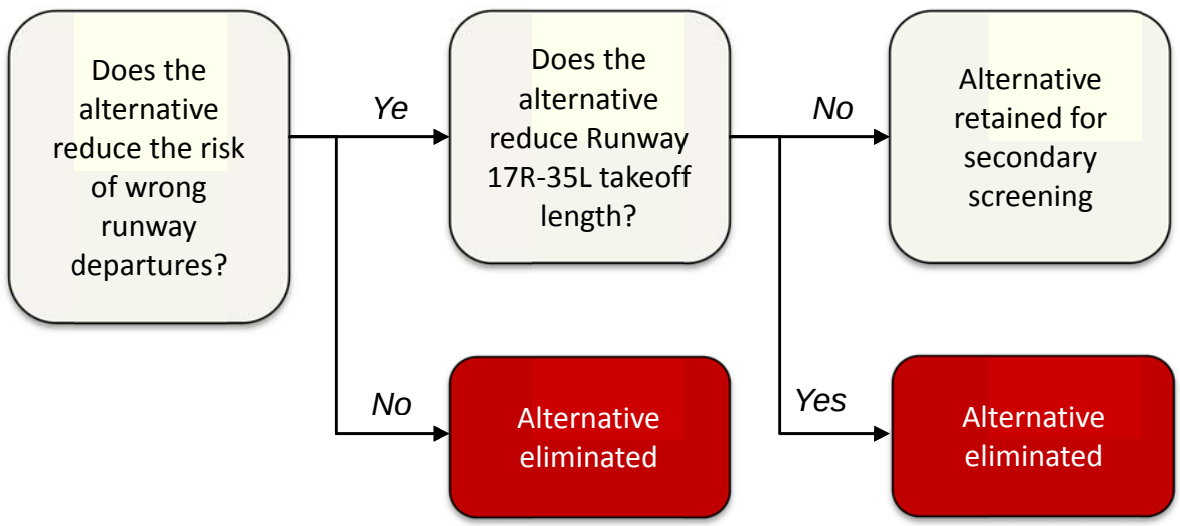
Primary Screening of Airfield Alternatives

After formulation of the initial alternatives, the alternatives were screened against criteria developed to address the aforementioned goal and objectives for the airfield. The screening process involved two stages — primary screening and secondary screening; the primary screening process is shown in Figure 5-11. If an alternative failed either of the two primary screening criteria, it was eliminated from further consideration. Accordingly, the existing condition was removed from consideration as it would not reduce the risk of wrong runway departures, and no alternatives were formulated by definition that would not reduce the risk of wrong runway departures. In addition, derivative Alternatives B1, B2, C1, D1, and D2 were eliminated as they reduced the takeoff field length of Runway 17L-35R. The remaining alternatives were carried forward and evaluated in secondary screening.

Figure 5-11
PRIMARY SCREENING PROCESS



Tables 5-2 and 5-3 show how each alternative compares to the other with regard to the field length of runway provided for landings and takeoffs, respectively. In Tables 5-2 and 5-3, green highlighted cells indicate an increase in field length relative to the existing condition, whereas orange and red indicate decreases in field length, with red being the greatest reduction. Cells with no color indicate that the field length provided by the alternative is equivalent to the existing condition.

Table 5-2
INITIAL ALTERNATIVES LANDING DISTANCE AVAILABLE

	Increase / (decrease) in runway length				Landing distance available (LDA)			
Alternative	**17R**	**35L**	**13**	**31**	**17R**	**35L**	**13**	**31**
Existing	-	-	-	-	11,022	11,022	8,269	7,913
A1	-	-	(910)	-	11,022	11,022	7,359	7,003
A2	-	1,800	(910)	-	12,822	12,822	7,359	7,003
A3	-	2,500	(910)	-	13,522	12,822	7,359	7,003
A4	-	-	(910)	440	11,022	11,022	7,799	7,003
A5	-	1,800	(910)	440	12,822	12,822	7,799	7,003
A6	-	2,500	(910)	440	13,522	12,822	7,799	7,003
A7	-	-	(910)	910	11,022	11,022	8,269	7,003
A8	-	1,800	(910)	910	12,822	12,822	8,269	7,003
A9	-	2,500	(910)	910	13,522	12,822	8,269	7,003
B1	(1,500)	-	(220)	-	9,522	9,522	7,359	7,693
B2	(1,500)	1,200	(220)	-	10,722	10,722	7,359	7,693
B3	(1,500)	1,800	(220)	-	11,322	11,322	7,359	7,693
B4	(1,500)	2,500	(220)	-	12,022	11,322	7,359	7,693
C1	(620)	-	-	-	10,402	10,402	8,269	7,913
C2	(620)	1,800	-	-	12,202	12,202	8,269	7,913
C3	(620)	2,500	-	-	12,902	12,202	8,269	7,913
D1	(1,500)	-	(910)	-	9,522	9,522	7,359	7,003
D2	(1,500)	1,200	(910)	-	10,722	10,722	7,359	7,003
D3	(1,500)	1,800	(910)	-	11,322	11,322	7,359	7,003
D4	(1,500)	2,500	(910)	-	12,022	11,322	7,359	7,003

Note: Reductions in runway field length are shown in parentheses.
Source: LeighFisher, December 2012.

Table 5-3
INITIAL ALTERNATIVES TAKEOFF DISTANCE AVAILABLE

	Increase / (decrease) in runway length				Takeoff distance available (TORA, TODA, ASDA)			
Alternative	**17R**	**35L**	**13**	**31**	**17R**	**35L**	**13**	**31**
Existing	-	-	-	-	11,022	11,022	8,269	8,269
A1	-	-	(910)	-	11,022	11,022	7,359	7,359
A2	-	1,800	(910)	-	12,822	12,822	7,359	7,359
A3	-	2,500	(910)	-	13,522	13,522	7,359	7,359
A4	-	-	(910)	440	11,022	11,022	7,799	7,799
A5	-	1,800	(910)	440	12,822	12,822	7,799	7,799
A6	-	2,500	(910)	440	13,522	13,522	7,799	7,799
A7	-	-	(910)	910	11,022	11,022	8,269	8,269
A8	-	1,800	(910)	910	12,822	12,822	8,269	8,269
A9	-	2,500	(910)	910	13,522	13,522	8,269	8,269
B1	(1,500)	-	(220)	-	9,522	9,522	8,049	8,049
B2	(1,500)	1,200	(220)	-	10,722	10,722	8,049	8,049
B3	(1,500)	1,800	(220)	-	11,322	11,322	8,049	8,049
B4	(1,500)	2,500	(220)	-	12,022	12,022	8,049	8,049
C1	(620)	-	-	-	10,402	10,402	8,269	8,269
C2	(620)	1,800	-	-	12,202	12,202	8,269	8,269
C3	(620)	2,500	-	-	12,902	12,902	8,269	8,269
D1	(1,500)	-	(910)	-	9,522	9,522	7,359	7,359
D2	(1,500)	1,200	(910)	-	10,722	10,722	7,359	7,359
D3	(1,500)	1,800	(910)	-	11,322	11,322	7,359	7,359
D4	(1,500)	2,500	(910)	-	12,022	12,022	7,359	7,359

Note: Reductions in runway field length are shown in parentheses.
Source: LeighFisher, December 2012.

Secondary Screening of Airfield Alternatives

After primary screening, the alternatives were evaluated against secondary screening criteria. This stage of screening allows for a relative comparison of the alternatives to each other. Secondary screening evaluated: (1) the various field length provided by the runway alternatives; (2) the number of runway crossings required for typical aircraft movements on the airfield; (3) RSA and runway protection zone (RPZ) clearance; (4) runway operational dependencies; and (5) operational restrictions to existing taxiways. The secondary screening matrix is shown in Table 5-4.

Secondary screening indicated that Alternative Families A and C should be eliminated from further consideration, and conversely Alternative Families B and D should be refined and subject to further refinement, with the most promising alternative derivations being B3 and B4 and D3 and D4.

Family A was eliminated primarily because of the runway crossing and dependency ranking, as well as the fact that the RSAs were not clear of runway pavements. In addition, extensions to Runway 31 were eliminated from consideration, as the operational benefit of increased departure length for Runway 31 was outweighed by the operational restrictions imposed on Taxiways G and H (especially given the crosswind's primary function as an arrival runway). Likewise, Family C was eliminated because of the runway crossing and dependency ranking, as well as the fact that the RSAs were not clear of runway pavements.

Table 5-4
SECONDARY SCREENING MATRIX

Alternative	Runway crossing ranking (1=best)	Runways clear of RSAs	Increases Runway 17R-35L TORA	Reduces Runway 31 LDA	Reduces Runway 13 LDA	Reduces Runway 13 TORA	Reduces Runway 31 TORA	Runway dependency ranking (1=best)	Runway 13 RPZ clear of public roadways	Runway 35L RPZ clear of public roadways	Introduces new operational restrictions to taxiways
Existing	Eliminated as a result of primary screening.										
A1	3	N	N	Y	Y	Y	Y	3	Y	Y	N
A2	3	N	Y	Y	Y	Y	Y	3	Y	Y	N
A3	3	N	Y	Y	Y	Y	Y	3	Y	Y	N
A4	3	N	N	Y	Y	Y	Y	3	Y	Y	Y
A5	3	N	Y	Y	Y	Y	Y	3	Y	Y	Y
A6	3	N	Y	Y	Y	Y	Y	3	Y	Y	Y
A7	3	N	N	Y	N	N	N	3	Y	Y	Y
A8	3	N	Y	Y	N	N	N	3	Y	Y	Y
A9	3	N	Y	Y	N	N	N	3	Y	Y	Y
B1	Eliminated as a result of primary screening.										
B2	Eliminated as a result of primary screening.										
B3	1	Y	Y	Y	Y	Y	Y	2	N	Y	N
B4	1	Y	Y	Y	Y	Y	Y	2	N	Y	N
C1	Eliminated as a result of primary screening.										
C2	2	N	Y	N	N	N	N	4	N	Y	N
C3	2	N	Y	N	N	N	N	4	N	Y	N
D1	Eliminated as a result of primary screening.										
D2	Eliminated as a result of primary screening.										
D3	1	Y	Y	Y	Y	Y	Y	1	Y	Y	N
D4	1	Y	Y	Y	Y	Y	Y	1	Y	Y	N

Source: LeighFisher, December 2012.

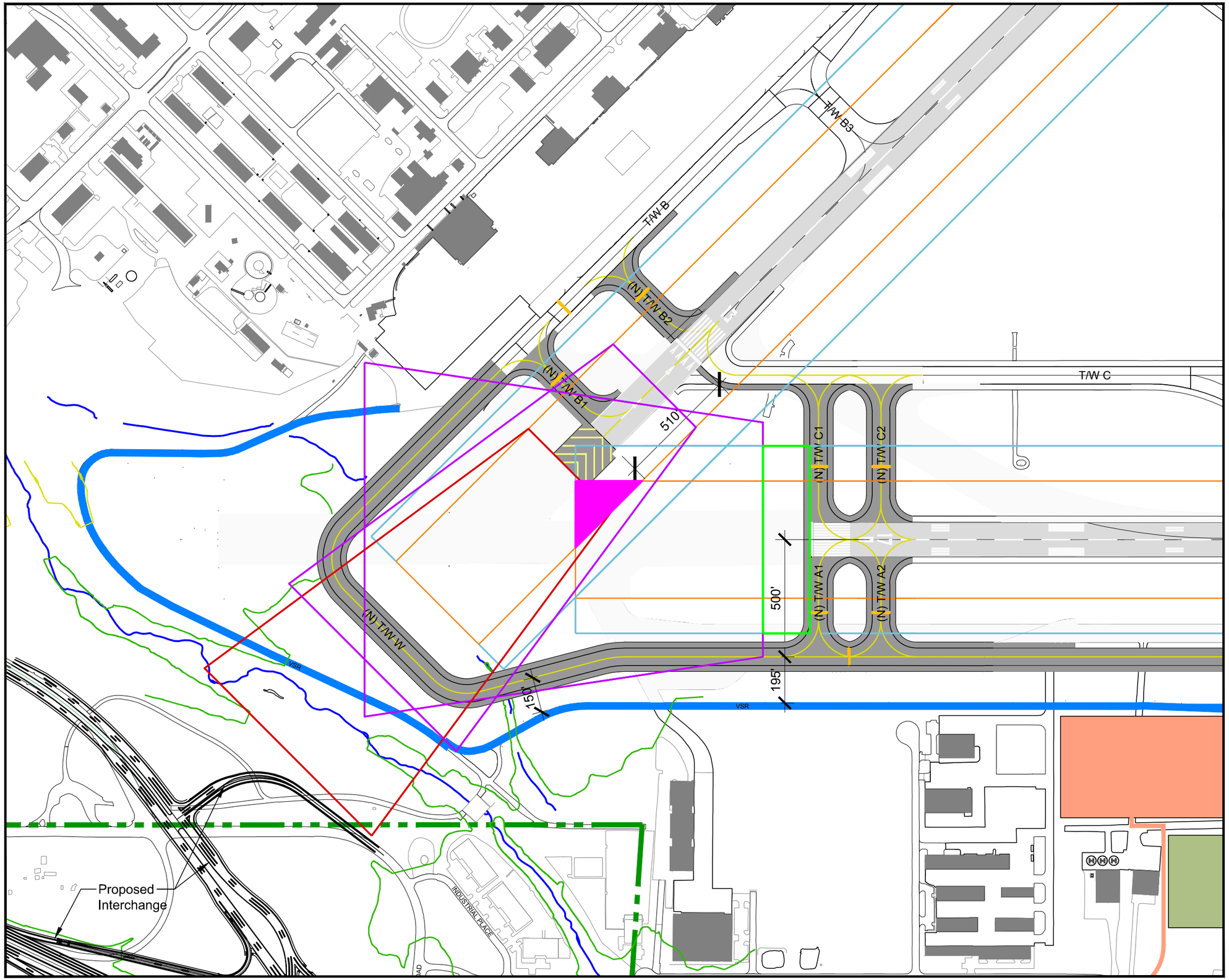
Refined Alternatives

After consultation with representatives from the FAA, including representatives from Air Traffic Control (ATC), the Denver Airports District Office (ADO), and Runway Safety Action Team (RSAT), two primary refinements were made to the most promising Family B and D alternatives as described below.

First, because Family B and D both involved a significant shift of Runway 17R to the south, the alternatives were refined to provide as long of an extension to the Runway 35L end as practical. The longer the extension the better the alternative would preserve the operational capability of Runway 17R-35L in keeping with the objectives. Accordingly, the refined alternatives included the 2,500 foot extension to Runway 35L as shown in Figure 5-8. Effectively, this refinement eliminated Alternatives B3 and D3, leaving Alternatives B4 and D4 as the only remaining alternatives.

In addition, there were two further refinements to Alternative B. First, Taxiway W was realigned such that it did not fall within the Runway 13 RSA. Second, the length of the displaced threshold was reduced from 690 feet to 510 feet, in effect shortening Runway 13 by an additional 180 feet for a total of 400 feet. This second change was made to clear the departure RPZ of Runway 31 of Industrial Drive in both its existing and proposed alignment.

The refined alternatives designated as Alternative B5 and Alternative D5 are shown on Figures 5-12 and 5-13, respectively.



LEGEND

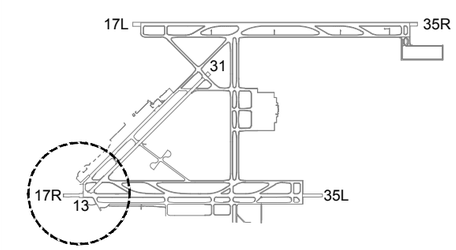
- Pavement to be demolished
- Proposed pavement
- Existing runway
- Vehicle service road
- Airport property line
- Runway / taxiway centerline
- Localizer (relocated)

FAA Airport Design Standards

- Runway Safety Area (RSA)
- Runway Object Free Area (ROFA)
- Departure Runway Protection Zone
- Approach Runway Protection Zone
- Precision Obstacle Free Zone (POFZ)

Source: Airport Layout Drawing - Jacobs Engineering, April 2011

KEY PLAN



NORTH

0 200' 400' 800'

Figure 5-12
Alternative B5
Runway 13 - Shorten 400 Feet
Runway 17R - Shorten 1,500 Feet
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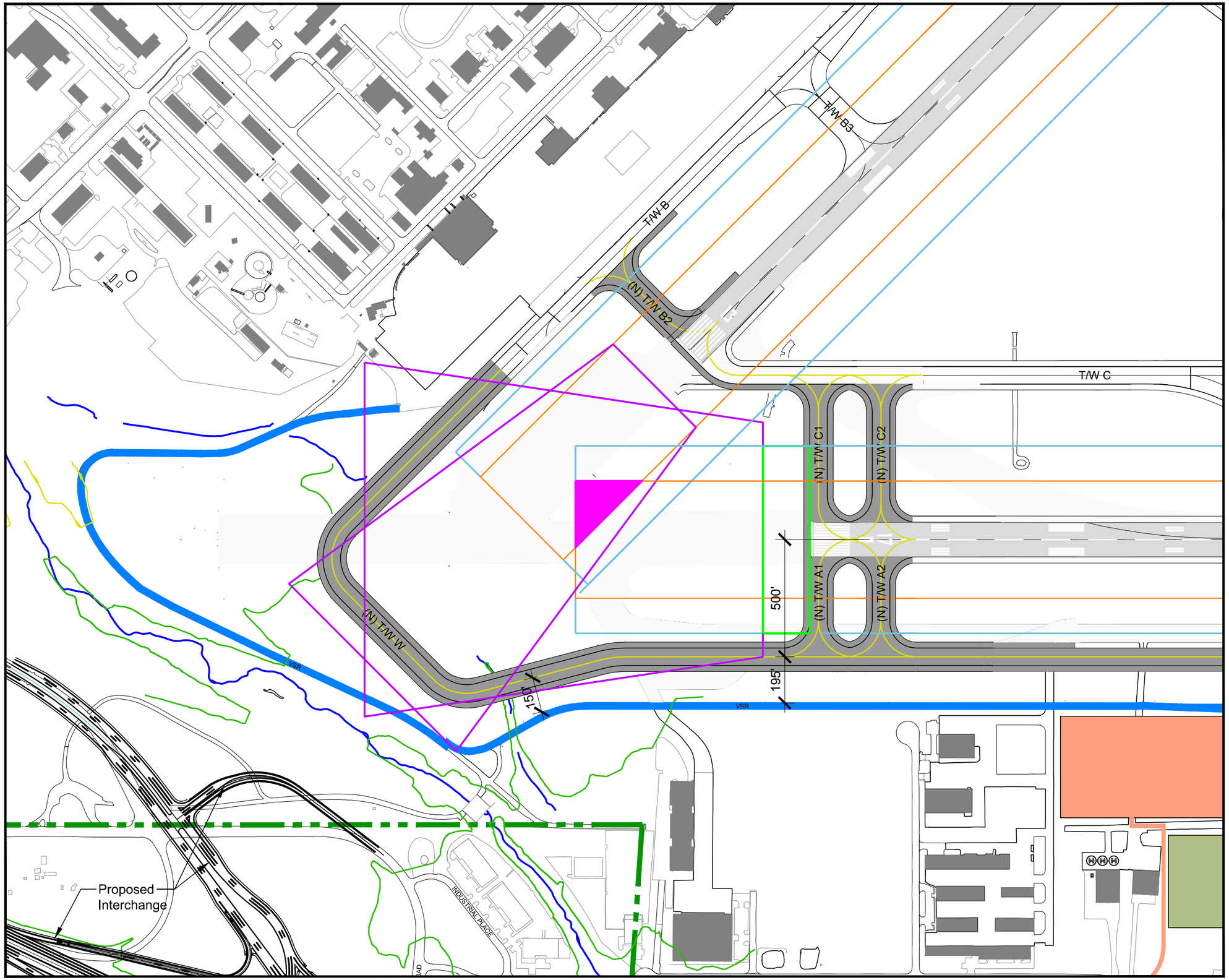

LEGEND

- Pavement to be demolished
- Proposed pavement
- Existing runway
- Vehicle service road
- Airport property line
- Runway / taxiway centerline
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FAA Airport Design Standards

- Runway Safety Area (RSA)
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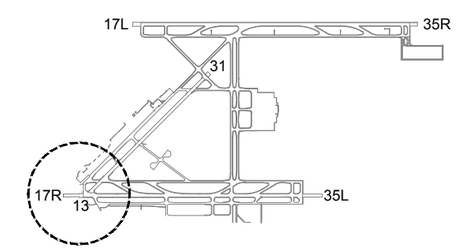
- Precision Obstacle Free Zone (POFZ)

Source: Airport Layout Drawing - Jacobs Engineering, April 2011

KEY PLAN



NORTH

0 200' 400' 800'

Figure 5-13
Alternative D5
Runway 13 - Shorten 910 Feet
Runway 17R - Shorten 1,500 Feet
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Runway field length. Table 5-5 highlights the primary difference between Alternatives B5 and D5, which is the LDA for Runway 31. Alternative B5 provides 7,513 feet of landing distance for Runway 31 arrivals which is 500 feet more than Alternative D5. Because of this material difference, Alternative B5 was carried forward for further refinement as a finalist alternative. Note the data shown in Table 5-5 assumes the 2,500 foot extension to Runway 35Lwith a displaced threshold of 775 feet and no extension to Runway 31.

Table 5-5
TAKEOFF AND LANDING DISTANCE AVAILABLE FOR REFINED ALTERNATIVES

	Field length			
Alternative	**17R**	**35L**	**13**	**31**
Takeoff run available				
Existing	11,022	11,022	8,269	8,269
Alternative B5	12,022	12,022	7,869	7,869
Net increase (decrease)	1,000	1,000	(400)	(400)
Alternative D5	12,022	12,022	7,359	7,359
Net increase (decrease)	1,000	1,000	(910)	(910)
Landing distance available				
Existing	11,022	11,022	8,269	7,913
Alternative B5	12,022	11,247	7,359	**7,513**
Net increase (decrease)	1,000	225	(910)	(400)
Alternative D5	12,022	11,247	7,359	**7,003**
Net increase (decrease)	1,000	225	(910)	(910)

Source: LeighFisher, December 2012.

Finalist Alternatives

After further consultation with FAA regarding the Alternative B5, further refinement was made with respect to the location of the Runway 17R end and Taxiway W, which resulted in the development of two finalist alternatives, designated as B6 and B7. All three Alternatives B5, B6, and B7 were considered finalist alternatives and evaluated against one another to determine the recommended airfield alternative.

Alternative B6. Runway 17R was shifted south by an additional 290 feet, for a total of 1,790 feet such that the RSAs for Runway 17R and 13 would not overlap. The RSA overlap that would occur in the case of Alternative B5 is shown as a pink triangle on Figure 5-12. The additional 290 feet of shift involves a *net decrease* of 65 feet in the landing distance available (LDA) for Runway 35L as shown in Table 5-6 on the following page. Because Alternative B5 involves a 1,500 foot shift, the LDA for Runway 35L would result in a *net increase* of 225 feet. Alternative B6 is shown on Figure 5-14.

Alternative B7. Alternative B7, shown in Figure 5-15, is identical to Alternative B6 with one exception: Taxiway W would not be constructed under this alternative. With the implementation of Alternative B7, aircraft destined for the general aviation ramp traveling from Peterson Air Force Base would have to cross two runways: Runway 13 and Runway 17R, in both locations at the runway arrival threshold. The rationale regarding the removal of Taxiway W from the alternative follows.

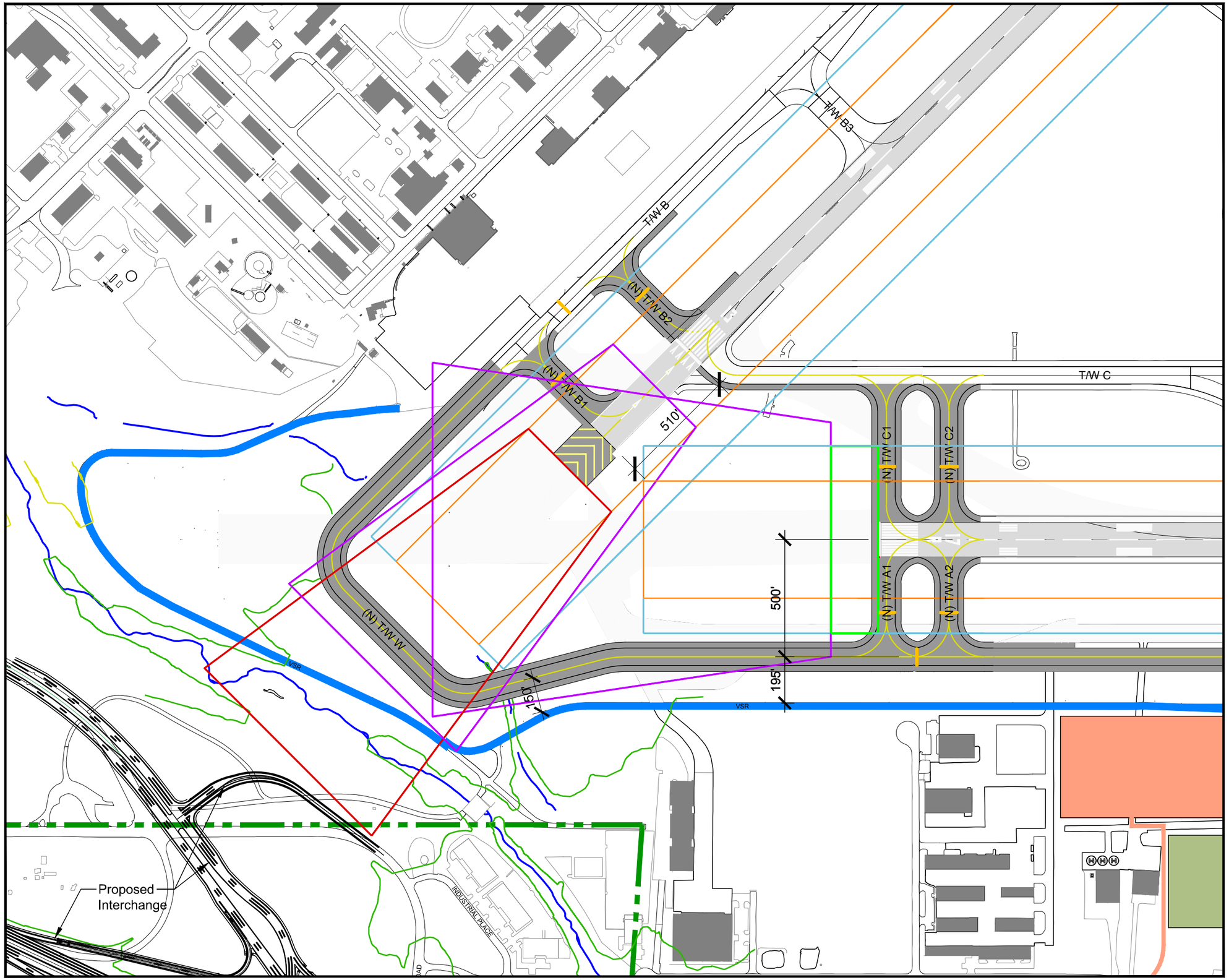
Taxiway W is not intended to be a fully independent, "end-around taxiway," as defined in FAA *Advisory Circular 150/5300-13A, Airport Design,* paragraph 415. Rather, Taxiway W would be provided to permit aircraft to taxi between the general aviation and military aprons on the airfield and vice versa. In the current configuration, shown in Figure 5-1, aircraft traveling from Peterson Air Force Base destined for the general aviation areas along Taxiway A, must taxi from Taxiway B on to Runway 17R, down Runway 17R for approximately 300 feet, onto Taxiway A.

In both Alternatives B5 and B6, aircraft may taxi from Taxiway B onto Taxiway W to Taxiway A with "virtual" crossings of Runway 13-31 and 17R-35L. This movement would require operational restrictions such that there are no aircraft on Taxiway W during arrival operations to Runways 13 or Runway 17R and departures on Runway 31 and Runway 35L. Aircraft would need clearance from the Airport Traffic Control Tower (ATCT) before taxiing beyond aircraft hold lines onto Taxiway W.

Table 5-6
TAKEOFF AND LANDING DISTANCE AVAILABLE FOR FINALIST ALTERNATIVES

	Field length			
Alternative	**17R**	**35L**	**13**	**31**
Takeoff run available				
Existing	11,022	11,022	8,269	8,269
Alternative B5	12,022	12,022	7,869	7,869
Net increase (decrease)	1,000	1,000	(400)	(400)
Alternative B6	11,732	11,732	7,869	7,869
Net increase (decrease)	710	710	(400)	(400)
Alternative B7	11,732	11,732	7,869	7,869
Net increase (decrease)	710	710	(400)	(400)
Landing distance available				
Existing	11,022	11,022	8,269	7,913
Alternative B5	12,022	**11,247**	7,359	7,513
Net increase (decrease)	1,000	225	(910)	(400)
Alternative B6	11,732	**10,957**	7,359	7,513
Net increase (decrease)	710	(65)	(910)	(400)
Alternative B7	11,732	**10,957**	7,359	7,513
Net increase (decrease)	710	(65)	(910)	(400)

Source: LeighFisher, December 2012.



LEGEND

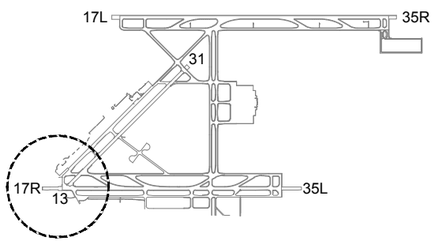
- Pavement to be demolished
- Proposed pavement
- Existing runway
- Vehicle service road
- Airport property line
- Runway / taxiway centerline
- Localizer (relocated)

FAA Airport Design Standards

- Runway Safety Area (RSA)
- Runway Object Free Area (ROFA)
- Departure Runway Protection Zone
- Approach Runway Protection Zone
- Precision Obstacle Free Zone (POFZ)

Source: Airport Layout Drawing - Jacobs Engineering, April 2011

KEY PLAN



NORTH

0 200' 400' 800'

Figure 5-14
Alternative B6
Runway 13 - Shorten 400 Feet
Runway 17R - Shorten 1,790 Feet
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Colorado Springs Airport
May 2013

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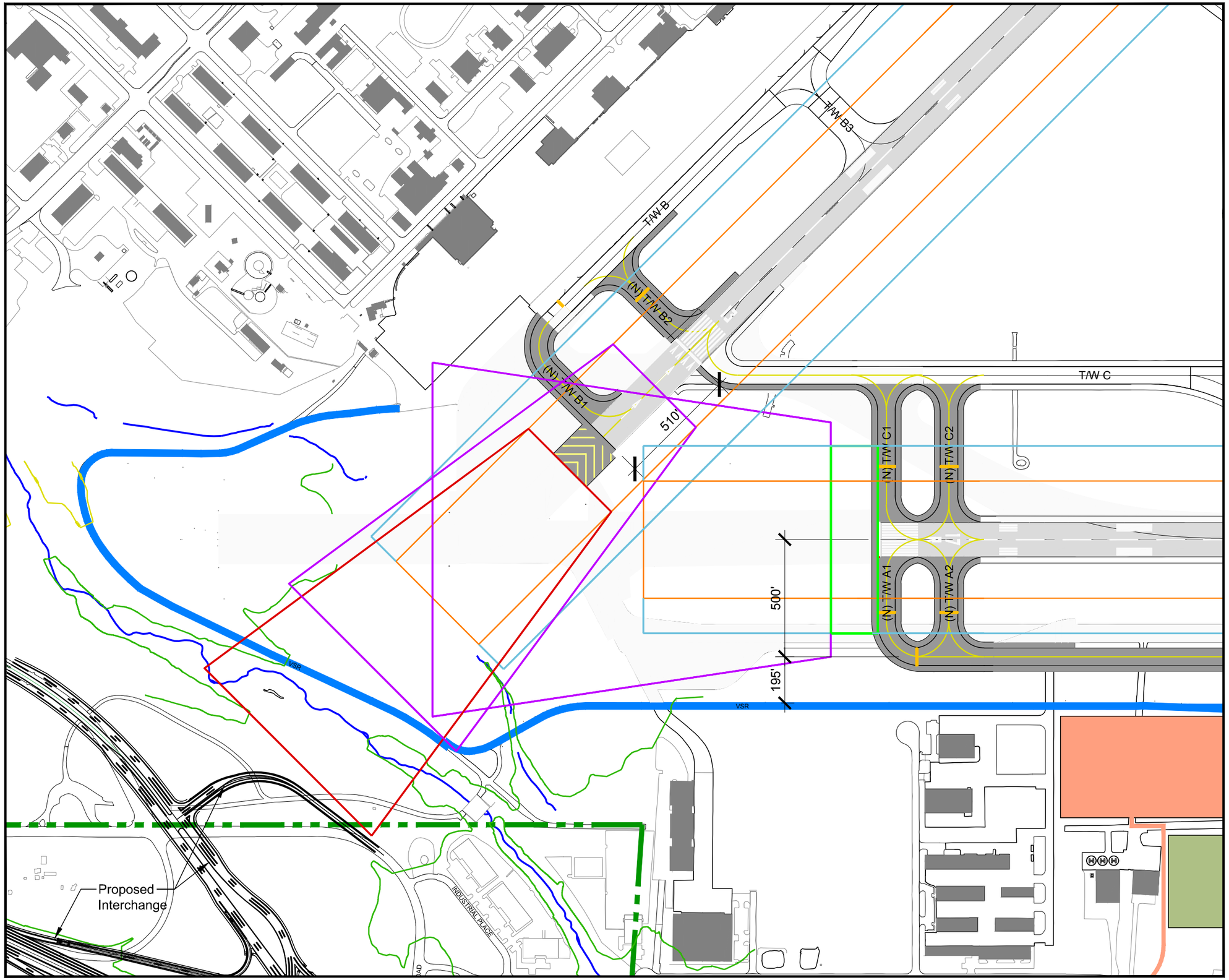

LEGEND

- Pavement to be demolished
- Proposed pavement
- Existing runway
- Vehicle service road
- Airport property line
- Runway / taxiway centerline
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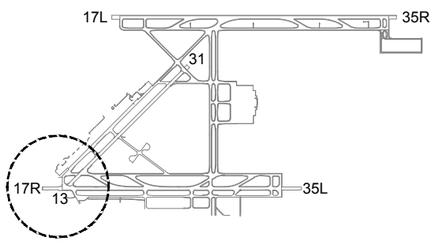
FAA Airport Design Standards

- Runway Safety Area (RSA)
- Runway Object Free Area (ROFA)
- Departure Runway Protection Zone
- Approach Runway Protection Zone
- Precision Obstacle Free Zone (POFZ)

Source: Airport Layout Drawing - Jacobs Engineering, April 2011

KEY PLAN



NORTH

0 200' 400' 800'

Figure 5-15
Alternative B7
Runway 13 - Shorten 400 Feet
Runway 17R - Shorten 1,790 Feet
Master Plan Update
Colorado Springs Airport
July 2013

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Recommended Airfield Alternative

After a final consultation with FAA, Alternative B7 was selected for depiction on the Airport Layout Plan as part of the Recommended Development Plan which is described in Chapter 6. Alternative B6 was selected for two reasons: (1) the number of operations forecast to use Taxiway W was not sufficient to warrant its implementation within the planning horizon and (2) the 1,790 foot shift provided for a standard RSA for Runway 17R clear of the Runway 13 RSA.

PASSENGER TERMINAL FACILITIES

The requirements analyses provided in Chapter 4 indicates that the passenger terminal footprint is adequate to meet projected demand through the planning horizon. However, specific attention was given to the passenger loading bridges and passenger security checkpoint as described in the following sections.

Passenger Boarding Bridge Analysis

Recent experience has shown that some of the passenger boarding bridges (PBBs) at the Airport may be geometrically incompatible with certain aircraft in the current and forecast fleet mix. When docked with aircraft having lower door sill heights, the PBB tunnel slope is often steeper than desirable; exacerbated by the fact that the passenger terminal concourse is higher (averaging over 15 feet above apron) than most concourses serving a narrowbody fleet (usually about 12 feet above apron). The analyses described in this section were undertaken to assess PBB docking capabilities in detail, and to provide recommendations to improve compatibility where practicable.

PBB docking geometrics were analyzed using PathPlanner, an industry standard software package that simulates PBB docking, as well as aircraft and vehicle surface movements. Inputs to the model include:

- AutoCAD base plan showing two-dimensional planimetrics and orthophoto.
- User-input vertical information for each gate, including PBB rotunda height above apron, and apron slope (gradient and direction).
- PathPlanner library objects, including aircraft and PBBs, which the software utilizes for simulating PBB docking. Aircraft and PBB operational parameters are obtained by the software developer from manufacturers.

PBB simulations were performed for a representative fleet mix of aircraft at each gate, including B767-300, B757-200, B737-800, A319, MD-83, CRJ-900, CRJ-700, CRJ-200, E175, E145, and Q400. In a PBB simulation session, the software indicates whether or not the PBB can dock to a given parked aircraft. In a successful docking session, the simulation output includes PBB tunnel slope, PBB cab angle, and other details.

As a performance metric, a PBB tunnel slope of 1:12 (8.33% gradient) was identified as the desired goal. As set forth in the Americans with Disabilities Act of 1990 (ADA), this is the maximum slope for a ramp utilized by persons in wheelchairs. The ADA guidelines for ramps also require a flat, level landing for every 30 inches in vertical difference (i.e., each sloped segment of a ramp cannot exceed 30 inches of drop). In practice, when docking with any aircraft with a door sill greater than 30 inches higher or lower than the PBB rotunda floor, it would be virtually impossible for a PBB tunnel to comply with the ADA level landings requirement because the tunnel is comprised of rigid telescoping segments of a single, uniform slope. Accordingly, airline passengers in wheelchairs are typically assisted by an airline or airport employee when moving to or from the aircraft on an incompatible PBB.

That said, most airports attempt to have PBB tunnels comply with the spirit of the ADA ramp requirement to the extent practicable (i.e., the 1:12 slope). Irrespective of the ADA requirement, steeper slopes are more cumbersome to navigate for able-bodied passengers as well, especially those with carry-on baggage.

Summary and Recommendations

For low-sill aircraft simulations, the aircraft was placed as far away from the PBB rotunda as possible to maximize the horizontal component of the slope. Docking simulation calculation results are presented in Figure 5-16. PBB tunnel slopes are keyed by color: green indicates the slope does not exceed 8.3%, while red indicates slope exceeds 8.3%.

Where the PBB tunnel slope exceeds 8.3%, an estimate is provided for additional horizontal length that could be added to lower the slope to 8.2%. The additional horizontal length could be provided by the addition of fixed-bridge segments using the existing PBBs or installation of new longer PBB models. PBB models with a longer reach may require more substantial PBB rotundas and/or rotunda foundations. The Airport installed a sloping fixed bridge segment in 2012 at Gate 2 to serve lower sill height aircraft, and this is the preferred solution of Airport management.

Because the apron slopes downwards east-to-west, the apron on the east side of the concourse is generally higher in elevation than on the west side. PBB tunnel slopes for existing conditions were calculated to be less steep on the east side; and for those PBB tunnels that were steeper than the 8.3% metric, the amount of additional length required was found to be less for east side gates versus west side. Therefore, if the number of gates to be upgraded is limited, upgrading the east side gates (Gates 4, 6, 8 and 10) should be the given the highest priority, as they can more easily be brought into compliance (i.e. shorter fixed bridges would be necessary).

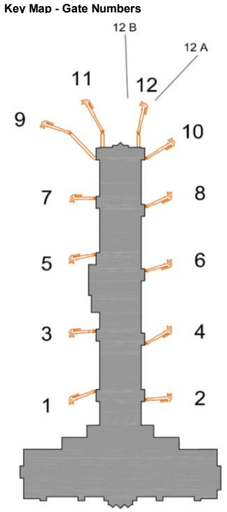
PASSENGER BOARDING BRIDGE DOCKING CHARACTERISTICS

Colorado Springs Airport
Master Plan Update

Gate	1 [10]	2	2R [5]	3	4	5 [6]	6	7 [7]	8	9	10	11	12 Lead-in Line A	12 Lead-in Line B
PBB Model	A3 60/119 125R	A3 60/119 125R	A3 60/119 125R	A3 60/119 125R	A3 60/119 125R	A3 60/119 125R	A3 60/119 125R	A3 60/119 125R	A3 60/119 125R	A3 60/119 125R	A3 60/119 125R	A3 60/119 125R	A3 60/119 125R	A3 60/119 125R
Actual Rotunda Height (feet)	15.58	15.58	12.66	15.75	15.75	14.75	14.75	15.58	15.58	15.08	15.75	15.75	15.75	15.75
Rotunda Height Adjustment [1] (feet)	0.00	0.50	0.50	0.50	1.00	1.50	0.50	1.00	0.50	0.00	0.00	0.50	0.50	0.50
Virtual Rotunda Height [1] (feet)	15.58	16.08	13.16	16.25	16.75	16.25	15.25	16.58	16.08	15.08	15.75	16.25	16.25	16.25
Apron Slope Gradient	1.00%	0.75%	0.75%	1.00%	0.50%	1.00%	0.25%	0.60%	0.10%	0.60%	0.05%	0.50%	0.50%	0.50%
Apron Slope Direction [2]	-40	130	130	-25	130	-45	130	-30	160	-35	0	45	45	45

	Aircraft Type	Aircraft Door Sill Height [3] [4] (feet)	1 Slope	1 Length	1 Add'l Length	2 Slope	2 Length	2 Add'l Length	2R Slope	2R Length	2R Add'l Length	3 Slope	3 Length	3 Add'l Length	4 Slope	4 Length	4 Add'l Length	5 Slope	5 Length	5 Add'l Length	6 Slope	6 Length	6 Add'l Length	7 Slope	7 Length	7 Add'l Length	8 Slope	8 Length	8 Add'l Length	9 Slope	9 Length	9 Add'l Length	10 Slope	10 Length	10 Add'l Length	11 Slope	11 Length	11 Add'l Length	12 Lead-in Line A Slope	12 Lead-in Line A Length	12 Lead-in Line A Add'l Length	12 Lead-in Line B Slope	12 Lead-in Line B Length	12 Lead-in Line B Add'l Length
Widebody Aircraft	Boeing 767-300	13.6	2.4%	78	-	2.1%	80	-	1.7%	93	-	4.0%	69	-	3.1%	80	-	3.3%	76	-	1.2%	79	-	3.0%	96	-	2.4%	78	-	1.6%	78	-	1.9%	80	-	3.2%	77	-	2.4%	95	-	[11]		
Narrowbody Aircraft	Boeing 757-200	12.4	3.2%	99	-	2.5%	102	-	0.5%	91	-	4.4%	91	-	3.4%	102	-	3.8%	98	-	1.9%	102	-	4.5%	86	-	2.8%	102	-	2.5%	100	-	2.5%	102	-	3.5%	102	-	3.4%	103	-	4.7%	80	-
	Boeing 737-800	8.5	7.3%	102	-	7.3%	96	-	7.0%	59	-	8.3%	102	-	7.9%	99	-	8.2%	98	-	7.9%	82	-	8.2%	101	-	8.0%	92	-	6.7%	100	-	7.9%	87	-	7.9%	101	-	7.6%	103	-	8.2%	99	-
	Airbus A319	11.1	5.0%	93	-	4.6%	94	-	2.4%	57	-	8.1%	67	-	5.3%	96	-	6.9%	74	-	4.6%	79	-	6.1%	92	-	5.1%	90	-	4.1%	98	-	5.0%	84	-	5.1%	102	-	4.8%	102	-	5.5%	96	-
	MD-83	7.2	8.7%	102	6	8.2%	102	-	7.6%	73	-	9.7%	102	19	9.0%	102	10	9.3%	102	14	7.6%	102	-	9.5%	102	16	8.6%	103	5	7.9%	102	-	8.1%	102	-	9.1%	102	11	9.0%	103	10	10.1%	95	22
Regional Jet Aircraft	CRJ-900	6.0	9.2%	102	12	9.7%	102	19	7.6%	89	-	11.2%	102	37	10.5%	102	29	10.7%	102	31	9.1%	102	11	11.0%	102	35	10.1%	102	24	9.4%	102	15	9.5%	102	16	10.6%	102	30	10.5%	102	29	10.9%	102	34
	CRJ-700	5.4	9.7%	102	19	10.3%	102	26	7.6%	96	-	11.7%	102	44	11.0%	102	35	11.3%	102	39	9.6%	102	17	11.5%	102	41	10.6%	102	30	9.9%	102	21	10.1%	102	24	11.1%	102	36	11.1%	103	36	11.4%	103	40
	CRJ-200	5.0	10.1%	102	24	10.8%	102	32	8.2%	96	-	12.2%	102	50	11.5%	102	41	11.7%	102	44	10.2%	102	25	12.0%	102	47	11.1%	102	36	10.4%	102	27	10.6%	102	30	11.7%	102	43	11.6%	102	42	12.0%	102	47
	Embraer 175	8.3	7.0%	99	-	7.5%	98	-	4.6%	91	-	8.6%	102	5	8.0%	101	-	8.2%	102	-	8.1%	84	-	8.4%	102	2	8.2%	94	-	6.9%	102	-	8.1%	89	-	8.0%	102	-	7.9%	103	-	8.2%	103	-
	Embraer 145	4.9	10.2%	102	25	10.9%	102	34	7.7%	102	-	12.4%	101	52	11.7%	101	43	11.9%	102	46	10.3%	102	26	12.1%	102	48	11.2%	102	37	10.5%	102	28	10.8%	101	32	11.8%	102	45	11.7%	102	44	12.1%	102	49
Turboprop	Dash 8-Q400	4.0	11.1%	102	36	11.8%	102	45	8.7%	102	6	13.3%	102	63	12.6%	102	55	12.8%	102	57	11.2%	102	37	13.1%	102	61	12.1%	102	49	11.4%	102	40	11.7%	102	43	12.7%	102	56	12.6%	103	55	13.0%	103	60

Key Map - Gate Numbers



Target slope for additional length calculations
8.20%

Legend

In PBB docking model, slope of tunnels does not exceed ADA maximum of 1:12 (8.3%)

In PBB docking model, slope of tunnels exceeds ADA maximum of 1:12 (8.3%)

Aircraft cannot be gated at the specified gate

Notes

[1] The PBB docking model assumes the apron is a continuous planar surface from PBB rotunda base to aircraft parking area. Where this is not the case in field conditions, a PBB rotunda height adjustment is required to normalize docking calculations. See diagram at right.

[2] Apron slope direction value is zero (0) where the apron slope direction is perpendicular from the face of terminal building, sloping downwards away from the building. Numeric values indicate degrees counterclockwise from perpendicular.

[3] Door sill height for a given aircraft varies according to weight loading of the aircraft. For conservative calculation purposes, the lowest height is used (e.g., the aircraft is fully weight-loaded).

[4] All aircraft were docked at left forward passenger/crew door with the following exceptions:
The Boeing 757-200 was docked at the left mid passenger door, except at Gate 12 where the left forward door is used.
The Boeing 767-300 was docked at the left mid passenger door at Gates 2R and 7.

[5] For Gate 2R, A fixed-bridge segment of 35 feet in length and 1:12 slope (e.g., 2.9 feet vertical drop) was added, and the PBB rotunda was moved correspondingly.

[6] The Gate 5 boarding bridge is currently not used because the apron is reconfigured to allow for two ground loading positions. Docking capabilities at that gate were estimated using the former lead-in line.

[7] The Gate 7 lead-in line was recently shortened by approximately 32 feet. Docking model assumes lead-in line restored to original length, in order to accommodate a larger fleet mix.

[8] The PBB docking model calculates the PBB length from the rotunda center to the aircraft door.

[9] For docking configurations non-compliant with ADA standards, the additional length required to reach a slope of 8.2% was estimated. Additional length could be achieved by adding a fixed-bridge segment, installation of a longer PBB, or a combination thereof. For gates with existing horizontal fixed bridges, reduced PBB slope could also be achieved by sloping the fixed bridge. In some cases, apron depth is not sufficient to accomodate additional total length.

[10] Regional jets on Gate 1 were docked using the rotated lead-in line.

[11] The Boeing 767-300 cannot dock at Gate 12 lead-in line B because ethe aircraft is too long for the apron depth at that gate in its current configuration.

Terminal Area Profile - Not To Scale, vertical variations exaggerated for clarity

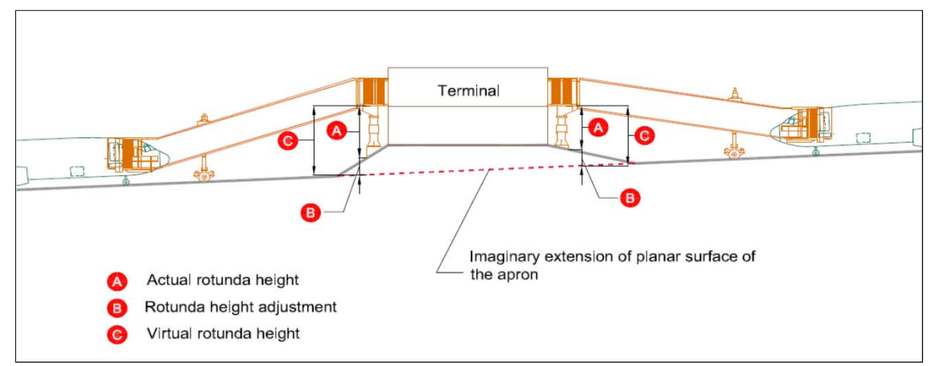


Figure 5-16

PASSENGER BOARDING BRIDGE DOCKING CHARACTERISTICS

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For example, a fixed bridge of approximately 37 feet would on Gate 8 would accommodate all the aircraft examined, with the exception of the Q400 (which would require nearly 50 feet), whereas a fixed bridge of approximately 48 feet would be necessary for Gate 7 located on the opposite side of the concourse. Further, coordination with the airlines is warranted such that east-side gates would be reserved for lower-sill height aircraft whenever possible to minimize the PBB slope.

In addition, specific gates should be identified for occasional widebody operations. While there are no widebody passenger aircraft in the routine passenger fleet mix, diversions from Denver International Airport and other irregular operations may involve such aircraft (e.g. the Boeing 767-300). Factors for consideration in terms of the optimal gate location for said aircraft operations include:

- availability of the gate (Gates 3, 4, 5, 7, 8, 10, 11 and 12 are currently used for regularly scheduled service);
- dependencies between gates (parking one large aircraft on a gate effectively limits the functionality of the adjacent gates);
- freedom of aircraft movement on the apron;
- the location of the vehicle service road; and
- interior space considerations (e.g. size of holdroom).

Given the fact that widebody aircraft operations are infrequent, it may not be necessary to designate a gate not currently assigned to a particular airline for widebody service. That said, a gate that is not routinely in service does provide a measure of flexibility so long as the use of the gate does not inflict an operational restriction on the adjacent gate. These gates include numbers 1, 2, 6 and 9. With the predominance of regional jet aircraft in the passenger fleet mix, dependencies between gates is less of a consideration than it might otherwise be. Delta Air Lines and American Airlines routinely use narrowbody aircraft at Gates 4 and 8, respectively.

With regard to the freedom of aircraft movement on the apron, Gates 10, 11, and 12 were eliminated from consideration as widebody aircraft parking positions because such an operation would limit the functionality of the apron-edge taxilane. The taxilane object free area width is 225 feet for Airplane Design Group (ADG) IV size aircraft, and the vehicle service road is located approximately 95 feet from the centerline of the taxilane (less than the 112.5 feet required for ADG IV aircraft).

Examining the location of the vehicle service road and its location relative to the tail of parked aircraft, the east side gates provide more depth than west side gates,

although none of the gates provide an advisable 10-foot buffer from the vehicle service road.

With regard to interior space considerations, all gate holdrooms were designed to accommodate the number of passengers served by Boeing 757 aircraft. Gates 8 through 12 provide the greatest amount of contiguous holdroom space, but as noted above, Gates 10 through 12 limit the capability of the apron edge taxilane. Gates that provide at least two contiguous holdrooms may be considered sufficient for most widebody aircraft.

Given all of the above, it seems impractical to exclude the consideration of gates because they are currently assigned to an airline. If widebody operations occur, it may often be the case that the flight is operated by one of the airlines currently serving the Airport. Setting aside the consideration of the assignation of gates to a specific airline, Gates 7 and 9 appear to be the optimal locations for widebody aircraft. Gate 7 is favorable because it is on the west side (leaving all east side gates available for smaller aircraft with lower sill heights) while providing the contiguous holdrooms from Gates 5 and 7 when Gate 5 is not in use. Gate 9 is also favorable as it is unassigned, offers the contiguous holdroom at the end of the concourse, and is on the west side of the concourse.

Passenger Security Checkpoint

Chapter 4 indicated that the passenger security checkpoint would require additional space for security queue and passenger processing. Subsequent to those findings, the Airport constructed an expansion of the area to address this future need by providing additional space and reconfiguring both the checkpoint and exit lanes.

GROUND TRANSPORTATION FACILITIES

The requirements analyses provided in Chapter 4 indicates that additional space for vehicle parking for the public should be provided as the Airport approaches PAL2. In addition, additional rental car ready return space should be provided as the Airport approaches PAL3.

To meet this demand in the near-term, the Airport could re-institute a public parking overflow lot that is located immediately west of the Air Cargo Road and south of the employee parking lot. This space provides approximately 875 additional spaces, which would bring the Airport total available public parking spaces to about 5,510, which is sufficient to meet PAL2 design day demand and nearly PAL2 holiday demand. The Airport could provide an additional 1,040 spaces to meet holiday demand at PAL3 which corresponds to an additional 300,000 square feet of public parking. This space would best be provided by displacing the rental car service center areas to the south for an optimal customer level of service. Additional ready return spaces could be provided immediately east of the existing ready return lot and west of the airport entrance roadway.

Figure 5-17 depicts the overflow parking lot, as well as the area that should be reserved for additional public parking.[1]

GENERAL AVIATION, AIR CARGO, AND AIRPORT SUPPORT FACILITIES

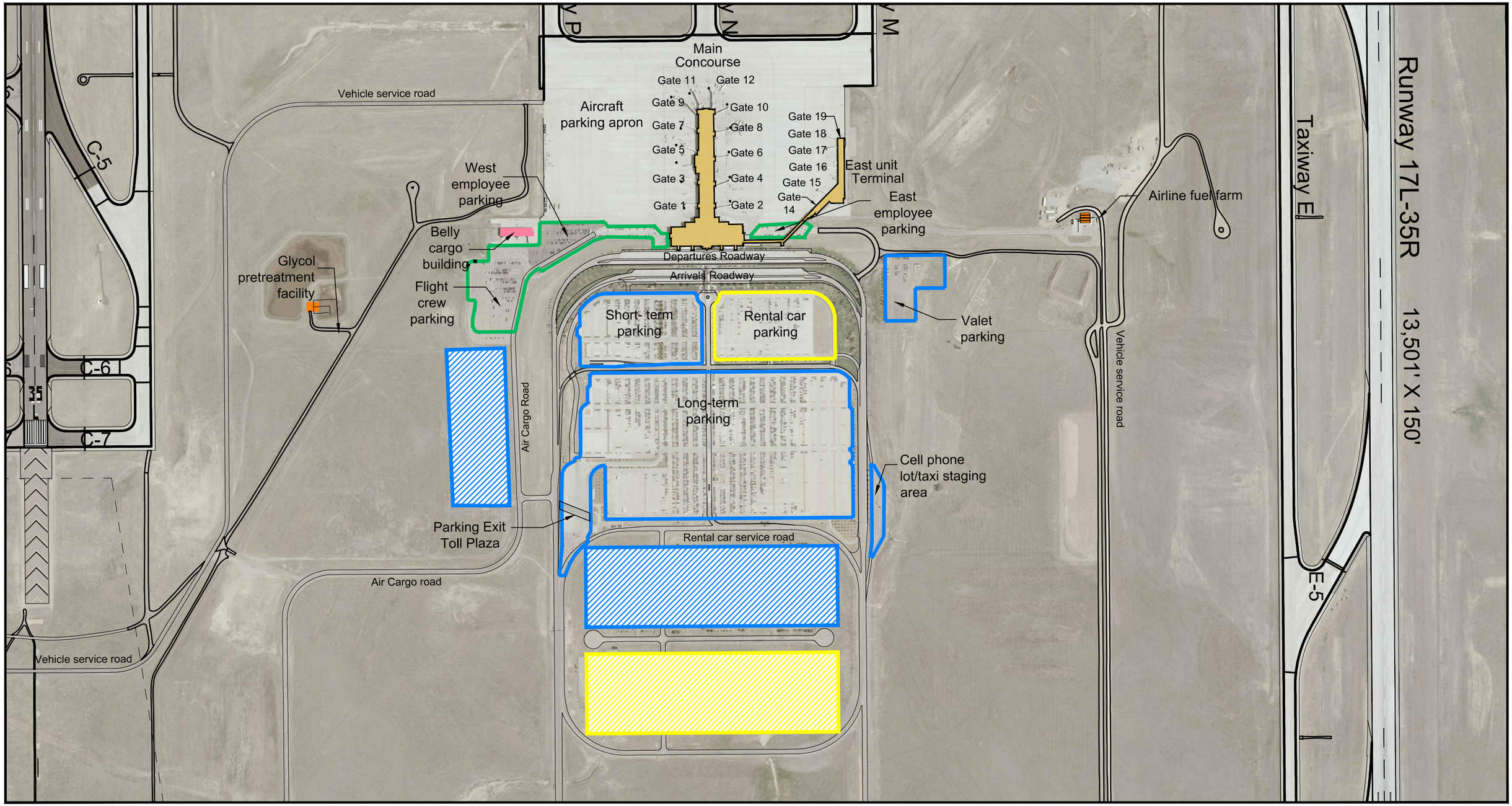
The requirements analyses provided in Chapter 4 indicates that additional space for general aviation should be provided at the Airport for corporate and community aircraft hangars and associated general aviation terminal space. Using past studies of the west side development area, optimal space was identified for additional general aviation facilities west of Taxiway A.

While the area dedicated to air cargo appears to be adequate through the planning horizon, air cargo demands can change quickly dependent on the market and the airline; accordingly, additional space contiguous to the existing cargo area should also be set aside.

Finally, two airport support function require additional space to be set aside. Specifically, a deicing pad is planned for the southeast quadrant of the intersection of Taxiways M and H. In addition, airport maintenance space is identified for west of the airfield vehicle service road and immediately north of Old Drennan Road.

Figure 5-18 depicts the areas set aside for expanded general aviation; air cargo; and maintenance, repair, and overhaul facilities.

[1] The area depicted on Figure 5-17 is larger than necessary to meet the requirement, but should be reserved for parking expansion to ensure no major facilities are constructed in this location ideally suited for this purpose.



LEGEND

- Airfield pavement
- Passenger terminal
- Air cargo
- Airline support
- Employee parking
- Public parking
- Rental car lot
- Public parking reserve
- Rental car lot reserve

NORTH

0 300' 600' 1,200'

Figure 5-17

PARKING AND RENTAL CAR RESERVE AREAS

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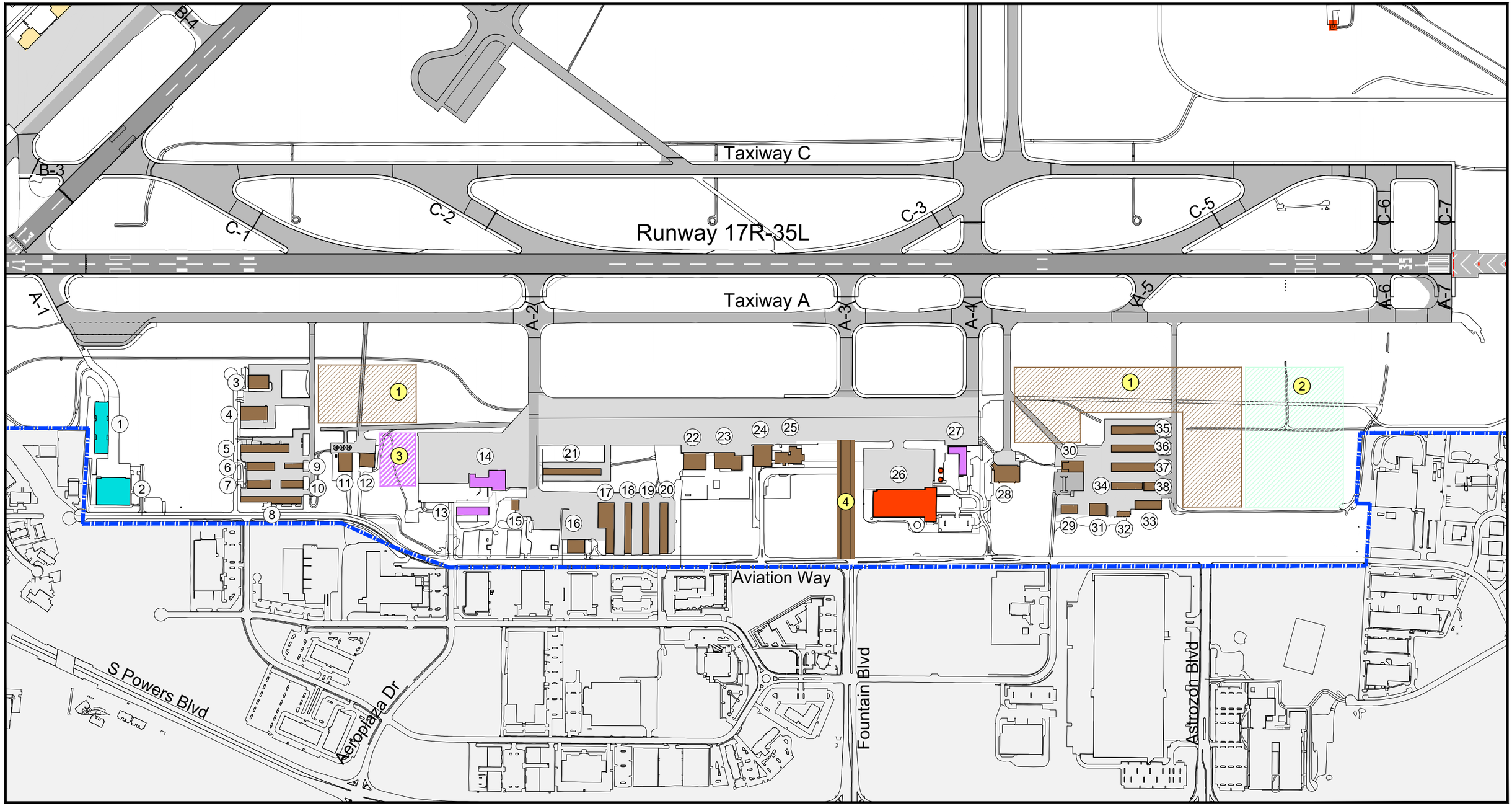

LEGENDjulu

- Airport property boundary
- Airfield pavement
- Air cargo
- Airline support
- General aviation (GA)
- Commercial use
- Non airport property

EXISTING FACILITY INDEX

- National Museum of World War II Aviation ① ②
- Colorado Springs Owners Association ③ - ⑩
- Colorado Springs Police hangar ⑪
- Perry Park Investments hangar ⑫
- FedEx Cargo facilities ⑬ ⑭
- Colorado Division of Wildlife hangar ⑮
- Cutter Aviation ⑯ - ⑳
- Colorado Jet Center ㉑ - ㉓
- Maintenance hangar ㉔
- Former passenger terminal building ㉕
- Skywest maintenance hangar ㉖
- Cargo sort facility ㉗
- Cordillera maintenance hangar ㉘
- A-Cent maintenance hangar (J.H.W) ㉙
- J.H.W. Investment Company ㉚ - ㊳

RESERVED AREAS

- General Aviation ①
- MRO/Hangars ②
- Air Cargo ③
- Central Taxilane ④

NORTH

0 350' 700' 1,400'

Figure 5-18
WESTSIDE RESERVED AREAS

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Chapter 6

RECOMMENDED DEVELOPMENT PLAN

Colorado Springs Airport

This chapter describes the Recommended Development Plan (RDP) for Colorado Springs Airport (the Airport). Included herein is a summary of projects included in the RDP and the cost estimates and phasing associated with the individual components of the RDP.

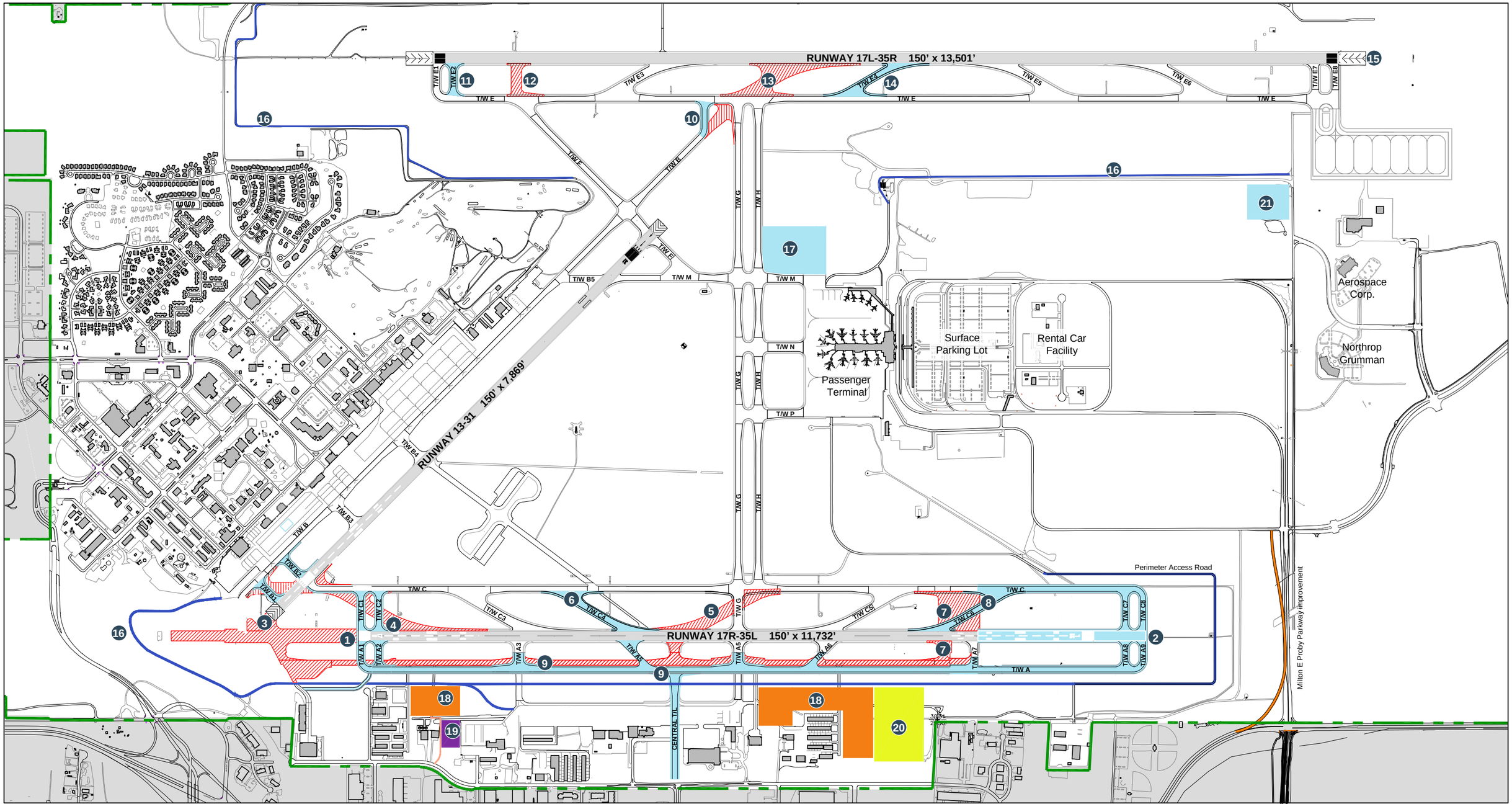
RECOMMENDED PROJECTS

The primary goal of the RDP is the elimination of the intersection of Runway ends 17R and 13 and associated taxiway improvements on the west airfield. These projects are founded upon Airport management's intent to reduce the risk of wrong runway departures and reduce identified "hot spots," while providing improved capability of Runway 17R-35L the secondary runway to Runway 17L-35R. With the net increase in length for Runway 17R-35L departures and the provision of an improved instrument landing system (ILS) for Runway 35R, the Airport improves its operational capability. Specifically, the improved ILS on Runway 35R would allow the primary runway to serve aircraft operations during Category II weather conditions, and the increased departure length of Runway 17R-35L provides near equivalent capability to primary Runway 17L-35R.

The individual components of the RDP are depicted on Figure 6-1, numbered 1-21 as described below.

1. **Shift the Runway 17R threshold to the south by 1,790 feet.** Runway 17R-35L is shown on Figure 6-1 shifted to the south by approximately 1,790 feet. This project provides separation from Runway 13-31, eliminating the runway intersection and reducing the risk of wrong runway departures. The project involves pavement removal, earthwork, and re-marking of the runway. This project would be completed in concert with projects 2 and 3.

2. **Extend Runway 35L to the south by 2,500 feet.** This project would involve extension of Runway 35L to the south approximately 2,500 feet. The net increase in departure length for Runway 17R-35L would be 710 feet. The net increase in arrival length for Runway 17R is 710 feet, and the net decrease for Runway 35L is 65 feet. The Runway 35L threshold is displaced by approximately 775 feet to provide a Runway Protection Zone (RPZ) clear of Milton E. Proby Parkway. The project involves construction of proposed pavement, significant earthwork, re-marking of the runway, and relocation of the approach lighting system for Runway 35L arrivals. This project would be completed in concert with projects 1 and 3.



LEGEND

- Pavement to be demolished
- Recommended airfield project
- General aviation
- Air cargo
- MRO/hangars

Source: Airport Layout Drawing - Jacobs Engineering, June 2013

Recommended Projects

1. Runway 17R: shorten 1,790' and construct new taxiways
2. Runway 35L: extend 2,500' and construct new taxiways
3. Runway 13: shorten 400' and construct new taxiways
4. Remove existing Taxiway C1
5. Remove existing Taxiway C3
6. Construct new Taxiway C4
7. Remove existing Taxiways C6, C7, and A6
8. Construct new Taxiway C6
9. Remove existing Taxiway A; realign Taxiway A to 500' from Runway 17R-35L; construct central taxilane
10. Realign Taxiway B segment
11. Construct new Taxiway E2
12. Remove existing Taxiway E2
13. Remove existing Taxiway E4
14. Construct new Taxiway E4
15. Construct new instrument approach lighting system (ALSF-II)
16. Pave vehicle service roads
17. Construct deicing pad area
18. General aviation expansion areas
19. Air cargo expansion area
20. MRO expansion area
21. SRE facility

NORTH

0 700' 1400' 2800'

Figure 6-1
RECOMMENDED DEVELOPMENT PLAN
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3. **Reduce length of Runway 13-31 by 400 feet.** Runway 13-31 would be shortened by approximately 400 feet. Shortening Runway 13-31, coupled with project 2, eliminates the runway intersection conflict. The Runway 13 threshold would be displaced by approximately 510 feet to provide a standard 1,000 foot Runway Safety Area and clear RPZ. The net decrease in departure length of Runway 13-31 would be 400 feet. The net decrease in arrival length of Runway 13 is 910 feet, and the net decrease in arrival length of Runway 31 is 400 feet. This project would be completed in concert with projects 1 and 2.

4. **Remove existing high-speed exit Taxiway C1.** This project would be completed in concert with project 1. The high-speed exit would no longer be located in the proper placement for Runway 35L arrivals as it is too near the relocated end of the runway. Further, the geometry of the existing taxiway would conflict with the proposed perpendicular exits.

5. **Remove existing high-speed exit Taxiway C3.** The location of this high-speed exit would no longer be properly placed given the shift of the Runway 17R threshold to the south. Moreover, the geometry associated with Taxiway C3 conflicts with the geometry of Taxiway G in its current configuration.

6. **Construct proposed high-speed exit Taxiway C4.** This project provides a proposed high-speed exit for Runway 35L arrivals. The location of this high-speed exit taxiway accounts for the shift of the Runway 35L threshold with the runway extension to the south.

7. **Remove existing exit Taxiways A6, C6, C7.** These taxiways currently serve the existing end of Runway 35L. With the extension to Runway 35L, these taxiways are no longer required but may remain in place. However, these exits must be removed to enable the construction of a proposed high-speed exit Taxiway C6 to serve Runway 17R arrivals. This project would be completed in concert with project 8.

8. **Construct proposed high-speed exit Taxiway C6.** This project provides a proposed high-speed exit for Runway 17R arrivals. The location of this high-speed exit accounts for the change in location of the Runway 17R threshold to the south. This project would be completed in concert with project 7.

9. **Remove and realign Taxiway A.** The realignment of Taxiway A would provide a parallel taxiway for Airplane Design Group (ADG) IV aircraft, with a centerline to centerline separation from Runway 17R-35L of 500 feet.

10. **Realign Taxiway B.** Taxiway B currently intersects Taxiways E, E4, and G creating the potential for pilot confusion. Taxiway B would be realigned to intersect Taxiway E at a 90 degree angle, eliminating potential confusion and providing improved functionality.

11. **Construct proposed bypass Taxiway E2.** This proposed taxiway would provide a bypass taxiway to serve aircraft needing to exit the Runway 17L end.

12. **Remove existing Taxiway E2.** Taxiway E2 would be better located nearer the end of Runway 17L. This project would be completed in concert with project 12.

13. **Remove existing high-speed exit Taxiway E4.** The geometry at the intersection of Taxiway E, E4, G, and H is complex, potentially causing pilot confusion. This taxiway would be replaced in a location approximately 1,400 feet south to reduce the potential for pilot confusion.

14. **Construct proposed high-speed exit Taxiway E4.** This project provides a proposed high-speed exit for Runway 35R arrivals. The location of this high-speed exit accounts for the removal of existing Taxiway E4. This project would be completed in concert with project 13.

15. **Provide Runway 35R with an improved Instrument Landing System.** The approach to Runway 35R would be enhanced by the addition of a High Intensity Approach Lighting System with Sequenced Flashing Lights (ALSF-2). The ALSF-2 would provide Category II capability for arrivals in inclement weather conditions.

16. **Pave perimeter vehicle service roads.** The perimeter vehicle service roads require realignment around the ends of Runway 17R-35L. In addition, the perimeter road is not paved in its entirety. The FAA Runway Safety Action Team has expressed the need for the perimeter road to be paved to reduce the number of vehicles using taxiways and runways to move about the Airport.

17. **Construct deicing pad.** This project would provide additional space for deicing aircraft nearer their point of departure, primary Runway 17L-35R.

18. **General aviation expansion areas.** These parcels of land were identified in the master planning process as being ideal for general aviation expansion as the need arises.

19. **Air cargo expansion area.** This parcel of land was identified in the master planning process as being ideal for air cargo expansion as the need arises. The project would likely involve expansion of the existing cargo apron, currently in use by FedEx, to the north, allowing for one additional aircraft parking position.

20. **Maintenance, repair, and overhaul (MRO) expansion area.** This parcel of land was identified in the master planning process as being ideal for MRO expansion should the need arise. The parcel of land provides good access to the airfield, is consistent with the surrounding land use on the west side of Taxiway A, and has good landside access as well.

21. **Snow removal equipment (SRE) facility.** This parcel of land was identified in the master planning process as being ideal for an SRE storage facility. The goal of constructing additional SRE storage is to achieve increased efficiency for snow removal operations that occur on the east side of the Airport. Due to its length and the fact that Runway 17L-35R is equipped with an ILS on both ends, it is most capable of handling aircraft during inclement weather. However, the existing SRE facility is located on the southwest side of the Airport and results in time-consuming preparation and travel to primary Runway 17L-35R.

IMPLEMENTATION PLAN

The following provides the estimated costs and potential phasing for the RDP along with the Airport's overall capital improvement program.

Project Phasing

Table 6-1 also indicates in which of the four phases the individual project component is included; Figure 6-2 presents a graphical depiction of the RDP showing its four phases.

Phase 1, including projects 1-4, involves the improvements necessary to deconflict the intersection of Runway ends 17R and 13. Each of these projects is located on the west side of the airfield. Phase 1 also includes projects 15 and 16 which are of immediate interest to Airport management and may be implemented independently of projects 1-4. These projects have independent utility; in the case of project 15 the Airport would improve its capability to accommodate landings during Category II weather conditions. In the case of project 16, the Airport would reduce runway crossings by maintenance and operations vehicles by providing paved service roads that reduce the need to traverse taxiways and runways.

Phase 2, including projects 6 through 8, could be completed in concert with Phase 1; however, they are not necessary to implement the runway deconflicting. This

phasing scheme allows airport management the flexibility to decrease the upfront cost of implementation should it be prudent to do so.

Phase 3 includes projects 10 through 14 and is primarily focused on improvements to the east side of the airfield. These projects could be completed in concert with major maintenance to Runway 17L-35R or its parallel Taxiway E.

Phase 4, including projects 17-21, would be implemented by the Airport on an opportunistic basis and as the need arises. It may be prudent to implement one of these projects ahead of the other phases, depending on the need and availability of funding. Further, these projects need not be completed and would not likely be completed as part of a package. Each project has independent utility, and their implementation schedule should be revisited on an annual basis by Airport management as part of the routine review of the RDP. Phase 4 also includes project 9, which involves the realignment and reconstruction of parallel Taxiway A. This project would likely be undertaken when Taxiway A pavement would be scheduled for reconstruction.

Capital Improvement Program

The Airport has an ongoing capital improvement program (CIP) which assigns projects to a given year, currently looking out nine years to 2021. While the majority of the implementation of the RDP is anticipated to be beyond the next five years, the Airport is planning to undertake a number of projects to enable the implementation of the master plan recommendations, beginning in 2018. Projects in the CIP related to implementation of the RDP include:

- Environmental Assessment for master plan projects 1-5, scheduled for 2018;
- Design for projects 1-5, scheduled for 2019;
- Construction for projects 1-5, scheduled for 2020 and 2021.

Within the next five years (2014-2018), the Airport intends to spend approximately 65.1 million on a variety of projects, including major pavement rehabilitation projects for Taxiways E, G, and H and the terminal apron. The Airport's CIP is summarized in Table 6-1.

Notably, the CIP for the first five years is the most well-defined. Beyond five years, the CIP includes order of magnitude cost estimates and is subject to continual refinement of priorities and schedule. The CIP for years 2019-2021 will be the subject of continual refinement as the Airport consults with the FAA and plans for the implementation of the RDP.

Table 6-1
CAPITAL IMPROVEMENT PROGRAM
Colorado Springs Airport

Year	Project description	Cost (millions)
2014	Rehabilitation of Taxiways E, G and H (Phase V)	$10.4
	Taxiway A partial rehabilitation	3.3
	Other projects	0.2
	Subtotal	**$13.9**
2015	Rehabilitation of terminal apron and trench drain system	$11.0
	Other projects	1.1
	Subtotal	**$12.1**
2016	Rehabilitation of Taxiways C, G and terminal connectors (Phase I)	$ 11.0
	Other projects	1.0
	Subtotal	**$12.0**
2017	Rehabilitation of Taxiways C, G and terminal connectors (Phase II)	$ 13.2
	Other projects	1.1
	Subtotal	**$14.3**
2018	Rehabilitation of Taxiways C, G and terminal connectors (Phase III)	$ 10.4
	Environmental Assessment for master plan projects 1-5	1.1
	Other projects	1.2
	Subtotal	**$12.7**
2019	Rehabilitation of Taxiways C, G and terminal connectors (Phase IV)	$ 10.4
	Design for master plan projects 1-5	1.1
	Other projects	1.2
	Subtotal	**$12.7**
2020	Construction of master plan projects 1, 3, 5	$ 12.1
	Other projects	1.2
	Subtotal	**$12.3**
2021	Construction of master plan project 2 (Phase 1)	**$ 11.0**
	TOTAL	**$101.0**

Source: Airport records and master plan cost estimates, July 2013.

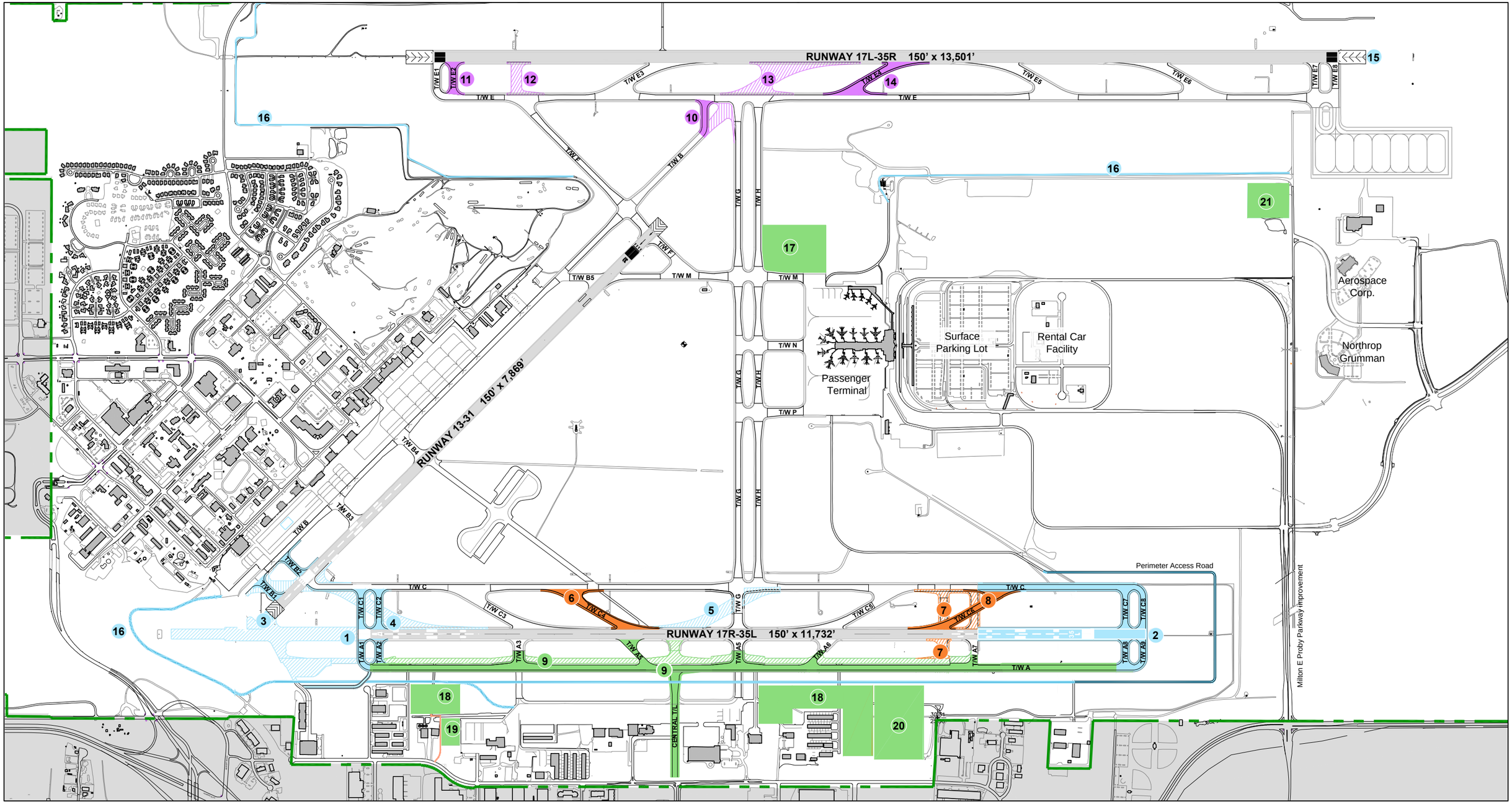
Anticipated Funding Sources

A combination of traditional airport funding sources and financing mechanisms including federal Airport Improvement Program (AIP) grants, airport revenue bonds, passenger facility charges, state grants, and cash generated from Airport operations could be used to fund the RDP. The majority of funding would likely come in the form of AIP discretionary grants, which are awarded to airports on the basis of priority and available funding.

Future development at the Airport shall continue to be self-funded by users of the airport and aviation system; no local sales or property taxes will be used to fund Airport capital improvements.

Cost Estimates

Project cost estimates for the RDP are summarized in Table 6-2. In total, the plan is estimated to cost approximately $114.5 million. Phases 1 and 2, which total $80.6 include all of the west airfield improvements excluding the realignment of Taxiway A. Detailed information supporting these cost estimates is located in Appendix F.



LEGEND

- PHASE 1 (Projects 1-5, 15, 16)
- PHASE 2 (Projects 6-8)
- PHASE 3 (Projects 10-14)
- PHASE 4 (Project 9, 17-21)

Source: Airport Layout Drawing - Jacobs Engineering, June 2013

Recommended Projects

1. Runway 17R: shorten 1,790' and construct new taxiways
2. Runway 35L: extend 2,500' and construct new taxiways
3. Runway 13: shorten 400' and construct new taxiways
4. Remove existing Taxiway C1
5. Remove existing Taxiway C3
6. Construct new Taxiway C4
7. Remove existing Taxiways C6, C7, and A6
8. Construct new Taxiway C6
9. Remove existing Taxiway A; realign Taxiway A to 500' from Runway 17R-35L; construct central taxilane
10. Realign Taxiway B segment
11. Construct new Taxiway E2
12. Remove existing Taxiway E2
13. Remove existing Taxiway E4
14. Construct new Taxiway E4
15. Construct new instrument approach lighting system (ALSF-II)
16. Pave vehicle service roads
17. Construct deicing pad area
18. General aviation expansion areas
19. Air cargo expansion area
20. MRO expansion area
21. SRE facility

NORTH

0 700' 1400' 2800'

Figure 6-2
PHASING PLAN
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Table 6-2

RECOMMENDED DEVELOPMENT PLAN COST ESTIMATES

Colorado Springs Airport

Project no. *(a)*	Description	Cost *(b)*
PHASE 1		
1	Shift Runway 17R-35L 1,790 feet south; construct Taxiways A1, A2, C1, and C2	$ 8.5
2	Construct 2,500 foot extension to Runway 35L; construct Taxiways A8, A9, C7, and C8	43.8
3	Shorten Runway 13-31 by 400 feet; construct Taxiways B1 and B2; displace Runway 13 threshold	3.6
4	Remove existing high-speed exit Taxiway C1	0.8
5	Remove existing Taxiway C3	1.1
15	Construct approach lighting system (ALSF-II) for Runway 35R arrivals	3.3
16	Pave vehicle service roads around Runway 17R-35L; from PAFB to A/DACG facility; from A/DACG to fuel farm.	6.1
	Subtotal	**$67.2**
PHASE 2		
6	Construct proposed high-speed exit Taxiway C4	$6.7
7	Remove existing Taxiways A6, C6, and C7	0.6
8	Construct proposed high-speed exit Taxiway C6	6.1
	Subtotal	**$13.4**
PHASE 3		
10	Realign Taxiway B at intersection with Taxiway E	$2.3
11	Construct Taxiway E2	2.2
12	Remove existing Taxiway E2	0.8
13	Remove existing Taxiway E4	2.2
14	Construct proposed high-speed exit Taxiway E4	5.1
	Subtotal	**$12.6**
PHASE 4 *(c)*		
9	Realign Taxiway A to provide 500 foot separation from Runway 17R-35L	$21.3
	Subtotal	**$21.3**
GRAND TOTAL	Total for Phases 1 through 4 (excluding projects 17-21)	**$114.5**

(a) Corresponds to numbering Figure 6-2, Phasing Plan.
(b) Cost in millions of dollars.
(c) Projects 17-21 were not included as the cost would be dependent upon the scope of the development which is unknown at this time.

Source: Cost estimates provided by Jacobs Engineering, July 2013.

Chapter 7
ENVIRONMENTAL OVERVIEW
Colorado Springs Airport

INTRODUCTION

The following narrative presents a general overview of the environmental implications of the Recommended Development Plan (RDP) at Colorado Springs Airport (the Airport). This overview identifies environmental considerations related to the environmental resource categories assuming implementation of the RDP. Further, this overview identifies the level of environmental review (i.e., Categorical Exclusion, Environmental Assessment or Environmental Impact Statement) anticipated prior to implementation of specific projects within the RDP in an effort to identify critical resources that would need to be addressed in the eventual preparation of environmental review documentation for the RDP.

The RDP is defined in Chapter 6. The majority of the projects included in the RDP are associated with a reconfiguration of the west airfield to meet FAA standards, including the deconflicting of the Runway 13 and 17R intersection. Notably, these airfield improvements have not been proposed to accommodate future demand or larger aircraft. Key modifications include:

- a shift of Runway 17R-35L to the south;
- a shortening of Runway 13-31 on the northwest end; and
- select modifications to various taxiways

Alternatives involving the alternate airfield configurations have been considered; however, none of the alternatives would require land acquisition. A number of Airport-specific environmental studies were used to inform this overview, including the following:

- *Final Environmental Assessment - Colorado Springs Airport Instrument Landing System*; prepared by Bionomics Environmental, June 2006.
- *Colorado Springs Airport Open Space Management Plan: A Resource Management Guide*; prepared by Colorado Springs Airport, January 2007.
- *National Register of Historic Places Registration Form*; Old Colorado Springs Municipal Airport; National Park Service, 1996.
- *FAR Part 150 Study for Colorado Springs Airport*; prepared by Barnard Dunkelberg & Co., August 2001.
- *Colorado Springs Airport Business Park Supplemental Environmental Assessment: Airbus Point Realignment*; prepared by CH2MHill, May 2009.

ENVIRONMENTAL RESOURCES

The RDP will be subject to environmental review under the National Environmental Policy Act of 1969 (NEPA) and will require an FAA determination prior to implementation. Brief summaries of environmental considerations associated with implementation of the RDP for select resource categories are provided below. A qualitative assessment of these select resource categories and potential environmental consequences associated with the RDP are provided below. This assessment is based on review of FAA Order 1050.1E, *Environmental Impacts: Policies and Procedures* and FAA Order 5050.4B, *National Environmental Policy Act (NEPA) Implementing Instructions for Airport Actions* to provide an overview of potential environmental consequences of the RDP and strategies for addressing them.

Air Quality

Air Quality is measured through attainment of National Ambient Air Quality Standards (NAAQS) under the Clean Air Act, which regulates several specific air pollutants, including ozone (precursors of which are oxides of nitrogen and volatile organic compounds), oxides of sulfur, particular matter with a diameter less than 10 microns, particulate matter with a diameter less than 2.5 microns, and carbon monoxide. More specifically, impacts to air quality would be considered significant if a NAAQS for one or more of these pollutants were not attained as a result of a project, or if project related emissions exceeded a defined 100-ton per year de minimis threshold under the General Conformity rule.

The RDP would result in modest, but temporary emissions from construction equipment (see discussion of Construction Impacts below). It is not expected that the RDP would noticeably affect the operation of aircraft at the Airport, although aircraft taxi patterns and times may change during construction. The RDP is not likely to exceed any of the NAAQS since the Airport's location is in maintenance for carbon monoxide and in attainment for all other pollutants, while construction-related emissions are expected to be modest. If no NAAQS were exceeded as a result of the RDP, it would not be considered a significant air quality impact as described in Table 7-1 of FAA Order 5050.4B.

Under the General Conformity Rule, all project-related emissions would have to be estimated and compared to the 100-ton per year de minimis threshold for carbon monoxide. Although air quality mitigation measures are not likely to be required, there is the potential for short-term increases in fugitive dust emissions from construction activities; however best management practices such as watering disturbed surface areas would be implemented to minimize construction impacts. Contractors would be required to apply for any applicable air quality permits and provide mitigation measures to maintain compliance.

Construction Impacts

Construction impacts refer to temporary environmental effects that result from construction of a project, which often concern dust from earthmoving, construction equipment emissions that affect air quality, storm water runoff, and noise. Construction impacts are considered significant when the significance threshold for an affected environmental resource is reached.

Construction for the RDP includes: (1) the removal of the northern portion of Runways 17R-35L and 13-31, which would require the removal of pavement debris and (2) the extension of the southern portion of Runway 17R-35L, which would involve earthmoving and paving activities. Typical construction equipment would include dump trucks, dozers, graders, excavators, pavers, and loaders. It is likely that ambient noise levels would modestly increase during working hours (primarily at night), but would be short in duration and temporary in nature. Noise could occur on the north end of Runway 17R-35L and Runway 13-31 where residential neighborhoods adjacent to S. Powers Boulevard are close to the edge of Airport property. This potential impact and possible mitigation measures would need to be considered in future environmental review of the RDP.

Emissions from construction activities would create a modest, but temporary, impact to the local air quality. An inventory of construction vehicle emissions would quantify the impact to local air quality. Fugitive dust would be controlled through best management practices (BMPs) during the construction process to protect air quality. Construction vehicles transporting materials to and from the vicinity of Runway 17R-35L would potentially create a modest, but temporary, impact to local traffic patterns during working hours (mostly at night).

Although the northern portion of Runway 17R-35L is currently paved, it is likely that debris removal would expose significant areas of bare soil, which could affect local water quality through erosion or storm water runoff. Extending the southern portion of Runway 17R-35L would involve significant excavating and earthmoving activities, which could also affect local water quality. Construction activities would be performed in accordance with the City of Colorado Springs Stormwater Quality Policies, Procedures, and Best Management Practices manual. However, further environmental review would need to verify that water quality standards would be met throughout the construction process, and which mitigation measures would be necessary.

Farmlands

Farmlands considered "important" for environmental review include croplands, pasturelands, and forests that have specific chemical characteristics, agricultural potential, and/or designation from relevant government authorities. Important farmland can be categorized as "prime," "unique," or "statewide and locally important." Projects that impact any category of important farmland must be coordinated with the Department of Agriculture Natural Resources Conservation

Service (NRCS) Soil Survey and would be regulated under Farmland Protection Policy Act (FPPA) of 1984. This type of project would require completion of Form AD-1006, Farmland Conversion Impact Rating. An impact to farmland would be considered significant if the project's score of Form AD-1006 fell in the range between 200 and 260.

Large tracks of agricultural land are present to the east and south of the Airport in the vicinities of State Highway 94, S. Marksheffel Avenue, Drennan Road, and South Powers Boulevard. There are also smaller agricultural land parcels to the east and north of the Airport. On-Airport soil types previously identified include the Bresser and Truckton sandy loams, with 0 to 3 percent slopes.[1]

Soils located on Airport property, including in the vicinity of proposed Runway 17R-35L extension, have been previously identified by the NRCS Soil Survey as having the potential to become prime farmland if they were irrigated. [2] In correspondence between consultants and the NRCS soil survey for the Airport's Instrument Landing System 2006 Environmental Assessment, John Valentine, District Conservationist, confirmed that soils in question would not be considered prime farmland because they do not have access to water.[3]

In the event that soils affected by the RDP were classified as prime or important farmland, the RDP would need to be coordinated more closely with the local NRCS field office, and it would require submission of Form AD-1006 to determine if impacts to farmland were significant.

Fish, Wildlife, and Plants

Impacts to fish, wildlife, and plants must be considered for any of these species in the vicinity of the proposed project that are listed as federally endangered or protected, as well as those that are state-listed as rare or unique. A significant impact would occur if a project jeopardized one of these species' continued existence or adversely affected its habitat. There are no surface waters in the vicinity of the RDP available to provide fish habitat, thus this discussion only includes wildlife and plants.

Bald eagles (Haliaeetus leucocephalus), which the Colorado Division of Wildlife designates as a "Species of Special Concern", have been found to inhabit cottonwood stands on the west side of Big Johnson Reservoir, which is located south of the Airport. They have also been observed flying over Airport property, but the on-Airport prairie ecosystem does not provide a suitable habitat for nesting, feeding,

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[1] Final Environmental Assessment - Colorado Springs Airport Instrument Landing System. Prepared by Bionomics Environmental, June 2006, page 13.

[2] Final Environmental Assessment - Colorado Springs Airport Instrument Landing System. Prepared by Bionomics Environmental, June 2006, page 13.

[3] Final Environmental Assessment - Colorado Springs Airport Instrument Landing System. Prepared by Bionomics Environmental, June 2006, Appendix.

or roosting.[4] The bald eagle's designation of State Special Concern does not provide statutory protection, but public concern for bald eagles makes them noteworthy.

Potential sensitive species that have been observed on Airport property or have the potential to migrate onto Airport property include the Western Burrowing Owl (State threatened), Ferruginous Hawk (State Special Concern), Mountain Plover (State Special Concern), Piping Plover (Federal/State Threatened), Interior Least Tern (Federal/State Threatened), and Mexican Spotted Owl (Federal/State Threatened) and are protected by the Federal Migratory Bird Treaty Act.

The Preble's Meadow Jumping Mouse (Federal/State Threatened) has potential habitat within 300 feet of creeks. However, per the USFWS, the East Branch of Sand Creek on Airport property was not designated as critical habitat for the Mouse.

A biological assessment/bird survey would need to be performed prior to any construction activities.

The Colorado Natural Heritage Program (CNHP) classifies Colorado Springs Airport as a Potential Conservation Area, which is an estimate of the habitat needed to support the long term survival of both "significant natural communities and rare, threatened or endangered plants and animals."[5] CNHP considers the Airport to be noteworthy because it possesses the largest known area of big bluestem - prairie sandreed (Andropogon gerardii - Calamovilfa longifolia) tall grass prairie in the state of Colorado. This tall grass prairie occurs in patches throughout El Paso County, but the most extensive community occurs in an area of approximately two square miles located between Milton E. Proby Parkway and Powers Boulevard south of the Airport. CNHP-designated rare wildlife species also found in this area include the ottoe skipper (Hesperia ottoe), dusted skipper (Atrytonopsis hianna), and crossline skipper (polites origenes) butterflies. [6,7]

Designated Open Space parcels are present on Airport property south of Milton E. Proby Parkway. Airport management created these spaces as a mitigation measure for fish, plant, and wildlife impacts associated with the Airport Business Park development project.[8] The provision of open space helps ensure that the Airport's outstanding mixed grass prairie, which serves as a habitat for multiple local species, would be minimally impacted by future development.

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[4] Colorado Springs Airport Open Space Management Plan: A Resource Management Guide, Prepared by Colorado Springs Airport, January 2007, page 10.

[5] Colorado Springs Airport Open Space Management Plan: A Resource Management Guide, Prepared by Colorado Springs Airport, January 2007, page 17.

[6] Final Environmental Assessment - Colorado Springs Airport Instrument Landing System. Prepared by Bionomics Environmental, June 2006, pages 17-18.

[7] CNHP Conservation Status Handbook Tracking Lists, available from http://www.cnhp.colostate.edu/download/list.asp, accessed June 30, 2013.

[8] Colorado Springs Airport Business Park Supplemental Environmental Assessment: Airbus Point Realignment. Prepared by CH2MHill, May 2009.

Previous environmental reviews have indicated that no endangered or threatened species dwell in the area of the RDP, and the nearest confirmed bald eagle habitat is over two miles south of the site of the proposed Runway 17R-35L extension.[9,10] Further coordination with US Fish & Wildlife Service (F&WS) and CNHP would be conducted to update the locations of critical habitats.

Hazardous Materials, Pollution Prevention, and Solid Waste

Hazardous materials are technically defined contaminates such as industrial wastes and petroleum products that could be "capable of posing an unreasonable risk to health, safety, and property" according to FAA Order 1050.1E. Impacts related to hazardous materials are considered significant when the project involves a contaminated area that is on or is eligible for the National Priority List (NPL), which is a list of important contaminated areas maintained by the Environmental Protection Agency (EPA).

A number of sites that may potentially contain hazardous materials are located on the Airport, including: (1) several above- and below-ground liquid storage tanks; (2) fuel storage and distribution facilities; (3) the airfield maintenance facility; (4) aircraft rescue and firefighting facilities; and (5) a former military training area referred to as the Rapier Site. The Rapier Site is located south and east of the fuel farm is a former military training area used by Peterson AFB that consists of approximately 84-acres. The site was historically used as a skeet range, pistol range, ordinance storage area, lead deposit side, small arms open burn/open detonation area, disposal area, and gas instruction storage area. The site is currently undergoing remedial investigation through the United States Air Force Environmental Restoration Program, Military Munitions Response Program in accordance with the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP).

Although the RDP is not adjacent to any areas likely to contain hazardous materials, the Airport would conduct a Phase 1 Environmental Due Diligence Audit (EDDA) to confirm the absence of hazardous materials in areas that would undergo extensive earthmoving and excavating activities. If contaminated soil is exposed or any other hazardous wastes are generated during construction, they would be disposed of in a manner that is in accordance with all applicable local, state, and federal regulations.

Debris associated with the removal of the northern portion of Runways 17R-35L and 13-31 would likely create a high volume of solid waste (discarded pavement), but it

[9] Colorado Springs Airport Open Space Management Plan: A Resource Management Guide, Prepared by Colorado Springs Airport, January 2007.

[10] Final Environmental Assessment - Colorado Springs Airport Instrument Landing System. Prepared by Bionomics Environmental, June 2006, pages 15, 17-18.

is anticipated that debris generation and transport activities would only occur on a temporary basis, likely at night, and that a portion of the debris could be recycled.

Historic, Architectural, Archeological, and Cultural Resources

Federal regulations, including the National Historic Preservation Act of 1966 and the Archeological and Historic Preservation Act of 1974, require the identification and conservation of cultural resources. Impacts to these resources are considered significant when a project adversely affects them and a State and/or Tribal Historic Preservation Officer believes the impact merits further study.

The Old Colorado Springs Municipal Airport on Peterson Air Force Base is located approximately 3,400 feet north of Runway 17R-35L. This site consists of five buildings, including the original terminal, two hangars, a former residence, and a utility/maintenance building. Because there are no other known historic sites within Airport property, it is unlikely that impacts would occur to any properties listed or eligible to be listed on the National Register. The land south of Runway 17R-35L is largely undeveloped and contains no known properties of historical significance.

In the unlikely event that any historical, architectural, cultural, or archaeological resources are discovered during the construction process, all work would cease until the Airport notifies the Colorado Office of Archaeology and Historic Preservation (OAHP) and the FAA's Airport District Office. The Airport would be required to coordinate with FAA and OAHP to preserve the area until all historical, architectural, cultural, or archaeological resource concerns have been addressed and is in compliance with all applicable local, state, and federal laws.

Light Emissions and Visual Impacts

Light emissions refer to changes in lighting patterns that could cause annoyance to stakeholders near an airport. Visual impacts refer more broadly to contrast with existing environments that could be caused by an airport project, such as obstruction of views. These impacts are considered significant when they cause annoyance that interferes with normal activities in the vicinity of the project.

Existing land uses in the vicinity of the RDP result in light emissions that are common to airport operations (runway and building lighting, navigational lighting, etc.). Runway 17R-35L is a flat, level, and paved surface used for aircraft landings and takeoffs. Shifting Runway 17R-35L and extending it southward would relocate existing navigational light emissions to the south. Shifted approach lighting to the south of Runway 17R-35L would encroach upon the Airport Open Space area, but it is not anticipated that it would disturb existing wildlife habitats or nearby residences.

Because construction activities would be phased to create the least possible impact to airport operations (e.g., at night), it is anticipated that additional light emissions

would occur, but that they would be minimal and temporary in nature. These light emissions are unlikely to create annoyance to interfere with normal activities in nearby residences or wildlife habitats.

Noise

Research has shown that noise from normal airport operations may exceed levels that make certain noise sensitive land uses, such as residences, hospitals, or churches, non-compatible with airport operations. As a result, FAA requires analysis of the effects of any airport development project that has the potential to cause aircraft noise outside an airport's boundaries. The FAA uses day night average sound level (DNL) 65 as the threshold for determining whether or not a particular function or facility type is incompatible with the noise produced by aircraft operations at an airport. Significant impacts are those that cause noise sensitive facilities and areas within the DNL 65 contour to experience a noise increase of at least DNL 1.5 dB.

Aircraft currently utilizing Runways 17R-35L and 13-31 create noise during landing, takeoff, and taxi operations. No known noise-sensitive facilities or areas are located within the existing DNL 65 affected area.

According to the Airport's 2001 Part 150 Noise Compatibility Study, the noise contours for year 2000 depict the DNL 65 contour reaching beyond the Airport boundary to the north of Runways 17R-35L and 17L-35R, to the south of Runway 17L-35R, and to the west of Runway 17R-35L.[11] The noise exposure for normal aircraft operations would shift to the south as a result of the RDP, but the exact extent of the exposure depends on fleet mix as well as runway location, and future environmental review would be needed to determine changes in noise exposure. The Airport intends to evaluate noise impacts as a component of an Environmental Assessment for the runway improvement project. Future environmental review would also need to provide special consideration for any changes in noise exposure over the Old Colorado Springs Municipal Airport on Peterson Air Force Base, since it appears on the National Register of Historic Places.

Construction of the extended Runway 35L to the south and shortened Runway 17R to the north would create additional, temporary changes in noise exposure at night during construction. Construction vehicles used for removing runway debris from the Airport would likely operate at night along local roads, which may cause moderate, but temporary noise impacts to surrounding neighborhoods.

Secondary (Induced) Impacts

Secondary or induced impacts refer to impacts on a particular resource when the cumulative result of impacts on that resource occurs due to past, present, and reasonably foreseeable actions within a defined time and geographical area.

[11] FAR Part 150 Study for Colorado Springs Airport. Prepared by Barnard Dunkelberg & Co., August 2001.

Cumulative impacts are significant when they meet significance thresholds established for the environmental resources affected.

Secondary impacts are not expected to occur as a result of the RDP, except for minor changes to traffic during RDP construction. Local traffic patterns include Aviation Way to the immediate west of Runway 17R-35L and South Powers Boulevard to the west and south of the Airport. Other major roads on and around the Airport include Milton E Proby Parkway, Air Cargo Road, Langley Street, Airport Road and Drennan Road. Milton E Proby Parkway provides the main passenger entrance to the Airport.

Construction activities and debris removal would temporarily impact local traffic patterns, specifically South Powers Boulevard and Milton E Proby Parkway to the west of the Airport. Impacts to each of these roads could be limited by the implementation of a nighttime construction schedule.

Water Quality

Water quality is defined in the Clean Water Act and measured according to water quality standards. Significant impacts are those that cause water quality standards to be exceeded, often through sediment-laden runoff from construction.

The Airport is located within the boundary of the Laramie-Fox Hills aquifer, one of four aquifers included in the Denver Basin Aquifer system. There are riverine wetlands to the west and northeast of the Airport, and the wetland located to the west is adjacent to the Airport property line. The Airport is not located in the vicinity of a sole source aquifer.

The patterns of storm water runoff would change as a result of the RDP, thus possibly increasing pollutant and sediment loading in the vicinity of Runway 17R-35L. However, as part of the RDP, the Airport would make drainage improvements as part of implementation. These improvements are described in Appendix G.

Standard design and operational measures would be implemented via a Stormwater Management Plan (SWMP) during construction, which would adequately prevent or mitigate any potential impacts. The Airport would adhere to all state and local requirements associated with the implementation of best management practices to minimize potential impacts to the local water quality.

Wetlands

Wetlands are environmental resources subject to review under NEPA and the Clean Water Act. Significant impacts to wetlands include adversely affecting wetland functions, substantially changing the hydrology of wetlands, reducing a wetland's ability to contain water, or adversely affecting natural resources, such as wildlife, fish, or timber, that are associated with a wetland.

The US Army Corps of Engineers determined that the East Fork of Sand Creek that crosses the northwest corner of Airport property to be navigable waters of the U.S. and protected under Section 404 of the Clean Water Act. Coordination with the US Army Corps of Engineers and a Section 404 permit would be required if any construction activities impact East Fork Sand Creek on Airport property.

Compatible Land Use

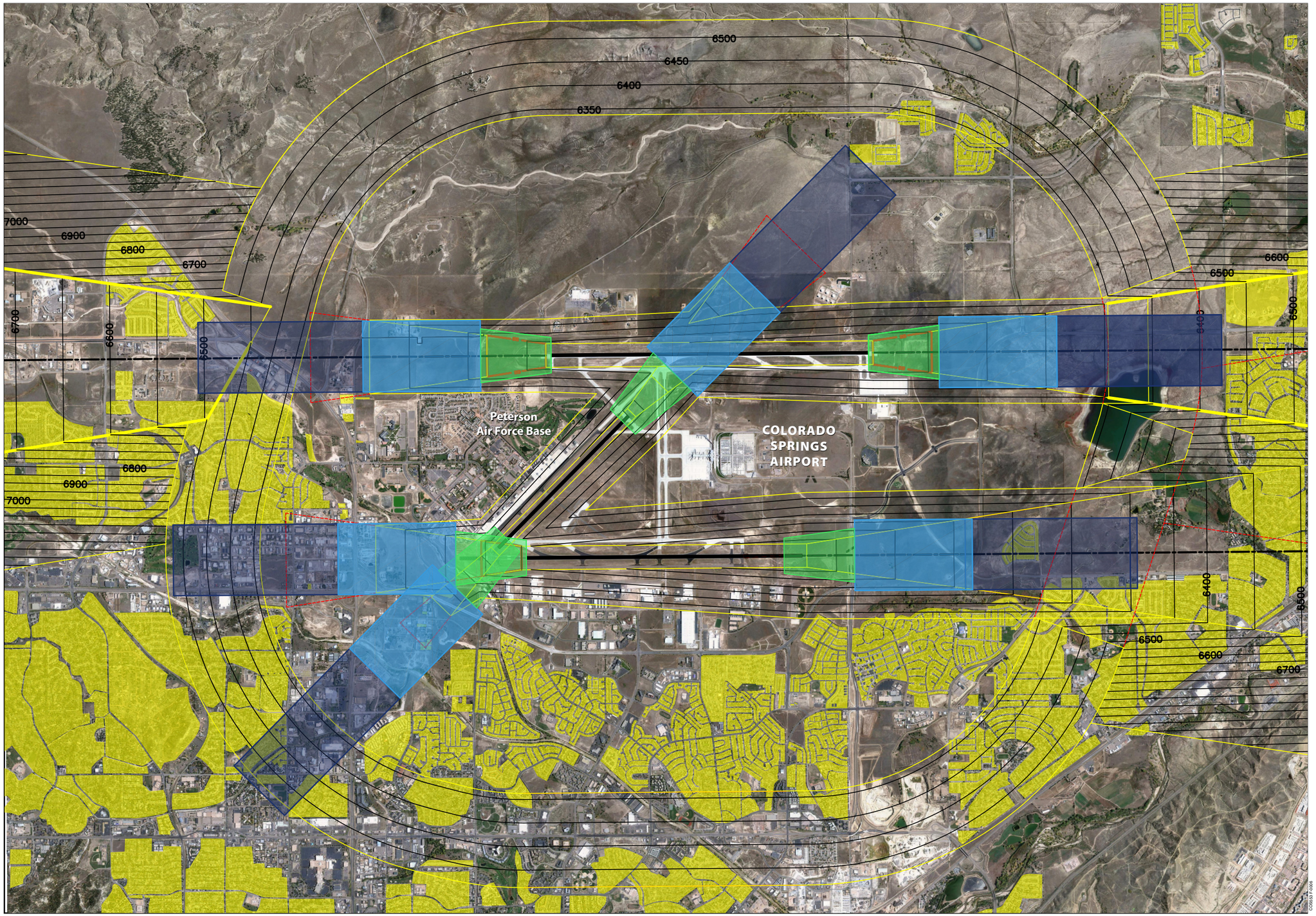
It is unlikely that changes in noise contours resulting from the RDP would noticeably impact communities, businesses, wetlands, or critical habitats. Additionally, the RDP is commensurate with surrounding land uses and would occur entirely on Airport property.

However, the Airport's Commercial Airport Overlay Districts would be modified to encompass the areas shown in Figure 7-1. These modifications result from the proposed shifting and extension of Runway 17R-35L and the shortening of Runway 13-31 as described in Chapter 6. Accordingly, the FAR Part 77 imaginary surfaces will be shifted, along with the Runway Protection Zones (RPZ) and Accident Potential Zones 1 and 2, as shown on Figure 7-1. For further description of the Commercial Airport Overlay Districts, see Chapter 2.

Resources Unaffected by the Proposed Improvements

The following environmental resource categories, as outlined in FAA Order 1050.1E, are not considered to be part of the affected environment:

- **Coastal Resources**—there are no coastal zones or coastal barriers located in the vicinity of the Airport.
- **Department of Transportation Act: Section 4(f)**—the RDP would not require the use of any publicly owned land from a public park, recreation area, or wildlife and waterfowl refuge, or land of a historic site that is of national, state or local significance.
- **Floodplains**—there are no 100-year or 500-year floodplains located in the vicinity of the RDP, so no floodplain encroachment would occur.
- **Natural Resources and Energy Supply**—the RDP would not involve a significant increase in energy consumption nor would it require the use of unusual materials or materials in short supply.
- **Socioeconomic Impacts, Environmental Justice, and Children's Environmental Health and Safety Risks**—the RDP would not result in a disproportionately high or adverse impact to local low-income and minority communities, nor would it require the relocation of residents or businesses.
- **Wild and Scenic Rivers**—there are no Wild and Scenic Rivers located in the vicinity of the Airport.



LEGEND

- Airport boundary
- Residential land use
- Proposed Part 77 surfaces
- Proposed Runway Protection Zone
- Proposed Accident Potential Zone I
- Proposed Accident Potential Zone II

Source: Land use data provided by City of Colorado Springs.

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Graphic Scale in Miles

Figure 7-1

POTENTIAL COMMERCIAL AIRPORT OVERLAY DISTRICTS WITH RECOMMENDED DEVELOPMENT PLAN

Master Plan Update
Colorado Springs Airport
July 2013

LeighFisher

REQUIRED AGENCY COORDINATION AND PERMITTING

This section addresses coordination with other agencies and permits that would be required to implement the RDP. Further, this section provides an overview of the NEPA review documentation likely required to implement the RDP.

Air Quality

If ground is disturbed for more than six months and is 25 acres or more in size, an Air Pollutant Emission Notice (APEN) is required to ensure that specific measures to control dust are put into place. Because the area of earthwork would exceed 25 acres, an APEN would be obtained from the Colorado Department of Public Health and Environment. Further, the earthwork necessary to construct the RDP would also require a permit from the El Paso County Department of Health and Environment.

Farmlands

Coordination with the NRCS would be required to see if any soils within the project site could be classified as prime farmland. If prime farm land was identified, it would be regulated under the Farmland Protection Policy Act (FPPA), which requires completion of the Farmland Conversion Impact Rating Form (AD-1006) or a completion of a Land Evaluation Site Assessment (LESA), if applicable. Impacts to prime farmland are considered significant when the total combined score on Form AD-1006 ranges between 200 and 260.

Fish, Wildlife, and Plants

The Airport would be required to coordinate with the US Fish and Wildlife Service to confirm that the project vicinity still is not a habitat for any threatened or endangered species. Coordination with CNHP would be beneficial to verify that the RDP does not impact any of the designated rare species for which Airport property serves as habitat, and that it does not impact the open space located south of Runway 17R-35L.

Historic, Architectural, Archeological, and Cultural Resources

The Airport would be required to request a Letter of Determination from OAHP to verify the absence of any historic, architectural, cultural, or archaeological resources in the vicinity of the RDP. The Airport would also be required to coordinate with local tribal representatives to verify that no archeological or cultural resources of tribal significance are located in the vicinity of the RDP.

Water Quality

Because construction activities would involve the disturbance of more than one acre of ground, the Airport would be required to seek a construction storm water permit and any other applicable permit from the Colorado Department of Public Health

and Environment Water Quality Control Division. Additionally, the Airport would be required to seek an erosion control permit from the Colorado Springs City Engineer's office. The Airport would be required to update their Stormwater Management Plan if any construction activities modify stormwater runoff patterns.

Wetlands

A Clean Water Act Section 404 permit is required from the U.S. Army Corps of Engineers if proposed airport development would require dredging or filling navigable waters or wetlands, known collectively as "waters of the United States."

Local Coordination

Based on previous development projects, Airport management should coordinate with the US Air Force and US Army to seek their participation regarding the RDP. Further, Airport management should meet with the Airport Open Space Advocates (AOSA), a local environmental interest group that participated in the 2006 Environmental Assessment for the Airport Business Park, to visit the site and discuss the RDP. Discussion should include consideration of prairie management strategies outlined in *Colorado Springs Open Space Management Plan: A Resource Management Guide* to ensure that the RDP is compatible with existing land use plans. Written confirmation that AOSA does not object to the RDP should be obtained, if possible.

National Environmental Policy Act Review

Based on implementation guidelines provided in FAA Order 1050.1E, *Environmental Impacts: Policies and Procedures* and FAA Order 5050.4B, *National Environmental Policy Act (NEPA) Implementing Instructions for Airport Actions*, it is likely that the key projects in the RDP, needed to reconfigure the airfield to meet safety and functional requirements, would require an Environmental Assessment, although the appropriate level of environmental review would ultimately be subject to FAA oversight. Specifically, a runway extension, as envisioned in the RDP, normally requires an Environmental Assessment according to Section 702 of FAA Order 5050.4B.

Although the runway extension that comprises the majority of the RDP is proposed based upon a foundation of mitigating the risk of wrong runway departures (as opposed to accommodating future demand or larger aircraft), it would not likely be eligible for a Categorical Exclusion since changes to noise contours resulting from the shifted runway location could represent an extraordinary circumstance as listed in Table 6-3 of FAA Order 5050.4B. Other environmental resource categories, as summarized in preceding sections, would need to be evaluated as well. However, the preceding qualitative analysis indicates that any resulting environmental impacts are unlikely to be significant and could be mitigated.

Accordingly, the context and minimal intensity of any potential environmental impacts is unlikely to trigger the requirement for an Environmental Impact

Statement (EIS), based on Section 501 of FAA Order 1050.1E, which details Actions Requiring Environmental Impact Statements. In evaluating the need for an EIS, "context" refers to the setting and effects on the local area, while "intensity" measures the severity of potential impacts. Based on the preceding overview and FAA Guidelines for evaluating these criteria, neither context nor intensity of potential environmental consequences appears to merit an EIS, making an Environmental Assessment the likely level of environmental review appropriate for the key projects in the RDP. Less intrusive projects with independent utility, such as paving a vehicle service road, could likely be accomplished through preparation of a Categorical Exclusion.