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:

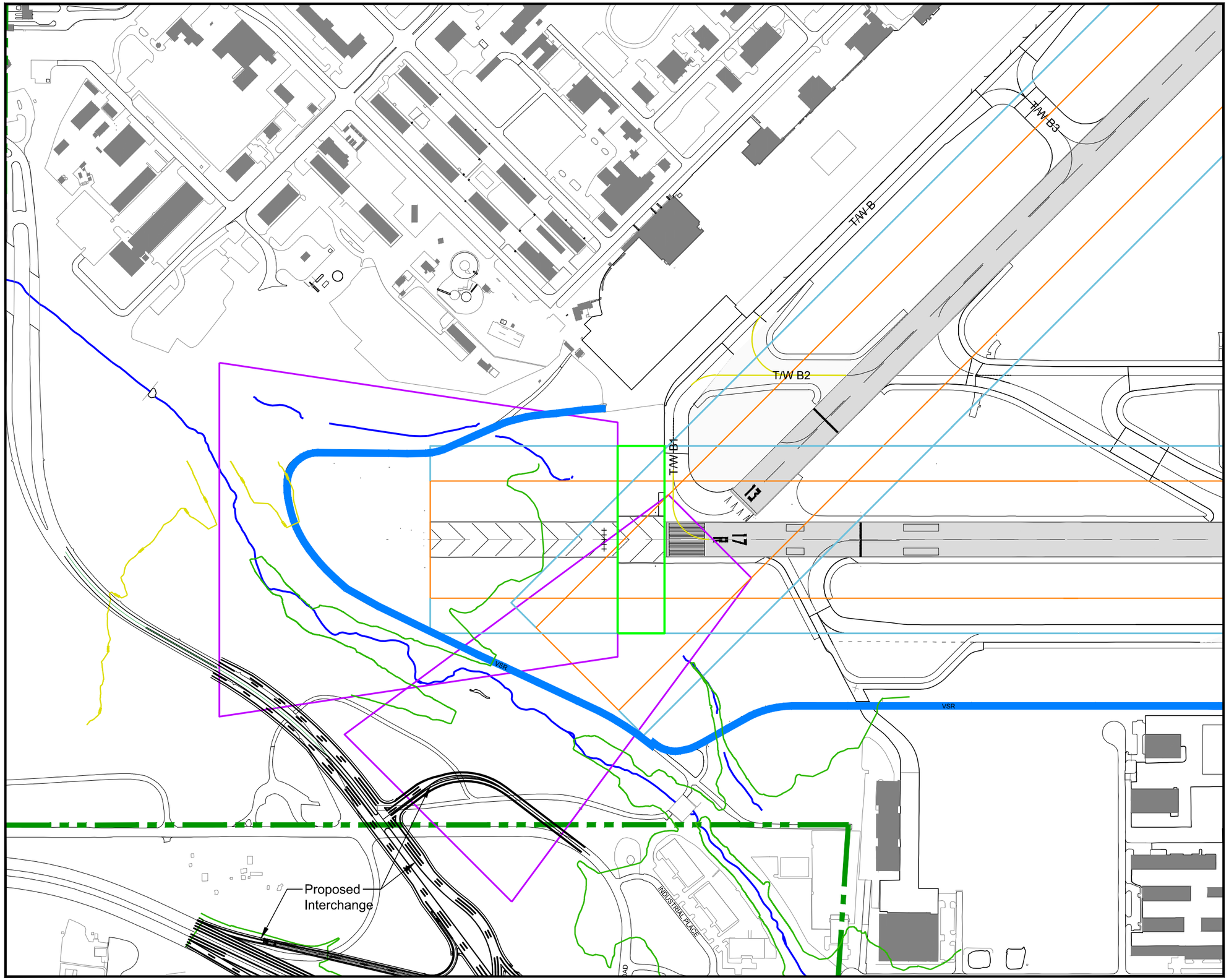
- One taxiway to multiple runways (Taxiways B1, A1)
- Close proximity of multiple departure runway ends (Runway 17R, Runway 13)

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

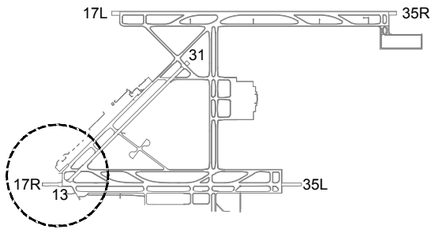
- Pavement to be demolished
- Proposed pavement
- Existing runway
- Vehicle service road
- Airport property line
- Runway / taxiway centerline
- Localizer (relocated)

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

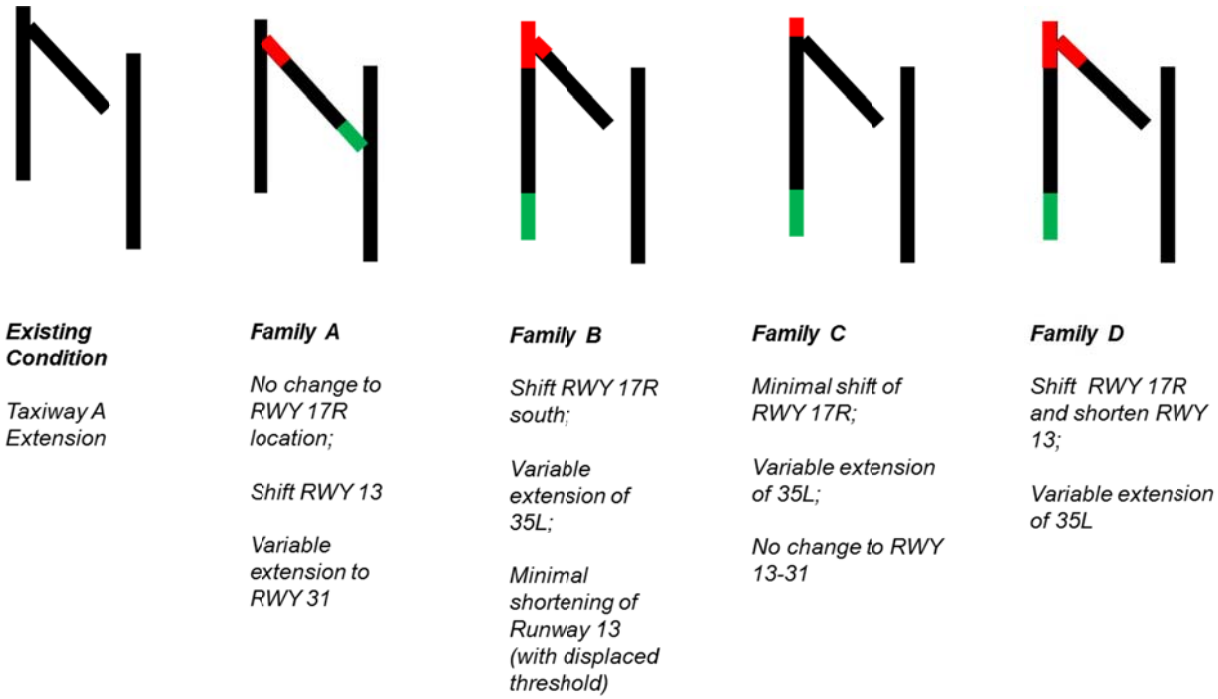
Master Plan Update
Colorado Springs Airport
July 2013

Leigh | Fisher
Management Consultants

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.

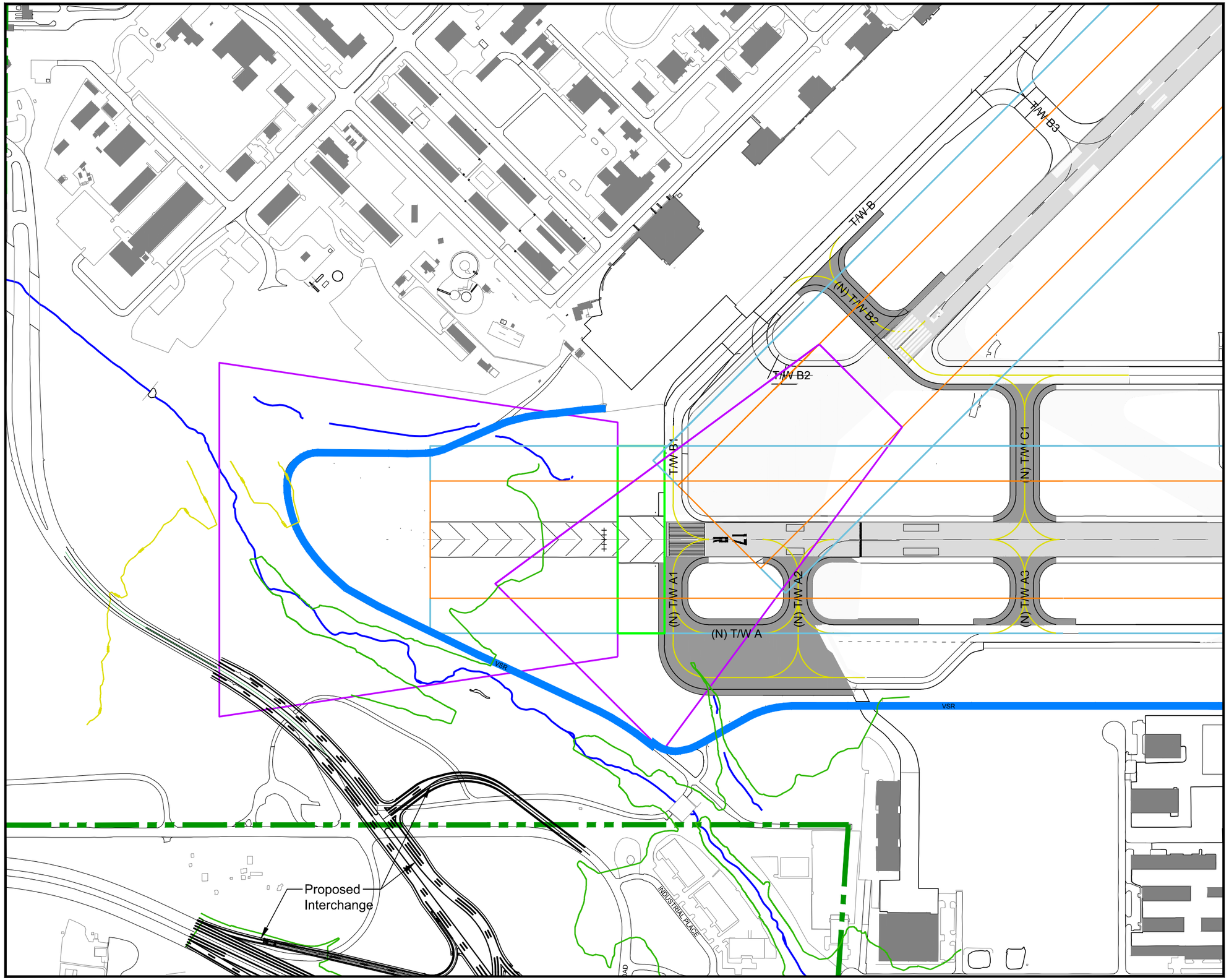
Because the alternatives primarily involve various runway shifts and extensions, they may be summarized in terms of the change in length to the runways in question as shown in Table 5-1.

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

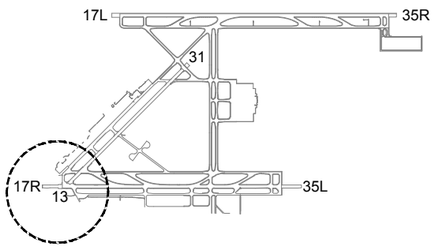
- Pavement to be demolished
- Proposed pavement
- Existing runway
- Vehicle service road
- Airport property line
- Runway / taxiway centerline
- Localizer (relocated)

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



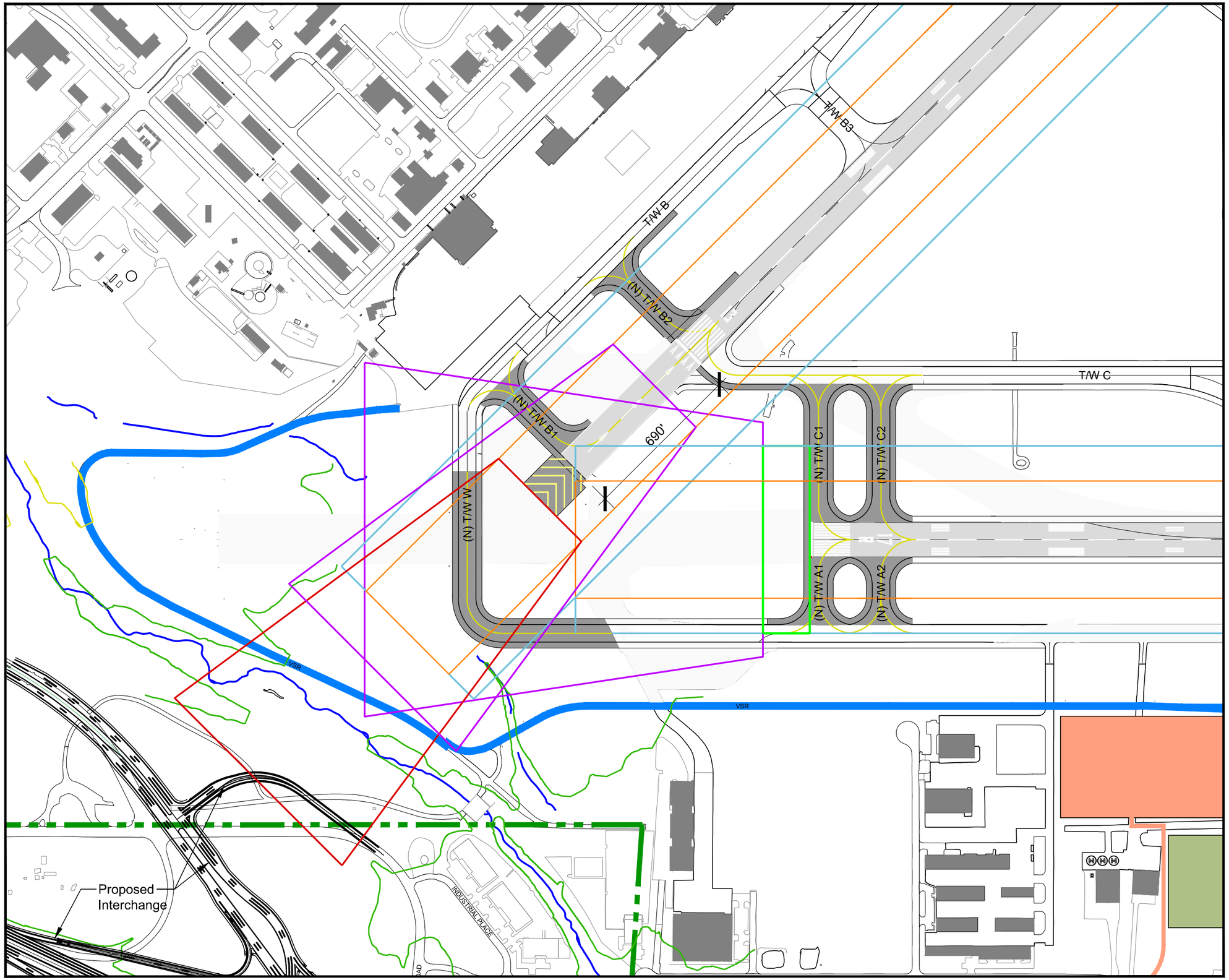
NORTH

0 200' 400' 800'

Figure 5-3
Alternative A
Runway 13 - Shorten 910 Feet

Master Plan Update
Colorado Springs Airport
July 2013

Leigh | Fisher
Management Consultants



LEGEND

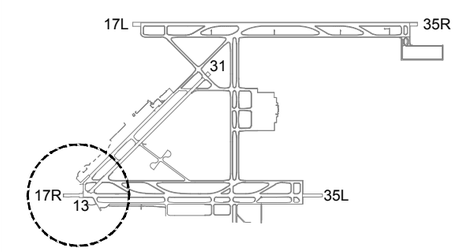
- Pavement to be demolished
- Proposed pavement
- Existing runway
- Vehicle service road
- Airport property line
- Runway / taxiway centerline
- Localizer (relocated)

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

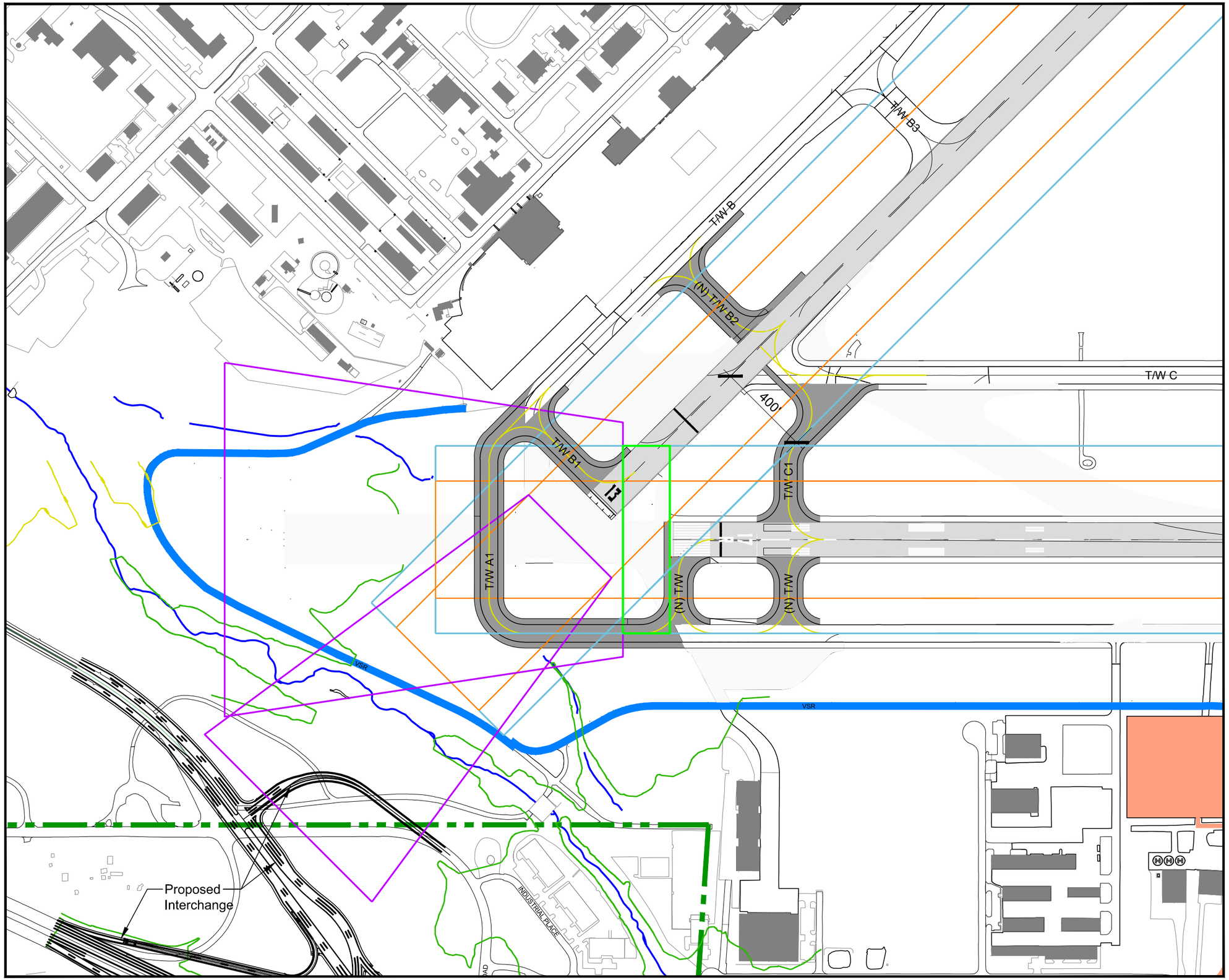


NORTH

0 200' 400' 800'

Figure 5-4
Alternative B
Runway 13 - Shorten 220 Feet
Runway 17R - Shorten 1,500 Feet
Master Plan Update
Colorado Springs Airport
July 2013

Leigh | Fisher
Management Consultants



LEGEND

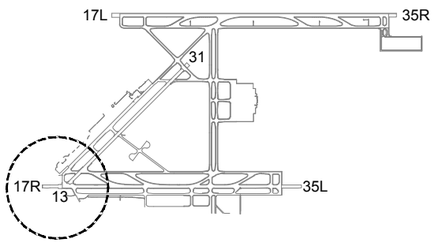
- Pavement to be demolished
- Proposed pavement
- Existing runway
- Vehicle service road
- Airport property line
- Runway / taxiway centerline
- Localizer (relocated)

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



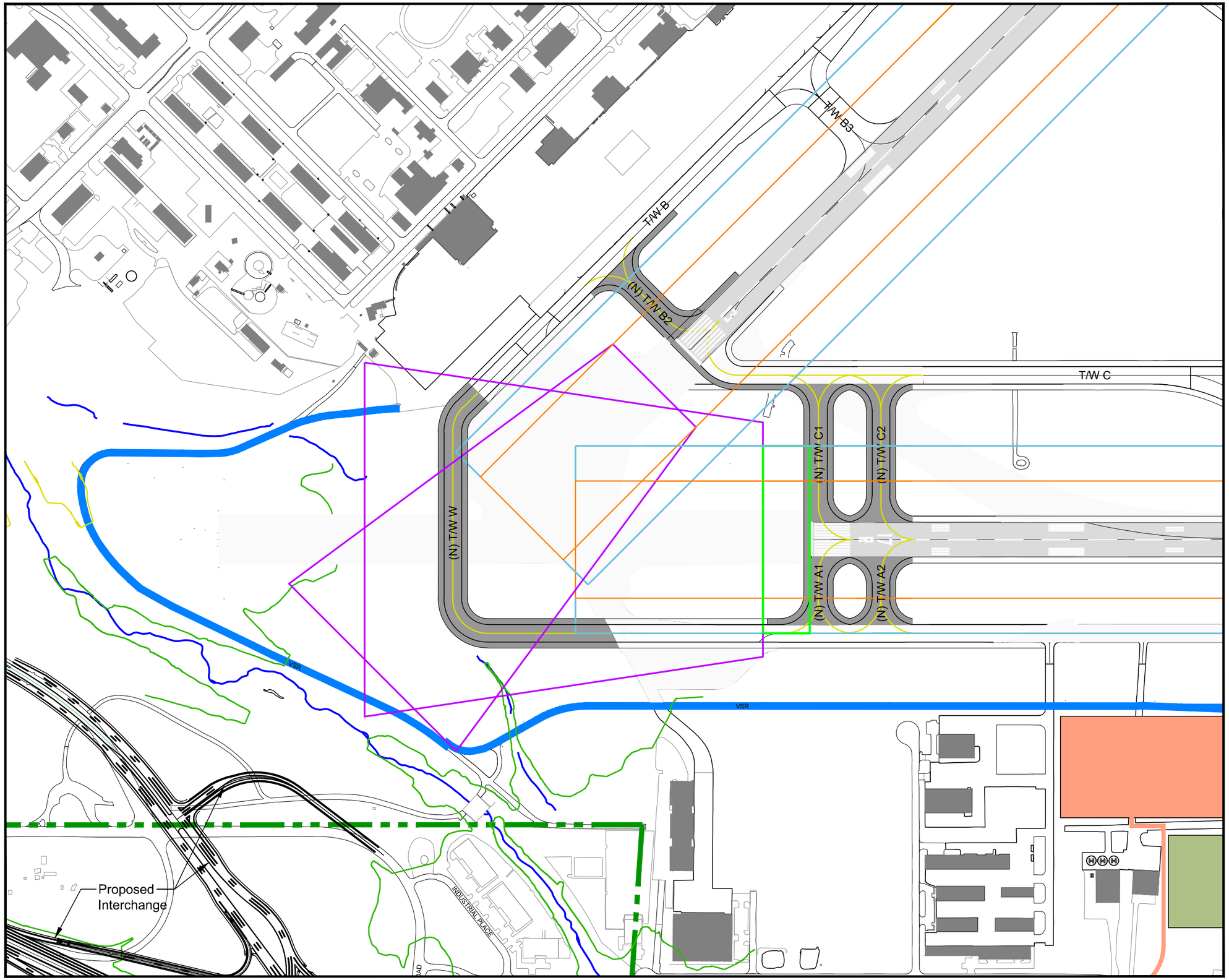
NORTH

0 200' 400' 800'

Figure 5-5
Alternative C
Runway 17R - Shorten 620 Feet

Master Plan Update
Colorado Springs Airport
July 2013

Leigh | Fisher
Management Consultants



LEGEND

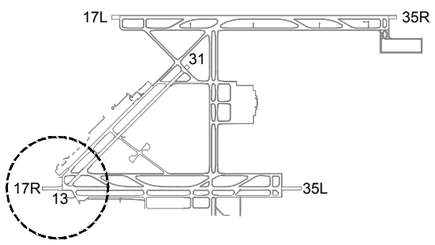
- Pavement to be demolished
- Proposed pavement
- Existing runway
- Vehicle service road
- Airport property line
- Runway / taxiway centerline
- Localizer (relocated)

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

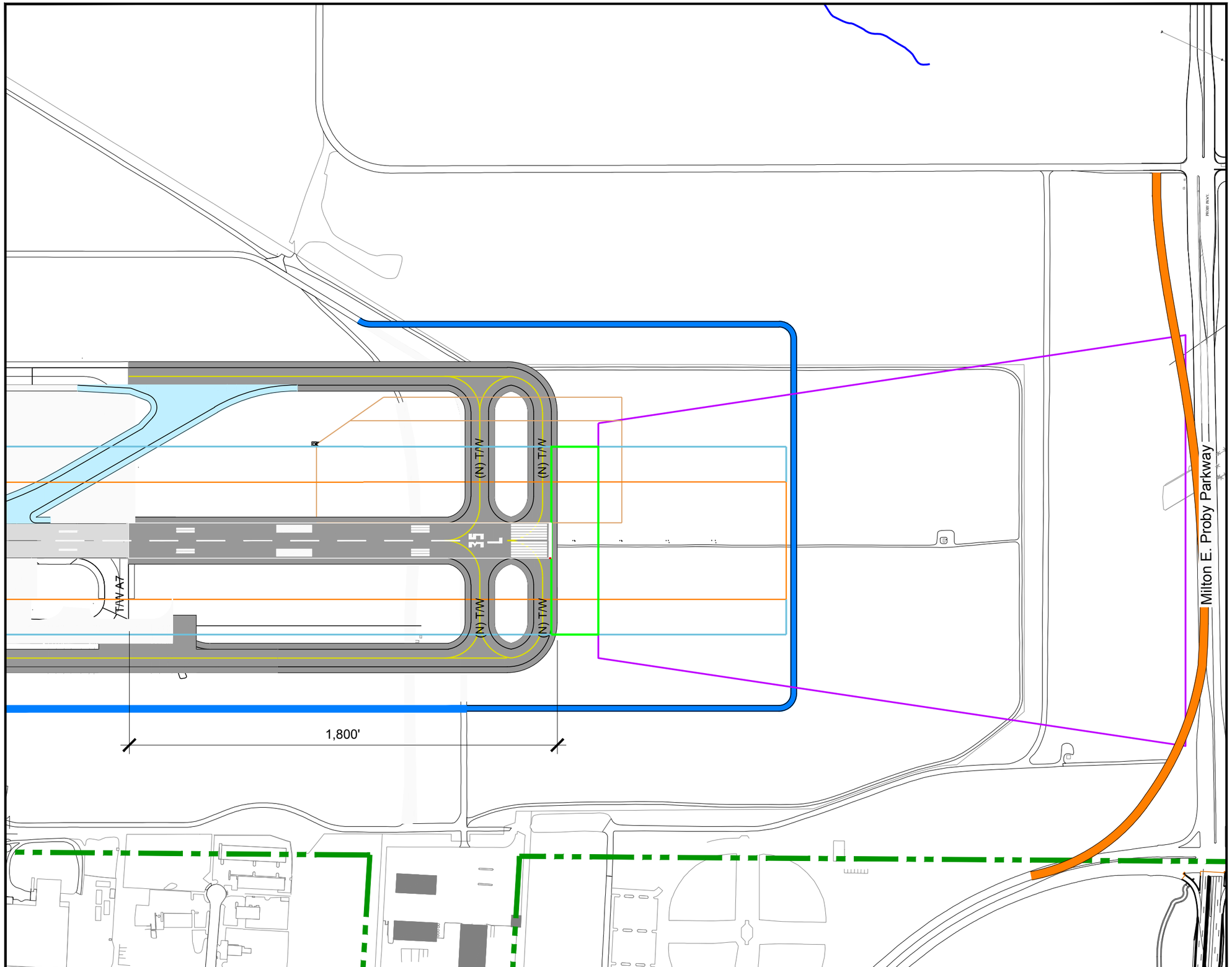


NORTH

0 200' 400' 800'

Figure 5-6
Alternative D
Runway 13 - Shorten 910 Feet
Runway 17R - Shorten 1,500 Feet
Master Plan Update
Colorado Springs Airport
July 2013

Leigh | Fisher
Management Consultants



LEGEND

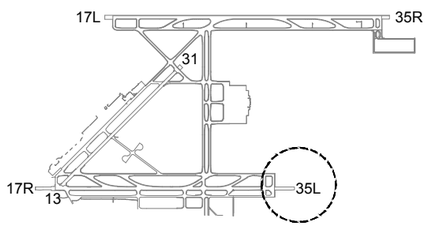
- Pavement to be demolished
- Proposed pavement
- Existing runway
- Vehicle service road
- Airport property line
- Runway / taxiway centerline
- Localizer (relocated)

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

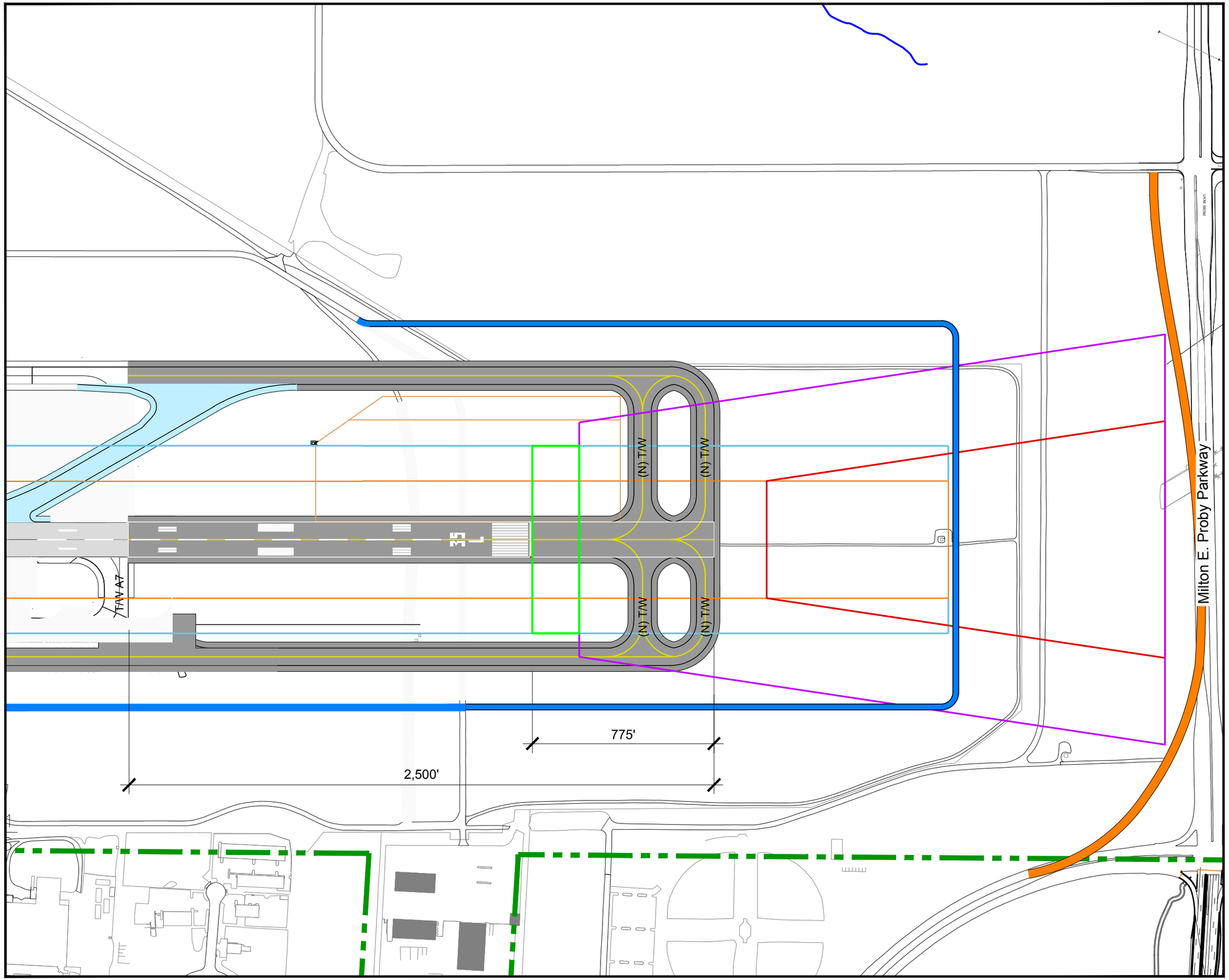
0 200' 400' 800'

Figure 5-7

Runway 35L - Extend 1,800 Feet

Master Plan Update
Colorado Springs Airport
July 2013

Leigh | Fisher
Management Consultants



LEGEND

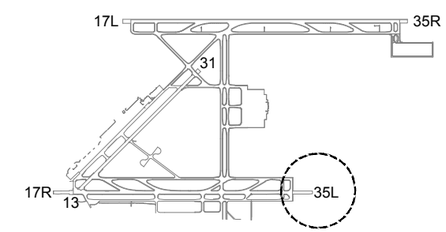
- Pavement to be demolished
- Proposed pavement
- Existing runway
- Vehicle service road
- Airport property line
- Runway / taxiway centerline
- Localizer (relocated)

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

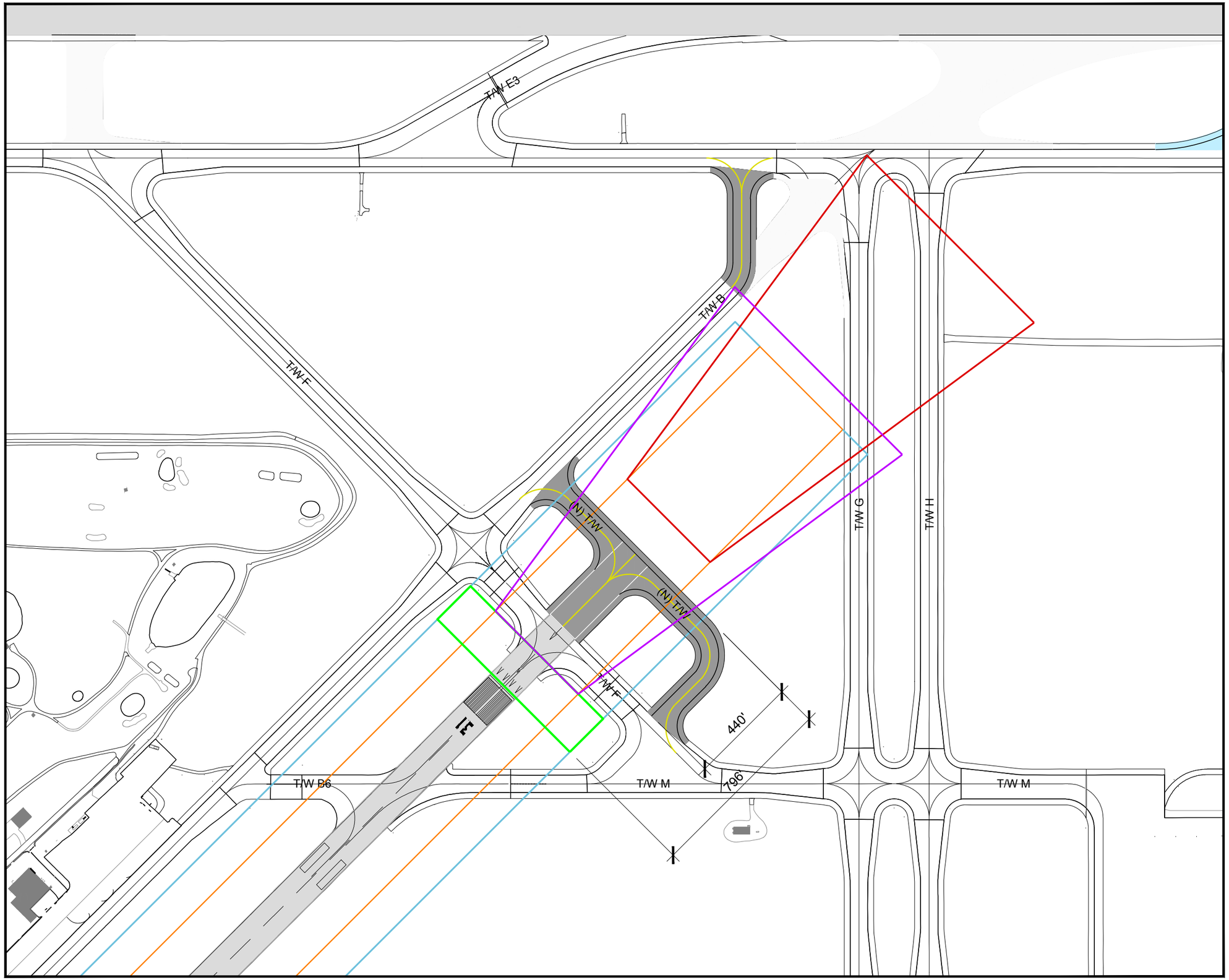
0 200' 400' 800'

Figure 5-8

Runway 35L - Extend 2,500 Feet

Master Plan Update
Colorado Springs Airport
July 2013

Leigh | Fisher
Management Consultants



LEGEND

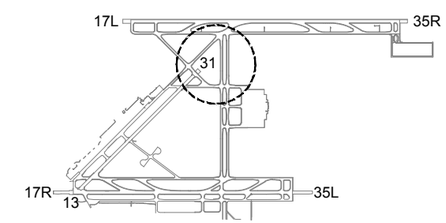
- Pavement to be demolished
- Proposed pavement
- Existing runway
- Vehicle service road
- Airport property line
- Runway / taxiway centerline
- Localizer (relocated)

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

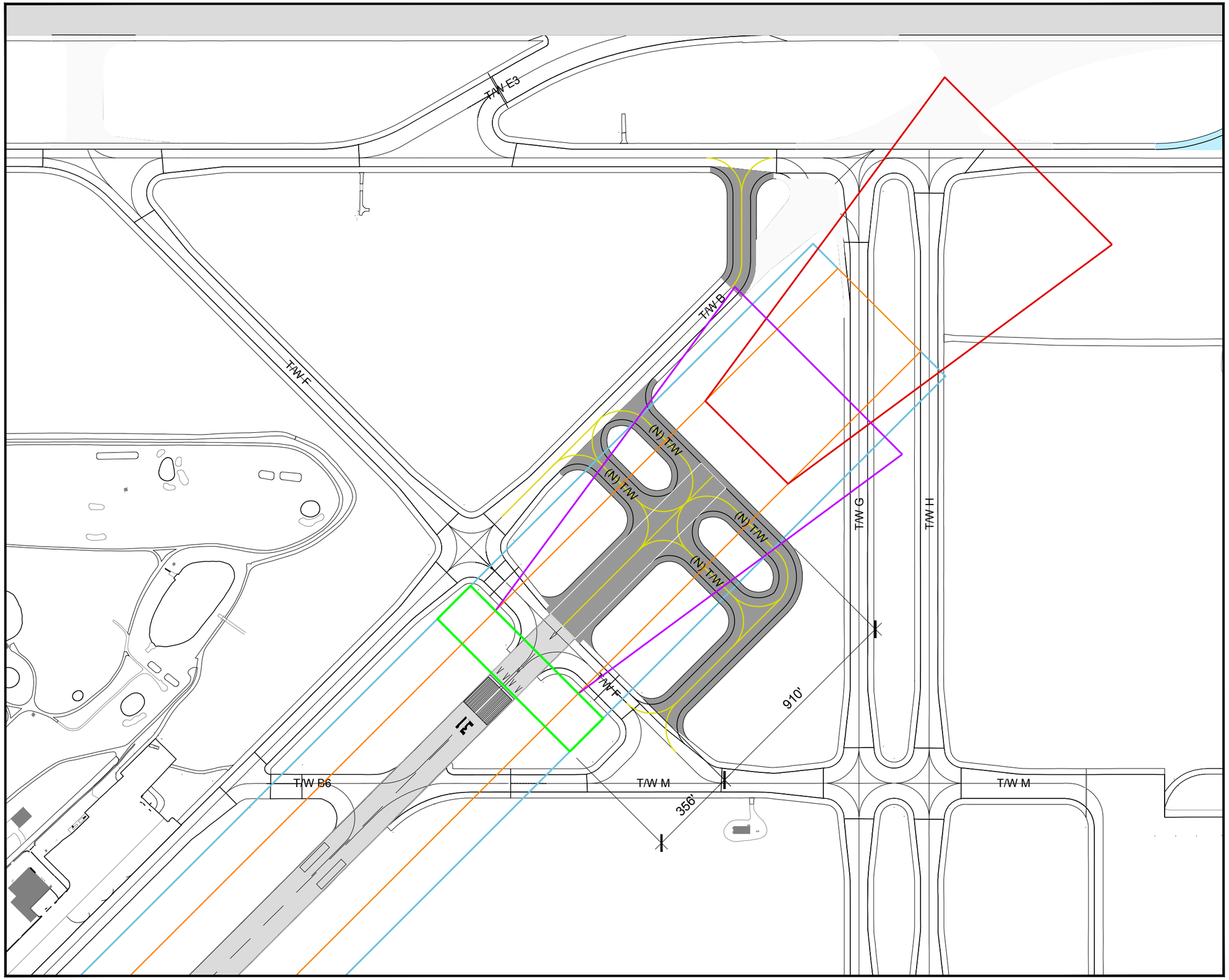
0 200' 400' 800'

Figure 5-9

Runway 31 - Extend 440 Feet

Master Plan Update
Colorado Springs Airport
July 2013

LeighFisher
Management Consultants



LEGEND

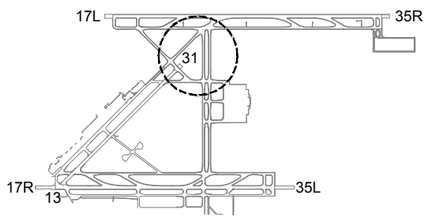
- Pavement to be demolished
- Proposed pavement
- Existing runway
- Vehicle service road
- Airport property line
- Runway / taxiway centerline
- Localizer (relocated)

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

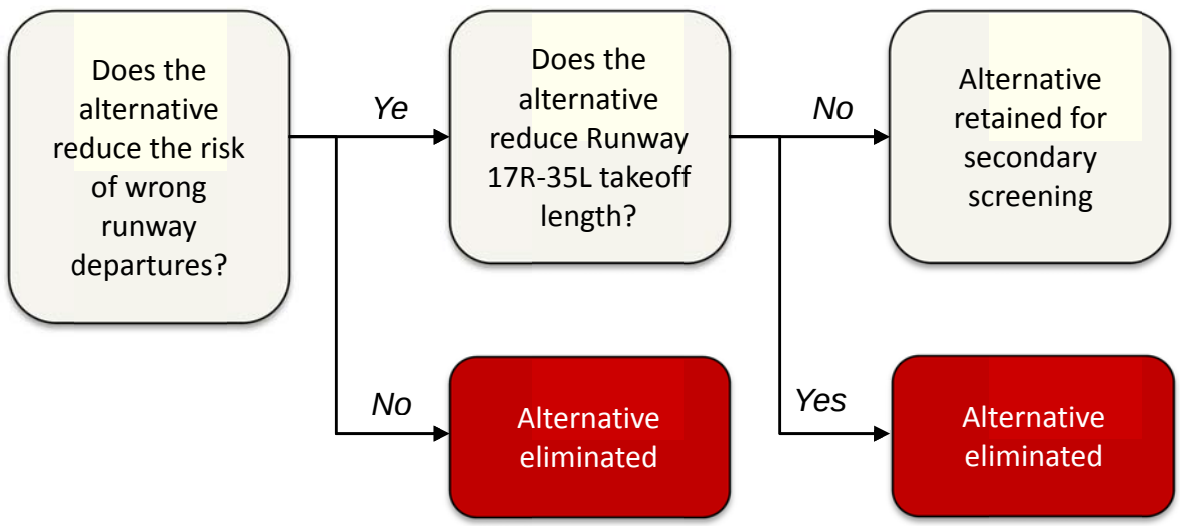
Master Plan Update
Colorado Springs Airport
July 2013

LeighFisher
Management Consultants

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.

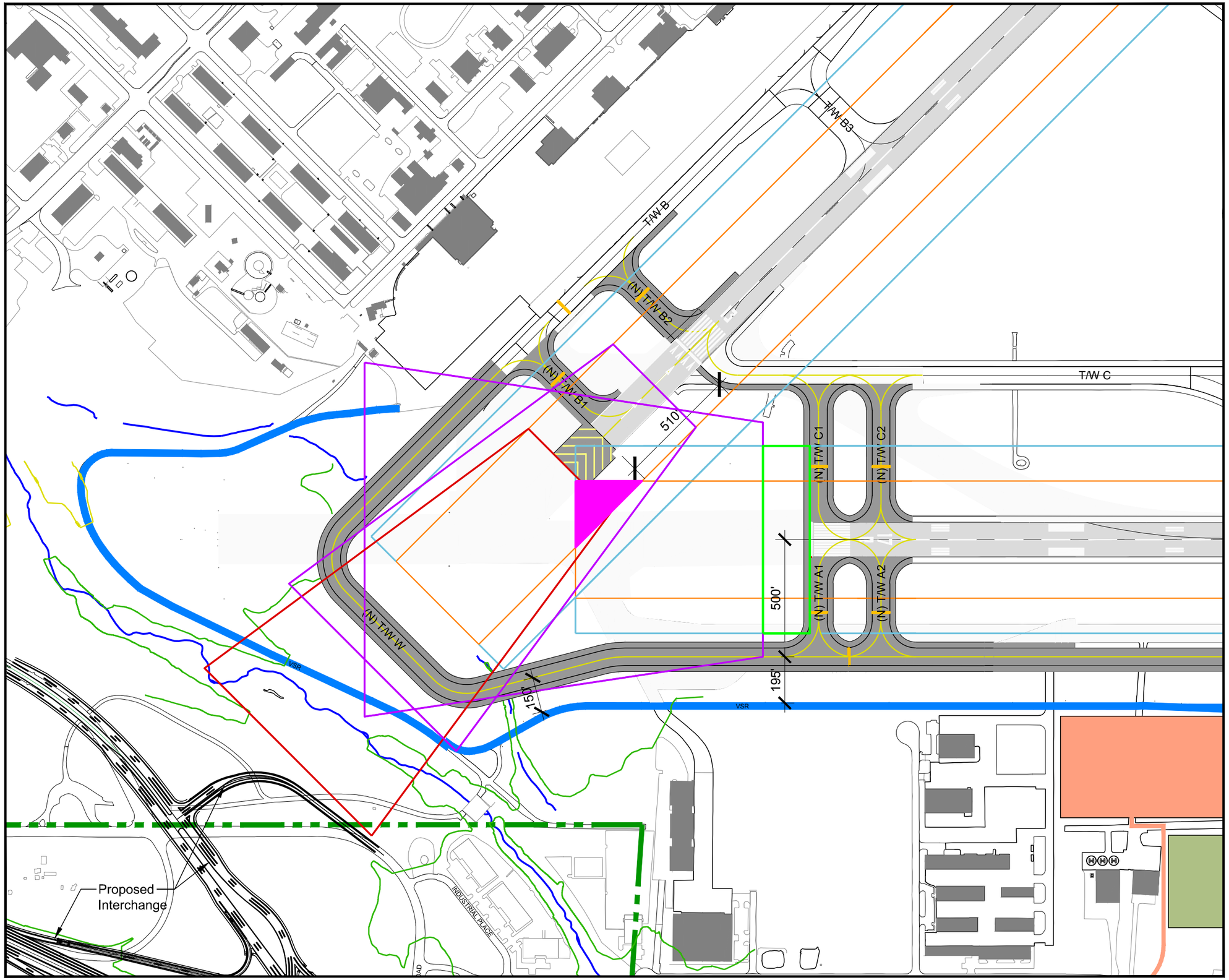
Refined Alternatives

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

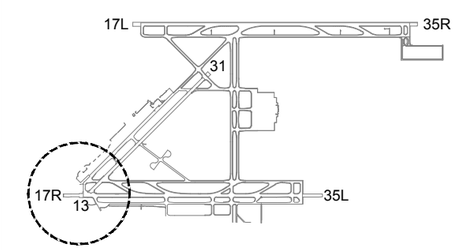
- Pavement to be demolished
- Proposed pavement
- Existing runway
- Vehicle service road
- Airport property line
- Runway / taxiway centerline
- Localizer (relocated)

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

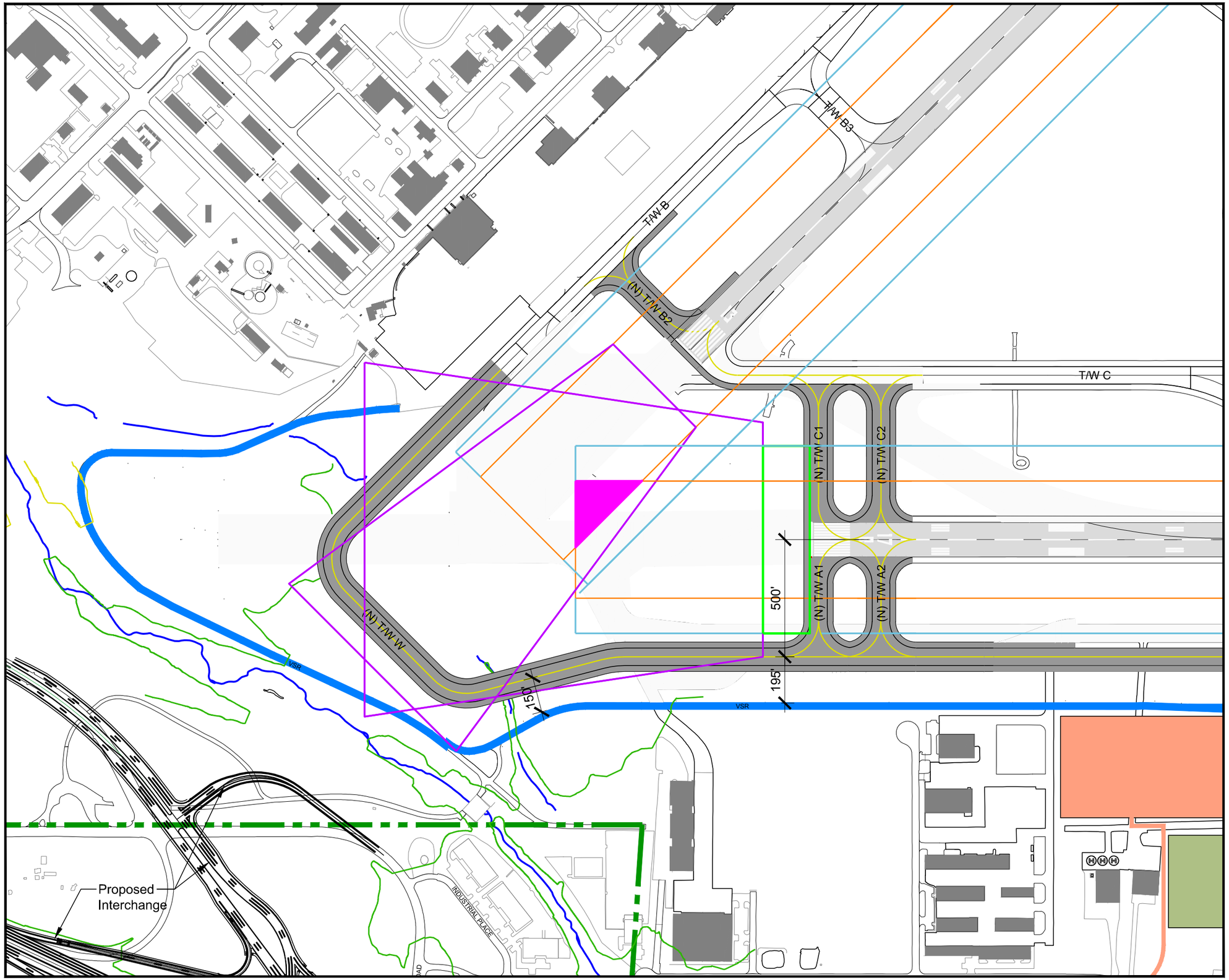


NORTH

0 200' 400' 800'

Figure 5-12
Alternative B5
Runway 13 - Shorten 400 Feet
Runway 17R - Shorten 1,500 Feet
Master Plan Update
Colorado Springs Airport
July 2013

Leigh | Fisher
Management Consultants



LEGEND

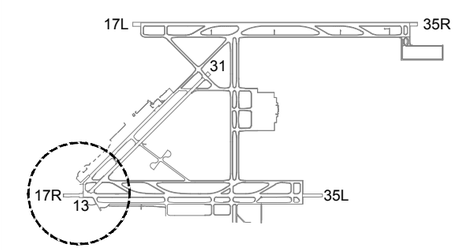
- Pavement to be demolished
- Proposed pavement
- Existing runway
- Vehicle service road
- Airport property line
- Runway / taxiway centerline
- Localizer (relocated)

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 5-13
Alternative D5
Runway 13 - Shorten 910 Feet
Runway 17R - Shorten 1,500 Feet
Master Plan Update
Colorado Springs Airport
July 2013

Leigh | Fisher
Management Consultants

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.

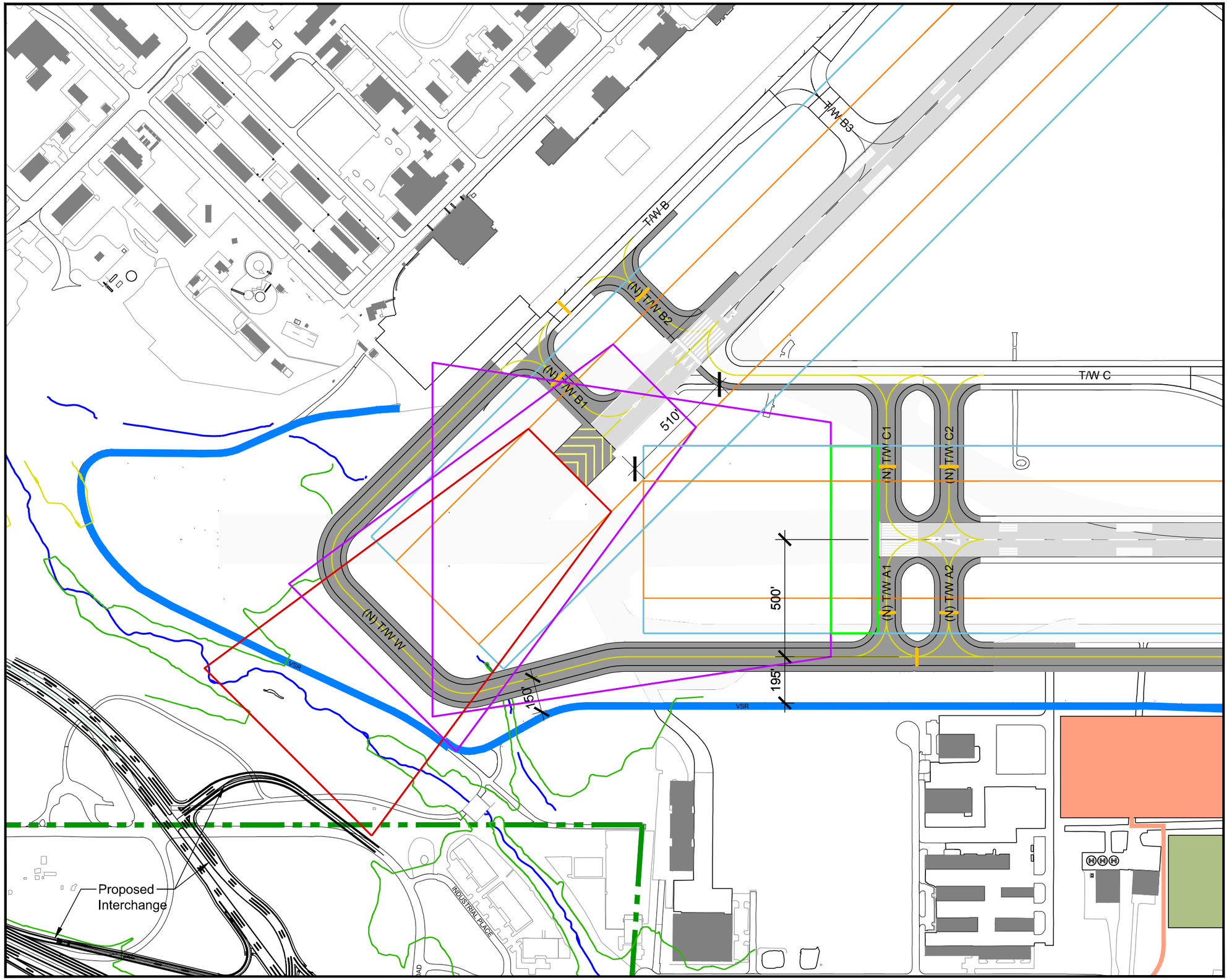
Taxiway W is not intended to be a fully independent, "end-around taxiway," as defined in FAA *Advisory Circular 150/5300-13A, Airport Design,* paragraph 415. Rather, Taxiway W would be provided to permit aircraft to taxi between the general aviation and military aprons on the airfield and vice versa. 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

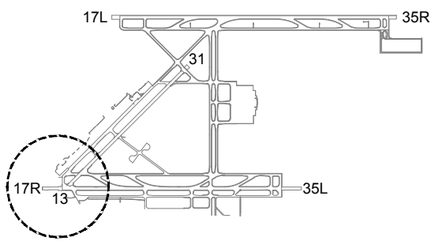
- Pavement to be demolished
- Proposed pavement
- Existing runway
- Vehicle service road
- Airport property line
- Runway / taxiway centerline
- Localizer (relocated)

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

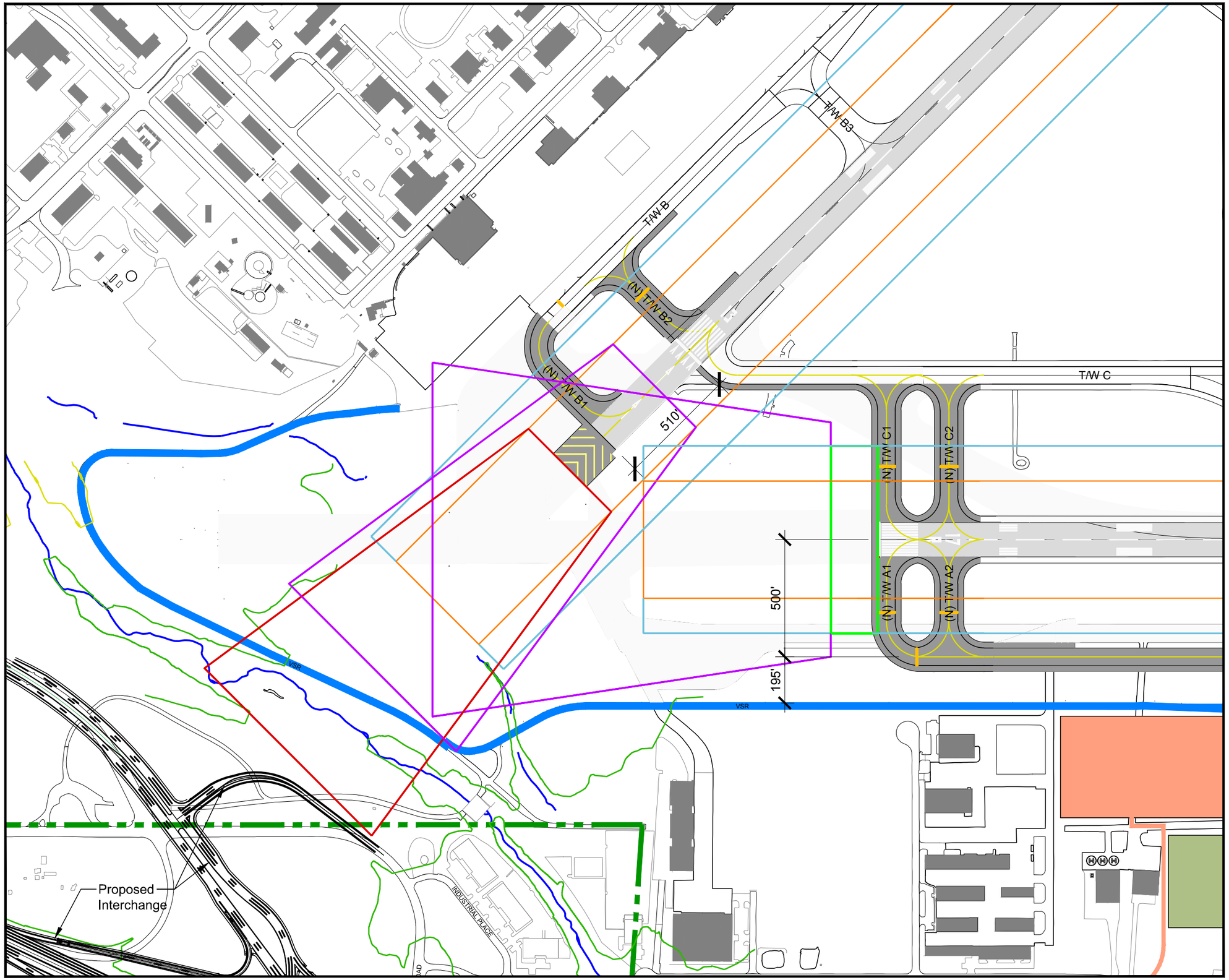


NORTH

0 200' 400' 800'

Figure 5-14
Alternative B6
Runway 13 - Shorten 400 Feet
Runway 17R - Shorten 1,790 Feet
Master Plan Update
Colorado Springs Airport
May 2013

Leigh | Fisher
Management Consultants



LEGEND

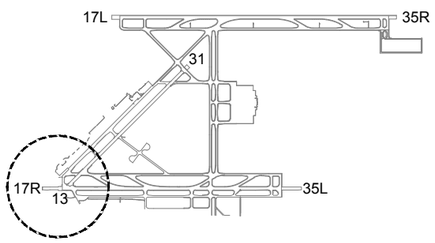
- Pavement to be demolished
- Proposed pavement
- Existing runway
- Vehicle service road
- Airport property line
- Runway / taxiway centerline
- Localizer (relocated)

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 5-15
Alternative B7
Runway 13 - Shorten 400 Feet
Runway 17R - Shorten 1,790 Feet
Master Plan Update
Colorado Springs Airport
July 2013

Leigh | Fisher
Management Consultants

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).

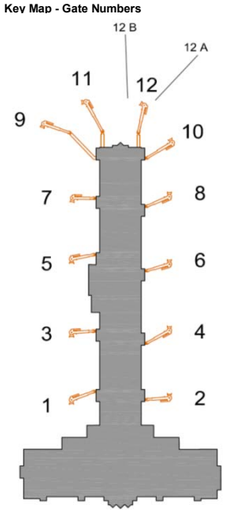
PASSENGER BOARDING BRIDGE DOCKING CHARACTERISTICS

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

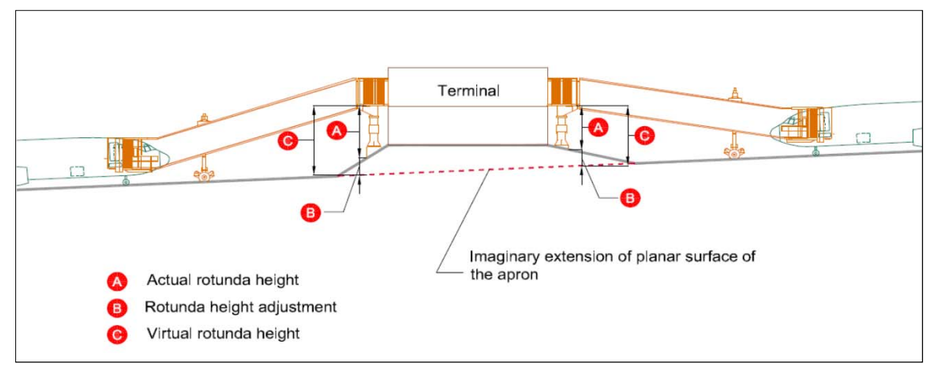


Figure 5-16

PASSENGER BOARDING BRIDGE DOCKING CHARACTERISTICS

Master Plan Update
Colorado Springs Airport
July 2013

LeighFisher

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

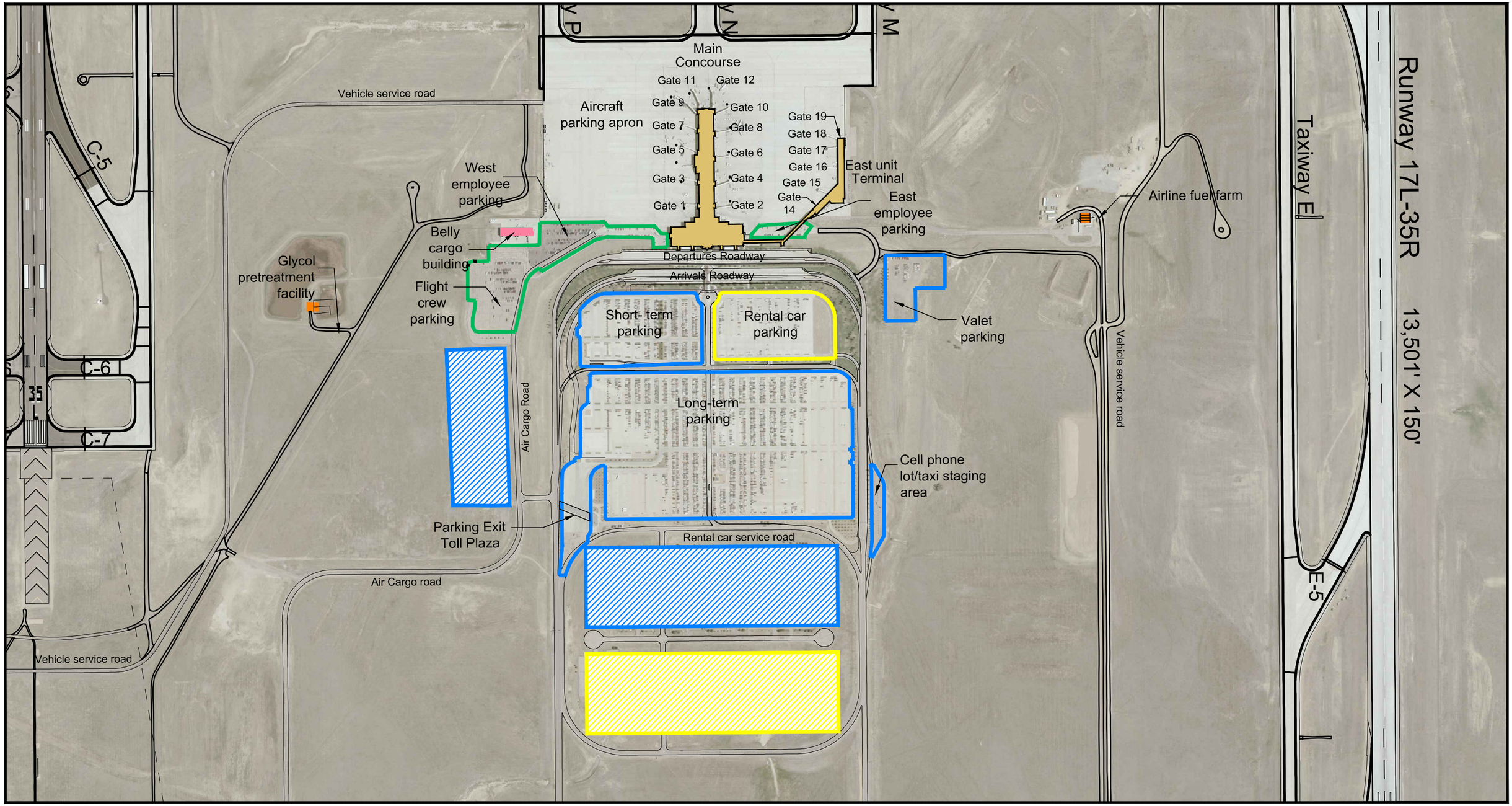
The requirements analyses provided in Chapter 4 indicates that additional space for general aviation should be provided at the Airport for corporate and community aircraft hangars and associated general aviation terminal space. Using past studies of the west side development area, optimal space was identified 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

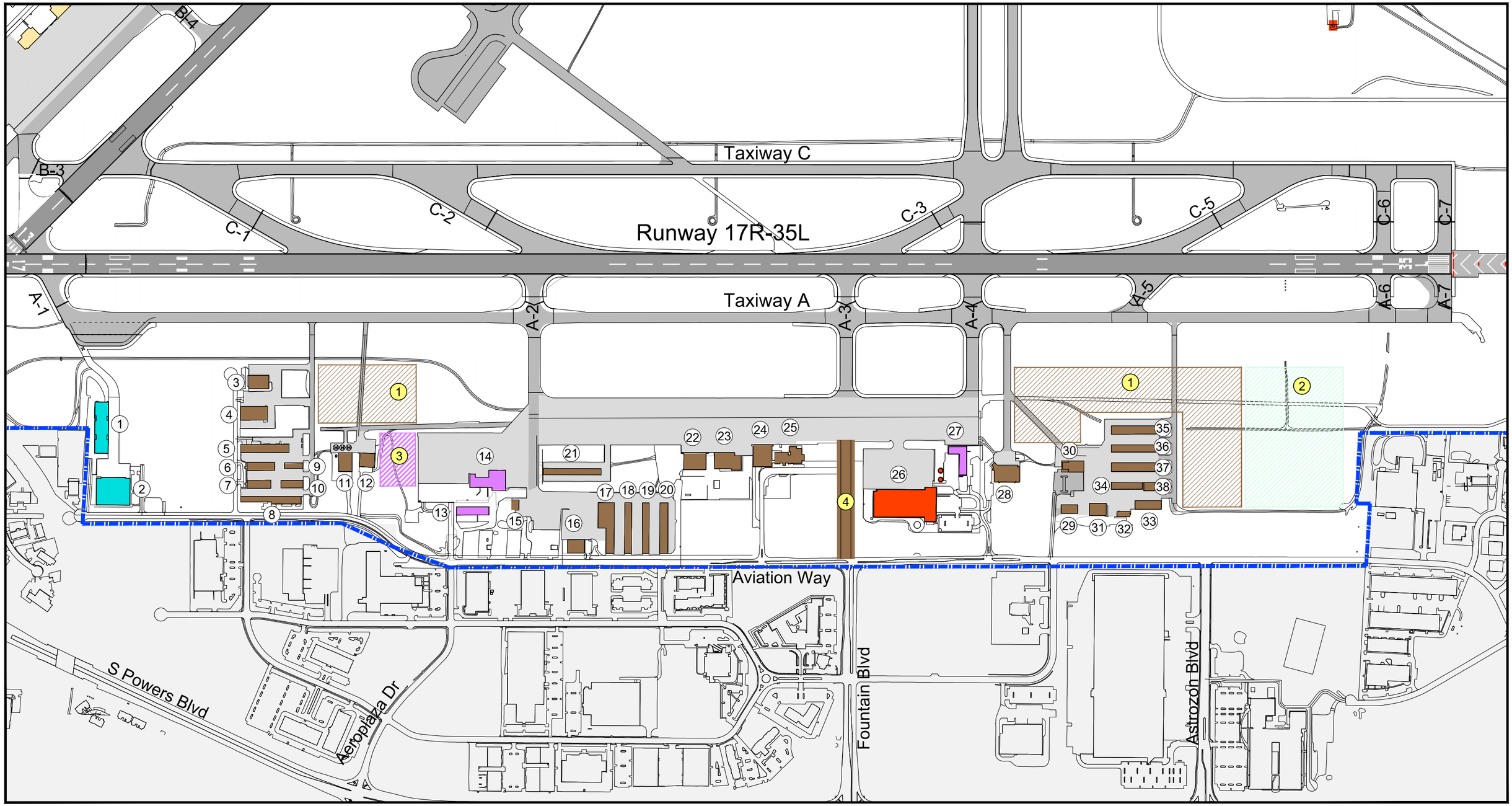
0 300' 600' 1,200'

Figure 5-17

PARKING AND RENTAL CAR RESERVE AREAS

Master Plan Update
Colorado Springs Airport
July 2013

Leigh | Fisher
Management Consultants



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

Master Plan Update
Colorado Springs Airport
July 2013

LeighFisher
Management Consultants